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# ISEE Middle Level

## 2500+ Practice Questions

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# Verbal

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## **Synonyms**

### **Synonyms Practice Set 1**

1. **Answer choice (B) is correct.** The word **fair** means in accordance with what is morally right. For example, if you and your friends compete together in a competition and win prize money, it is **fair** to split the prize money equally. This is closest in meaning to **just**.
2. **Answer choice (C) is correct.** An **opinion** is a view or judgment about something. For example, people have differing **opinions** on politics. This is closest in meaning to **belief**.
3. **Answer choice (C) is correct.** The word **submissive** means willing to conform or willing to fit someone else's needs. For example, a **submissive** dog will listen to his owner's commands. This is closest in meaning to **accommodating**.
4. **Answer choice (C) is correct.** The word **ravenous** means very hungry. For example, if you haven't eaten in over a day, you will probably be **ravenous**. This is closest in meaning to **hungry**.
5. **Answer choice (C) is correct.** The word **concise** means giving a lot of information clearly and in a few words. For example, a **concise** definition of the word kind would be, "Being friendly and considerate," because it is short and clear. This is closest in meaning to **brief**.
6. **Answer choice (A) is correct.** The word **disheartened** means having lost confidence. For example, a team may feel **disheartened** after losing five soccer games in a row. This is closest in meaning to **discouraged**.
7. **Answer choice (D) is correct.** The word **novel** means new or unusual in an interesting way. For example, when cars were first introduced, they were a **novel** idea because no one had ever seen anything like them. This is closest in meaning to **original**.
8. **Answer choice (B) is correct.** The word **innate** means natural or something you are born with. For example, some people think that intelligence is **innate** and not impacted by your upbringing or environment. This is closest in meaning to **natural**.
9. **Answer choice (B) is correct.** The word **inconclusive** means not leading to a firm conclusion. For example, if a study into the safety of a specific medication does not prove it either safe or unsafe, then the results of the study were **inconclusive**. This is closest in meaning to **unresolved**.
10. **Answer choice (D) is correct.** The word **overbearing** means unpleasantly arrogant or dominating. For example, an **overbearing** friend may constantly pressure you to do what they want instead of listening to what you want. This is closest in meaning to **domineering**.
11. **Answer choice (A) is correct.** The word **ambiguous** means open to more than one interpretation. For example, it is ambiguous to say, "The chicken is ready to eat," is ambiguous because it could mean

that the chicken is finished being cooked and people are going to eat the chicken, or it could mean that the chicken is going to eat. This is closest in meaning to **vague**.

12. **Answer choice (D) is correct.** The word **zestful** means characterized by great enthusiasm and energy. For example, instructors of workout classes are often **zestful** because they enthusiastically motivate the people in their classes to push themselves. This is closest in meaning to **enthusiastic**.
13. **Answer choice (A) is correct.** The word **scorn** means the feeling that someone or something is worthless. For example, an honest person may have **scorn** for people who steal and cheat. This is closest in meaning to **contempt**.
14. **Answer choice (A) is correct.** The word **impromptu** means done without being planned or organized. For example, if you wake up one morning and decide to go on a road trip that day, that is an **impromptu** decision. This is closest in meaning to **unrehearsed**.
15. **Answer choice (C) is correct.** The word **tarnish** means damage or harm done to something. For example, if you spill tomato sauce on your rug, you've **tarnished** your rug. This is closest in meaning to **stain**.
16. **Answer choice (B) is correct.** A **blemish** is a small mark or flaw. For example, a scratch on a car is considered a **blemish**. This is closest in meaning to **imperfection**.
17. **Answer choice (B) is correct.** A **grievance** is a criticism or complaint. For example, if your boss constantly yells at you for no reason, you could file a **grievance** with the company. This is closest in meaning to **complaint**.
18. **Answer choice (D) is correct.** The word **acquire** means to buy or get something. For example, if you go to the store and purchase a new book, you've **acquired** the book. This is closest in meaning to **obtain**.
19. **Answer choice (A) is correct.** The word **eccentric** means someone or something that is different or behaves in an unconventional way. For example, an adult wearing onesie pajamas to a formal dinner would be described as **eccentric**. This is closest in meaning to **peculiar**.
20. **Answer choice (B) is correct.** The word **revoke** means to take something back. For example, if someone gets caught driving under the influence, their driver's license will be **revoked**. This is closest in meaning to **rescind**.
21. **Answer choice (C) is correct.** The word **conspicuous** means standing out. For example, a woman wearing a bright pink coat and neon green pants would be **conspicuous** because it is easy to spot her. This is closest in meaning to **visible**.

## Synonyms Practice Set 2

1. **Answer choice (D) is correct.** The word **broad** means covering a wide scope of subjects or areas. For example, if an online math course is **broad**, it may cover multiple types of math and a variety of topics. This is closest in meaning to **comprehensive**.
2. **Answer choice (A) is correct.** The word **generous** means willing to give more of something. For example, a person who often donates to charities and gives food to the homeless is **generous**. This is closest in meaning to **giving**.
3. **Answer choice (C) is correct.** The word **refuse** means not being willing to do or accept something. For example, you may **refuse** an invitation to a party because you are busy that day. This is closest in meaning to **decline**.
4. **Answer choice (A) is correct.** The word **liberate** means to set free. For example, if a prisoner is proven innocent, he/she will be **liberated** and released from prison. This is closest in meaning to **release**.
5. **Answer choice (D) is correct.** The word **charming** means appealing or pleasant. A person who is friendly, always smiling, and makes people feel good would be described as **charming**. This is closest in meaning to attractive.
6. **Answer choice (A) is correct.** The word **comprehend** means to understand. For example, if you **comprehend** a math concept you will be able to solve problems involving that concept. This is closest in meaning to **grasp**.
7. **Answer choice (C) is correct.** The word **malicious** means intending or intended to do harm. For example, a **malicious** person may purposely trip you in the hallway. This is closest in meaning to **hateful**.
8. **Answer choice (D) is correct.** An **acknowledgment** is an acceptance of the truth or existence of something. For example, if you make a mistake, you can acknowledge your mistake by admitting and accepting that you made an error. This is closest in meaning to **acceptance**.
9. **Answer choice (D) is correct.** The word **informal** means having a casual or relaxed manner. For example, if the dress code of an event is **informal**, you can wear everyday, casual clothing. This is closest in meaning to **casual**.
10. **Answer choice (B) is correct.** The word **crafty** means clever at achieving one's goals using deceitful methods. For example, someone who successfully pick pockets is **crafty** because they steal money and belongings from people's pockets without them knowing. This is closest in meaning to **wily**.
11. **Answer choice (D) is correct.** The word **condemn** means to express disapproval. For example, most teachers **condemn** cheating because it is dishonest and unfair. This is closest in meaning to **criticize**.



12. **Answer choice (A) is correct.** The word **adhere** means to stick. For example, paint will not **adhere** to a wall well if the wall is oily because it is difficult for paint to stick to oil. This is closest in meaning to **stick**.
13. **Answer choice (B) is correct.** The word **dubious** means not to be relied upon or suspect. For example, a teacher may be **dubious** of a child who says that their dog ate their homework. This is closest in meaning to **suspicious**.
14. **Answer choice (B) is correct.** The word **greed** means a selfish desire for something, especially with wealth, power, or food. For example, a person who eats 10 of the 11 cookies at a party before anyone else has had a chance to grab any would be considered **greedy**. This is closest in meaning to **avarice**.
15. **Answer choice (A) is correct.** The word **manipulate** means to control or influence a situation or person in a clever or unfair way. For example, if a child starts crying when she doesn't get the toy she wants because she knows her parents will feel bad and buy the toy for her, the child is **manipulating** her parents. This is closest in meaning to **exploit**.
16. **Answer choice (B) is correct.** An **inquiry** is a question. For example, if you have an **inquiry** about a product, you can email the manufacturer and ask them your question. This is closest in meaning to **question**.
17. **Answer choice (A) is correct.** The word **peril** means serious or immediate danger. For example, fires, floods, and natural disasters are all examples of **perils**. This is closest in meaning to **danger**.
18. **Answer choice (D) is correct.** The word **lackadaisical** means lacking enthusiasm or determination. For example, a **lackadaisical** employee will not take initiative and is not motivated to perform well at work. This is closest in meaning to **careless**.
19. **Answer choice (C) is correct.** The word **sluggish** means slow-moving or inactive. For example, sloths are described as **sluggish** because they spend most of their days in trees and move very slowly. This is closest in meaning to slow.
20. **Answer choice (D) is correct.** The word **indisputable** means unable to be challenged or denied. For example, it's an **indisputable** fact that San Francisco is in California. This is closest in meaning to **undeniable**.
21. **Answer choice (D) is correct.** A **summit** is the highest point of a hill or mountain. For example, while people have attempted to climb Mount Everest, only a fraction of them have made it to the **summit** or top of the mountain. This is closest in meaning to **peak**.

### Synonyms Practice Set 3

1. **Answer choice (B) is correct.** The word **adjacent** means next to something else. For example, if your bedroom shares a wall with your brother’s bedroom, your rooms are **adjacent**.
2. **Answer choice (C) is correct.** The word **desert** means to leave or abandon a person, cause, organization etc. For example, if someone leaves their dog on the side of the road and drives away, the dog has been **deserted**. This is closest in meaning to **abandon**.
3. **Answer choice (A) is correct.** The word **cramped** means now having a lot of space. For example, you may feel **cramped** while standing on a crowded subway train. This is closest in meaning to **constricted**.
4. **Answer choice (D) is correct.** The word **gloomy** means dark or poorly lit. For example, on a rainy and cloudy day, it is typically **gloomy** outside. This is closest in meaning to **dim**.
5. **Answer choice (C) is correct.** The word **mandatory** means required. For example, it is **mandatory** to wear a seatbelt while driving a car. This is closest in meaning to **obligatory**.
6. **Answer choice (A) is correct.** The word **haphazard** means lacking organization. For example, if you throw your clothes into your closet without thinking, your closet is **haphazard**. This is closest in meaning to **disorganized**.
7. **Answer choice (B) is correct.** The word **consecutive** means following continuously. For example, if it rains on Monday, Tuesday, and Wednesday, it rained for three **consecutive** days. This is closest in meaning to **successive**.
8. **Answer choice (A) is correct.** The word **devious** means using dishonest tactics to achieve a goal. For example, it’s **devious** for a politician to lie about his/her competitor in order to win an election. This is closest in meaning to **underhanded**.
9. **Answer choice (B) is correct.** The word **comprehensive** means complete or thorough. For example, if your teacher assigns a **comprehensive** test at the end of the school year, the test will cover everything that you’ve learned throughout the year. This is closest in meaning to **complete**.
10. **Answer choice (B) is correct.** The word **harmony** means agreement. For example, when people of different religions can live in the same community without conflict, they are living in **harmony**. This is closest in meaning to **accord**.
11. **Answer choice (C) is correct.** The word **deviate** means to depart from an established course. For example, if you start driving on a certain route, but realize there is a delay five miles ahead, you may **deviate** from your route and choose a different one. This is closest in meaning to **diverge**.

12. **Answer choice (A) is correct.** The word **exterior** means relating to the outside of something. For example, if you have a wreath on the front door of your house facing the street, the wreath is on the **exterior** of the house. This is closest in meaning to **outside**.
13. **Answer choice (C) is correct.** The word **simultaneous** means occurring at the same time. For example, if two students answer a teacher’s question at the same time, they are answering **simultaneously**. This is closest in meaning to **concurrent**.
14. **Answer choice (B) is correct.** The word **assimilate** means to become absorbed or integrated into a society or culture. For example, if you move to a new country and learn the customs and traditions of the people who live there, you are **assimilating** to your new home. This is closest in meaning to **integrate**.
15. **Answer choice (D) is correct.** The word **captivating** means attractive or charming. For example, if someone is very personable, attractive, and catches your attention, you could describe them as **captivating**. This is closest in meaning to **charming**.
16. **Answer choice (C) is correct.** The word **indifference** means lack of concern, interest, or preference. For example, if you are asked what type of food you’d like to eat for lunch, and you reply by saying, “I don’t care,” you are showing **indifference**. This is closest in meaning to **apathy**.
17. **Answer choice (A) is correct.** The word **prowl** means to move stealthily. For example, lions **prowl** when they hunt their prey. This is closest in meaning to **sneak**.
18. **Answer choice (B) is correct.** The word **atrocious** means horrifyingly cruel. For example, a serial killer would be described as **atrocious**. This is closest in meaning to **wicked**.
19. **Answer choice (C) is correct.** The word **affinity** means a natural liking or sympathy for something or someone. For example, if you enjoy painting, drawing, and creating sculptures, you have an **affinity** for art. This is closest in meaning to **liking**.
20. **Answer choice (A) is correct.** The word **profound** means having great knowledge or insight. For example, the advice, “When someone shows you who they are, believe them,” is **profound**. This is closest in meaning to **wise**.
21. **Answer choice (B) is correct.** The word **listless** means lacking energy or enthusiasm. For example, when people are sick, they often lack energy and feel **listless**. This is closest in meaning to **lethargic**.

#### **Synonyms Practice Set 4**

1. **Answer choice (A) is correct.** The word **primary** means of great importance. For example, if the **primary** reason you chose to attend a specific college is because it is close to home, then the main reason you chose that college is because it is close to home. This is closest in meaning to **principal**.

2. **Answer choice (B) is correct.** The word **restrain** means to prevent someone or something from doing something. For example, if your dog is trying to attack someone, you would **restrain** him from doing so. This is closest in meaning to **prevent**.
3. **Answer choice (A) is correct.** The word **bravery** means courageous behavior or character. For example, firefighters are often described as having **bravery** because they risk their lives to save other people. This is closest in meaning to **courage**.
4. **Answer choice (D) is correct.** A **hoax** is an act intended to trick someone. For example, a fake news story that is intended to trick people is a **hoax**. This is closest in meaning to **prank**.
5. **Answer choice (D) is correct.** The word **precise** means accurate and exact. For example, if a bike costs \$243.58, and you have exactly \$243.58, you have the **precise** amount needed to buy the bike. This is closest in meaning to **exact**.
6. **Answer choice (D) is correct.** The word **cordial** means warm and welcoming. For example, if you meet someone for the first time and they greet you with a smile and a hug, they are being **cordial**. This is closest in meaning to **friendly**.
7. **Answer choice (B) is correct.** The word **punctual** means on time. For example, if a party starts at 7:00 PM and you get there exactly at 7:00 PM, you are extremely **punctual**. This is closest in meaning to **prompt**.
8. **Answer choice (C) is correct.** A **predicament** is an unpleasant situation that is difficult to get out of. For example, if your car breaks down in the middle of the night, on a dirt road, with no one around and your phone has no service, you are in a **predicament**.
9. **Answer choice (C) is correct.** The word **yield** means to produce or provide. For example, a fruit farmer’s land will **yield** various fruits such as grapes, berries, and apples. This is closest in meaning to **produce**.
10. **Answer choice (C) is correct.** The word **rudimentary** means elementary or fundamental. For example, if you know your addition, subtraction, multiplication and division facts, you have a **rudimentary** knowledge of math. This is closest in meaning to **basic**.
11. **Answer choice (B) is correct.** The word **bewilder** means to puzzle or confuse. For example, you may be **bewildered** by a very challenging puzzle. This is closest in meaning to **confuse**.
12. **Answer choice (B) is correct.** The word **agile** means able to move quickly and easily. For example, a soccer player who is dribbling the ball and weaving past other players would be considered **agile**. This is closest in meaning to **nimble**.

13. **Answer choice (D) is correct.** The word **vilify** means to speak or write about in a disparaging manner. For example, if an article is written about a celebrity's previous criminal record, the article is trying to **vilify** the celebrity. This is closest in meaning to **defame**.
14. **Answer choice (A) is correct.** The word **lucid** means expressed clearly. For example, if an explanation is **lucid**, it is easy to understand because it was expressed clearly. This is closest in meaning to **clear**.
15. **Answer choice (C) is correct.** The word **divert** means to cause someone or something to change course. For example, if there is an accident on the main road, police will **divert** traffic to a side street. This is closest in meaning to **redirect**.
16. **Answer choice (A) is correct.** The word **abridged** means abbreviated or shortened. For example, an **abridged** version of a book is a shortened version that has certain parts taken out. This is closest in meaning to **shortened**.
17. **Answer choice (C) is correct.** The word **pessimistic** means tending to see the worst aspect of things or believing that the worst will happen. For example, if a **pessimistic** person applies for a job, they believe someone else will get hired over them, even if they are qualified. This is closest in meaning to **negative**.
18. **Answer choice (C) is correct.** The word **conscientious** means wishing to do what is right, especially when it comes to work. For example, a **conscientious** student will never miss a homework assignment and will always study hard for tests. This is closest in meaning to **hardworking**.
19. **Answer choice (B) is correct.** The word **bleak** means lacking vegetation and exposed to the elements. For example, a deserted island that is inhospitable to animals and plants would be **bleak**. This is closest in meaning to **bare**.
20. **Answer choice (B) is correct.** The word **temperate** means moderate or mild. For example, the climate in Northern California is often described as **temperate** because the weather does not get cold in the winter, does not get very hot in the summer, and it rarely rains. This is closest in meaning to **mild**.
21. **Answer choice (D) is correct.** The word **insolent** means showing a rude and arrogant lack of respect. For example, an **insolent** child may talk back to his teacher and leave the classroom without asking permission. This is closest in meaning to **rude**.

### **Synonyms Practice Set 5**

1. **Answer choice (B) is correct.** The word **famous** means known by many people. For example, celebrities are **famous**. This is closest in meaning to **celebrated**.

2. **Answer choice (C) is correct.** The word **doubt** means a feeling of uncertainty. For example, if you have **doubts** about your new employee, you may be unsure about how well he will do his job. This is closest in meaning to **uncertainty**.
3. **Answer choice (A) is correct.** The word **disobedient** means refusing to obey rules or someone in authority. For example, if your mother tells you not to eat candy after 7:00 pm, and you sneak a chocolate bar into your room and eat it at 9:00 pm, you are being **disobedient**. This is closest in meaning to **unruly**.
4. **Answer choice (A) is correct.** The word **negligent** means failing to take proper care in doing something. For example, if you are texting while you drive, you are being **negligent**. This is closest in meaning to **careless**.
5. **Answer choice (B) is correct.** The word **affectionate** means feeling or showing fondness. For example, a newlywed couple giving each other kisses and hugs during their first dance are **affectionate**. This is closest in meaning to **adoring**.
6. **Answer choice (C) is correct.** The word **nostalgic** means a feeling of longing or thinking fondly of a past time. For example, many people are **nostalgic** when they look back on their childhood and remember the good memories they made. This is closest in meaning to **wistful**.
7. **Answer choice (C) is correct.** The word **impair** means to weaken or damage something. For example, sometimes people’s memories become **impaired** when they get older and they have a harder time remembering things. This is closest in meaning to **damage**.
8. **Answer choice (D) is correct.** The word **aloof** means not friendly or forthcoming. For example, if a child typically sits by herself at lunch, even though other students have asked her to join their table, she is being **aloof**. This is closest in meaning to **distant**.
9. **Answer choice (B) is correct.** The word **sever** means to put an end to or break off. For example, if you and your friends have a huge fight and you feel like you can no longer be friends, you may **sever** the relationship. This is closest in meaning to **discontinue**.
10. **Answer choice (A) is correct.** The word **meek** means quiet, gentle, and easily imposed. For example, a **meek** person may go along with what his friends want even though he does not agree. This is closest in meaning to **submissive**.
11. **Answer choice (A) is correct.** The word **appease** means to calm or pacify. For example, a mother may **appease** her crying baby by giving him a pacifier to suck on. This is closest in meaning to **soothe**.
12. **Answer choice (D) is correct.** An **asset** is a useful or valuable thing, person, or quality. For example, a talented soccer player would be an **asset** to your team. This is closest in meaning to **benefit**.

13. **Answer choice (A) is correct.** The word **menacing** means suggesting the presence of danger. For example, a tiger’s growl is **menacing** because it is frightening. This is closest in meaning to **threatening**.
14. **Answer choice (A) is correct.** The word **prominent** means important or famous. For example, J.K. Rowling who wrote Harry Potter is a **prominent** author. This is closest in meaning to **famous**.
15. **Answer choice (C) is correct.** A **conviction** is a firmly held belief or opinion. For example, if you have strong political **convictions**, you are probably unlikely to change your views on politics. This is closest in meaning to **stance**.
16. **Answer choice (D) is correct.** The word **depict** means to show or represent. For example, a photograph that **depicts** a winter day could include snow covered trees and people bundled in warm clothing. This is closest in meaning to **portray**.
17. **Answer choice (A) is correct.** The word **entice** means to attract by offering something advantageous. For example, you can **entice** your dog to sit by offering him a treat. This is closest in meaning to **tempt**.
18. **Answer choice (A) is correct.** The word **abundant** means available in large quantities. For example, trees are **abundant** in the forest. This is closest in meaning to **bountiful**.
19. **Answer choice (D) is correct.** The word **hastily** means with excessive speed or urgency. For example, if you are running late for school, you would **hastily** eat your breakfast and pack up your backpack. This is closest in meaning to **quickly**.
20. **Answer choice (B) is correct.** The word **feeble** means lacking physical strength. For example, many people feel **feeble** when they have the flu and have a hard time getting out of bed. This is closest in meaning to **weak**.
21. **Answer choice (A) is correct.** The word **contentious** means likely to cause an argument. For example, religion can be a **contentious** topic because many people have strong but differing views on religion. This is closest in meaning to **controversial**.

### **Synonyms Practice Set 6**

1. **Answer choice (B) is correct.** The word **endorse** means to declare one’s public approval or support of something. For example, influencers often **endorse** products by advertising them to their followers. This is closest in meaning to **support**.
2. **Answer choice (C) is correct.** The word **enrich** means to improve the quality of something. For example, farmers use manure to **enrich** their soil. This is closest in meaning to **enhance**.

3. **Answer choice (D) is correct.** Having **empathy** is the ability to understand and share the feelings of someone else. For example, let’s say your friend fails a test and you remember what it feels like to fail the test, so you say something like, “I’m so sorry about the test. I know how hard you studied and how disappointing it feels to fail.” This is an example of showing **empathy**. This is closest in meaning to **compassion**.
4. **Answer choice (A) is correct.** The word **fantasize** means to imagine something or think about something that is unlikely to happen. For example, you may **fantasize** about winning the lottery. This is closest in meaning to **daydream**.
5. **Answer choice (D) is correct.** The word **anarchy** means a state of disorder. For example, if there was no government or laws, there would be **anarchy** in our country. This is closest in meaning to **disorder**.
6. **Answer choice (B) is correct.** A **beacon** is a fire or light set up as a warning, signal, or celebration. For example, lighthouses have a **beacon** at the top to help sailors guide their ships at night. This is closest in meaning to **light**.
7. **Answer choice (D) is correct.** The word **validate** means to check or provide the validity or accuracy of something. For example, in order to **validate** that a story told by your friend is true, you may talk to other people who were involved in the story. This is closest in meaning to **confirm**.
8. **Answer choice (A) is correct.** The word **omit** means to leave out. For example, if you are baking cookies but are allergic to chocolate, you would **omit** the chocolate chips from the recipe. This is closest in meaning to **exclude**.
9. **Answer choice (B) is correct.** The word **compile** means to put information together into a list, report, book, etc. For example, if you are going on vacation to Disney World, you may **compile** a list of the best rides at the park. This is closest in meaning to **assemble**.
10. **Answer choice (A) is correct.** A **crevice** is a narrow opening, especially in a rock or wall. For example, sometimes weeds grow out of **crevices** in driveways. This is closest in meaning to **crack**.
11. **Answer choice (C) is correct.** The word **fleeting** means lasting for a short time. For example, if something falls in your house, you may have a **fleeting** sense of fear until you figure out what caused the noise. This is closest in meaning to **brief**.
12. **Answer choice (D) is correct.** The word **ludicrous** means extremely foolish or unreasonable. For example, a movie about a dog who becomes president would be **ludicrous**. This is closest in meaning to **absurd**.
13. **Answer choice (A) is correct.** The word **colossal** means extremely large. For example, many redwood trees, which stand between 250 and 300 feet tall, are **colossal**. This is closest in meaning to **massive**.



14. **Answer choice (B) is correct.** The word **cynical** means doubtful. For example, many people are **cynical** about politicians' promises because politicians don't always follow through on their promises. This is closest in meaning to **skeptical**.
15. **Answer choice (A) is correct.** The word **ascend** means to go up or rise through the air. For example, when planes are taking off, they are **ascending**. This is closest in meaning to **climb**.
16. **Answer choice (D) is correct.** The word **virtue** means behavior showing high moral standards. For example, being honest, generous, and courageous are all **virtues**. This is closest in meaning to **righteousness**.
17. **Answer choice (D) is correct.** The word **glib** is used to describe a person who speaks easily and well but is insincere. For example, if a politician's answers to serious issues seem rehearsed and vague, the politician may come off as being **glib**. This is closest in meaning to **insincere**.
18. **Answer choice (D) is correct.** The word **opaque** means not able to be seen through. For example, when you shower, the windows in the bathroom become **opaque** from the steam. This is closest in meaning to **cloudy**.
19. **Answer choice (C) is correct.** The word **allocate** means to distribute resources or duties. For example, schools **allocate** money from their budget to various things such as salaries, extracurricular activities, and events. This is closest in meaning to **distribute**.
20. **Answer choice (B) is correct.** The word **astute** means having the ability to accurately assess situations or people. For example, an **astute** businesswoman would be good at identifying advantageous business opportunities or profitable investments. This is closest in meaning to **acute**.
21. **Answer choice (A) is correct.** The word **abet** means to encourage or assist someone to do something wrong. For example, if you buy your friend a can of spray paint so they can graffiti the walls of the school, you are **abetting** your friend. This is closest in meaning to **aid**.

### **Synonyms Practice Set 7**

1. **Answer choice (A) is correct.** A **consequence** is a result or effect of something. For example, the **consequence** of cheating in school may be a suspension or even expulsion. This is closest in meaning to **result**.
2. **Answer choice (B) is correct.** An **obligation** is a duty or something you are committed to. For example, children have an **obligation** to go to school, and some parents have an **obligation** to go to work. This is closest in meaning to **commitment**.

3. **Answer choice (D) is correct.** The word **confidential** means intended to be kept secret. For example, personal information about employees at a company, such as social security number, address, etc, is **confidential** information that is not allowed to be shared. This is closest in meaning to **secret**.
4. **Answer choice (A) is correct.** The word **charismatic** means charming or attractive. For example, someone who is outgoing, likable, and has a personality that others are drawn to is **charismatic**. This is closest in meaning to **charming**.
5. **Answer choice (D) is correct.** The word **confront** means to face, meet, or deal with a difficult person or situation. For example, if someone is attempting to steal something from your house, you may **confront** them before they leave and try to stop them. This is closest in meaning to **challenge**.
6. **Answer choice (A) is correct.** The word **plentiful** means existing in large quantities. For example, Florida is known as “The Orange State” because oranges are **plentiful** in Florida from October to June. This is closest in meaning to **ample**.
7. **Answer choice (B) is correct.** The word **infer** means to conclude something from evidence and reasoning rather than explicit statements. For example, if you wake up and your front lawn is wet, you could **infer** that it rained last night, even though you didn’t see the rain. This is closest in meaning to **assume**.
8. **Answer choice (D) is correct.** The word **analyze** means to examine something in detail or discover something through examination. For example, in English class, teachers often have you **analyze** books to find themes, plot, and other important information. This is closest in meaning to **examine**.
9. **Answer choice (B) is correct.** The word **competent** means having the necessary ability, knowledge, or skill to do something successfully. For example, a **competent** mechanic would be able to fix your car easily. This is closest in meaning to **able**.
10. **Answer choice (C) is correct.** The word **susceptible** means likely to be influenced or harmed by a particular thing. For example, elderly people are often more **susceptible** to infections than younger people. This is closest in meaning to **vulnerable**.
11. **Answer choice (C) is correct.** The word **precarious** means uncertain or dependent on chance. For example, it is **precarious** to invest in startups because most of them are not successful. This is closest in meaning to **risky**.
12. **Answer choice (C) is correct.** The word **ajar** means slightly open. For example, if your car door is **ajar**, your car will typically beep to let you know the door is open. This is closest in meaning to **open**.
13. **Answer choice (B) is correct.** The word **notable** means worthy of attention or notice. For example, Oprah is a notable talk show host, actress, and entrepreneur. This is closest in meaning to **remarkable**.

14. **Answer choice (A) is correct.** The word **indolent** means wanting to avoid activity or exertion. For example, if you sit on the couch all day and play video games, you are being **indolent**. This is closest in meaning to **lazy**.
15. **Answer choice (A) is correct.** The word **impose** means to force something to be accepted or put in place. For example, some schools are not allowed to teach religion because some parents don't want certain religious beliefs **imposed** on their children. This is closest in meaning to **force**.
16. **Answer choice (B) is correct.** The word **stifle** means to make someone unable to breathe properly. For example, the smoke from forest fires in California can be **stifling** to people who live close to the fires. This is closest in meaning to **suffocate**.
17. **Answer choice (B) is correct.** The word **creed** means a system of religious belief. For example, the United States is made up of people of many **creeds** and cultures. This is closest in meaning to **faith**.
18. **Answer choice (A) is correct.** The word **sheepish** means showing embarrassment from shame or lack of self-confidence. For example, if someone trips and falls, they may have a **sheepish** grin on their face as they stand up. This is closest in meaning to **embarrassed**.
19. **Answer choice (B) is correct.** The word **laborious** means requiring considerable effort and time. For example, becoming a doctor requires years of **laborious** schooling and training. This is closest in meaning to **difficult**.
20. **Answer choice (C) is correct.** The word **irate** means extremely angry. For example, if you broke your parents television right before they wanted to watch an important sporting event, they would be **irate**. This is closest in meaning to **livid**.
21. **Answer choice (D) is correct.** The word **spurn** means to reject. For example, if a child is an extremely picky eater, they may **spurn** everything except chicken nuggets and macaroni and cheese. This is closest in meaning to **reject**.

### **Synonyms Practice Set 8**

1. **Answer choice (D) is correct.** The word **initiate** means to cause or facilitate the beginning of something. For example, if you walk up to someone and start talking to them, you are **initiating** a conversation. This is closest in meaning to **begin**.
2. **Answer choice (D) is correct.** The word **reference** means to mention or refer to something. For example, if someone is giving a school presentation on growing up with siblings, they may **reference** stories from their childhood. This is closest in meaning to **mention**.
3. **Answer choice (A) is correct.** The word **boycott** means to refuse to participate in something or buy something, normally as a punishment or protest. For example, a person may **boycott** a grocery store that sells soap that is harmful to animals. This is closest in meaning to **shun**.

4. **Answer choice (C) is correct.** The word **relevant** means closely connected or appropriate to what is being done or considered. For example, if you are applying to work as a summer camp counselor, your previous babysitting job would be considered **relevant** experience because babysitting is similar to being a camp counselor. This is closest in meaning to **applicable**.
5. **Answer choice (B) is correct.** The word **unbiased** means showing no prejudice for or against something. For example, in an effort to make the TV show “The Voice” **unbiased**, the judges are not allowed to see the performers as they sing, so the performers are solely judged on their voices and not their appearance. This is closest in meaning to **impartial**.
6. **Answer choice (B) is correct.** The word **linger** means to stay in a place longer than expected because you’re reluctant to leave. For example, if you’re at your friend’s house and there is a storm, you may **linger** at your friend’s house because you don’t want to drive in the rain. This is closest in meaning to **stay**.
7. **Answer choice (C) is correct.** The word **solitary** means done or existing alone. For example, tortoises are **solitary** animals who spend most of their lives alone, except for when they breed. This is closest in meaning to **alone**.
8. **Answer choice (A) is correct.** The word **blunt** means very straightforward and to the point, often in a way that offends people. For example, if your friend tells you that they don’t like your dress and it is not flattering on you, they are being **blunt**. This is closest in meaning to **frank**.
9. **Answer choice (C) is correct.** The word **unconventional** means out of the ordinary or not common. For example, schools that don’t have grades are considered **unconventional**. This is closest in meaning to **unorthodox**.
10. **Answer choice (D) is correct.** A **ploy** is a cunning plan or action to achieve a desired goal. For example, if you start to cry in an attempt to get your mother to buy you ice cream, this is a **ploy**. This is closest in meaning to **scheme**.
11. **Answer choice (A) is correct.** The word **acclaimed** means commended or praised. For example, Beyonce is **acclaimed** for her talent and music. This is closest in meaning to **praised**.
12. **Answer choice (D) is correct.** The word **rationalize** means to justify by coming up with a set of reasons for something. For example, you could **rationalize** skipping class by saying your grades are good and your class isn’t teaching you anything, but you’re still breaking the rules. This is closest in meaning to **justify**.
13. **Answer choice (B) is correct.** The word **snare** means to catch or trap something. For example, a praying mantis will use its legs to **snare** its prey, pinning it in place. This is closest in meaning to **trap**.

14. **Answer choice (D) is correct.** The word **adorn** means to dress something up by decorating it. For example, most people **adorn** their Christmas trees with ornaments. This is closest in meaning to **embellish**.
15. **Answer choice (D) is correct.** The word **dutiful** means doing what you're told out of duty and obligation. For example, **dutiful** students will complete their homework on time, not talk during class, and listen to their teacher. This is closest in meaning to **dedicated**.
16. **Answer choice (C) is correct.** The word **astonishing** means extremely surprising or impressive. For example, when people first walked on the moon, it was **astonishing**. This is closest in meaning to **astounding**.
17. **Answer choice (C) is correct.** The word **stealthy** is used to describe someone or something that is marked by secrecy or sneakiness. For example, ninjas are **stealthy** and move quietly and cautiously so they won't be heard or seen. This is closest in meaning to **secretive**.
18. **Answer choice (A) is correct.** The word **luster** means sheen or shine. For example, a brand new spoon will have **luster**. This is closest in meaning to **shine**.
19. **Answer choice (A) is correct.** The word **imminent** means close in time or about to happen. For example, if there are gray clouds in the sky, a storm is probably **imminent**. This is closest in meaning to **approaching**.
20. **Answer choice (C) is correct.** The word **stagnant** means lacking movement or inactive. For example, pool water is often **stagnant** while ocean water is not. This is closest in meaning to **still**.
21. **Answer choice (D) is correct.** The word **calculated** means done in a deliberate way or with a lot of thought. For example, a **calculated** remark could be an insult about a sensitive topic that is intended to hurt someone's feelings. This is closest in meaning to **premeditated**.

### **Synonyms Practice Set 9**

1. **Answer choice (C) is correct.** A **confession** is an admission of guilt, fault, or a mistake. For example, if you admit to your mom that you snuck a candy bar into your room at night, this is a **confession**. This is closest in meaning to **admission**.
2. **Answer choice (D) is correct.** The word **contagious** refers to something that spreads easily. For example, millions of people catch a cold each year because the common cold is very **contagious**. This is closest in meaning to **infectious**.
3. **Answer choice (B) is correct.** The word **graceful** is used to describe movements that are lovely and elegant. Ballet dancers are often described as **graceful** because their movements look effortless and fluid. This is closest in meaning to **elegant**.

4. **Answer choice (C) is correct.** The word **wealthy** means having a lot of money. For example, most celebrities are incredibly **wealthy**. This is closest in meaning to **rich**.
5. **Answer choice (B) is correct.** The word **persuasive** means good at convincing someone to do or believe something. For example, if you can convince your friend to pull a prank on the teacher by saying that it will make your friend popular, you're **persuasive**. This is closest in meaning to **convincing**.
6. **Answer choice (B) is correct.** The word **mimic** means to copy or imitate. For example, babies sometimes **mimic** their parents' facial expressions, so if a baby's mom smiles, the baby will smile too. This is closest in meaning to **imitate**.
7. **Answer choice (B) is correct.** The word **satisfactory** means okay or acceptable. For example, a grade of a C in school is typically considered **satisfactory**. This is closest in meaning to **adequate**.
8. **Answer choice (C) is correct.** The word **arrogant** means having an exaggerated sense of one's own importance or abilities. For example, if your friend constantly brags about their grades, how good they are at sports, and how popular they are, they are being **arrogant**. This is closest in meaning to **conceited**.
9. **Answer choice (B) is correct.** The word **envy** means a feeling of admiration and desire to have something that someone else has. For example, many people are **envious** of celebrities because they are famous and wealthy. This is closest in meaning to **jealousy**.
10. **Answer choice (C) is correct.** The word **contemplate** means to think intently and deeply about something. For example, before you decide which college to go to, you should take time to **contemplate** the pros and cons of different schools. This is closest in meaning to **ponder**.
11. **Answer choice (A) is correct.** The word **inadequate** means lacking the quality or quantity required, or not enough. For example, if you need to be 60 inches tall to ride a rollercoaster, but you are only 55 inches tall, your height is **inadequate** for riding the rollercoaster. This is closest in meaning to **insufficient**.
12. **Answer choice (A) is correct.** The word **vocation** means a person's employment or main job. For example, teacher, doctor, lawyer, and engineer are all vocations.
13. **Answer choice (B) is correct.** The word **just** means morally and ethically sound. For example, if you are a **just** teacher, you will not treat a student differently just because the student's mother is mean to you. This is closest in meaning to **fair**.
14. **Answer choice (C) is correct.** The word **assent** means agreement. If you give your **assent** to a proposed plan, you are agreeing with the plan. This is closest in meaning to **agreement**.

15. **Answer choice (D) is correct.** The word **bashful** means shy or timid. You may feel **bashful** when meeting your favorite soccer player, a celebrity, or your idol.
16. **Answer choice (D) is correct.** The word **arduous** means requiring strenuous effort. For example, applying to law school is an **arduous** process filled with many applications, interviews, and a challenging admissions test. This is closest in meaning to **taxing**.
17. **Answer choice (C) is correct.** The word **ingenuity** means the ability to think creatively about a situation or solve problems in an original way. For example, Albert Einstein’s **ingenuity** helped him discover the theory of relativity. This is closest in meaning to **inventiveness**.
18. **Answer choice (D) is correct.** The word **hostile** means unfriendly or aggressive. For example, it would be **hostile** to walk up to a stranger on the street and yell at them for no reason. This is closest in meaning to **antagonistic**.
19. **Answer choice (A) is correct.** The word **keen** means sharp or showing great insight and perception. For example, if you have a **keen** sense of smell, you have a heightened sense of smell compared to other people, so you can distinguish between certain smells more easily. This is closest in meaning to **perceptive**.
20. **Answer choice (A) is correct.** Being **pretentious** means acting like you are more important or knowledgeable than you really are. For example, it is **pretentious** for a celebrity to expect to cut the line at a restaurant because of their fame. This is closest in meaning to **pompous**.
21. **Answer choice (C) is correct.** The word **misconstrue** means to interpret something wrongly. For example, if your friend is not speaking to you and you don’t know it’s because she lost her voice, you may **misconstrue** his lack of communication as him being upset with you. This is closest in meaning to **misinterpret**.

### **Synonyms Practice Set 10**

1. **Answer choice (C) is correct.** The word **furious** means extremely angry. For example, your parents may be **furious** with you if you lie to them and skip school to go hang out with your friends. This is closest in meaning to **enraged**.
2. **Answer choice (B) is correct.** The word **admiration** means a feeling of liking, appreciation, and approval. For example, people have **admiration** for their favorite athlete, author, actress, or musician. This is closest in meaning to **respect**.
3. **Answer choice (B) is correct.** The word **frigid** means very cold. For example, Antarctica is always extremely **frigid**. This is closest in meaning to freezing.
4. **Answer choice (D) is correct.** A **compromise** is an agreement where all sides make concessions. For example, if your friend wants to play video games all day but you want to ride your bike all day, you

can come to a **compromise** and play video games for the first half of the day and ride your bikes for the second half of the day. This is closest in meaning to **settlement**.

5. **Answer choice (D) is correct.** The word **alter** means to change or make different. For example, after writing a rough draft of an essay and receiving feedback from your teacher, you may **alter** your essay to improve it. This is closest in meaning to **change**.
6. **Answer choice (C) is correct.** The word **anxiety** means uneasiness. For example, you may have **anxiety** before a big test that counts for half of your grade. This is closest in meaning to **worry**.
7. **Answer choice (D) is correct.** The word **anguish** means severe emotional or physical pain. For example, people often experience **anguish** after the death of a loved one. This is closest in meaning to **pain**.
8. **Answer choice (D) is correct.** The word **shrewd** means smart or clever in a practical way. For example, a **shrewd** shopper will carefully think about their spending and will know how to find the best deals on products. This is closest in meaning to **savvy**.
9. **Answer choice (A) is correct.** The word **affluent** means having a lot of money or possessions. For example, someone who owns a mansion and many luxury cars is **affluent**. This is closest in meaning to **wealthy**.
10. **Answer choice (D) is correct.** The word **cunning** means clever and getting your way using trickery or deception. For example, pickpockets are **cunning** because they distract you while stealing from your pockets. This is closest in meaning to **sly**.
11. **Answer choice (C) is correct.** The word **expedite** means to make faster or speed up the process of something. For example, when you order products online, you can choose **expedited** shipping that is faster than normal shipping. This is closest in meaning to **accelerate**.
12. **Answer choice (D) is correct.** The word **contaminate** means to make something impure by adding something poisonous or harmful to it. For example, chemicals and trash from humans **contaminate** the ocean. This is closest in meaning to **pollute**.
13. **Answer choice (B) is correct.** The word **renounce** means to officially give up or abandon something. For example, if you become a vegetarian, you will **renounce** chicken, bacon, and all other meats. This is closest in meaning to **reject**.
14. **Answer choice (B) is correct.** The word **obsolete** means out of date. For example, some people believe paper books are becoming **obsolete** because eBooks are becoming more popular and convenient. This is closest in meaning to **outdated**.



15. **Answer choice (A) is correct.** The word **abate** means become less intense, smaller, or widespread. For example, if you have the flu, your symptoms will likely begin to **abate** after a few days of rest. This is closest in meaning to **lessen**.
  16. **Answer choice (A) is correct.** The word **eloquent** means having a way with words or being fluent and persuasive in speaking. For example, some people describe Barack Obama as **eloquent**, saying his speeches were clear, powerful, and inspiring. This is closest in meaning to **articulate**.
  17. **Answer choice (D) is correct.** The word **esteem** means respect and admiration. For example, most children look up to their parents and hold them in high **esteem**. This is closest in meaning to **acclaim**.
  18. **Answer choice (B) is correct.** The word **agony** means extremely mental or physical suffering. For example, burning your entire arm on a hot stove will cause **agony**. This is closest in meaning to **suffering**.
  19. **Answer choice (B) is correct.** The word **allude** means to suggest or call attention indirectly. For example, if you lost your job, you may **allude** to it by saying, “I’ve had a tough week.” This is closest to **imply**.
  20. **Answer choice (C) is correct.** The word **gallantry** means courage, especially in battle. For example, soldiers are often described as having **gallantry** because they risk their lives fighting for their country. This is closest in meaning to **bravery**.
  21. **Answer choice (C) is correct.** The word **drab** means lacking brightness or interest. For example, if a room has beige walls with beige curtains and light brown furniture, you could describe it as **drab**. This is closest in meaning to **dull**.
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### ***Sentence Completion***

#### **Sentence Completion Practice Set 1**

1. **Answer choice (A) is correct.** Because a loud noise was heard outside, we can assume that the security team was tasked with inspecting the outside of the house. The sentence also says the security team was tasked with inspecting the ----- of the house to make sure no intruders were trying to break in, which tells us that they were tasked with looking outside. The word “perimeter” means the outermost boundary of an area, so “perimeter” fits best in the blank.
2. **Answer choice (B) is correct.** The word “since” tells us that the word in the blank is a consequence of Brett texting during class. It would not make sense that Brett’s teacher “delivered” or “tarnished” his phone because he was texting, so answer choice (A) is incorrect. Since Brett’s teacher asked his parents to pick his phone up at the end of class, we can assume that the word in the blank means

Brett’s teacher took his phone away from him. “Confiscated” means to take with authority, so “confiscated” fits best in the blank.

3. **Answer choice (C) is correct.** Since Will’s mom was frustrated, we can eliminate answer choice (A): his mom would be happy if he was hurrying since they were already late for the recital. The second part of the sentence tells us that they were already late for the recital, which means we can assume the word in the blank means Will was moving slowly. “Dawdle” means to waste time or move slowly, so “dawdle” fits best in the blank.
4. **Answer choice (C) is correct.** The second part of the sentence says Glen could not justify paying the ----- price for a new laptop, which means the word in the blank should be negative. The words “practical” and “subsidized” are positive ways to describe a price, so we can eliminate answer choices (A) and (D). “Aggressive” means hostile, which isn’t a way to describe a price. “Exorbitant” means extremely expensive, so “exorbitant” fits best in the bank: Glen could not justify paying such a high price for the laptop, even though his laptop was old and ran slowly.
5. **Answer choice (A) is correct.** The word “although” tells us that the second part of the sentence should be the opposite of the first part. The first part of the sentence says that the teacher did not want to punish the student for yelling, which means the second part of the sentence should say something similar to the teacher did not want to set an expectation that disrespectful behavior (yelling) was acceptable. The phrase “set a precedent” means set an example or expectation or set a rule for the future, so “precedent” fits best in the blank.
6. **Answer choice (B) is correct.** Positive reinforcement has the word “positive” in it, so we can assume it is a beneficial practice. The sentence also says that positive reinforcement can help the parent’s son learn new coping skills, which is a benefit. Therefore, we can assume the word in the blank is positive, so we can eliminate answer choice (A) which is negative. The words “mediate” does not make sense in the blank because you would not “mediate” self-esteem, so answer choice (C) is incorrect. The word “stabilize” means balance and the word “boost” means improve. Since “boost” is more positive than “stabilize”, “boost” fits best in the blank.
7. **Answer choice (D) is correct.** Since Cassandra’s had a hard time trusting her brother because he would change his mind for no reason, we know the word in the blank should mean something similar to “changes one’s mind frequently.” The word “fickle” means changing frequently, especially when it comes to opinions, loyalties, and interests, so “fickle” fits best in the blank.
8. **Answer choice (C) is correct.** The word “despite” tells us that the second part of the sentence should be the opposite of the first part. The first part says that the doctor gave Cindy permission to be discharged, which means the doctor thinks Cindy is recovering well and can take care of herself at home. This means the second part of the sentence should say something similar to Cindy doesn’t agree with the doctor, and she doesn’t feel sure about her ability to take care of herself at home. The word “confident” means sure of oneself, so “confident” fits best in the blank.

9. **Answer choice (A) is correct.** The phrase “the best way to keep his students -----” must be a result of Mr. Brown using interactive and hands-on experiments during his lesson. Hands-on and interactive experiments are used to help students pay attention and have fun during class. The word “engaged” means to be involved and interested in something, so “engaged” fits best in the blank.
10. **Answer choice (C) is correct.** Since the first part of the sentence says surgeons are often required to perform delicate procedures with their hands, the word in the blank should mean having talent with your hands. “Dexterity” means skill in performing tasks, especially with your hands, so “dexterity” fits best in the blank.
11. **Answer choice (A) is correct.** The word in the blank describes something that was “crushed” as a result of Kevin being paralyzed from the neck down in college. “Aspiration” means “dream,” so it makes sense to say that Kevin’s “dream” to become a professional football player was crushed when he became paralyzed because if Kevin is paralyzed, he can no longer pursue his dream of playing professional football. Therefore, “aspiration” fits best in the blank. While “occupation” may seem like it fits in the blank, “occupation” means your job or career. Since Kevin got injured in college, he never had a career as a professional football player, so “occupation” does not work in the blank.
12. **Answer choice (B) is correct.** The word in the blank must be a result of Kangaroo rats having an adaptation that reduces the amount of water needed to live. Since Kangaroo rats don’t need much water to live, it would not make sense that they would “perish” or die in the desert without water, so answer choice (C) is incorrect. While kangaroo rats could “migrate” or “procreate” in the desert, the sentence does not give any indication that kangaroo rats migrate (move to a new region during different seasons) or procreate (reproduce), so answer choices (A) and (D) are incorrect. We are left with answer choice (B), “survive”. It would make sense that because kangaroo rats have an adaptation that reduces the amount of water needed to live, they are able to “survive” or live in the desert without much water, so “survive” fits best in the blank.
13. **Answer choice (D) is correct.** The word “but” tells us that the second part of the sentence should be the opposite of the first. The first part of the sentence says Felicia was confident that she could persuade her parents to let her adopt a dog, so the second part of the sentence should say something similar to her efforts were unsuccessful. The word “fruitless” means pointless or unsuccessful, so “fruitless” fits best in the blank.
14. **Answer choice (B) is correct.** The second part of the sentence says that Frank’s sprained ankle was almost healed, so the word in the blank must be positive. The phrase “the swelling ensued” means that the swelling developed, which is not positive, so answer choice (A) is incorrect. The phrase “the swelling evolved” means the swelling developed gradually, which is not positive, so answer choice (C) is incorrect. We are down to answer choices (A) and (D). The phrase “the swelling stabilized” is relatively positive because it means the swelling stopped getting worse. However, the phrase “the swelling subsided” means the swelling decreased, which is very positive. Therefore, “subsided” works better in the blank than “stabilized.”

15. **Answer choice (C) is correct.** The word “so” tells us that the word in the blank has to be the reason Brenda practiced for hours each day leading up to the competition. “Determined” means you’ve made a decision to do something, and you’re not going to let anything get in the way. If Brenda was “determined” to win the spelling bee, she would do whatever it takes to win, including practicing for hours every day leading up to the competition. Therefore, “determined” fits best in the blank. If Brenda was “predicted” or “qualified” to win, she would not necessarily need to practice excessively leading up to the competition. If Brenda was “petrified” or scared about winning, she would not be practicing because she would not want to win.
16. **Answer choice (C) is correct.** The second part of the sentence says Susan was surprised, so the word in the blank must make the second part of the sentence say something that would be unexpected given that the holidays are the busiest time of the year. Since the holidays are the busiest time of the year, it would be unexpected for Susan to be able to take time off. Therefore, it would be unexpected for Susan’s request for time off over Christmas to be “approved,” so “approved” fits best in the blank.
17. **Answer choice (B) is correct.** The word “although” tells us the first part of the sentence should be the opposite of the second part. The second part of the sentence says Kira offered to drive the narrator to work even though Kira had errands to run. This is a helpful and generous act, so the first part of the sentence should say that people describe Kira as the opposite of helpful and generous. The opposite of helpful and generous is “selfish,” so “selfish” fits best in the blank.
18. **Answer choice (A) is correct.** The word “despite” tells us the first part of the sentence should be the opposite of the second part. The second part of the sentence says Peter worked hard and was able to graduate at the top of his class, so the first part must say something similar to Peter experienced things that would make it challenging for him to graduate at the top of his class. Therefore, the word in the blank must be negative. “Setbacks,” which means challenges, is the only word in the answer choices that is negative, so “setbacks” fits best in the blank.
19. **Answer choice (D) is correct.** The second part of the sentence says the source of the smell was a week-old tuna sandwich. A week-old tuna sandwich would have a horrible smell, so the word in the blank must be negative. “Rancid,” which means an unpleasant and sour smell, is the only word in the answer choices that is negative, so “rancid” fits best in the blank.
20. **Answer choice (D) is correct.** The word “poor” is negative, so “poor time management” will result in a negative consequence. Therefore, the word in the blank must be negative. Answer choices (A) and (B) are positive, so they are incorrect. “Decimate” means completely destroy or kill, and “hinder” means delay or slow down. Saying that poor time management completely destroys or kills a student’s academic progress is too extreme, so answer choice (C) is incorrect. Saying that poor time management delays or slows down a student’s academic progress makes the best sense, so “hinder” fits best in the sentence.

## **Sentence Completion Practice Set 2**

1. **Answer choice (C) is correct.** Poison ivy has three leaves, so the sentence is saying that because other plants have three leaves, nature enthusiasts often confuse poison ivy with other benign, or harmless, plants. The word “classify” means put something in a certain category or group. This makes sense in the sentence because if nature enthusiasts mistakenly think poison ivy is part of a group of benign, or harmless, plants, they may touch the poison ivy, which will result in an unexpected rash. Therefore, “classify” fits best in the blank.
2. **Answer choice (B) is correct.** The word “but” tells us the second part of the sentence should be the opposite of the first part. The first part of the sentence says Serena usually hated spending time with her brother, which is negative. Therefore, the second part of the sentence should be positive. “Delightful” is the only word in the answer choices that is positive, so “delightful” fits best in the blank.
3. **Answer choice (A) is correct.** The word “due” tells us that the second part of the sentence is a result of the first part. The first part says the politician has extensive legal background, a charming demeanor, and many endorsements, which are all positive things. Therefore, the word in the blank should be positive. “Devious” and “inappropriate” are negative, so answer choices (B) and (C) are incorrect. “Esteemed” means very respected and admired, and “convenient” means suitable. While these words are both positive, “esteemed” is more positive, and it would make sense that the candidate is respected and admired if he/she has many endorsements. Therefore, “esteemed” fits best in the blank.
4. **Answer choice (D) is correct.** The phrase “change of pace” tells us that the second part of the sentence should be the opposite of the first part. The first part of the sentence said Danny had a long, boring week because he was stuck at home with the flu, so the second part of the sentence should say something similar to Danny made fun plans with his friends. “Exciting” is the only positive word in the answer choices, and it means thrilling, so “exciting” fits best in the blank.
5. **Answer choice (A) is correct.** The word in the blank should describe Dane’s ability to use the same shooting form to sink free throws over and over again. “Consistent” means acting or done in the same way over time, so “consistent” fits best in the blank.
6. **Answer choice (C) is correct.** The word “despite” tells us the second part of the sentence should be the opposite of the first part. The first part says that turmeric, curry, and saffron have the same hue, or color, so the second part of the sentence should say the three spices have different flavors. “Distinct” means different or easily distinguishable, so “distinct” fits best in the blank.
7. **Answer choice (D) is correct.** The sentence says that if a patient is bleeding, deadly diseases can be transmitted through bodily fluids. Since most people do not want deadly diseases transmitted to them, it would make sense to say that it is extremely important to wear rubber gloves if a patient is bleeding so you lower your risk of contracting deadly diseases. The word “imperative” means critical or extremely important, so “imperative” fits best in the blank.

8. **Answer choice (C) is correct.** The word “though” tells us the first part of the sentence should be the opposite of the second part. The second part says that Ana’s employer made her stay home from work, so the first part should say something similar to Ana’s symptoms were not severe enough to stay home from work. The word “mild” means not severe, so “mild” fits best in the blank.
9. **Answer choice (D) is correct.** The word “also” tells us that the first part of the sentence should be similar to the second part. The second part says that dung beetles also suffer, which is negative, so the word in the blank should also be negative. “Detrimental,” which means harmful, is the only word in the answer choices that is negative in this context, so “detrimental” fits best in the blank.
10. **Answer choice (A) is correct.** The second part of the sentence says Stephen always shows up to class on time and was well prepared, so the word in the blank should be an adjective that describes these qualities. “Punctual” means prompt or on time, so “punctual” fits best in the blank.
11. **Answer choice (C) is correct.** The word in the blank must be an adjective that describes a singer who charms the crowd with sidelong glances and intriguing interludes. The words “charming” and “intriguing” are both positive, so the word in the blank should be positive. “Dullness” and “antipathy” are negative, so answer choices (A) and (B) are incorrect. “Mystique” means an aura of mystery, awe, and charm, and “bravado” means boldness. Since “mystique” means having charm or mystery, and the sentence says the singer was charming and intriguing, “mystique” fits best in the blank.
12. **Answer choice (B) is correct.** The sentence says that “to keep track of the many demands and deadlines of his job” Rupert does something with daily alarms to keep himself on track. If Rupert dismissed, or turned off, the alarms, they would not help him stay on track, so answer choice (A) is incorrect. “Synchronize” means cause to occur at the same time. If Rupert synchronized his alarms, they would all go off at the same time, which would not help him remember to complete multiple tasks, so answer choice (C) is incorrect. “Concocts” means to make something by combining different ingredients, or to create or devise a story or plan. It does not make sense to concoct daily alarms, so answer choice (D) is incorrect. “Utilizes” means use, and it would make sense that Rupert uses daily alarms to keep himself on track, so “utilizes” fits best in the blank.
13. **Answer choice (B) is correct.** The sentence says the employees were shocked at what happened in the grocery store before the blizzard because they had experienced weeks of slow business. Therefore, the word in the blank should be the opposite of slow business. “Havoc” means chaos, which would be caused by crowds of people at the grocery store trying to stock up on food and supplies before the blizzard. Since crowds of people is the opposite of slow business, “havoc” fits best in the sentence.
14. **Answer choice (B) is correct.** The word in the blank should be an adjective that describes the actor’s ability to open up about his personal struggles with mental health, something that a lot of people are not comfortable being honest and open about. The word “candor” means being open and honest, so “candor” fits best in the blank.

15. **Answer choice (A) is correct.** The word “disappointment” tells us that the word in the blank should be negative. “Everlasting love” and “alluring love” are both positive, so answer choices (B) and (C) are incorrect. “Understated” means subtle. While “understated love” is not necessarily positive, it is not very negative. On the other hand, “unrequited love” means love that is not reciprocated, which is negative: you love someone and they don’t love you back. This would be very disappointing, so “unrequited” fits best in the blank.
16. **Answer choice (D) is correct.** The words “painstakingly” and “intricate” tell us that the word in the blank should mean something similar to complicated. The word “elaborate” means detailed and complicated in design and planning, so “elaborate” fits best in the blank.
17. **Answer choice (C) is correct.** The word “surprisingly” tells us that the word in the blank should be surprising given that Ariel was new to Tae Kwon Do. If you are new at a sport, it would be surprising if you were really talented or skilled at the sport. The word “adept” means skilled, so “adept” fits best in the blank.
18. **Answer choice (D) is correct.** The phrase “did not need” tells us that the word in the blank should be an adjective describing unnecessary purchases. The phrase “frivolous purchase” means a purchase that you don’t need, so “frivolous” works best in the blank.
19. **Answer choice (D) is correct.** The sentence says Kombucha achieves something from a second round of fermentation, which creates bubbles. Therefore, the first part of the sentence should say something similar to, “Kombucha achieves its bubbiness.” The word “effervescent” means bubbles in a liquid, so “effervescence” fits best in the blank.
20. **Answer choice (A) is correct.** The sentence says that the accordion player was elderly and he was surprisingly something. It then says he maintained an upbeat tempo and quick two-step dance for his entire performance. Therefore, the word in the blank has to be a surprising way to describe an elderly musician, and has to describe maintaining an upbeat tempo and dance. The word “spry” means active and lively, especially of an old person, so “spry” fits best in the blank.

### **Sentence Completion Practice Set 3**

1. **Answer choice (D) is correct.** The word in the blank should be an adjective that describes forming lifelong friendships and mourning the death of their loved ones. The phrase “intimate relationship” means a very close and personal relationship. If elephants form lifelong friendships and mourn the death of their loved ones, then they must have close and personal relationships with each other. Therefore, “intimate” fits best in the blank.
2. **Answer choice (B) is correct.** The word “while” tells us that the first part of the sentence should be the opposite of the second part. The second part says that Mrs. Diaz was prepared to give a concession speech. A concession speech is a speech given when you lose an election, so the first part of the sentence should say that Mrs. Diaz was sure that she would win the election. The word “triumphant” means victorious, so “triumphant” fits best in the blank.

3. **Answer choice (B) is correct.** The first part of the sentence should be the reason the patient refused to take the medication prescribed by her doctor. The word “credibility” means trustworthiness, integrity, or reliability. If a patient doubts that their doctor is trustworthy, reliable, and has integrity, it would make sense that he/she will not want to take the doctor’s advice and take the prescribed medication. Therefore, “credibility” fits best in the blank.
4. **Answer choice (D) is correct.** The word “but” tells us that the first part of the sentence should be the opposite of the second part. The second part of the sentence says that the narrator’s real estate agent says it is the right time to purchase a house, so the first part of the sentence should say that many individuals don’t feel like it’s the right time to purchase a house. The word “apprehensive” means worried. If people are worried about buying a home in this market, they are unsure if it is the right time to buy a home, so “apprehensive” fits best in the blank.
5. **Answer choice (A) is correct.** The phrase “even though” tells us that the second part of the sentence should be the opposite of the first part. The first part of the sentence says Jack felt nervous before his piano solo, so the second part of the sentence should say something similar to Jack’s routine felt easy because he had been practicing for weeks. The word “effortless” means easy or without effort, so “effortless” fits best in the blank. You could also eliminate answer choices (B), (C), and (D) because they are negative. Since the first part of the sentence says Jack is nervous, which is negative, and the second part of the sentence must be the opposite, the second part must be positive.
6. **Answer choice (C) is correct.** The sentence says the mosaic appeared like a rainbow from afar, so the word in the blank should be a word that would describe the appearance of a rainbow. “Spiritless” means lifeless, “disorienting” means causing a sense of confusion, and “compelling” means complicated or detailed. These are not ways to describe the appearance of a rainbow, so answer choices (A), (B), and (D) are incorrect. The word “vibrant” means bright and colorful, which is a way to describe the appearance of a rainbow, so “vibrant” fits best in the blank.
7. **Answer choice (C) is correct.** The sentence says that when the rainfall is a certain way, Main Street becomes flooded. Therefore, the word in the blank needs to describe a type of rainfall that would cause flooding. “Torrential rainfall” describes a large amount of rain that is falling quickly, which could cause a flood, so “torrential” fits best in the blank.
8. **Answer choice (B) is correct.** The word “despite” tells us that the second part of the sentence should be the opposite of the first part. The first part of the sentence says the forecast predicted intense sun, so the second part should say that Jakob didn’t put on sunscreen. The phrase “neglected to” means failed to do something, so “neglected” fits best in the blank.
9. **Answer choice (C) is correct.** The word in the blank should be an adjective used to describe spending hours entering data into a spreadsheet. Entering data into a spreadsheet is most likely repetitive and boring. The word “tedious” means tiresome and monotonous, so “tedious” fits best in the blank. “Lucrative” means producing a large amount of profit, but there is no indication that Angela makes a lot of money from her job, so answer choice (A) is incorrect. “Needless” means



unnecessary, but since it is Angela’s job to enter data into a spreadsheet, it must be necessary, so answer choice (B) is incorrect. “Perplexing” means confusing, but the second part of the sentence says “simply,” so we know Angela’s job is simple, not confusing. Therefore, answer choice (D) is incorrect.

10. **Answer choice (A) is correct.** The phrase “even though” tells us that the second part of the sentence should be the opposite of the first. The first part of the sentence says it has been raining for the past three days. If it had been raining for three days, you would expect a soccer tournament to be canceled, so the second part of the sentence should be the opposite of that: Missy felt hopeful that her tournament would not be canceled. The word “optimistic” means hopeful, so “optimistic” fits best in the blank.
11. **Answer choice (A) is correct.** The sentence says that Frederick Eugene Ives patented more than 70 inventions, so the word in the blank should be a way to describe someone who is inventive. The word “pioneer” means someone who is the first to do something. If you invent something, you are the first to create that thing, so it would make sense to say Frederick Eugene Ives was a “pioneer” of color photography. Therefore, “pioneer” fits best in the blank.
12. **Answer choice (C) is correct.** The sentence says that a certain type of plants are a great way for people to decorate their homes without having to deal with live plants. Therefore, the word in the blank should describe the opposite of live plants. “Artificial plants” are fake plants, so “artificial” fits best in the blank.
13. **Answer choice (D) is correct.** The word “since” tells us that the second part of the sentence should be a result of the first part. Anthony’s daughter had a passion for science, so it would not make sense that he was “disheartened” or sad when she was accepted into a graduate physics program. Therefore, answer choice (A) is incorrect. There is no indication that Anthony is “envious” or jealous of his daughter getting into the program, so answer choice (B) is incorrect. Anthony’s daughter had a passion for science, so Anthony would not be “shocked” that she got accepted into a graduate physics program. Therefore, answer choice (C) is incorrect. “Elated” means very happy. It would make sense that if Anthony’s daughter loved science, he would be very happy that she was able to study physics in graduate school, so “elated” fits best in the blank.
14. **Answer choice (C) is correct.** The word “since” tells us that the first part of the sentence should be a result of the second part. Wedding planners are in charge of organizing dozens of different events, so it would make sense that they need to be able to manage their time well. Therefore, time management is probably a required or “requisite” skill for wedding planners to have, so “requisite” fits best in the blank.
15. **Answer choice (D) is correct.** The word “so” tells us that the second part of the sentence is a result of the first. The second part of the sentence says Macy’s mom ordered extra pizza. If Macy’s mom ordered extra pizza, it is probably because Macy did not order enough food. The word “inadequate” means insufficient or not enough, so “inadequate” fits best in the blank.

16. **Answer choice (B) is correct.** The word “but” tells us that the first part of the sentence should be the opposite of the second. The second part of the sentence says you can make the process of remodeling your house more manageable by asking your friends and family for help, so the first part of the sentence should say that remodeling your home by yourself can seem like an unmanageable or challenging task. The word “daunting” means seeming difficult, so “daunting” fits best in the blank.
17. **Answer choice (A) is correct.** The word in the blank should describe the fact that the company bought themselves at least three more months. Since the company bought themselves at least three more months, they delayed bankruptcy. “Forestall” means to prevent, hinder, or delay something from happening, so “forestall” fits best in the blank.
18. **Answer choice (B) is correct.** The second part of the sentence says a giant dark cloud was moving towards us. If a giant dark cloud is moving towards you, you would expect a storm to be approaching. Therefore, the word in the blank should mean approaching. “Imminent” means about to happen or approaching, so “imminent” fits best in the blank.
19. **Answer choice (D) is correct.** The word in the blank should be an adjective used to describe someone who spends their free time volunteering. “Benevolent” means kind and charitable, so “benevolent” fits best in the blank.
20. **Answer choice (D) is correct.** The first part of the sentence says Julie’s English teacher gave her a suggestion because taking notes will help her better retain the information. Therefore, the word in the blank must mean something similar to “taking notes.” “Annotate” means to add notes to something, usually a text, so “annotate” fits best in the blank.

#### **Sentence Completion Practice Set 4**

1. **Answer choice (D) is correct.** The word “because” tells us that the second part of the sentence should be a result of the first. Josiah putting his phone on silent and sitting in a quiet room would probably help him stay focused while completing his homework, so the first part of the sentence should say that Josiah is often easily not focused, or distracted. Therefore, “distracted” fits best in the blank.
2. **Answer choice (C) is correct.** The word “despite” tells us that the first part of the sentence should be the opposite of the second part. The second part says Amy dazzled the crowd with her energy, so the first part of the sentence should say that Amy lacked energy or felt tired from staying up all night. The word “enervated” means drained of energy, so “enervated” fits best in the blank.
3. **Answer choice (D) is correct.** The word in the blank should be an adjective describing someone who believes anything, no matter how outlandish or crazy it is. The word “gullible” means easily persuaded to believe something, so “gullible” fits best in the sentence.

4. **Answer choice (B) is correct.** The word in the blank should mean replacing the carpet and repainting the walls in a house. “Renovate” means to restore or upgrade something. Replacing the carpet and repainting the walls in a house both upgrade the house, so “renovate” fits best in the blank.
5. **Answer choice (C) is correct.** The second part of the sentence says he was unsure of whether to enter his sister's room, so the first part of the sentence must be saying that he hesitated and stopped before entering the room. This means he stopped at the doorway of the room. “Threshold” means the bottom of a doorway, so “threshold” fits best in the sentence.
6. **Answer choice (A) is correct.** The fact that Sasha’s friends are envious tells us that the word in the blank is positive, so we can eliminate answer choices (C) and (D) because “flustered” and “anxious” are negative. The word “despite” tells us that the part of the sentence before “despite” should be the opposite of the part of the sentence after “despite.” The end of the sentence says “despite her nerves,” so the part of the sentence before “despite” should be an adjective used to describe someone who is not nervous. The word “poised” means calm and composed, so “poised” fits best in the blank.
7. **Answer choice (A) is correct.** The sentence says Melinda typically enjoyed spending her evenings alone, but she diverted from her usual habits. Therefore, the word in the blank should be an adjective describing someone who likes to spend time alone. The word “introverted” is used to describe someone who prefers spending time alone, so “introverted” fits best in the blank.
8. **Answer choice (B) is correct.** The word “because” tells us that the first part of the sentence is a result of the second part. The first part of the sentence says Davia was unable to afford the movie, which would be a result of not having enough money. Therefore, the second part of the sentence should say that Davia had already spent or used up her monthly entertainment budget. “Surpassed” means exceeded, so “surpassed” fits best in the blank.
9. **Answer choice (B) is correct.** The word in the blank should be an adjective describing someone who lacks motivation and is unwilling to take initiative. “Lackadaisical” means lacking enthusiasm or carelessly lazy, so “lackadaisical” fits best in the blank.
10. **Answer choice (D) is correct.** The end of the sentence says that Doreen is ready to move to Boca Raton and spend her days playing pickleball instead of working. Therefore, the middle of the sentence should say that Doreen was ready to not work anymore. “Retired” means leaving one’s job and no longer working, so “retired” fits best in the blank.
11. **Answer choice (C) is correct.** The second part of the sentence says Mr. Davis found a group of students cheering loudly and having a dance battle, so the word in the blank should be a word that describes loud noise. “Commotion” means noisy disturbance, so “commotion” fits best in the blank.
12. **Answer choice (C) is correct.** The sentence says Rob rarely gets upset and stays calm during disagreements, so the word in the blank should be an adjective describing a calm person. “Mellow” means easygoing and gentle, so “mellow” fits best in the blank.

13. **Answer choice (A) is correct.** The phrase “in light of” tells us that the second part of the sentence should be a result of the first. The first part of the sentence says Ellie lost her job. If you lose your job, you probably do not want to spend money to go on vacation. Therefore, the word in the blank should mean that Ellie canceled or delayed the vacation she was planning on taking. “Postpone” means put off or delay, so “postpone” works best in the blank.
14. **Answer choice (A) is correct.** The word in the blank should describe a feeling that would be the result of being asked to sit quietly for hours for an appointment. Most people would feel negatively if they had to sit for hours for an appointment, so we can eliminate answer choices (B) “empowered” and (C) “curious” because they are not negative. While “fearful” is negative, you would not be scared if you were asked to wait for hours for an appointment, so we can eliminate answer choice (D). We are left with answer choice (A), “irked”, which means annoyed. It would make sense that waiting for several hours would annoy someone, so “irked” fits best in the sentence.
15. **Answer choice (D) is correct.** The word “since” tells us that the first part of the sentence should be a result of the second part. The first part sentence says it was difficult to tell the signatures apart, so the second part should say something similar to the signatures were nearly identical. The word “indistinguishable” means unable to tell the difference between two or more things, so “indistinguishable” fits best in the blank.
16. **Answer choice (B) is correct.** The word “after” tells us that the second part of the sentence is the result of the first part. The second part says Molly’s lungs were burning, and her heart was pounding rapidly, which would be the result of intense exercise. Therefore, the word in the blank should mean intense. “Vigorous” means involving a lot of strength or energy, so “vigorous” fits best in the blank.
17. **Answer choice (D) is correct.** The word “despite” tells us that the second part of the sentence should be the opposite of the first part or surprising based on the first part. The first part of the sentence says St. Paul is the capital of Minnesota. The end of the sentence says Minneapolis reported more residents than St. Paul, so the middle of the sentence is saying that although people might expect that St. Paul has a larger population than other Minnesota cities since it is the capital, it does not. The phrase “most populated” means having the highest population, so “populated” fits best in the blank.
18. **Answer choice (B) is correct.** The word in the blank should be a verb that means helping soil produce a large amount of crops or vegetables. “Fertilize” means to make soil more productive by adding something to it, such as manure and compost. Therefore, “fertilize” fits best in the blank.
19. **Answer choice (A) is correct.** The word “so” tells us that the second part of the sentence is a result of the first. The second part of the sentence says Leslie courageously asked her crush to be her date to the dance. The word “courageously” tells us that the word in the blank should describe Leslie feeling courageous or brave. “Emboldened” means feeling courageous or confident, so “emboldened” fits best in the blank.
20. **Answer choice (A) is correct.** The sentence says that Professor Schultz studied tropical botany for decades and researched plants in the Manú Rainforest, so we can assume that Professor Schultz is

very knowledgeable when it comes to Amazonian flora. Therefore, the word in the blank should be positive, so we can eliminate answer choice (B) “meekness” and answer choice (C) “naivety” because these are negative. While “charisma” is positive, it means charming and does not describe how knowledgeable Professor Schultz is, so answer choice (D) is incorrect. “Spoke with authority” means Professor Schultz spoke with confidence and conviction, which would make sense since he is so knowledgeable, so “authority” fits best in the blank.

### **Sentence Completion Practice Set 5**

1. **Answer choice (A) is correct.** The sentence said the roads through the barren, rural landscape were easier to drive on than the heavily-trafficked streets, so the word in the blank should mean the opposite of heavily trafficked. “Desolate” means deserted or empty, so “desolate” is the opposite of heavily trafficked. Therefore, “desolate” fits best in the blank.
2. **Answer choice (C) is correct.** The word in the blank should be an adjective relating to the fact that the hikers used their dirty fingers to share food, so the word in the blank should mean something similar to dirty. “Unhygienic” means not clean or not sanitary, so “unhygienic” fits best in the blank.
3. **Answer choice (B) is correct.** The sentence says Raymond was glad to have a week to relax after having a summer filled with lacrosse practice, summer school, and helping his parents remodel their house. The second part of the sentence tells us that Raymond had a busy summer, so it would make sense that he would want to relax. Therefore, the word in the blank should mean something similar to busy. “Hectic” means extremely busy, so “hectic” fits best in the blank.
4. **Answer choice (B) is correct.** The word “but” tells us that the first part of the sentence should be the opposite of the second part. The second part of the sentence says that right now, the narrator does not have the time to take care of a child. Therefore, the first part of the sentence should say something similar to the narrator would be open to or wouldn’t be against having a child later in life. The phrase “wouldn’t be opposed to” means wouldn’t be against, so “opposed” fits best in the blank.
5. **Answer choice (D) is correct.** The word “or” tells us that the first part of the sentence should be the opposite of the second. The second part of the sentence asks if the question was an invitation for the narrator to speak, so the word in the blank should describe a question that is not meant to be answered. “Rhetorical” refers to a question that is not meant to be answered, so “rhetorical” fits best in the blank.
6. **Answer choice (D) is correct.** The word “disappointed” tells us that the phrase “had not always ----- the law” should have a negative connotation. If Wren had not always “violated” the law or had not always “questioned” the law, his parents would not be disappointed because not violating the law and not questioning the law are good things. Therefore, answer choices (A) and (C) are incorrect. While it is not a good thing to not “understand” the law, it is a worse thing to not “obey” the law, so “obeyed” fits better in the sentence than “understood.”

7. **Answer choice (B) is correct.** The word “however” tells us that the second part of the sentence should be the opposite of the first. The first part of the sentence says Pam was convinced she saw a small lake, so the second part of the sentence should say that Pam didn’t actually see a lake. The word “mirage” is an optical illusion caused by atmospheric conditions. Therefore, “mirage” fits best in the sentence because the sentence is saying that although Pam was convinced she saw a lake, it turned out to be an illusion.
8. **Answer choice (C) is correct.** The second part of the sentence says that Mexico supplies forty-five percent of the international avocado market, so the first part of the sentence should say that Mexico is one of the leading suppliers of avocados. “Exporters” are people or countries that supply goods or services to other countries, so “exporters” fits best in the blank.
9. **Answer choice (C) is correct.** For this question, it’s best to use process of elimination. “Integrate” means combine, so it wouldn’t make sense to say “before we integrate to the next lesson,” so answer choice (B) is incorrect. “Retreat” means go backwards. Since the sentence says they are going to the next lesson, it wouldn’t make sense to say they are retreating to the next lesson, so answer choice (D) is incorrect. We are down to choice (A) and (C). “Consent” means to agree to something and “advance” means to go forward. While you could say, “Before we agree to the next lesson, I want to make sure my students have a firm grasp of the concepts we’ve learned so far,” it makes more sense to say, “before we go forward to the next lesson, I want to make sure my students have a firm grasp of the concepts we’ve learned so far.” Therefore, “advance” fits best in the blank.
10. **Answer choice (A) is correct.** The word “because” tells us that the second part of the sentence is a result of the first. The first part of the sentence says there is poor ventilation in the basement. Poor ventilation means that not a lot of air is flowing through the basement, so the air will not be fresh and will probably be damp. The word “musty” means damp and stale, so “musty” fits best in the blank.
11. **Answer choice (D) is correct.** The word “while” tells us that the second part of the sentence should be the opposite of the first part. The first part of the sentence says American brides traditionally wear white, so the second part of the sentence should say that in some Eastern countries, it is traditional for brides to not wear white, but instead wear red. Therefore, the word in the blank should be similar to “traditional.” “Customary” means traditional, so “customary” fits best in the blank.
12. **Answer choice (B) is correct.** The sentence says the tournament is for poker players who have never participated in a professional competition, so the word in the blank should describe people who do not have professional poker experience. Therefore, answer choice (A) is incorrect because “veteran” means having a lot of experience. The word “novice” means beginner or not having a lot of experience, so “novice” fits best in the blank.
13. **Answer choice (C) is correct.** The sentence says the narrator trusts Sally and feels comfortable confiding in her. Therefore, the word in the blank should be positive and should describe someone that you feel comfortable sharing personal information with. “Antagonist” and “gossiper” are negative, so answer choices (A) and (B) are incorrect. An “acquaintance” is a person you know

slightly, and a “confidant” is a person you trust with your secrets. Therefore, “confidant” fits best in the blank.

14. **Answer choice (A) is correct.** The sentence says that because the summers in Phoenix are so -----, some days it’s dangerous to be outside between 12:00 pm and 4:00 pm. Since it’s dangerous to be outside because of the summer weather, we can assume the word in the blank is negative. Therefore, we can eliminate answer choice (B) “temperate” and answer choice (C) “bearable” because those are not negative. While “unpredictable” weather could be annoying, it would not prevent you from being outside, so answer choice (D) is incorrect. “Scorching” means extremely hot. If the weather is extremely hot, it would be dangerous to be outside because you could get severely sunburned or have a heatstroke, so “scorching” fits best in the blank.
15. **Answer choice (C) is correct.** The second part of the sentence says the teacher imposes more lenient consequences for boys than he does for girls. This is unfair because teachers should not change their consequences based on gender. Therefore, the word in the blank should mean “unfair.” “Biased” means unfairly prejudiced, so “biased” fits best in the blank.
16. **Answer choice (D) is correct.** The phrase “in an effort to” tells us that the second part of the sentence is a way to accomplish the first part of the sentence. The first part of the sentence says to try and help low-income families save money, so the second part must mean something that would help low-income families save money. The word “subsidize” means to pay part of the cost of something, so if the state subsidizes housing for families, they are paying for part of housing, which helps the families save money. Therefore, “subsidizes” fits best in the blank.
17. **Answer choice (A) is correct.** The second part of the sentence says Lydia broke the narrator’s trust by sharing his/her secrets. Therefore, the word in the blank must mean the narrator shared his/her secrets with Lydia with the expectation that Lydia would not repeat them. “Confided” means to tell your secret to someone in a private way while trusting them not to share it, so “confided” fits best in the blank.
18. **Answer choice (A) is correct.** The second part of the sentence is a result of Lucy having not eaten all day. Since Lucy hadn’t eaten all day, she would be starving, so she probably ate her entire meal quickly. The word “devoured” means ate greedily or quickly, so “devoured” fits best in the blank.
19. **Answer choice (B) is correct.** The second part of the sentence tells us that the person who Chris is determined to beat has previously beaten him three times in a row. Therefore, the person he is trying to beat is someone who he has competed with before. The word “adversary” means an opponent, so “adversary” fits best in the blank.
20. **Answer choice (D) is correct.** The word “although” tells us that the first part of the sentence should be the opposite of the second or something that is unexpected based on the second part. The second part of the sentence says Gary was expelled for cheating. The end of the sentence says that Gary was expelled for his mistake. From this, we can assume that Gary made a mistake and accidentally cheated, which is why it would be unexpected that he got expelled. “Deliberately” means

intentionally, so saying “Gary did not deliberately plagiarize” means he accidentally plagiarized. Therefore, “deliberately” fits best in the blank.

### **Sentence Completion Practice Set 6**

1. **Answer choice (C) is correct.** The word “because” tells us that the word in the blank should describe the brightly colored ribbons that adorned Dr. Rickard’s office. Brightly colored ribbons are over the top and showy. “Gaudy” means extravagantly bright or showy, so “gaudy” fits best in the blank.
2. **Answer choice (C) is correct.** The second part of the sentence says that Maddie was going to pass the class regardless of what she scored on her final exam, which means that it didn’t matter what Maddie scored on her final exam. Therefore, the word in the blank should mean “unimportant” or should describe something that doesn’t matter. “Irrelevant” means insignificant, so “irrelevant” fits best in the blank.
3. **Answer choice (B) is correct.** The sentence says that Maxine felt a certain way after her daughter bullied another child, and she couldn’t show her face to any of the other parents. When people don’t want to show their face, it’s typically because they are embarrassed. It would also make sense that Maxine was embarrassed that her daughter bullied another child. The word “mortified” means very embarrassed or ashamed, so “mortified” fits best in the blank.
4. **Answer choice (A) is correct.** The sentence says that the supervisor’s tone made the narrator feel patronized, so the tone must have been patronizing or belittling. The word “condescending” means patronizing, so “condescending” fits best in the blank.
5. **Answer choice (D) is correct.** The sentence says that Mason was confident in his abilities to do something to his wireless speakers because he had previously fixed his broken television. Therefore, we can assume that since he had previously fixed his television, Mason was confident that he could fix his wireless speakers. “Repair” means fix, so “repair” fits best in the blank.
6. **Answer choice (C) is correct.** The word “because” tells us that the second part of the sentence should be a result of the first. The first part of the sentence says that innovation and problem solving are needed to overcome everyday issues, so the second part of the sentence should say that thinking involving innovation and problem solving is an important skill. “Creative thinking” is thinking that involves coming up with innovative solutions to problems, so “creative” fits best in the blank.
7. **Answer choice (C) is correct.** The end of the sentence gives an example of the word in the blank, saying that the track star’s favorite ----- was her tri-county medal from last year. A medal is an example of an award, so the word in the blank must mean award. “Accolades” are awards, so “accolades” fits best in the blank.
8. **Answer choice (D) is correct.** The sentence says to make sure the cut is no more than six inches in length, so we can assume the word in the blank means cut. “Incision” means cut, so “incision” fits best in the blank.



9. **Answer choice (A) is correct.** Anesthesia is administered to patients before surgeries that puts them in a sleep-like state so they don't feel pain. The sentence says that the anesthesia administered to patients can leave them feeling ----- and confused. Since the patients were in a sleep-like state, and the sentence says they can be left feeling confused, we can assume the word in the blank is similar to confused. "Disoriented" means having lost one's sense of direction, so "disoriented" fits best in the blank.
10. **Answer choice (D) is correct.** The word "because" tells us that the reason Mia likes living in ----- areas is because she doesn't mind crowded streets and likes to be able to easily walk places. Therefore, the word in the blank must describe a type of area that is walkable and crowded. "Urban" refers to cities, which are easily walkable and crowded, so "urban" fits best in the blank.
11. **Answer choice (A) is correct.** The end of the sentence said Anna was unsure of what choice to make, so the word in the blank should be a verb that describes being unsure. "Wavered" means going back and forth, which makes sense in the sentence because if Anna is unsure of whether or not she should take her dream job, she is probably going back and forth deciding if she wants to stay near family or follow her dreams. Therefore, "wavered" fits best in the blank.
12. **Answer choice (D) is correct.** Landed hadn't eaten or slept in days, so it would make sense that he is hungry and tired. The word "weary" means tired or worn out, so "weary" fits best in the blank.
13. **Answer choice (B) is correct.** The word "despite" tells us that the second part of the sentence should be the opposite of the first part or that the second part wouldn't be expected based on the first part. Since Charlie only recently started studying Spanish, it wouldn't be unexpected he would be able to speak Spanish clearly and well during his first presentation. "Articulate" means the ability to speak fluently and clearly, so "articulate" fits best in the sentence.
14. **Answer choice (B) is correct.** The sentence says that the principal hands out awards to two students. Awards are presented when you achieve something or do something well, so the word in the blank should be positive. The words "mock" and "distort" are negative, and the word "improvise" is neutral. The word "exemplify" means to be an example of something, so "exemplify the quality of a good leader" is positive. Therefore, "exemplify" fits best in the sentence.
15. **Answer choice (B) is correct.** The word "but" tells us that the first part of the sentence is the opposite of the second part. The second part of the sentence says that Mr. Hanson is worried that his marital problem could lead to a divorce, so Mr. Hanson clearly believes their issues are important or significant. This means Mr. Hanson's wife believes the opposite: their marital problems are unimportant. "Trivial" means unimportant or insignificant, so "trivial" fits best in the blank.
16. **Answer choice (B) is correct.** The documents were arranged in order of date, starting with those written in 2010 and ending with those written in 2020. Therefore, the word in the blank should mean in order of date. "Chronologically" means in order of which events occurred, so "chronologically" fits best in the blank.

17. **Answer choice (D) is correct.** The word “because” tells us that the second part of the sentence is a result of the first part. The second part of the sentence tells us the narrator starts every morning with a ritual. Therefore, the narrator likes rituals or structure, so he/she probably gets overwhelmed by lack of structure or consistency. “Routine” means a consistent action or program, similar to a ritual, so “routine” fits best in the blank.
18. **Answer choice (D) is correct.** The word “unlike” tells us that Liam is the opposite of his brother. Since Liam made careless mistakes on his homework, his brother must be careful when it comes to schoolwork. The word “meticulous” means showing great attention to detail, so “meticulous” fits best in the blank.
19. **Answer choice (C) is correct.** The word “after” tells us that the second part of the sentence is a result of the first part. The first part says that Coach Mason lost five games in a row, which is negative. Therefore, the second part of the sentence must be negative also. “Promoted” is positive and “escorted” is neutral, so answer choices (B) and (D) are incorrect. “Coerced” means persuaded to do something by force. Although this is negative, there is no indication that the team used force to make Coach Mason become the assistant coach, so answer choice (A) is incorrect. “Relegated” means dismissed to an inferior rank. Because Coach Mason was moved from coach to assistant coach, he was dismissed to an inferior rank or position, so “relegated” fits best in the blank.
20. **Answer choice (A) is correct.** The sentence says that Sarah’s ----- nature helped her make friends, so the word in the blank is an adjective used to describe people who can make friends easily. “Gregarious” means sociable, and sociable people can talk to people and make friends easily, so “gregarious” fits best in the blank.

### **Sentence Completion Practice Set 7**

1. **Answer choice (D) is correct.** The word “because” tells us that the first part of the sentence is a result of the second part. The second part of the sentence says certain chemicals have been shown to cause severe harm, so it would make sense that those chemicals would not be allowed to be used in the United States, in an effort to protect people. The word “prohibited” means banned or not allowed, so “prohibited” works best in the blank.
2. **Answer choice (C) is correct.** The first part of the sentence says the child finished working through the assigned problems, which tells us that the second part of the sentence should say the child looked up at the teacher awaiting further assignments or awaiting what the teacher wants the child to do next. “Instructions” are directions or information on what should be done next, so “instructions” fits best in the blank.
3. **Answer choice (C) is correct.** The word “after” tells us that the company was investigated as a result of numerous employees complaining about unfair treatment and harassment. Therefore, the company was investigated for treating its employees unfairly and harassing them, so they were investigated for something negative. The word “innovative” is positive and “unconventional” is neutral, so answer

choices (A) and (D) are incorrect. While “fraudulent,” which means dishonest, is negative, there is no indication that the company lied or was dishonest, so answer choice (B) is incorrect. “Abusive” means cruel or offensive, which describes harassment and unfair treatment, so “abusive” fits best in the blank.

4. **Answer choice (D) is correct.** The sentence says Ronald jumped at the chance to work on such a challenging project, so the word in the blank should be similar to “challenging.” “Complex” means complicated, so “complex” fits best in the blank.
5. **Answer choice (D) is correct.** The word in the blank should describe someone who calls out their teacher, even though he knew it would land him in detention. It is bold and brave to call out a teacher for being dishonest even though you know it will get you in trouble. “Audacious” means bold, so “audacious” fits best in the blank.
6. **Answer choice (B) is correct.** The sentence said Rachel was surprised because she had previously deposited thousands of dollars in her bank account. We can assume Rachel was surprised that she had limited or no money in her bank account since she had recently deposited a large amount of money. “Insufficient” means not enough, so “insufficient funds” means you don’t have enough money in your account to cover a certain transaction. Therefore, “insufficient” fits best in the blank.
7. **Answer choice (C) is correct.** If Katie has been tinkering with electronics and computers since she was five, we can assume she is interested in robotics. Therefore, she would be disappointed when she found out that her school doesn’t have a robotics team. The word “disheartened” means discouraged or saddened, so “disheartened” fits best in the blank.
8. **Answer choice (C) is correct.** The sentence says that Quincy forced his girlfriend to choose between him and her career. Therefore, the word in the blank has to mean a demand to choose between two things. An “ultimatum” is a demand for someone to make one decision or another, so “ultimatum” fits best in the blank.
9. **Answer choice (A) is correct.** The second part of the sentence describes the weather in the city as being sunny with clear skies one minute and then the next minute it’s pouring rain. From this, we can assume the weather shifts quickly, so the word in the blank should mean “changes quickly.” “Temperamental” means unpredictable or describes something that changes rapidly, so “temperamental” fits best in the blank.
10. **Answer choice (B) is correct.** The word “after” tells us that the odor Ben noticed in his apartment was a result of the dirty dishes he left in the sink for over a week. Since the dishes had been left in the sink for over a week, we can assume they produced a bad smelling odor. Therefore, the word in the blank must mean “bad smelling.” “Foul” means disgusting, so “foul” fits best in the blank.
11. **Answer choice (B) is correct.** Failing to respond to accusations of any kind as a politician, especially accusations of fraud, is going to be harmful to your campaign. Therefore, the word in the blank must be negative. “Advantage” and “promotion” are positive, and “consequence” is neutral, so answer

choices (A), (C), and (D) are incorrect. A “blunder” is a mistake, which is negative, so it fits best in the blank.

12. **Answer choice (A) is correct.** The word “after” tells us that Frank realized something about his hosts because of the luxury vehicles in their driveway. Luxury cars are very expensive, so we can assume Franklin realized his hosts were wealthier or richer than he had previously thought. “Affluent” means rich, so “affluent” fits best in the blank.
13. **Answer choice (C) is correct.** The phrase “even after” tells us that the second part of the sentence is surprising based on the first part. The second part of the sentence says Niko was unable to find the owners of the stray cat. This would be surprising if Niko had spent a long time putting up flyers, so the word in the blank should mean “many.” “Countless” means too many to be counted, or very many, so “countless” fits best in the blank.
14. **Answer choice (D) is correct.** Anthony found the jokes about his cat’s death, which is a serious issue, to be insensitive rather than funny, so the word in the blank must mean something similar to “insensitive.” “Facetious” means treating serious issues with inappropriate humor, so “facetious” fits best in the sentence.
15. **Answer choice (D) is correct.** The second part of the sentence says the essay covered basic subject matter that had been explored dozens of times. Therefore, the phrase “lacked -----” should mean lacks uniqueness and should refer to something that has been done many times. “Originality” means being novel or unusual, so “lacked originality” means lacked novelty. Therefore, “originality” fits best in the blank.
16. **Answer choice (C) is correct.** The sentence says the table continued to yell and disrupt people after being told to quiet down. Yelling and ignoring the request to quiet down are both negative, so the word in the blank should be negative. “Diplomatic” and “lively” are positive, so answer choices (B) and (D) are incorrect. “Oblivious” could be negative, but it means unaware of what is going on, so it would not make sense to use “oblivious” to describe a group of people who are loud. “Obnoxious” is negative and means extremely unpleasant, which is a way to describe people who are yelling and disturbing people, so “obnoxious” fits best in the blank.
17. **Answer choice (B) is correct.** The phrase “before they run out” tells us that the Earth’s resources are running out. Therefore, the word in the blank should mean decreasing. “Diminishing” means declining or decreasing, so “diminishing” fits best in the blank.
18. **Answer choice (A) is correct.** The word “because” tells us that Mrs. Rogers removed herself from the panel as a result of her daughter being in the pageant. If Mrs. Rogers is a judge at her own daughter’s beauty pageant, she may feel inclined to give her daughter a higher rating than other contestants. Therefore, Mrs. Rogers was probably worried that she would be unable to remain fair if she was on the panel for her daughter’s pageant. The word “impartial” means fair or unbiased, so “impartial” fits best in the blank.

19. **Answer choice (A) is correct.** Abigail did not want her boss to find out that she was working on her side hustle during work, so she was probably working in a secretive way. Therefore, the word in the blank should mean secretive. “Surreptitious” means kept secret, especially because it would not be approved of, so “surreptitious” fits best in the blank.
20. **Answer choice (B) is correct.** The sentence says that the track star’s fans lost trust in her and doubted her abilities, which are both negative things. Therefore, the word in the blank must be negative. “Expedited” and “commended” are positive, so answer choices (A) and (D) are incorrect. “Deterred” means discouraged, which does not make sense in the sentence: you would not say a reputation was “discouraged” by cheating, so answer choice (C) is incorrect. “Tainted” means tarnished or harmed, so “tainted” fits best in the sentence.

### **Sentence Completion Practice Set 8**

1. **Answer choice (B) is correct.** The phrase “in an effort to” tells us that the type of meals Edgar eats will help him live a healthy and long life. Therefore, we can assume the word in the blank means something similar to “healthy” because eating healthy food will help you stay healthy and live longer. “Nutritious” means healthy, so “nutritious” fits best in the blank.
2. **Answer choice (D) is correct.** The “and” tells us that the first and second parts of the sentence go together. The second part of the sentence says “there is never a justification for using violence,” so the first part of the sentence should say that Martin’s behavior was not justifiable. “Inexcusable” refers to something that is so bad it cannot be excused or justified, so “inexcusable” fits best in the sentence.
3. **Answer choice (A) is correct.** The second part of the sentences says that the new variant infected thousands of people within a few days, so the word in the blank should mean infectious. “Contagious” means infectious or easily spreadable, so “contagious” fits best in the blank. While “deadly” seems like it may fit, the sentence does not indicate that the new variant was killing people, it only says it was infecting people.
4. **Answer choice (A) is correct.** Since the children were punished for entering the area behind the school, we can assume that the students were not supposed to be in the area. Answer choice (B) is incorrect because “immaculate” means perfectly clean or tidy, and it wouldn’t make sense that children would be punished for going into a clean or tidy area. Answer choice (C) is incorrect because public means accessible to everyone, so it wouldn’t make sense that children would be punished for going into a public area. A “secluded area” is an area that is concealed and isolated from other areas. A “restricted area” is an area that is off limits to certain people. It would make more sense that the children would be punished for entering a “restricted” area than a “secluded” area, so “restricted” fits best in the sentence. The fact that the children climbed under yellow caution tape, which is typically used to close off an area so people do not enter, also gives us a hint that “restricted” is the best word for the blank.
5. **Answer choice (D) is correct.** The word in the blank should describe the grandpa saying it’s important for people to go to sleep early but not actually taking his own advice and going to sleep at

2:00 am. “Hypocritical” is used to describe a person who says one thing but acts in a way that is contradictory or opposite. Therefore, “hypocritical” fits best in the blank.

6. **Answer choice (B) is correct.** If something cannot be seen with the naked eye, it is most likely very small. Therefore, skin cells, bacteria, and some types of algae are probably too small to be seen with the naked eye. “Microscopic” describes something so small it can only be seen with a microscope, so microscopic fits best in the blank.
7. **Answer choice (C) is correct.** The sentence says that Marilyn thought she was being ----- by telling her friends the truth, so we know the word in the blank has to relate to telling the truth. We also know that she realized she was being insensitive, so the word in the blank has to relate to accidentally being insensitive. “Frank” means telling the truth, even if it may hurt someone’s feelings, so “frank” fits best in the blank.
8. **Answer choice (B) is correct.** The phrase “even though” tells us that the first part of the sentence should be the opposite of the second part. The second part of the sentence says the band was recommended to Sarita by several friends, so we can assume her friends thought the band was talented. Therefore, Sarita must have thought they were not very talented, so the word in the blank must mean not very talented. “Mediocre” means average or not very good, so “mediocre” fits best in the blank.
9. **Answer choice (C) is correct.** The second part of the sentence says the river repeatedly snaked its way from one side of the valley to the other, so the word in the blank should mean something similar to snaking repeatedly. “Meandering” means following a winding course, so “meandering” fits best in the blank.
10. **Answer choice (D) is correct.** The sentence says Vanessa’s husband could barely understand what Vanessa was saying as she fell asleep, so the word in the blank should mean “not understandable.” “Incoherent” means unclear or hard to understand, so “incoherent” fits best in the blank.
11. **Answer choice (B) is correct.** The word “although” tells us that the second part of the sentence should be the opposite of the first part. The first part of the sentence says Roxy thought the email from her boss was legitimate, so the second part should say she realized the email was not legitimate. Therefore, the word in the blank should mean not legitimate. “Fraudulent” means deceitful or dishonest, and a “fraudulent email” is a scam, so “fraudulent” fits best in the blank.
12. **Answer choice (B) is correct.** The word “because” tells us that the second part of the sentence is a result of the first part. The second part of the sentence says that what used to take us eight hours to complete now only takes us two hours. Therefore, the process has become faster or more efficient, so the word in the blank should mean something similar to faster or efficient. “Streamlined” means to make something more efficient by using faster and more organized methods, so “streamlined” fits best in the blank.

13. **Answer choice (D) is correct.** The end of the sentence says the narrator was driving too fast to get a good look, so the narrator only caught a quick glimpse of the deer. Therefore, the word in the blank should mean something similar to quick. “Fleeting” means lasting for a short period of time, so “fleeting” fits best in the blank.
14. **Answer choice (A) is correct.** The second part of the sentence says that Maria’s mom used to cook hard-boiled eggs perfectly when she was a child, and this is where Maria’s ----- for hard-boiled eggs came from. Since the word “perfectly” is positive, we can assume the word in the blank is positive. “Disdain” is negative, and “ambivalence” and “inkling” are neutral, so we can eliminate answer choices (B), (C), and (D). “Penchant” is positive and means a strong liking for something, so “penchant” fits best in the blank.
15. **Answer choice (B) is correct.** The end of the sentence says the exam covered thirteen of the fifteen chapters the class had studied that semester, which means the exam covered a lot of materia. Therefore, the word in the blank should mean covering a lot of material. “Comprehensive” means complete or including nearly all aspects of something, so “comprehensive” fits best in the blank.
16. **Answer choice (D) is correct.** The first part of the sentence says the placement test should not be difficult, and the word “since” tells us the first part of the sentence is a result of the second part. Therefore, the second part of the sentence should say that the test only requires a basic or limited understanding of the material because most students would find it easy to have a basic understanding of something. “Rudimentary” means basic or introductory, so “rudimentary” fits best in the blank.
17. **Answer choice (C) is correct.** Since the narrator was frustrated, we know the word in the blank should be negative. We can eliminate answer choices (B) and (D) because “precise” and “coherent” are positive. The second part of the sentence says the narrator was frustrated because he didn’t have a thorough understanding of his symptoms or treatment plan, so we can assume the doctor’s explanation was not thorough. Therefore, the word in the blank should mean something similar to not thorough. “Curt” means rudely brief or short, so “curt” fits best in the blank.
18. **Answer choice (C) is correct.** The second part of the sentence says Mary was the first woman to throw three touchdowns in a Texas State Football Championship. Since most college football players are men, and Mary was the first woman to achieve three touchdowns in the championship game, we can assume Mary’s achievements are very impressive and inspiring for other women football players. Therefore, the word in the blank should describe something very impressive and something that is the first of its kind. “Revolutionary” means new and creating radical change, so “revolutionary” fits best in the blank.
19. **Answer choice (D) is correct.** The word “although” tells us that the second part of the sentence should be different than the first part. The first part says that over-the-counter pain medications do not cure the flu, and the second part says they do help ----- some of the symptoms. From this, we can assume that while these medications don’t cure the flu, they do help with and reduce some of the symptoms. Therefore, the word in the blank should mean help or reduce. “Alleviate” means make less severe, so “alleviate” fits best in the blank.

20. **Answer choice (D) is correct.** The word “and” tells us the first and second parts of the sentence should be similar. The second part of the sentence says Alicia was eager to learn and grow, so the word in the blank should mean something similar to eager. “Zeal” is enthusiasm and eagerness when pursuing something, so “zeal” fits best in the blank.

### **Sentence Completion Practice Set 9**

1. **Answer choice (B) is correct.** The sentence says that Carla changed her mind about following in her father’s footsteps after spending the summer growing vegetables and taking care of her family’s livestock. Therefore, her father must work in a field that involves growing vegetables and taking care of livestock. “Agriculture” is the practice of growing crops, raising livestock, and farming. Therefore, the word “agriculture” fits best in the blank.
2. **Answer choice (C) is correct.** The phrase “continued effort” tells us the word in the blank should mean something similar to putting in continued effort. “Consistent” means done in the same way over time, so a “consistent workout regime” means a workout routine that you do on a regular basis. Therefore, “consistent” fits best in the blank.
3. **Answer choice (A) is correct.** Since Mr. Wilson was surprised, we know that what his doctors told him must go against how Mr. Wilson felt. Mr. Wilson felt healthy and energized, which means he probably thought it would be safe for him to return home from the hospital. Therefore, the opposite of this is his doctors telling him that it would be harmful for him to leave the hospital, so the word in the blank should mean something similar to “harmful.” “Detrimental” means harmful, so “detrimental” fits best in the blank.
4. **Answer choice (C) is correct.** The sentence says that the mother’s speech brought up feelings of sorrow and sympathy from the audience, so the word in the blank should describe a speech that would make people emotional. “Facetious” means treating a serious issue with inappropriate humor, so answer choice (A) does not fit in the blank. “Oppressive” means harsh or brutal, so answer choice (B) does not fit in the blank. “Lighthearted” means amusing and entertaining, so answer choice (D) does not fit in the blank. “Heartfelt” means deeply sincere or expressive of deep feelings, so “heartfelt” fits best in the blank.
5. **Answer choice (A) is correct.** A detour is a different route taken to avoid something, such as an accident. Therefore, the word in the blank should mean “different.” “Alternate” means different or taking the place of, so “alternate” fits best in the blank.
6. **Answer choice (D) is correct.** The fact that Fernando was surprised when his dog was walking perfectly tells us that he was told something different. Since Fernando was pleasantly surprised, we know that what he was told was negative. “Treatable” is positive and “involuntary” is neutral, so answer choices (A) and (C) are incorrect. While “hideous” is negative, it describes something that is ugly, and the sentence does not indicate that Fernando was happy that his dog’s limp was not ugly. Therefore, answer choice (A) is incorrect. “Incurable” means unable to be cured. It makes sense that



Fernando would be pleasantly surprised if his dog’s seemingly incurable limp was cured in six months, so “incurable” fits best in the blank.

7. **Answer choice (B) is correct.** The child is described as talking during class, not paying attention, and disobeying his teacher, so the word in the blank must be negative. “Charismatic” means charming, which is positive, so answer choice (D) is incorrect. “Submissive” means conforming to authority, which can be positive or negative, but is the opposite of disobedient, so answer choice (A) is incorrect. “Disengaged” is negative and means emotionally detached or not interested. “Defiant” is negative and means resistant or uncooperative. Since “defiant” is more similar to disobedient than disengaged is, “defiant” fits best in the blank.
8. **Answer choice (A) is correct.** The sentence says the woman felt calm and relaxed by the lake, so the word in the blank should mean something similar to calmness or relaxation. “Tranquility” means quietness or peacefulness, so “tranquility” fits best in the blank.
9. **Answer choice (D) is correct.** The sentence says Kenya sleepwalks in a trance and wanders through the house without being conscious, so the word in the blank should describe how someone would walk if they were in a trance and unconscious, or unaware of what was going on. “Intentionally” means on purpose. People do not sleepwalk on purpose, so answer choice (A) is incorrect. “Hastily” means quickly. While people who sleepwalk may walk quickly, there is no indication that Kenya was walking quickly, so answer choice (B) is incorrect. “Precisely” means accurately, which wouldn’t be used to describe how someone sleepwalks, so answer choice (C) is incorrect. “Aimlessly” means without purpose or direction. Since sleepwalkers are unconscious, they are unaware of what they are doing, so it makes sense to say they are walking without a purpose or direction. Therefore, “aimlessly” fits best in the blank.
10. **Answer choice (B) is correct.** Working and taking care of children is tiring and difficult, especially if you are a single parent and are forced to do it by yourself. Therefore, the word in the blank should mean tiring and/or difficult. “Taxing” means physically or mentally demanding, so “taxing” fits best in the blank.
11. **Answer choice (D) is correct.** The second part of the sentence says Brielle’s grandfather told her stories about this life, so the word in the blank should mean personal stories. “Anecdotes” are personal stories, so “anecdotes” fit best in the blank. While “fables” are stories, they involve animals or characters. While a “memoir” is a personal account of someone’s life, it is written as an essay, book, or other type of writing.
12. **Answer choice (A) is correct.** The word “while” tells us the second part of the sentence should be the opposite of the first. The first part of the sentence says Hansel was not one to exaggerate, so the second part of the sentence should say that his statement about today’s football game was an exaggeration. “Hyperbole” means exaggeration, so “hyperbole” fits best in the blank.
13. **Answer choice (C) is correct.** The word “because” tells us that the word used to describe the birds is a result of them only living on St. James Island. Therefore, the word in the blank should be used to

describe animals that only live in one specific region. “Endemic” refers to plants or animals that are native or restricted to a certain place, so “endemic” fits best in the blank.

14. **Answer choice (B) is correct.** The word “but” tells us that the second part of the sentence should be the opposite of the first part or unexpected based on the first part. The second part of the sentence says Devin was determined to ruin his friend's life because his best friend framed him for a crime, so the second part of the sentence is saying Devin was determined to get revenge against his friend. Therefore, the first part of the sentence should say that Devin was not the type of person who sought revenge. “Vengeful” means seeking revenge, so “vengeful” fits best in the sentence.
15. **Answer choice (B) is correct.** The sentence says the narrator’s father has always emphasized the importance of expressing opinions confidently and directly, so we can assume the word in the blank means something similar to expressing your opinions confidently and directly. “Assertive” means showing confidence and speaking up for yourself, so “assertive” fits best in the blank.
16. **Answer choice (C) is correct.** The word “after” tells us the first part of the sentence is a result of the second part. The second part of the sentence says an investor plowed down all the trees in a forest, so the forest was left empty. Therefore, the word in the blank should mean empty. “Barren” means containing nothing, so “barren” fits best in the blank.
17. **Answer choice (B) is correct.** The sentence says Kim’s ----- helped her overcome obstacles, so the word in the blank should be a characteristic over people who are able to overcome obstacles. “Resilience” is the capacity to recover quickly from difficulties or challenges, so “resilience” fits best in the blank.
18. **Answer choice (D) is correct.** The crew realized it was going to be a long winter with little food, and “rations” means food, so the word in the blank must mean a limited amount of. “Scarce” means insufficient or in short supply, so “scarce” fits best in the blank.
19. **Answer choice (A) is correct.** Since Kai was frustrated with Lindsey’s attitude, we know the word in the blank must be negative. “Mysterious” is neutral and “tenacious” is positive, so answer choices (C) and (D) are incorrect.
20. **Answer choice (C) is correct.** Since the comedian felt discouraged and got booed off the stage, we know the word in the blank should be negative. “Commended” and “flattered” are both positive, so answer choices (A) and (D) are incorrect. While “tainted” is negative, it means tarnished, spoiled, or stained which doesn’t make sense in the context of this sentence, so answer choice (B) is incorrect. “Heckled” is negative and means to interrupt someone, usually a public speaker, with rude or abusive comments, so “heckled” fits best in the blank.

### **Sentence Completion Practice Set 10**

1. **Answer choice (D) is correct.** The second part of the sentence says some educators assume a student’s success in school is mainly based on their intelligence and motivation, which means these

educators don't believe an unstable home life has a significant impact on a child's academic importance. Therefore, the word in the blank should mean something similar to ignore, don't know, or downplay. "Underestimate" means to assume that something is less important than it is, so "underestimate" fits best in the blank.

2. **Answer choice (C) is correct.** The phrase "on the spot" gives us a hint as to what word should go in the blank. "Improvise" means to create something spontaneously, without preparation, so "improvise" fits best in the blank.
3. **Answer choice (A) is correct.** Arachnophobia is an extreme or irrational fear of spiders. Therefore, since Alexis is extremely scared of spiders, she would be terrified if she saw a tarantula, so the word in the blank should mean terrified. "Petrified" means extremely frightened, so "petrified" fits best in the blank.
4. **Answer choice (B) is correct.** The sentence says Mark spent two years grieving the loss of his wife, and now he was ready to move on. Since he spent two years grieving, we can assume his life was partially on hold for these two years, so he is probably ready to start living his life again. "Rebuilding a life" means developing a new life for yourself, which would make sense in this context, because Mark needs to create a new life for himself without his wife. Therefore, "rebuilding" fits best in the sentence.
5. **Answer choice (D) is correct.** The sentence says a moat was built to protect the city's citizens from attackers, so the word in the blank should mean something similar to protect. "Fortify" means to strengthen and secure something, so "fortify" fits best in the sentence.
6. **Answer choice (D) is correct.** Speakers are used to make noises louder, so we can assume the speakers were set up to increase the volume of the sound coming from the presenter's microphone. Therefore, the word in the blank should mean increase the volume of. "Amplify" means increase the volume of, so "amplify" fits best in the sentence.
7. **Answer choice (B) is correct.** Since Markus was shocked that he didn't get the promotion, we can assume he thought he was more qualified than his competition. Therefore, the word in the blank should mean something to qualifications. "Competencies" means knowledge and skills, so "competencies" fits best in the blank.
8. **Answer choice (A) is correct.** The word "forced" tells us that Jan probably did not want to stay home and take care of their sick mother, so she probably feels something negative towards her brother. Therefore, we can eliminate answer choices (B) and (C) because "complimented" and "revered" are both positive. "Pestered" means annoyed and "resented" means felt bitter. While Jan may have pestered her brother, there is no indication that Jan bothered him or annoyed him, so answer choice (D) is incorrect. Since Jan was forced to take care of her mother, which probably meant she could not go to college, it makes sense that she would feel bitter towards her brother. Therefore, "resented" fits best in the blank.

9. **Answer choice (B) is correct.** Since Christopher was interested in discovering new things and was curious about how the world works, the word in the blank should mean something similar to curious and interested. “Inquisitive” means curious or inquiring, so “inquisitive” fits best in the blank.
10. **Answer choice (B) is correct.** For this question, it’s best to use the process of elimination. “Unintentionally” means accidentally or not on purpose. If a child is playing a math game, they are intentionally practicing math, so answer choice (A) is incorrect. “Begrudgingly” means reluctantly. If a child is playing a fun math game, they are probably not reluctant to practicing math since they are having fun, so answer choice (C) is incorrect. Also, the sentence says “math games are a great way,” which is positive, so the word in the blank should not be negative. “Instinctively” means without conscious thought or naturally. Since the children are intentionally playing a math game, they are not unconsciously playing, so answer choice (D) is incorrect. “Simultaneously” means at the same time. Since math games are both fun and educational, it makes sense to say they are a great way for students to have fun and practice math at the same time. Therefore, “simultaneously” fits best in the blank.
11. **Answer choice (C) is correct.** The sentence says that the teacher asked the narrator to find sources to back up his/her opinion, so the word in the blank should mean something similar to not backed up by sources. “Unsubstantiated” means not supported by evidence, so “unsubstantiated” fits best in the blank.
12. **Answer choice (C) is correct.** The sentence says that Jim had to slow down, so we can assume that he realized he could not keep his fast pace for the entire race. Since Jim slowed down so much that he ended up in last place, we can assume it was because he couldn’t maintain his pace, so the word in the blank should mean something similar to not able to be maintained. “Sustainable” means not able to be maintained at a certain rate or level, so “sustainable” fits best in the blank.
13. **Answer choice (B) is correct.** The sentence says that Edmund Hillary and Nepalese Tenzing Norgay reached the ----- of Mount Everest, which is the highest peak in the world. “Peak” means the top of the mountain, so we can assume the word in the blank means the top of a mountain. “Summit” means the highest point of a mountain or hill, so “summit” fits best in the blank.
14. **Answer choice (A) is correct.** Since Lydia was hesitant to drive and was worried she may get into an accident, we can assume the roads were unsafe to drive on. Therefore, the word in the blank must describe road conditions that are unsafe. “Treacherous” means hazardous or dangerous, so “treacherous” fits best in the blank. “Decimated” means destroyed. While destroyed roads would make it impossible to drive, Lydia was hesitant, which means there was still a chance she was going to drive on the roads. Therefore, the roads could not have been destroyed, so answer choice (B) is incorrect. “Reliable” means consistently good in quality or condition. If the roads are in good condition, Lydia wouldn’t be hesitant to drive, so answer choice (C) is incorrect. “Congested” means filled with traffic. While Lydia may not want to drive on roads filled with traffic, it does not make sense that the roads would be filled with traffic after a snowstorm, so answer choice (D) is incorrect.

15. **Answer choice (A) is correct.** The word “while” tells us that the first part of the sentence and the second part of the sentence should be opposite. The first part of the sentence says humans rely on their vision to navigate the world. Humans typically have strong vision, so we can assume that since dogs use their sense of smell to assess their surroundings and communicate, they have a strong sense of smell. The word “keen” means sharp or highly developed, so “keen” fits best in the blank.
16. **Answer choice (D) is correct.** Since all of Mr. Kim’s students and colleagues were devastated when he announced his retirement, we can assume he was well liked. Therefore, the word in the blank should be positive. “Combative” is negative, so answer choice (B) is incorrect. “Educated,” “sprightly,” and “revered” are all positive, so we need to find the best word for the blank. While Mr. Kim may have been the most educated or sprightly (energetic) teacher, this would not necessarily mean people like him, so answer choice (A) is incorrect. “Revered” means deeply loved, admired, or respected. If Mr. Kim was deeply loved, admired, and respected, it would make sense that people were devastated when he announced he would no longer be teaching, so “revered” fits best in the blank.
17. **Answer choice (C) is correct.** The sentence says Kevin did not apologize, which means he probably did not feel guilty or sorry for his actions. Therefore, the word in the blank should mean something similar to guilty. “Remorseful” means filled with regret or sorry, so “remorseful” fits best in the blank.
18. **Answer choice (A) is correct.** Since Lucy’s manager offered her various perks if she stayed at the company, we can assume the manager thought Lucy was a valued and important member of their team. Therefore, the word in the blank should mean something similar to valued and important. “Integral” means necessary or important, so “integral” fits best in the blank.
19. **Answer choice (C) is correct.** The end of the sentence says Ethan was prevented from ever stepping foot inside the casino. Therefore, the word in the blank must be related to never being able to go back into the casino. The word “ban” means to officially or legally prohibit someone from doing something, such as entering a place. Therefore, “ban” fits best in the blank. While “arrested” may seem like it fits because if Ethan was “arrested,” he probably would not be able to step foot inside of the casino, we don’t know if the casino arrested him or not, we only know that they made it so he could never step foot inside of the casino again. Therefore, “arrested” does not fit best in the sentence.
20. **Answer choice (B) is correct.** The word “although” tells us the second part of the sentence should be opposite of the first part or unexpected based on the first part. The first part of the sentence says Manuel and Isabella went through a nasty divorce. Therefore, we would expect them to not be friendly with each other. Since the second part of the sentence should be unexpected, the second part should say something similar to Manuel and Isabella did their best to have a friendly relationship for the sake of their children. “Amicable” means friendly or cordial, so “amicable” fits best in the blank.

# **Quantitative & Math**

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## ***Numbers and Operations – Whole Numbers***

### **Fundamentals Practice Set 1**

1. **Answer choice (C) is correct.** When adding whole numbers, stack the numbers on top of each other and line up the digits. Then add straight down, carrying when necessary. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to add large numbers](#)
2. **Answer choice (A) is correct.** When subtracting large numbers, stack the numbers on top of each other and line up the digits. Then subtract straight down, borrowing when necessary. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to subtract large numbers](#)
3. **Answer choice (A) is correct.** When multiplying two numbers, stack the numbers on top of each other and line up the digits. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to multiply large numbers](#)
4. **Answer choice (A) is correct.** When subtracting three numbers, start by subtracting the second number from the first number:  $65,894 - 4,300 = 61,594$ . Then subtract the third number from the result:  $61,594 - 250 = 61,344$ . Use the following link to see a step-by-step solution on how to subtract each pair of numbers: [how to subtract large numbers](#)
5. **Answer choice (C) is correct.** When performing long division, place the first number underneath the division box and the second number outside of the division box. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to perform long division](#)
6. **Answer choice (D) is correct.** When adding three numbers, you can add all three numbers at the same time by stacking the numbers on top of each other and lining up the digits. Then add straight down, carrying when necessary. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to add large numbers](#)
7. **Answer choice (C) is correct.** When multiplying three numbers, multiply two of the numbers first. It does not matter which two numbers you multiply first, but for this problem, it is easiest to multiply 60 by 500 which equals 30,000. Then multiply 30,000 by 12 to get 360,000. To see a step-by-step solution for multiplying 60 by 500 and 30,000 by 12, follow this link: [how to multiply large numbers](#)
8. **Answer choice (B) is correct.** When performing long division, place the first number underneath the division box and the second number outside of the division box. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to perform long division](#)
9. **Answer choice (C) is correct.** When multiplying two numbers, stack the numbers on top of each other and line up the digits. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to multiply large numbers](#)

10. **Answer choice (A) is correct.** When performing long division, place the first number underneath the division box and the second number outside of the division box. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to perform long division](#)

### **Fundamentals Practice Set 2**

1. **Answer choice (B) is correct.** When subtracting large numbers, stack the numbers on top of each other and line up the digits. Then subtract straight down, borrowing when necessary. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to subtract large numbers](#)
2. **Answer choice (C) is correct.** When adding whole numbers, stack the numbers on top of each other and line up the digits. Then add straight down, carrying when necessary. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to add large numbers](#)
3. **Answer choice (A) is correct.** When multiplying two numbers, stack the numbers on top of each other and line up the digits. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to multiply large numbers](#)
4. **Answer choice (D) is correct.** When adding three numbers, you can add all three numbers at the same time by stacking the numbers on top of each other and lining up the digits. Then add straight down, carrying when necessary. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to add large numbers](#)
5. **Answer choice (C) is correct.** When performing long division, place the first number underneath the division box and the second number outside of the division box. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to perform long division](#)
6. **Answer choice (A) is correct.** When subtracting three numbers, start by subtracting the second number from the first number:  $65,000 - 1,923 = 63,077$ . Then subtract the third number from the result:  $63,077 - 450 = 62,627$ . Use the following link to see a step-by-step solution on how to subtract each pair of numbers: [how to subtract large numbers](#)
7. **Answer choice (D) is correct.** When performing long division, place the first number underneath the division box and the second number outside of the division box. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to perform long division](#)
8. **Answer choice (C) is correct.** When multiplying three numbers, multiply two of the numbers first. It does not matter which two numbers you multiply first, but for this problem, it is easiest to multiply 300 by 200 which equals 60,000. Then multiply 60,000 by 70 to get 4,200,000. To see a step-by-step solution for multiplying 60 by 500 and 30,000 by 12, follow this link: [how to multiply large numbers](#)



- Answer choice (A) is correct.** When performing long division, place the first number underneath the division box and the second number outside of the division box. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to perform long division](#)
- Answer choice (C) is correct.** When multiplying two numbers, stack the numbers on top of each other and line up the digits. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to multiply large numbers](#)

### **Operations with Negative Numbers Practice Set 1**

- Answer choice (B) is correct.** When subtracting a larger number from a smaller number, subtract the smaller number from the larger number and make the result negative:  $782 - 546 = 236$  so  $546 - 782 = -236$ .
- Answer choice (A) is correct.** When subtracting a number from a negative number, remove both negative signs and add the two numbers. Then make the result negative:  $6,532 + 1,398 = 7930$ , so  $-6,532 - 1,398 = -7930$ .
- Answer choice (D) is correct.** Two negative numbers multiplied together result in a positive number. Therefore,  $(-40) \cdot (-12) = 40 \cdot 12 = 480$ .
- Answer choice (B) is correct.** Dividing a negative number and a positive number results in a negative number. Therefore,  $(-4200) \div 60 = -(4,200 \div 60) = -70$ .
- Answer choice (C) is correct.** Subtracting a negative number is the same as adding the number, so  $-892 - (-976) = -892 + 976$ . This is the same as  $976 - 892$  which equals 84.
- Answer choice (B) is correct.** Multiplying a negative number and a positive number results in a negative number. Therefore,  $18 \cdot (-50) = -(18 \cdot 50) = -900$ .
- Answer choice (B) is correct.** Answer choices (A), (C), and (D) all have a value of  $-100$ . Answer choice (B) has a value of  $-40$  because subtracting a negative number is the same as adding the number, so  $-70 - (-30) = -70 + 30 = -40$ .
- Answer choice (A) is correct.** The value of answer choice (A) is  $-43$  because  $-25 - 18 = -(25 + 18) = -43$ . The value of answer choice (B) is  $-7$  because  $-25 - (-18) = -25 + 18 = -7$ . The value of answer choice (C) is  $25 - 18 = 7$ . The value of answer choice (D) is  $43$  because  $25 - (-18) = 25 + 18 = 43$ .
- Answer choice (B) is correct.** Dividing a negative number and a positive number results in a negative number. Therefore,  $84,000 \div (-120) = -(84,000 \div 120) = -700$ .
- Answer choice (D) is correct.** Answer choices (A), (B), and (C) all result in negative numbers because dividing or multiplying a negative number and a positive number results in a negative

number. Answer choice (D) is positive because multiplying two negative numbers results in a positive number. Therefore, answer choice (D) has the greatest value.

11. **Answer choice (A) is correct.** Adding a negative number is the same as subtracting the positive version of the number, so  $500 - 840 + (-35) = 500 - 840 - 35$ . Perform the operations moving left to right:  $500 - 840 = -340$ , and  $-340 - 35 = -375$ .
12. **Answer choice (C) is correct.** Perform the operations moving left to right:  $60 \cdot (-30) = -1800$ , and  $-1800 \div (-20) = 90$ .
13. **Answer choice (B) is correct.** Perform the operations moving left to right:  $(-12) \div (-6) = 2$ ,  $2 \cdot 2 = 4$ , and  $4 \cdot (-5) = -20$ .
14. **Answer choice (C) is correct.** Subtracting a negative number is the same as adding the number, so  $84 - 106 - (-73) = 84 - 106 + 73$ . Perform the operations moving left to right:  $84 - 106 = -22$ , and  $-22 + 73 = 51$ .
15. **Answer choice (B) is correct.** Since we are multiplying the three numbers, the order in which we multiply does not matter. Multiplying  $(-8) \cdot (-5)$  first is easiest:  $(-8) \cdot (-5) = 40$ . Now multiply 40 by  $(-40)$  to get  $-1600$ .
16. **Answer choice (A) is correct.** Adding a negative number is the same as subtracting the positive version of the number, so  $-463 - 300 + (-560) = -463 - 300 - 560$ . Perform the operations moving left to right:  $-463 - 300 = -763$ , and  $-763 - 560 = -1323$ .
17. **Answer choice (D) is correct.** The value of answer choice (A), (B), and (C) is  $-210$ . The value of answer choice (D) is 190 because  $-100 + 90 - (-200) = -100 + 90 + 200 = -10 + 200 = 190$ .
18. **Answer choice (D) is correct.** Perform the operations moving left to right:  $48 \div (-4) = -12$ ,  $-12 \cdot 9 = -108$ , and  $-108 \div (-3) = 36$ .
19. **Answer choice (D) is correct.** The value of answer choice (A) is  $-30 - 40 - 50 = -70 - 50 = -120$ . The value of answer choice (B) is  $-30 - (-40) - 50 = -30 + 40 - 50 = 10 - 50 = -40$ . The value of answer choice (C) is  $-30 - 40 - (-50) = -30 - 40 + 50 = -70 + 50 = -20$ . The value of answer choice (D) is  $-30 - (-40) - (-50) = -30 + 40 + 50 = 10 + 50 = 60$ .
20. **Answer choice (A) is correct.** Adding a negative number is the same as subtracting the positive version of the number, so  $145 + (-123) - 348 + 250 = 145 - 123 - 348 + 250$ . Perform the operations moving left to right:  $145 - 123 = 22$ ,  $22 - 348 = -326$ , and  $-326 + 250 = -76$ .

### **Operations with Negative Numbers Practice Set 2**

1. **Answer choice (B) is correct.** Adding a negative number is the same as subtracting the positive version of the number, so  $4000 + (-7250) = 4000 - 7250$ . When subtracting a larger number from a

smaller number, subtract the smaller number from the larger number and make the result negative:  
 $7250 - 4000 = 3250$  so  $4000 - 7250 = -3250$ .

2. **Answer choice (D) is correct.** Dividing a negative number by a negative number results in a positive number. Therefore,  $(-240) \div (-3) = 240 \div 3 = 80$ .
3. **Answer choice (C) is correct.** Adding a negative number is the same as subtracting the positive version of the number, so  $-64,733 + 3800 = 3800 - 64,733$ . When subtracting a larger number from a smaller number, subtract the smaller number from the larger number and make the result negative:  
 $64,732 - 3800 = 60,932$  so  $3800 - 64,732 = -60,932$ .
4. **Answer choice (A) is correct.** Multiplying a negative number and a positive number results in a negative number. Therefore,  $40 \cdot (-110) = -(40 \cdot 110) = -4400$ .
5. **Answer choice (A) is correct.** Answer choices (B) and (D) result in positive numbers because dividing or multiplying a negative number by a negative number results in a positive number. Answer choices (A) and (C) result in negative numbers because dividing or multiplying a negative number and a positive number results in a negative number. Since negative numbers are always smaller than positive numbers, we can eliminate answer choices (B) and (D). Answer choice (A) is multiplying two numbers greater than 1, and answer choice (D) is dividing the same two numbers. Multiplying two numbers greater than 1 results in a larger number than dividing those two numbers. However, since our answer for (A) and (C) are both negative, the “larger” negative number is smaller, so answer choice (A) has the smallest value.
6. **Answer choice (A) is correct.** When subtracting a number from a negative number, remove both negative signs and add the two numbers. Then make the result negative:  $340 + 6400 = 6740$ , so  $-340 - 6400 = -6740$ .
7. **Answer choice (C) is correct.** Multiplying a negative number by a negative number results in a positive number. Therefore,  $(-16) \cdot (-20) = 16 \cdot 20 = 320$ .
8. **Answer choice (B) is correct.** The value of answer choice (A) is  $-80 - 120 = -(80 + 120) = -200$ . The value of answer choice (B) is  $-80 + 120 = 120 - 80 = 40$ . The value of answer choice (C) is  $-120 - 80 = -(120 + 80) = -200$ . The value of answer choice (D) is  $-120 + 80 = 80 - 120 = -40$ .
9. **Answer choice (A) is correct.** Dividing a positive number by a negative number results in a negative number. Therefore,  $-309 \div 3 = -(309 \div 3) = -103$ .
10. **Answer choice (D) is correct.** Simplify each answer choice, but you don’t need to find the final value to compare the answer choices. Subtracting a negative number is the same as adding the positive version of the number, so answer choice (A) is equivalent to  $-56 + 94$ . Answer choice (B) is also  $-56 + 94$ . When adding numbers, we can change the order, so answer choice (C) is equivalent to  $-56 + 94$ . Subtracting a negative number is the same as adding the positive version of the number, so answer

choice (D) is equivalent to  $94 + 56$ . Therefore, answer choice (D) does NOT have the same value as the other three answer choices.

11. **Answer choice (B) is correct.** Subtracting a negative number is the same as adding the positive version of the number, so  $-320 - 930 - (-240) = -320 - 930 + 240$ . Perform the operations from left to right:  $-320 - 930 + 240 = -1250 + 240 = -1010$ .
12. **Answer choice (B) is correct.** Perform the operations moving left to right:  $84 \div (-12) \cdot 15 = -7 \cdot 15 = -105$ .
13. **Answer choice (C) is correct.** Adding a negative number is the same as subtracting the positive version of the number, so  $75 + (-234) - 54 = 75 - 234 - 54$ . Perform the operations moving left to right:  $75 - 234 - 54 = -159 - 54 = -213$ .
14. **Answer choice (D) is correct.** Perform the operations moving left to right:  $(-30) \cdot 8 \div (-24) \cdot 13 = -240 \div (-24) \cdot 13 = 10 \cdot 13 = 130$ .
15. **Answer choice (C) is correct.** Perform the operations moving left to right:  $(-50) \cdot 4 \cdot (-6) = -200 \cdot (-6) = 1200$ .
16. **Answer choice (B) is correct.** Subtracting a negative number is the same as adding the positive version of the number, so  $507 - 617 - (-234) = 507 - 617 + 234$ . Perform the operations from left to right:  $507 - 617 + 234 = -110 + 234 = 124$ .
17. **Answer choice (A) is correct.** Multiplying two negative numbers results in a positive number, so answer choices (B) and (C) are positive. Multiplying three positive numbers results in a positive number, so answer choice (D) is positive. Multiplying a negative number by a positive number results in a negative number, so answer choice (A) is negative. Therefore, answer choice (A) does NOT have the same value as the other three answer choices.
18. **Answer choice (B) is correct.** Perform the operations moving left to right:  $2 \cdot (-90) \div 36 \cdot 3 = -180 \div 36 \cdot 3 = -5 \cdot 3 = -15$ .
19. **Answer choice (C) is correct.** Subtracting a negative number is the same as adding the positive version of the number, so  $-270 + 430 - (-320) - 180 = -270 + 430 + 320 - 180$ . Perform the operations moving left to right:  $-270 + 430 + 320 - 180 = 160 + 320 - 180 = 480 - 180 = 300$ .
20. **Answer choice (A) is correct.** For this problem, we don't need to find the exact value of each answer choice since that will take a while. Instead, partially simplify each answer choice and then use reasoning. Adding a negative number is the same as subtracting the positive version of the number, so answer choice (A) can be written as  $-720 - 940 - 350$ . Subtracting a negative number is the same as adding the positive version of the number, so answer choice (C) can be written as  $720 - 940 + 350$ , and answer choice (D) can be written as  $-720 - 940 + 350$ . In answer choice (A), each number is negative or being subtracted, so answer choice (A) is the smallest of all four answer choices.

## Exponents and Roots Practice Set 1

- Answer choice (C) is correct.**  $5^3 = 5 \cdot 5 \cdot 5 = 125$ .
- Answer choice (B) is correct.**  $20^2 = 400$ , so the square root of 400 equals 20.
- Answer choice (C) is correct.** Apply each exponent before adding the two terms.  $4^2 = 4 \cdot 4 = 16$ , and  $3^2 = 3 \cdot 3 = 9$ , so  $4^2 + 3^2 = 16 + 9 = 25$ .
- Answer choice (D) is correct.**  $(-13)^2 = (-13) \cdot (-13) = 169$ .
- Answer choice (A) is correct.**  $8^2 = 64$ , so the square root of 64 equals 8.
- Answer choice (B) is correct.** Perform the subtraction first:  $25 - 9 = 16$ . Now find the square root of 16. Since  $4^2 = 16$ , the square root of 16 equals 4.
- Answer choice (A) is correct.**  $-10^2 = -(10 \cdot 10) = -100$ .
- Answer choice (C) is correct.** Find each square root before adding the two terms.  $6^2 = 36$ , so the square root of 36 equals 6.  $8^2 = 64$ , so the square root of 64 equals 8. Now add  $6 + 8$  to get 14.
- Answer choice (A) is correct.**  $\sqrt{25} < \sqrt{30} < \sqrt{36}$ . The square root of 25 is 5 because  $5^2 = 25$ , and the square root of 36 is 6 because  $6^2 = 36$ , so  $5 < \sqrt{30} < 6$ .
- Answer choice (B) is correct.** Test each answer choice until you find the correct answer. Answer choice (A) is incorrect because  $4^2 = 4 \cdot 4 = 16$ . Answer choice (B) is correct because  $4^3 = 4 \cdot 4 \cdot 4 = 64$ .
- Answer choice (D) is correct.** If the square root of  $a$  equals 16, then  $16^2$  equals  $a$ :  $16 \cdot 16 = 256$ , so  $a = 256$ .
- Answer choice (B) is correct.** Take the square root of the top and bottom of the fraction:  
 $\sqrt{144} = 12$  and  $\sqrt{121} = 11$ , so  $\sqrt{\frac{144}{121}} = \frac{12}{11}$ .
- Answer choice (B) is correct.**  $(-6)^3 = (-6) \cdot (-6) \cdot (-6) = -216$ .
- Answer choice (B) is correct.**  $\sqrt{64} < \sqrt{75} < \sqrt{81}$ . The square root of 64 is 8 because  $8^2 = 64$ , and the square root of 81 is 9 because  $9^2 = 81$ , so  $8 < \sqrt{75} < 9$ .
- Answer choice (B) is correct.** When you square a square root, the square and square root cancel each other out. Therefore, the answer is 14.

16. **Answer choice (A) is correct.** If  $b^2 = 81$ , then  $b = \sqrt{81}$  which is 9:  $9^2 = 81$ .
17. **Answer choice (B) is correct.**  $2^5 = 32$  because  $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 32$ , so  $x = 5$ . Therefore,  $x^2 = 5^2 = 25$ .
18. **Answer choice (B) is correct.**  $10^2 = 100$ ,  $14^2 = 196$ ,  $20^2 = 400$ , and  $90^2 = 8100$ . 180 is closest to 196, so the square root of 180 is closest to the square root of 196 which equals 14.
19. **Answer choice (C) is correct.** Apply the exponents before adding the two terms.  $3^2 = 3 \cdot 3 = 9$ , and  $3^1 = 3$ . Therefore,  $3^2 + 3^1 = 9 + 3 = 12$
20. **Answer choice (D) is correct.**  $3^6 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$ . We can group each pair of threes:  $3^6 = (3 \cdot 3) \cdot (3 \cdot 3) \cdot (3 \cdot 3)$ . Now we can multiply each pair of threes to get  $3^6 = 9 \cdot 9 \cdot 9 = 9^3$

### **Exponents and Roots Practice Set 2**

1. **Answer choice (C) is correct.**  $50^2 = 2500$ , so the square root of 2500 equals 50.
2. **Answer choice (C) is correct.**  $2^6 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 64$ .
3. **Answer choice (A) is correct.** Perform the addition first:  $25 + 144 = 169$ . Now find the square root of 169. Since  $13^2 = 169$ , the square root of 169 equals 13.
4. **Answer choice (D) is correct.** Apply each exponent before subtracting the two terms.  $12^2 = 12 \cdot 12 = 144$ , and  $9^2 = 9 \cdot 9 = 81$ , so  $12^2 - 9^2 = 144 - 81 = 63$ .
5. **Answer choice (B) is correct.**  $-30^2 = -(30 \cdot 30) = -900$ .
6. **Answer choice (B) is correct.**  $7^2 = 49$ , so the square root of 49 equals 7.
7. **Answer choice (A) is correct.** Find each square root before subtracting the two terms.  $10^2 = 100$ , so the square root of 100 equals 10.  $8^2 = 64$ , so the square root of 64 equals 8. Now subtract  $10 - 8$  to get 2.
8. **Answer choice (B) is correct.**  $\sqrt{49} < \sqrt{60} < \sqrt{64}$ . The square root of 49 is 7 because  $7^2 = 49$ , and the square root of 64 is 8 because  $8^2 = 64$ , so  $7 < \sqrt{60} < 8$ .
9. **Answer choice (D) is correct.**  $(-15)^2 = (-15)(-15) = 225$ .
10. **Answer choice (B) is correct.** Test each answer choice until you find the correct answer. Answer choice (A) is incorrect because  $2^4 = 2 \cdot 2 \cdot 2 \cdot 2 = 16$ . Answer choice (B) is correct because  $2^5 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 32$ .

11. **Answer choice (D) is correct.** If the square root of  $w$  equals 9, then  $9^2$  equals  $w$ :  $9 \cdot 9 = 81$ , so  $w = 81$ . Therefore,  $w^2 = 81 \cdot 81 = 6,561$ .
12. **Answer choice (B) is correct.** Take the square root of the top and bottom of the fraction:  $\sqrt{16} = 4$  and  $\sqrt{25} = 5$ , so  $\sqrt{\frac{16}{25}} = \frac{4}{5}$ .
13. **Answer choice (B) is correct.**  $\sqrt{144} < \sqrt{150} < \sqrt{169}$ . The square root of 144 is 12 because  $12^2 = 144$ , and the square root of 169 is 13 because  $13^2 = 169$ , so  $12 < \sqrt{150} < 13$ .
14. **Answer choice (A) is correct.**  $(-3)^5 = (-3)(-3)(-3)(-3)(-3) = -243$
15. **Answer choice (B) is correct.** Plug in each answer choice for  $a$  until you find one that makes the equation true. Answer choice (A) is incorrect because  $3^2 = 3 \cdot 3 = 9$ . Answer choice (B) is correct because  $(\sqrt{12})^2 = \sqrt{12} \cdot \sqrt{12} = \sqrt{144} = 12$ .
16. **Answer choice (C) is correct.** Apply the exponents before subtracting the two terms.  $7^3 = 7 \cdot 7 \cdot 7 = 343$ , and  $7^2 = 7 \cdot 7 = 49$ . Therefore,  $7^3 - 7^2 = 343 - 49 = 294$ .
17. **Answer choice (A) is correct.**  $15^2 = 225$ ,  $20^2 = 400$ ,  $25^2 = 625$ , and  $110^2 = 12,100$ . 220 is closest to 225, so the square root of 220 is closest to the square root of 225 which equals 15.
18. **Answer choice (C) is correct.** The value of  $x$  is 4 because  $10^4 = 10 \cdot 10 \cdot 10 \cdot 10 = 10,000$ . Therefore,  $x^2 = 4^2 = 4 \cdot 4 = 16$ .
19. **Answer choice (C) is correct.** When you square a square root, the square and square root cancel each other out. Therefore, the answer is 25.
20. **Answer choice (D) is correct.**  $16^3 = 16 \cdot 16 \cdot 16$ . We can rewrite each 16 as  $4^2$  to get  $16^3 = 16 \cdot 16 \cdot 16 = (4^2) \cdot (4^2) \cdot (4^2)$ . Now we can expand each term and rewrite it as one exponent:  $(4^2) \cdot (4^2) \cdot (4^2) = (4 \cdot 4) \cdot (4 \cdot 4) \cdot (4 \cdot 4) = 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 = 4^6$ .

### **Multiples, Factors, Divisibility, and Integers Practice Set 1**

1. **Answer choice (C) is correct.** To find the least common multiple (LCM) of a set of numbers, write out the first 6 multiples of each number and see if there are any common multiples. Multiple of 15: 15, 30, 45, 60, 75, 90. Multiples of 12: 12, 24, 36, 48, 60, 72. The smallest multiple 15 and 12 have in common is 60, so 60 is the LCM of 15 and 12.
2. **Answer choice (B) is correct.** To find the greatest common factor (GCF) of a set of numbers, write out the factors of each number. Factors of 56: 1, 2, 4, 7, 8, 14, 28, 56. Factors of 42: 1, 2, 3, 6, 7, 14, 21, 42. The greatest factor that 56 and 42 have in common is 14, so the GCF of 56 and 42 is 14.

3. **Answer choice (A) is correct.** Prime factorization means finding which prime numbers multiply together to make the original number. To find the prime factorization of 72, make a factor tree for 72 and continue breaking up the factors into more branches until you are left with all prime numbers. If you do this, you get that 72 equals  $2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$  which equals  $2^3 \cdot 3^2$ . To see a step-by-step solution of this problem, follow this link, type in the number, and choose “Find prime factorization and factor tree”: [prime factorization calculator](#)
4. **Answer choice (D) is correct.** 31 is a prime number, so its only factors are 1 and itself.
5. **Answer choice (C) is correct.** To find the least common multiple (LCM) of a set of numbers, write out the first 6 multiples of each number and see if there are any common multiples. Multiples of 5: 5, 10, 15, 20, 25, 30. Multiples of 10: 10, 20, 30, 40, 50, 60. Multiples of 15: 15, 30, 45, 60, 75, 90. The smallest multiple that 5, 10, and 15 have in common is 30, so 30 is the LCM of 5, 10, and 15.
6. **Answer choice (D) is correct.** Prime factorization means finding which prime numbers multiply together to make the original number. To find the prime factorization of 42, make a factor tree for 42 and continue breaking up the factors into more branches until you are left with all prime numbers. If you do this, you get that 42 equals  $2 \cdot 3 \cdot 7$ . To see a step-by-step solution of this problem, follow this link, type in the number, and choose “Find prime factorization and factor tree”: [prime factorization calculator](#)
7. **Answer choice (A) is correct.** To find the greatest common factor (GCF) of a set of numbers, write out the factors of each number. Factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36. Factors of 84: 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84. Factors of 16: 1, 2, 4, 8, 16. The greatest factor that 36, 84 and 16 have in common is 4, so the GCF of 36, 84 and 16 is 4.
8. **Answer choice (C) is correct.** 49 is not prime because  $7 \cdot 7 = 49$ . 47 is prime because its only factors are 1 and itself, so 47 is the largest prime number less than 50.
9. **Answer choice (A) is correct.** The positive integers less than 13 are 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12. The sum of these numbers is  $1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 + 11 + 12 = 78$ .
10. **Answer choice (D) is correct.** 936 is divisible by 2 because it is an even number, and it is divisible by 3 because the sum of its digits is divisible by 3:  $9 + 3 + 6 = 18$  which is divisible by 3.
11. **Answer choice (C) is correct.** Prime factorization means finding which prime numbers multiply together to make the original number. To find the prime factorization of 90, make a factor tree for 90 and continue breaking up the factors into more branches until you are left with all prime numbers. If you do this, you get that 90 equals  $2 \cdot 3 \cdot 3 \cdot 5$  which equals  $2 \cdot 3^2 \cdot 5$ . To see a step-by-step solution of this problem, follow this link, type in the number, and choose “Find prime factorization and factor tree”: [prime factorization calculator](#)



12. **Answer choice (B) is correct.** The prime factorization of a number is the product of the prime factors of a number. If you multiply out the prime factorization of any number, you will get the number. Therefore, since  $2^2 \cdot 3 \cdot 5 = 4 \cdot 3 \cdot 5 = 12 \cdot 5 = 60$ ,  $x = 60$ .
13. **Answer choice (C) is correct.** 9 can go into 67 seven times because  $9 \cdot 7 = 63$ . The remainder is 4 because  $67 - 63 = 4$ .
14. **Answer choice (B) is correct.** The prime numbers between 1 and 10 inclusive are 2, 3, 5, and 7. The sum of these numbers is  $2 + 3 + 5 + 7 = 17$ .
15. **Answer choice (B) is correct.** The odd integers between  $-6$  and  $-1$  inclusive are  $-5$ ,  $-3$ , and  $-1$ . The product of these integers is  $(-5) \cdot (-3) \cdot (-1) = -15$ .
16. **Answer choice (C) is correct.** If a number can be divided without a remainder by two different numbers, it can also be divided without a remainder by those numbers least common multiple. The least common multiple of 4 and 5 is 20, so  $z$  can also be divided by 20.
17. **Answer choice (A) is correct.** The distinct, or unique, prime factors of 24 are 2 and 3. The sum of 2 and 3 is 5.
18. **Answer choice (C) is correct.** The LCM of 10 and 15 is 30 because it is the smallest number that is divisible by both 10 and 15. The GCF of 10 and 15 is 5 because it is the greatest number that both 10 and 15 are divisible by. The sum of 30 and 5 is 35.
19. **Answer choice (A) is correct.** The prime factorization of a number is the product of prime factors that multiply to the number. We can rewrite the given prime factorization as  $3 \cdot 3 \cdot 5 \cdot 5$ . To find the factors of  $a$ , we can multiply any set of the factors from the prime factorization. Therefore, 9 is a factor of  $a$  because  $3 \cdot 3 = 9$ , 15 is a factor of  $a$  because  $3 \cdot 5 = 15$ , and 75 is a factor of  $a$  because  $3 \cdot 5 \cdot 5 = 75$ . 6 is NOT a factor of  $a$  because we cannot make 6 by multiplying any of the factors from the prime factorization of  $a$ .
20. **Answer choice (B) is correct.** The even integers from 2 to 12 inclusive are 2, 4, 6, 8, 10, 12. The even integers from 12 to 20 inclusive are 12, 14, 16, 18, 20. The even integers from 2 to 20 inclusive are 2, 4, 6, 8, 10, 12, 14, 16, 18, 20. Therefore, if we are given the sum of the even integers from 2 to 12 inclusive and the sum of the even integers from 12 to 20 inclusive, to find the sum of the integers from 2 to 20 inclusive, we can add the given sums and subtract 12 because 12 shows up in both sums:  $42 + 80 - 12 = 110$ .

### **Multiples, Factors, Divisibility, and Integers Practice Set 2**

1. **Answer choice (B) is correct.** To find the greatest common factor (GCF) of a set of numbers, write out the factors of each number. Factors of 45: 1, 3, 5, 9, 15, 45. Factors of 72: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72. The greatest factor that 45 and 72 have in common is 9, so the GCF of 45 and 72 is 9.

2. **Answer choice (D) is correct.** To find the least common multiple (LCM) of a set of numbers, write out the first 6 multiples of each number, or multiples up to the highest number in the answer choices, and see if there are any common multiples. Multiples of 28: 28, 56, 84, 112. Multiples of 16: 16, 32, 48, 64, 80, 96, 112. The smallest multiple that 28 and 16 have in common is 112, so 112 is the LCM of 28 and 16.
3. **Answer choice (B) is correct.** Prime factorization means finding which prime numbers multiply together to make the original number. To find the prime factorization of 56, make a factor tree for 56 and continue breaking up the factors into more branches until you are left with all prime numbers. If you do this, you get that 56 equals  $2 \cdot 2 \cdot 2 \cdot 7$  which equals  $2^3 \cdot 7$ . To see a step-by-step solution of this problem, follow this link, type in the number, and choose “Find prime factorization and factor tree”: [prime factorization calculator](#)
4. **Answer choice (B) is correct.** The factors of 27 are 1, 3, 9, and 27, so 27 has positive factors that are not one or itself.
5. **Answer choice (D) is correct.** The even integers between 10 and 20 inclusive are 10, 12, 14, 16, 18, and 20. Find the sum:  $10 + 12 + 14 + 16 + 18 + 20 = 90$ .
6. **Answer choice (B) is correct.** Since every number in the answer choices ends in 0, each number is divisible by 5. 80 is divisible by 4:  $80 \div 4 = 20$ . Any multiple of 100 is divisible by 4 because 100 is divisible by 4, so 600 is divisible by 4:  $600 \div 4 = 150$ . Since 800 is divisible by 4 and 20 is divisible by 4, 820 is divisible by 4:  $820 \div 4 = 205$ . 430 is NOT divisible by 4, so 430 could NOT be  $b$ .
7. **Answer choice (C) is correct.** Prime factorization means finding which prime numbers multiply together to make the original number. To find the prime factorization of 81, make a factor tree for 81 and continue breaking up the factors into more branches until you are left with all prime numbers. If you do this, you get that 81 equals  $3 \cdot 3 \cdot 3 \cdot 3$  which equals  $3^4$ . To see a step-by-step solution of this problem, follow this link, type in the number, and choose “Find prime factorization and factor tree”: [prime factorization calculator](#)
8. **Answer choice (C) is correct.** The factors of 105 are 1, 3, 5, 7, 15, 21, 35, and 105. A prime number is a number that only has 1 and itself as factors. Therefore, 7 is the greatest prime factor of 105.
9. **Answer choice (A) is correct.** To find the least common multiple (LCM) of a set of numbers, write out the first 6 multiples of each number, or multiples up to the highest number in the answer choices, and see if there are any common multiples. Multiples of 24: 24, 48, 72, 96. Multiples of 12: 12, 24, 36, 48, 60, 72, 84, 96. Multiples of 32: 32, 64, 96. The smallest multiple that 24, 12, and 32 have in common is 96, so 96 is the LCM of 24, 12, and 32.
10. **Answer choice (A) is correct.** The integers between  $-5$  and  $-1$  inclusive are  $-5, -4, -3, -2,$  and  $-1$ . Find the product of the numbers:  $(-5) \cdot (-4) \cdot (-3) \cdot (-2) \cdot (-1) = -120$ .

11. **Answer choice (D) is correct.** Prime factorization means finding which prime numbers multiply together to make the original number. To find the prime factorization of 48, make a factor tree for 48 and continue breaking up the factors into more branches until you are left with all prime numbers. If you do this, you get that 48 equals  $2 \cdot 2 \cdot 2 \cdot 2 \cdot 3$  which equals  $2^4 \cdot 3$ . To see a step-by-step solution of this problem, follow this link, type in the number, and choose “Find prime factorization and factor tree”: [prime factorization calculator](#)
12. **Answer choice (C) is correct.** The prime numbers between 10 and 20 inclusive are 11, 13, 17, and 19. Find the sum of the numbers:  $11 + 13 + 17 + 19 = 60$ .
13. **Answer choice (D) is correct.** 6 can go into 39 six times because  $6 \cdot 6 = 36$ . The remainder is 3 because  $39 - 36 = 3$ .
14. **Answer choice (C) is correct.** To find the greatest common factor (GCF) of a set of numbers, write out the factors of each number. Factors of 90: 1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90. Factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36. Factors of 54: 1, 2, 3, 6, 9, 18, 27, 54. The greatest factor that 90, 36, and 54 have in common is 18, so the GCF of 90, 36, and 54 is 18.
15. **Answer choice (A) is correct.** The LCM of 60 and 40 is 120 because it is the smallest number that is divisible by both 60 and 40. The GCF of 60 and 40 is 20 because it is the largest number that 60 and 40 are both divisible by. Find the quotient of 120 and 20:  $120 \div 20 = 6$ .
16. **Answer choice (B) is correct.** If a number can be divided without a remainder by two different numbers, it can also be divided without a remainder by those numbers least common multiple. The least common multiple of 4 and 6 is 12, so  $x$  can also be divided by 12.
17. **Answer choice (C) is correct.** The prime factorization of a number is the product of the prime factors of a number. If you multiply out the prime factorization of any number, you will get the number. Therefore, since  $3^3 \cdot 11 = 3 \cdot 3 \cdot 3 \cdot 11 = 9 \cdot 3 \cdot 11 = 27 \cdot 11 = 297$ ,  $a = 297$ .
18. **Answer choice (A) is correct.** A prime number is a number that only has 1 and itself as factors. Therefore, the smallest prime number between 0 and 10 inclusive is 2, and the largest prime number between 0 and 10 inclusive is 7. Find the difference between 2 and 7:  $7 - 2 = 5$ .
19. **Answer choice (C) is correct.** The prime factorization of a number is the product of prime factors that multiply to the number. We can rewrite the given prime factorization as  $2 \cdot 2 \cdot 2 \cdot 7$ . To find the factors of  $k$ , we can multiply any set of the factors from the prime factorization. Therefore, 28 is a factor of  $k$  because  $2 \cdot 2 \cdot 7 = 28$ .
20. **Answer choice (B) is correct.** The integers between 1 and 10 inclusive are 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. The integers between 10 and 20 inclusive are 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20. Therefore, if we are given the sum of the integers between 1 and 10 inclusive and the sum of the integers between 10 and 20 inclusive, to find the sum of the integers between 1 and 20 inclusive, we can add the given sum and subtract 10 because 10 shows up in both sums:  $55 + 165 - 10 = 210$ .

## Order of Operations Practice Set 1

- Answer choice (A) is correct.** PEMDAS tells us to perform division before addition and subtraction. Start by dividing 40 by 5 which equals 8. Now our expression is  $-55 - 8 + 35$ . Since we only have subtraction and addition left, we perform the operations from left to right:  $-55 - 8 + 35 = -63 + 35 = -28$ .
- Answer choice (C) is correct.** PEMDAS tells us to perform the operations inside the parentheses first. Start by subtracting  $24 - 16$  which equals 8, so now our expression is  $4 - 3^2 - 8$ . PEMDAS tells us to perform exponents before subtraction:  $3^2 = 9$ , so now our expression is  $4 - 9 - 8$ . Now perform the subtractions moving left to right:  $4 - 9 - 8 = -5 - 8 = -13$ .
- Answer choice (B) is correct.** We can rewrite the expression as  $[50(68 - 48)] \div 25$ . PEMDAS tells us to perform the operations inside the parentheses first, so we start with  $68 - 48$  which equals 20. Now our expression is  $(50 \cdot 20) \div 25$ . Perform what is inside the parentheses first:  $50 \cdot 20 = 1000$ , so now our expression is  $1000 \div 25$  which equals 40.
- Answer choice (A) is correct.** In answer choice (A), start with division because PEMDAS tells us that division is performed before addition and subtraction:  $18 \div 6 = 3$ , so now our expression is  $36 - 3 - 5 + 3$ . Since we are left with only addition and subtraction, we perform the operations from left to right:  $36 - 3 - 5 + 3 = 33 - 5 + 3 = 28 + 3 = 31$ .
- Answer choice (C) is correct.** PEMDAS tells us to perform the operations inside the parentheses first. Start by subtracting  $45 - 15$  to get 30. Now our expression is  $-16 + 4(30)$ . PEMDAS tells us to complete multiplication and then addition:  $-16 + 4(30) = -16 + 120 = 104$ .
- Answer choice (A) is correct.** We can rewrite the expression as  $[20(37 + 53)] \div 6$ . PEMDAS tells us to perform the operations inside the parentheses first, so add  $37 + 53$  which equals 90. Now our expression is  $(20 \cdot 90) \div 6$ . Perform what is inside the parentheses first:  $20 \cdot 90 = 1800$ , so now our expression is  $1800 \div 6$  which equals 300.
- Answer choice (C) is correct.** In answer choice (C), PEMDAS tells us to perform the operations inside the parentheses first:  $30 - 3(14 - 7) = 30 - 3(7)$ . PEMDAS tells us to complete multiplication and then subtraction:  $30 - 3(7) = 30 - 21 = 9$ .
- Answer choice (A) is correct.** PEMDAS tells us to perform the operations inside the parentheses first, so subtract  $14 - 34$  which equals  $-20$ . Now our expression is  $-48 + (\sqrt{23})^2 - (-20)$ . PEMDAS tells us to perform exponents next, so square  $\sqrt{23}$ : when you square a square root, the square and the square root cancel. Therefore,  $(\sqrt{23})^2 = 23$ . Now our expression is  $-48 + 23 - (-20)$ . Since we are left with addition and subtraction, perform the operations from left to right:  $-48 + 23 - (-20) = -25 - (-20) = -25 + 20 = -5$ .

9. **Answer choice (D) is correct.** In answer choice (D), PEMDAS tells us to perform the operations in the parentheses first, so add  $3 + 5$  to get 8. Now our expression is  $6 \cdot 8 - 8$ . PEMDAS tells us to perform multiplication then subtraction:  $6 \cdot 8 - 8 = 48 - 8 = 40$ .
10. **Answer choice (C) is correct.** PEMDAS tells us to perform the operations inside the parentheses first:  $5^3 - 5^2 = 125 - 25 = 100$ . Now our expression is  $10^2 - 3(100) + (-6)^2$ . Now perform the two exponents:  $10^2 = 100$  and  $(-6)^2 = 36$ , so now our expression is  $100 - 3(100) + 36$ . Perform the multiplication next:  $100 - 3(100) + 36 = 100 - 300 + 36$ . Finally, perform the subtraction and addition by moving left to right:  $100 - 300 + 36 = -200 + 36 = -164$ .

### **Order of Operations Practice Set 2**

1. **Answer choice (A) is correct.** PEMDAS tells us to perform multiplication before addition and subtraction. Start by multiplying  $-8$  by 3 to get  $-24$ . Now our expression is  $32 + (-24) - 56$ . Since we only have subtraction and addition left, we perform the operations from left to right:  $32 + (-24) - 56 = 8 - 56 = -48$ .
2. **Answer choice (C) is correct.** PEMDAS tells us to perform exponents before multiplication, division, and subtraction. Start by finding the value of  $4^2$ , which is 16. Now our expression is  $24 - 16 \div 8 - 16 \cdot 2$ . Now perform the division and multiplication, moving left to right:  $24 - 16 \div 8 - 16 \cdot 2 = 24 - 2 - 16 \cdot 2 = 24 - 2 - 32$ . Finally, perform the subtractions moving left to right:  $24 - 2 - 32 = 22 - 32 = -10$ .
3. **Answer choice (A) is correct.** We can rewrite the expression as  $[6(123 - 43)] \div 30$ . PEMDAS tells us to perform the operations inside the parentheses first, so we start with  $123 - 43$  which equals 80. Now our expression is  $6(80) \div 30$ . Since we are left with only multiplication and division, perform the operations moving left to right:  $6(80) \div 30 = 480 \div 30 = 16$ .
4. **Answer choice (B) is correct.** PEMDAS tells us to perform the operations inside the parentheses first, so we start with  $6 - 14$  which equals  $-8$ . Now our expression is  $-17 + 5(-8)$ . Perform the multiplication next and then the subtraction:  $-17 + 5(-8) = -17 - 40 = -57$ .
5. **Answer choice (C) is correct.** In answer choice (C), PEMDAS tells us to perform the operations inside the parentheses first, so start with  $10 + 20$  which equals 30. Now the expression is  $30 \div 5 - 3 + 4$ . Next perform the division, and then perform the remaining addition and subtraction moving left to right:  $30 \div 5 - 3 + 4 = 6 - 3 + 4 = 3 + 4 = 7$ .
6. **Answer choice (C) is correct.** Since this expression only has addition and subtraction, perform the operations moving left to right:  $54 - 14 + 10 - 7 - 2 = 40 + 10 - 7 - 2 = 50 - 7 - 2 = 43 - 2 = 41$ .
7. **Answer choice (B) is correct.** We can rewrite the expression as  $[140(27 + 73)] \div 7$ . PEMDAS tells us to perform the operations inside the parentheses first, so we start with  $27 + 73$  which equals 100. Now our expression is  $140(100) \div 7$ . Since we are left with only multiplication and division, perform the operations moving left to right:  $140(100) \div 7 = 14,000 \div 7 = 2,000$ .

8. **Answer choice (D) is correct.** PEMDAS tells us to perform exponents before division, multiplication, and subtraction, so square  $\sqrt{24}$ , which equals 24, and evaluate  $2^3$ , which equals 8. Now our expression is  $12 \cdot 6 - 24 \div 8$ . Perform the multiplication and division next, moving left to right:  $12 \cdot 6 - 24 \div 8 = 72 - 24 \div 8 = 72 - 3 = 69$ .
9. **Answer choice (B) is correct.** In answer choice (B), PEMDAS tells us to perform the operations in the parentheses first, so perform the operations in each parentheses and then perform the multiplication:  $(5 + 2) \cdot (10 - 8) = (7) \cdot (2) = 14$ .
10. **Answer choice (D) is correct.** In answer choice (D), PEMDAS tells us to perform the division first:  $12 - 4 + 8 \div 4 = 12 - 4 + 2$ . Since we are left with only addition and subtraction, perform the operations moving left to right:  $12 - 4 + 2 = 8 + 2 = 10$ .

### Scientific Notation Practice Set 1

1. **Answer choice (B) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. To write 450 in scientific notation, change it into a decimal that is between 1 and 10: 450 becomes 4.5. To get from 4.5 to 450, we need to move the decimal point 2 times to the right. Therefore, we can write 450 as  $4.5 \times 10^2$ .
2. **Answer choice (D) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. The positive two exponent tells us to move the decimal point in 3.246 two places to the right. Therefore,  $3.246 \times 10^2 = 324.6$ .
3. **Answer choice (B) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. The negative four exponent tells us to move the decimal point in 8.8 four places to the left. Therefore,  $8.8 \times 10^{-4} = 0.00088$ .
4. **Answer choice (D) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. To write 0.005 in scientific notation, change it into a decimal that is between 1 and 10: 0.005 becomes 5.0. To get from 5.0 to 0.005, we need to move the decimal point 3 times to the left. Therefore, we can write 0.005 as  $5 \times 10^{-3}$ .
5. **Answer choice (C) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the

decimal point: positive means move to the right and negative means move to the left. The negative three exponent tells us to move the decimal point in 6, or 6.0, three places to the left. Therefore,  $6 \times 10^{-3} = 0.006$ .

6. **Answer choice (A) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. To write 123,400 in scientific notation, change it into a decimal that is between 1 and 10: 123,400 becomes 1.234. To get from 1.234 to 123,400, we need to move the decimal point 5 times to the right. Therefore, we write 123,400 as  $1.234 \times 10^5$ .
7. **Answer choice (A) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. To write 0.00768 in scientific notation, change it into a decimal that is in between 1 and 10: 0.00768 becomes 7.68. To get from 7.68 to 0.00768, we need to move the decimal point 3 times to the left. Therefore, we can write 0.00768 as  $7.68 \times 10^{-3}$ .
8. **Answer choice (C) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. Because 0.4 is not between 1 and 10, answer choice (C) is NOT written in scientific notation.
9. **Answer choice (A) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. The positive six exponent tells us to move the decimal point in 5, or 5.0, six places to the right. Therefore,  $5 \times 10^6 = 5,000,000$ .
10. **Answer choice (C) is correct.** Write  $9 \times 10^{-3}$  in standard form by moving the decimal point 3 places to the left:  $9 \times 10^{-3} = 0.009$ . Write  $5 \times 10^{-4}$  in standard form by moving the decimal point 4 places to the left:  $5 \times 10^{-4} = 0.0005$ . Add 0.009 to 0.0005 to get 0.0095. Write 0.0095 in scientific notation to get  $9.5 \times 10^{-3}$ .
11. **Answer choice (D) is correct.** Write  $8.6 \times 10^6$  in standard form by moving the decimal point 6 places to the right:  $8.6 \times 10^6 = 8,600,000$ . Write  $6.2 \times 10^5$  in standard form by moving the decimal point 5 places to the right:  $6.2 \times 10^5 = 620,000$ . Subtract 8,600,000 minus 620,000 to get 7,980,000. Write 7,980,000 in scientific notation to get  $7.98 \times 10^6$ .
12. **Answer choice (B) is correct.** Write  $5.5 \times 10^4$  in standard form by moving the decimal point 4 places to the right:  $5.5 \times 10^4 = 55,000$ . Write  $2.3 \times 10^2$  in standard form by moving the decimal point 2 places to the right:  $2.3 \times 10^2 = 230$ . Add 55,000 and 230 to get 55,230. Write 55,230 in scientific notation to get  $5.523 \times 10^4$ .

13. **Answer choice (B) is correct.** Write  $1.2 \times 10^{-1}$  in standard form by moving the decimal point 1 place to the left:  $1.2 \times 10^{-1} = 0.12$ . Write  $4 \times 10^{-2}$  in standard form by moving the decimal point 2 places to the left:  $4 \times 10^{-2} = 0.04$ . Subtract 0.12 minus 0.04 to get 0.08. Write 0.08 in scientific notation to get  $8 \times 10^{-2}$ .
14. **Answer choice (B) is correct.** Write  $3 \times 10^4$  in standard form by moving the decimal point 4 places to the right:  $3 \times 10^4 = 30,000$ . Write  $6 \times 10^2$  in standard form by moving the decimal point 2 places to the right:  $6 \times 10^2 = 600$ . Now multiply 30,000 by 600 to get 18,000,000. Rewrite 18,000,000 in scientific notation to get  $1.8 \times 10^7$ .
15. **Answer choice (B) is correct.** Write  $5 \times 10^3$  in standard form by moving the decimal point 3 places to the right:  $5 \times 10^3 = 5,000$ . Write  $4 \times 10^7$  in standard form by moving the decimal point 7 places to the right:  $4 \times 10^7 = 40,000,000$ . Now multiply 5,000 by 40,000,000 to get 200,000,000,000. Rewrite 200,000,000,000 in scientific notation to get  $2 \times 10^{11}$ .

### Scientific Notation Practice Set 2

1. **Answer choice (C) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. The positive six exponent tells us to move the decimal point in 6.72 six places to the right. Therefore,  $6.72 \times 10^6 = 6,720,000$ .
2. **Answer choice (D) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. To write 321,000 in scientific notation, change it into a decimal that is between 1 and 10: 321,000 becomes 3.21. To get from 3.21 to 321,000, we need to move the decimal point 5 places to the right. Therefore, we can write 321,000 as  $3.21 \times 10^5$ .
3. **Answer choice (B) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. The negative three exponent tells us to move the decimal point in 4.36 three places to the left. Therefore,  $4.36 \times 10^{-3} = 0.00436$ .
4. **Answer choice (C) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. To write 0.068 in scientific notation, change it into a decimal that is between 1 and 10: 0.068 becomes 6.8. To get from 6.8 to 0.068, we need to move the decimal point 2 places to the left. Therefore, we can write 0.068 as  $6.8 \times 10^{-2}$ .



5. **Answer choice (B) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. The negative four exponent tells us to move the decimal point in 9 four places to the left. We can rewrite 9 as 9.0. Therefore,  $9.0 \times 10^{-4} = 0.0009$ .
6. **Answer choice (A) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. To write 48,000 in scientific notation, change it into a decimal that is between 1 and 10: 48,000 becomes 4.8. To get from 4.8 to 48,000, we need to move the decimal point 4 places to the right. Therefore, we can write 48,000 as  $4.8 \times 10^4$ .
7. **Answer choice (D) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. Because 0.04, 12, and 0.26 are not between 1 and 10, answer choices (A), (B), and (C) are not written in scientific notation. However, since 9 is between 1 and 10, and 9 is being multiplied by a power of 10, answer choice (D) is written in scientific notation.
8. **Answer choice (B) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. To write 0.000024 in scientific notation, change it into a decimal that is between 1 and 10: 0.000024 becomes 2.4. To get from 2.4 to 0.000024, we need to move the decimal point 5 places to the left. Therefore, we can write 0.000024 as  $2.4 \times 10^{-5}$ .
9. **Answer choice (B) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. The positive two exponent tells us to move the decimal point in 8 two places to the left. We can rewrite 8 as 8.0. Therefore,  $8.0 \times 10^2 = 800$ .
10. **Answer choice (C) is correct.** Write  $6.1 \times 10^5$  in standard form by moving the decimal point 5 places to the right:  $6.1 \times 10^5 = 610,000$ . Write  $3.4 \times 10^3$  in standard form by moving the decimal point 3 places to the right:  $3.4 \times 10^3 = 3,400$ . Add 610,000 and 3,400 to get 613,400. Write 613,400 in scientific notation to get  $6.134 \times 10^5$ .
11. **Answer choice (A) is correct.** Write  $9.8 \times 10^6$  in standard form by moving the decimal point 6 places to the right:  $9.8 \times 10^6 = 9,800,000$ . Write  $4.1 \times 10^4$  in standard form by moving the decimal point 4 places to the right:  $4.1 \times 10^4 = 41,000$ . Subtract 9,800,000 by 41,000 to get 9,759,000. Write 9,759,000 in scientific notation to get  $9.759 \times 10^6$ .
12. **Answer choice (B) is correct.** Write  $3.5 \times 10^{-2}$  in standard form by moving the decimal point 2 places to the left:  $3.5 \times 10^{-2} = 0.035$ . Write  $1.5 \times 10^{-1}$  in standard form by moving the decimal point 1 place to

the left:  $1.5 \times 10^{-1} = 0.15$ . Add 0.035 and 0.15 to get 0.185. Write 0.185 in scientific notation to get  $1.85 \times 10^{-1}$ .

13. **Answer choice (B) is correct.** Write  $5.2 \times 10^{-3}$  in standard form by moving the decimal point 3 places to the left:  $5.2 \times 10^{-3} = 0.0052$ . Write  $4 \times 10^{-4}$  in standard form by moving the decimal point 4 places to the left:  $4 \times 10^{-4} = 0.0004$ . Subtract 0.0052 by 0.0004 to get 0.0048. Write 0.0048 in scientific notation to get  $4.8 \times 10^{-3}$ .
14. **Answer choice (B) is correct.** Write  $8 \times 10^6$  in standard form by moving the decimal point 6 places to the right:  $8 \times 10^6 = 8,000,000$ . Write  $3 \times 10^3$  in standard form by moving the decimal point 3 places to the right:  $3 \times 10^3 = 3,000$ . Now multiply 8,000,000 by 3,000 to get 24,000,000,000. Rewrite 24,000,000,000 in scientific notation to get  $2.4 \times 10^{10}$ .
15. **Answer choice (B) is correct.** Write  $9 \times 10^4$  in standard form by moving the decimal point 4 places to the right:  $9 \times 10^4 = 90,000$ . Write  $4 \times 10^5$  in standard form by moving the decimal point 5 places to the right:  $4 \times 10^5 = 400,000$ . Now multiply 90,000 by 400,000 to get 36,000,000,000. Rewrite 36,000,000,000 in scientific notation to get  $3.6 \times 10^{10}$ .

### **Whole Number Word Problems Practice Set 1**

1. **Answer choice (B) is correct.** Find the total expected revenue by multiplying  $80 \cdot 5 \cdot 12$  to get \$4800. Find the profit by subtracting the cost, \$1475, from the revenue, \$4800:  $4800 - 1475 = 3325$ .
2. **Answer choice (B) is correct.** To find the *fewest* number of hamburgers she can purchase, we want to find the *least common multiple* of 8 and 12. The least common multiple of 8 and 12 is 24, which means the fewest number of hamburgers she can purchase is 24.
3. **Answer choice (B) is correct.** Find the total money Yasmin will save over one year by multiplying \$350 per month by 12 months:  $350 \cdot 12 = \$4200$ . Since Yasmin was \$1500 in debt, she had  $-\$1500$ . Add  $-\$1500$  to \$4200 to find how much money Yasmin has after one year:  $-1500 + 4200 = \$2700$ .
4. **Answer choice (B) is correct.** Since Sia scored 12 more points than Kim, Kim scored 12 fewer points than Sia. Find the number of points Kim scored by subtracting 12 from the number of points Sia scored:  $18 - 12 = 6$  points. Add the number of points Sia scored and the number of points Kim scored:  $18 + 6 = 24$  points.
5. **Answer choice (A) is correct.** Since Frank wants to make as many bouquets as possible, we want to first find the *greatest* number of bouquets he can make by finding the *greatest common factor* of 36, 24, and 48. The greatest common factor of 36, 24, and 48 is 12, so the greatest number of bouquets Frank can make is 12. To find the number of tulips in each bouquet, divide the total number of tulips by the number of bouquets:  $36 \div 12 = 3$  tulips per bouquet.

6. **Answer choice (A) is correct.** Since Kia wants to split her marbles into identical groups, she can only split them into groups that are common factors of 16, 24, and 8. The common factors of 16, 24, and 8 are 1, 2, 4, and 8. Since she wants at least two groups, she cannot split the marbles into 1 group, so we are left with 2, 4, and 8 groups. However, Kia wants at least 9 marbles in each group. If she splits the marbles into 8 groups, she will have 2 red marbles in each group, 3 blue marbles in each group, and 1 green marble in each group, which is only a total of 6 marbles in each group. Therefore, she cannot split her marbles into 8 groups, so we are left with either 2 or 4 groups. This means Kia can group her marbles in two ways.
7. **Answer choice (A) is correct.** Find the temperature at noon by increasing  $-8$  by  $23$ :  $-8 + 23 = 15$  degrees. Find the temperature at 9:00 PM by decreasing  $15$  by  $34$ :  $15 - 34 = -19$  degrees.
8. **Answer choice (D) is correct.** If Paul is 10 years younger than Emmy, then Emmy is ten years older than Paul. Find Emmy's age by adding 10 to Paul's age:  $30 + 10 = 40$  years. Bert is twice as old as Emmy, so find Bert's age by multiplying Emmy's age by 2:  $2 \cdot 40 = 80$  years. Find the sum of Bert's, Emmy's, and Paul's ages by adding the three ages:  $30 + 40 + 80 = 150$  years.
9. **Answer choice (D) is correct.** Each box contained the same number of items, so find the number of items in each box by dividing 360 by 6 (since there were 360 items in 6 boxes):  $360 \div 6 = 60$  items in each box. Find the total items in the shipment by multiplying the number of items in each box by the total number of boxes:  $60 \cdot 240 = 14,400$ .
10. **Answer choice (C) is correct.** Since we want to find the fewest number of students in each group, we want to find the *largest* possible number of groups. We can find this by finding the *greatest common factor* of 16 and 12, which is 4. If Mr. Trenton splits the 16 girls and 12 boys into 4 identical groups, he will have 4 girls in each group and 3 boys in each group, so he will have 7 students in each group.

### **Whole Number Word Problems Practice Set 2**

1. **Answer choice (D) is correct.** The average number of customers Maya has every weekend is  $18 + 22$  which equals 40. Find the average number of cups of lemonade Maya sells every weekend by multiplying the average number of customers by the average number of cups each customer purchases:  $40 \cdot 3 = 120$ . Find the average amount of money Maya makes every weekend by multiplying the average number of cups she sells by the price of each cup:  $120 \cdot \$2 = \$240$ . Finally, multiply  $\$240$  by 4 to find the amount of money Maya will make if she runs the lemonade stand for four weeks:  $\$240 \cdot 4 = \$960$ .
2. **Answer choice (A) is correct.** First we want to find the fewest number of pencils Mr. Thomas can find, and that will help us find the fewest number of packs of pencils. To find the *fewest* number of pencils, we want to find the *least common multiple* of 10 and 16. The least common multiple of 10 and 16 is 80, which means the fewest number of pencils Mr. Thomas can purchase is 80. Since pencils come in packs of 16, find the fewest number of packs of pencils by dividing 80 by 16:  $80 \div 16 = 5$  packs of pencils.

3. **Answer choice (B) is correct.** Find the total amount of money Rushika will withdraw after 9 months by multiplying 9 by the amount of money Rushika withdraws each month:  $9 \cdot \$250 = \$2,250$ . Find Rushika's account balance by subtracting the amount of money she withdraws over 9 months from her starting balance:  $\$1,800 - \$2,250 = -\$450$ .
4. **Answer choice (B) is correct.** Raquel is 5 years older than Jenna, so Jenna is 5 years younger than Raquel. Find Jenna's age by subtracting 5 from Raquel's age:  $25 - 5 = 20$  years. Jenna and Helen are the same age, so Helen is also 20 years old. Find the sum of the three ages:  $20 + 20 + 25 = 65$  years.
5. **Answer choice (B) is correct.** Since Quincy wants to make as many identical gift bags as possible, we want to find the *greatest* number of gift bags Quincy can make. Therefore, we need to find the *greatest common factor* of 32, 16, and 40. The greatest common factor of 32, 16, and 40 is 8, so the greatest number of gift bags Quincy can make is 8. Find the number of items in each gift bag by dividing the total number of items by 8:  $(32 + 16 + 40) \div 8 = 88 \div 8 = 11$  items.
6. **Answer choice (D) is correct.** Since the *greatest* number of identical groups Frank can create is 6, the *greatest common factor* of the number of pink balls, green balls, and orange balls must be 6. Therefore, the number of orange balls must have 6 as a factor. The only answer choice that has 6 as a factor is answer choice (D), so answer choice (D) is correct.
7. **Answer choice (A) is correct.** Find the temperature at 10:00 AM by increasing  $-13^\circ$  by  $15^\circ$ :  $-13^\circ + 15^\circ = 2^\circ$ . To get from  $2^\circ$  at 10:00 AM to  $-6^\circ$  by 9:00 PM, the temperature dropped by  $8^\circ$  ( $-6^\circ - 2^\circ = -8^\circ$ ). Therefore, the change in temperature from 10:00 AM to 9:00 PM was  $-8^\circ$  C.
8. **Answer choice (B) is correct.** The number of 6th grade students is twice the number of 7th grade students, so find the number of 7th grade students by dividing the number of 6th grade students by 2:  $160 \div 2 = 80$ . The number of 8th grade students is 50 more than the number of 7th grade students, so find the number of 8th grade students by adding 50 to the number of 7th grade students:  $80 + 50 = 130$ .
9. **Answer choice (C) is correct.** First find the total number of boxes Bernard sold over the five days by dividing \$4800 by the price of each box:  $\$4800 \div \$60 = 80$  boxes. Next find the number of boxes Bernard sold each day by dividing 80 by 5:  $80 \div 5 = 16$  boxes per day. Finally, find the number of action figures Bernard sold each day by multiplying 16 boxes per day by the number of action figures in each box, 8:  $16 \cdot 8 = 128$ .
10. **Answer choice (A) is correct.** To find the amount of time that has passed the next time Tanya and Gerry will both cross the starting point at the same time, we need to find the least common multiple of 3 and 4. The least common multiple of 3 and 4 is 12, so they will both cross the starting point again at the same time after 12 minutes. To find the number of laps Tanya will have run after 12 minutes, divide 12 minutes by the time it takes Tanya to run one lap:  $12 \div 4 = 3$  laps.

### **Quantitative Comparisons Practice Set 1**

1. **Answer choice (C) is correct.** Rearrange Column A to be  $8 \cdot 9 \cdot 7 \cdot 6$ . Now multiply  $8 \cdot 9$  to get 72 and  $7 \cdot 6$  to get 42. Therefore,  $8 \cdot 9 \cdot 7 \cdot 6 = 72 \cdot 42$  which is the same as Column B.
2. **Answer choice (A) is correct.** Find the value of Column A:  $\left(\frac{1}{2}\right)^3 = \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{8}$ . Find the value of Column B:  $\left(\frac{1}{3}\right)^2 = \frac{1}{3} \cdot \frac{1}{3} = \frac{1}{9}$ . Therefore, Column A is greater than Column B.
3. **Answer choice (A) is correct.** Find the value of Column A by first writing the numbers in standard form, and then multiplying:  $8,000,000,000 \cdot 7,000,000 = 56,000,000,000,000$ . Find the value of Column B by first writing the numbers in standard form, and then multiplying:  $900,000,000 \cdot 60,000,000 = 54,000,000,000,000$ . Therefore, Column A is greater than Column B.
4. **Answer choice (D) is correct.** If  $a = 0$  or  $a = 1$ , then Column A and Column B are equal. If  $a = 2$  (or any number greater than 1), then Column B is greater than Column A. If  $a = -2$  (or any negative number) Column A is greater than Column B. Therefore, the relationship cannot be determined from the information given.
5. **Answer choice (B) is correct.** Since the negative number is “larger” (has a larger absolute value) than the positive number in Column A, the value will be negative. Since the positive number is “larger” (has a larger absolute value) than the negative number in Column B, the answer will be positive. A positive number is always greater than a negative number, so Column B is greater than Column A.
6. **Answer choice (B) is correct.** Find the value of each column by using PEMDAS. Column A:  $5 + 3(4 + 6) = 5 + 3(10) = 5 + 30 = 35$ . Column B:  $3 + 5(2 + 8) = 3 + 5(10) = 3 + 50 = 53$ . Therefore, Column B is greater than Column A.
7. **Answer choice (B) is correct.** Column A equals  $-(25 \cdot 25)$  which equals  $-625$ , and Column B equals  $(-25) \cdot (-25)$  which equals 625. Therefore, Column B is greater than Column A.
8. **Answer choice (D) is correct.** Choose different pairs of integers for  $x$  and  $y$  to see if the relationship can be determined. If  $x = 3$  and  $y = -2$ , then Column A equals 1 and Column B equals 5, so Column B is greater. However, if  $x = 3$  and  $y = 2$ , then Column A equals 5 and Column B equals 1, so Column A is greater. Therefore, the relationship cannot be determined from the information given.
9. **Answer choice (A) is correct.** The value of Column A in standard form is 500,000,000,000. Find the value of Column B by writing each number in standard form and then finding the sum:  $3,200,000 + 180,000 = 3,380,000$ . Therefore, Column A is greater than Column B.
10. **Answer choice (B) is correct.** The LCM of 2 and 3 is 6 because it is the smallest number that is divisible by both 2 and 3. The GCF of 24 and 12 is 12 because it is the greatest number that both 24 and 12 are divisible by. Therefore, Column B is greater than Column A.

11. **Answer choice (B) is correct.** Since  $\frac{8}{9}$  is greater than  $\frac{64}{81}$ , the square root of  $\frac{8}{9}$  is greater than the square root of  $\frac{64}{81}$ .
12. **Answer choice (C) is correct.** 2 is the smallest positive prime number and the smallest positive even number, so Column A and Column B are equal.
13. **Answer choice (A) is correct.** Since  $a$  and  $b$  are both negative, the product of  $ab$  will always be positive, so Column A is positive. The sum of  $a + b$  will always be negative, so Column B is negative. Since a positive number is always greater than a negative number, Column A is greater than Column B.
14. **Answer choice (D) is correct.** Since  $m$  is a multiple of 12, it could equal 12, 24, 36, 48, 60 ... Since  $n$  is a multiple of 8, it could equal 8, 16, 24, 32, 40 ... Some multiples of 12 are greater than some multiples of 8, and some multiples of 8 are greater than some multiples of 12. Therefore, we cannot compare  $m$  and  $n$  from the given information.
15. **Answer choice (B) is correct.** Find the value of Column B by using PEMDAS:  $10 - 6(10 - 15) = 10 - 6(-5) = 10 + 30 = 40$ . Therefore, Column B is greater than Column A.
16. **Answer choice (A) is correct.** Since the square root of  $a = 9$ , then  $a = 81$  because  $9^2 = 81$ . So Column A equals 81. Since  $b^2 = 81$ ,  $b = 9$  because  $9^2 = 81$ . So Column B equals 9. Therefore, Column A is greater than Column B.
17. **Answer choice (D) is correct.** Choose different sets of values for  $x$ ,  $y$ ,  $a$ , and  $b$  to see if the relationship can be determined. If  $x = 10$  and  $y = 8$ , then Column A equals 18. If  $a = 7$  and  $b = 5$  then Column B equals 12. In this case, Column A is greater than Column B. However, if  $x = 4$  and  $y = 2$ , then Column A equals 6 which is not greater than Column B. Therefore, the relationship cannot be determined from the information given.
18. **Answer choice (C) is correct.** The distinct prime factors of 18 are 2 and 3, so the product of the distinct prime factors of 18 is 6. The distinct prime factors of 24 are also 2 and 3, so the product of the distinct prime factors of 24 is 6. Therefore the quantities in Column A and Column B are equal.
19. **Answer choice (A) is correct.** Find the value of Column A by first subtracting  $25 - 9$  to get 16, and then finding the square root of 16 which equals 4. Find the value of Column B by first finding each square root. The square root of 25 is 5, and the square root of 9 is 3. Now subtract  $5 - 3$  to get 2. Therefore, Column A is greater than Column B.
20. **Answer choice (B) is correct.** Find the temperature at 12:00 by increasing  $-4$  by 20:  $-4 + 20 = 16$ . Find the temperature at 9:00 pm by decreasing 16 by 18:  $16 - 18 = -2$ . Therefore, the temperature at 9:00 pm is  $-2^\circ$  F, so Column B is greater than Column A.

## Quantitative Comparisons Practice Set 2

- Answer choice (B) is correct.** Find the quantity in Column A by evaluating each exponent and then adding the terms:  $3^0 + 3^1 + 3^2 + 3^3 = 1 + 3 + 9 + 27 = 40$ . Find the quantity in Column B:  $3^4 = 81$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
- Answer choice (A) is correct.** Simplify the expression in each column by adding the numbers in each set of parentheses. Column A:  $(8 + 53)(6 + 24) = (61)(30)$ . Column B:  $(13 + 17)(34 + 25) = (30)(59)$ . Column A is 61 multiplied by 30, and Column B is 59 multiplied by 30. Since 61 is greater than 59, Column A is greater than Column B.
- Answer choice (A) is correct.** Since  $m$  is positive,  $m^3$  will always be positive, so the quantity in Column A is always positive. Since  $n$  is negative,  $n^5$  will always be negative, so the quantity in Column B is always negative. A positive number is always greater than a negative number, so the quantity in Column A is greater than the quantity in Column B.
- Answer choice (C) is correct.** Find the quantity in Column A by writing each number in standard form and then multiplying:  $(2 \times 10^3)(9 \times 10^5) = 2,000 \times 900,000 = 1,800,000,000$ . Find the quantity in Column B by writing each number in standard form and then multiplying:  $(3 \times 10^6)(6 \times 10^2) = 3,000,000 \times 600 = 1,800,000,000$ . Therefore the quantities in Column A and Column B are equal.
- Answer choice (B) is correct.** Because We know that  $1 < 2.5 < 4$ . We also know that  $\sqrt{1} = 1$  and  $\sqrt{4} = 2$ . Therefore,  $1 < \sqrt{2.5} < 2$ , so  $\sqrt{2.5}$  is greater than 0.5. Therefore, the quantity in Column B is greater than the quantity in Column A.
- Answer choice (D) is correct.** Integers are negative and positive whole numbers and 0. For this problem, we want to choose various integer values for  $x$  and  $y$  to see if we can determine the relationship between the two columns. If  $x = 2$  and  $y = 3$ , then Column A equals  $2 \cdot 3 = 6$ , and Column B equals  $2 \cdot 2 \cdot 3 = 12$ , so Column B is greater than Column A. If  $x = 0$  and  $y = 5$ , then Column A equals  $0 \cdot 5 = 0$ , and Column B equals  $2 \cdot 0 \cdot 5 = 0$ , so both columns are equal. Since we get a different relationship when choosing different values for  $x$  and  $y$ , the relationship between the two columns cannot be determined from the given information.
- Answer choice (B) is correct.**  $-596$  is more negative than  $-532$ , and  $-704$  is more negative than  $-684$ . Therefore, the quantity in Column A is more negative than the quantity in Column B, so the quantity in Column B is greater than the quantity in Column A.
- Answer choice (C) is correct.** First look at Column A: when raising a negative number to an odd power, the result is negative. Therefore, Column A equals  $-(15)^7$ , which is the same as Column B.
- Answer choice (A) is correct.** Use PEMDAS to find the quantity in Column A:  $36 \div 3(2^3 - 2) = 36 \div 3(8 - 2) = 36 \div 3(6) = 12(6) = 72$ . Use PEMDAS to find the quantity in Column B:  $72 \div 9(4^2 - 8) = 72 \div 9(16 - 8) = 72 \div 9(8) = 8(8) = 64$ . Therefore, the quantity in Column A is greater than the quantity in Column B.

10. **Answer choice (B) is correct.** The value of Column A in standard form is 41,000,000. Write each number in Column B in standard form:  $540,000,000,000 - 13,000$ . Without performing the subtraction, we can see that Column B is way bigger than Column A because 540,000,000,000 is way bigger than 41,000,000 and 13,000 is small compared to 540,000,000,000 and 41,000,000, so when we subtract 13,000 from 540,000,000,000, we will still get a number way bigger than 41,000,000. Therefore, the quantity in Column B is greater than the quantity in Column A.
11. **Answer choice (A) is correct.** Find the quantity in Column A by writing out the factors of 4 and 6 and finding the greatest factor 4 and 6 have in common. Factor of 4: 1, 2, 4. Factors of 6: 1, 2, 3, 6. Therefore, the GCF of 4 and 6 is 2. Find the quantity in Column B by writing out the factors of 27 and 35 and finding the greatest factor 27 and 35 have in common. Factors of 27: 1, 3, 9, 27. Factors of 35: 1, 5, 7, 35. Therefore, the GCF of 27 and 35 is 1, so the quantity in Column A is greater than the quantity in Column B.
12. **Answer choice (A) is correct.** The two smallest prime numbers are 2 and 3, so the smallest product of two distinct prime numbers is  $2 \cdot 3$  which equals 6. Any other product of two distinct prime numbers will be greater than 6, so the quantity in Column A is greater than the quantity in Column B.
13. **Answer choice (A) is correct.** The given expression represents the prime factorization of 72. Therefore, to find  $x$  and  $y$ , we need to find the prime factorization of 72. Prime factorization means finding which prime numbers multiply together to make the original number. To find the prime factorization of 72, make a factor tree for 72 and continue breaking up the factors into more branches until you are left with all prime numbers. If you do this, you get that 72 equals  $2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$  which equals  $2^3 \cdot 3^2$ . Therefore,  $x = 3$  and  $y = 2$ , so the quantity in Column A is greater than the quantity in Column B. To see a step-by-step solution of how to find the prime factorization of 72, follow this link, type in the number, and choose “Find prime factorization and factor tree”: [prime factorization calculator](#).
14. **Answer choice (B) is correct.** We know  $x$  and  $y$  are positive, odd integers less than 10, so  $x$  and  $y$  can each be 1, 3, 5, 7, or 9. We know  $a$  and  $b$  are negative, even integers less than  $-9$ , so  $a$  and  $b$  can each be  $-10, -12, -14, -16 \dots$  and so on. No matter which two integers  $x$  and  $y$  equal, their product will always be less than the product of  $a$  and  $b$  because the absolute value of each number that  $x$  and  $y$  can equal is less than the absolute value of each number  $a$  and  $b$  can equal. Therefore, the quantity in Column B is greater than the quantity in Column A. You could also think about it like this: the greatest possible value of  $xy$  is if  $x$  and  $y$  both equal 9:  $9 \cdot 9 = 81$ . The smallest possible value of  $ab$  is if  $a$  and  $b$  both equal  $-10$ :  $(-10) \cdot (-10) = 100$ . Therefore,  $ab$  will always be greater than  $xy$ .
15. **Answer choice (A) is correct.** Use PEMDAS to find the quantity in Column B:  $10 + 5(15 \div 3) = 10 + 5(5) = 10 + 25 = 35$ . Therefore, the quantity in Column A is greater than the quantity in Column B.
16. **Answer choice (B) is correct.** Since  $x$  is positive and  $y$  is negative, the quotient  $x \div y$  is always negative. However, the difference  $x - y$  is always positive. For example, if  $x = 4$  and  $y = -2$ ,  $x \div y = 4 \div (-2) = 2$ , and  $x - y = 4 - (-2) = 4 + 2 = 6$ . Therefore, the quantity in Column B is greater than the quantity in Column A.



17. **Answer choice (C) is correct.** The square root of 36 is 6 because  $6^2 = 36$ , so  $b = 6$ . Since  $a^2 = 36$ , and  $a > 0$ ,  $a$  also equals 6 because  $6^2 = 36$ . Therefore, the quantity in Column A equals the quantity in Column B.
18. **Answer choice (D) is correct.** Since  $p$  is a multiple of 18,  $p$  could equal 18, 36, 54, 72, 90 ... and so on. Since  $q$  is a factor of 36,  $q$  can equal 1, 2, 3, 4, 6, 9, 12, 18, or 36. If  $p$  equals 18 and  $q$  equals 36, then the quantity in Column B is greater than the quantity in Column A. However, if  $p = 54$  and  $q = 6$ , the quantity in Column A is greater than the quantity in Column B. Since we get different relationships between the two columns depending on which numbers we choose for  $p$  and  $q$ , the relationship between the two columns cannot be determined with the given information.
19. **Answer choice (C) is correct.** Column A equals  $\sqrt{16 \cdot 4} = \sqrt{64} = 8$ . When multiplying two square roots, multiply the numbers under the square root and put the result in a square root. Therefore, Column B equals  $\sqrt{16} \cdot \sqrt{4} = \sqrt{16 \cdot 4} = \sqrt{64} = 8$ . Therefore, the quantity in Column A and the quantity in Column B are equal.
20. **Answer choice (B) is correct.** Since Will is five years younger than Greg, Greg is five years older than Will. Find Greg's age by adding five to Will's age:  $20 + 5 = 25$  years old. Erin is three years older than Greg, so find Erin's age by adding 3 to Greg's age:  $25 + 3 = 28$  years old. Find the combined age of Erin, Greg, and Will:  $20 + 25 + 28 = 73$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
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### *Numbers and Operations – Fractions, Decimals, & Percents*

#### **Operations with Fractions Practice Set 1**

1. **Answer choice (C) is correct.** To divide mixed numbers, first change each mixed number into an improper fraction:  $1\frac{3}{4} \div 1\frac{1}{12} = \frac{7}{4} \div \frac{13}{12}$ . Now divide the fractions by multiplying the first fraction by the reciprocal of the second fraction, cross reducing when possible:
- $$\frac{7}{4} \div \frac{13}{12} = \frac{7}{4} \cdot \frac{12}{13} = \frac{21}{13} = 1\frac{8}{13}$$
2. **Answer choice (D) is correct.** To add fractions, we need to find a common denominator by finding the LCM of the denominators. The LCM of 6 and 9 is 18, so change the denominator of each fraction to 18:  $5\frac{7}{9} + 3\frac{5}{6} = 5\frac{14}{18} + 3\frac{15}{18}$ . Now add the whole numbers and the fractions:  $5\frac{14}{18} + 3\frac{15}{18} = 8\frac{29}{18}$ . Finally, simplify the improper fraction:  $8\frac{29}{18} = 9\frac{11}{18}$ .
3. **Answer choice (B) is correct.** To subtract fractions, we need to find a common denominator by finding the LCM of the denominators. The LCM of 5 and 10 is 10, so change the denominator of the

first fraction to 10:  $2\frac{4}{5} - 1\frac{9}{10} = 2\frac{8}{10} - 1\frac{9}{10}$ . Since  $\frac{8}{10}$  is less than  $\frac{9}{10}$ , we need to borrow before subtracting:  $2\frac{8}{10} - 1\frac{9}{10} = 1\frac{18}{10} - 1\frac{9}{10}$ . Now subtract the whole numbers and the fractions:  $1\frac{18}{10} - 1\frac{9}{10} = \frac{9}{10}$ .

4. **Answer choice (D) is correct.** To multiply mixed numbers, first change each mixed number into an improper fraction:  $4\frac{2}{5} \times 2\frac{3}{11} = \frac{22}{5} \times \frac{25}{11}$ . Now multiply the numerators and multiply the denominators, cross reducing first if possible:  $\frac{22}{5} \times \frac{25}{11} = \frac{2}{1} \times \frac{5}{1} = \frac{10}{1} = 10$ .
5. **Answer choice (B) is correct.**  $\frac{3}{7}$  is less than  $\frac{1}{2}$ , so we can eliminate answer choice (A).  $\frac{3}{9}$  simplifies to  $\frac{1}{3}$ , so we can eliminate answer choice (C).  $\frac{2}{8}$  simplifies to  $\frac{1}{4}$ , which is smaller than  $\frac{1}{3}$ , so we can eliminate answer choice (D). We are left with answer choice (B) as the correct answer.
6. **Answer choice (B) is correct.** To subtract fractions, we need to find a common denominator by finding the LCM of the denominators. The LCM of 4 and 2 is 4, so change the denominator of the second fraction to 4:  $2\frac{3}{4} - 4\frac{1}{2} = 2\frac{3}{4} - 4\frac{2}{4}$ . When subtracting a larger number from a smaller number, change the order of the numbers and make the answer negative:  $2\frac{3}{4} - 4\frac{2}{4} = -(4\frac{2}{4} - 2\frac{3}{4})$ . Since  $\frac{2}{4}$  is less than  $\frac{3}{4}$ , we need to borrow before subtracting:  $-(4\frac{2}{4} - 2\frac{3}{4}) = -(3\frac{6}{4} - 2\frac{3}{4})$ . Now subtract the whole numbers and the fractions:  $-(3\frac{6}{4} - 2\frac{3}{4}) = -(1\frac{3}{4}) = -1\frac{3}{4}$ .
7. **Answer choice (A) is correct.** To multiply a whole number by a mixed number, first change the mixed number into an improper fraction:  $2\frac{2}{3} = \frac{8}{3}$ . Now change  $-9$  into a fraction by putting it over 1 and multiply by  $\frac{8}{3}$ . Remember when multiplying fractions to multiply the numerators and multiply the denominators, cross reducing if possible:  $-9 \cdot \frac{8}{3} = -\frac{9}{1} \cdot \frac{8}{3} = -\frac{3}{1} \cdot \frac{8}{1} = -24$ .
8. **Answer choice (D) is correct.** We are looking for the answer choice that is NOT a possible value of  $w$ , so we are looking for a fraction that is either less than  $\frac{2}{9}$  or greater than  $\frac{5}{8}$ .  $\frac{1}{3}$  is equal to  $\frac{3}{9}$ , which is greater than  $\frac{2}{9}$ , so answer choice (A) is incorrect. Since the numerator of  $\frac{3}{7}$  is greater than the numerator of  $\frac{2}{9}$ , and the denominator of  $\frac{3}{7}$  is smaller than the denominator of  $\frac{2}{9}$ ,  $\frac{3}{7}$  is greater than  $\frac{2}{9}$ . Therefore, answer choice (B) is incorrect. Since the numerators of  $\frac{5}{9}$  and  $\frac{5}{8}$  are the same,  $\frac{5}{9}$  is smaller than  $\frac{5}{8}$  because it has a bigger denominator, so answer choice (C) is incorrect. We are left with answer choice (D) as the correct answer. You can also compare fractions by making them have a common denominator and then comparing their numerators.
9. **Answer choice (C) is correct.** When adding fractions, we need to find a common denominator by finding the LCM of the denominators. The LCM of 8 and 4 is 8, so change the denominator of the

second fraction into 8:  $-\frac{45}{8} + \frac{31}{4} = -\frac{45}{8} + \frac{62}{8}$ . We can rewrite this as  $\frac{62}{8} - \frac{45}{8}$ . Now subtract the fractions by subtracting the numerators:  $\frac{62}{8} - \frac{45}{8} = \frac{17}{8}$ . Change  $\frac{17}{8}$  into a mixed number to get  $2\frac{1}{8}$ .

10. **Answer choice (D) is correct.** Fraction bar means divide, so we can rewrite the expression as  $\frac{8}{3} \div \frac{5}{12}$ . Now divide the fractions by multiplying the first fraction by the reciprocal of the second fraction, cross reducing when possible:  $\frac{8}{3} \div \frac{5}{12} = \frac{8}{3} \cdot \frac{12}{5} = \frac{8}{1} \cdot \frac{4}{5} = \frac{32}{5} = 6\frac{2}{5}$ .
11. **Answer choice (B) is correct.** Subtract the fractions from left to right by first making a common denominator using the LCM of 3, 12, and 6, which is 12:  $3\frac{1}{3} - 1\frac{7}{12} - \frac{5}{6} = 3\frac{4}{12} - 1\frac{7}{12} - \frac{10}{12}$ . Now subtract the fractions moving left to right, borrowing when necessary:  $3\frac{4}{12} - 1\frac{7}{12} - \frac{10}{12} = 2\frac{16}{12} - 1\frac{7}{12} - \frac{10}{12} = 1\frac{9}{12} - \frac{10}{12} = \frac{21}{12} - \frac{10}{12} = \frac{11}{12}$ .
12. **Answer choice (D) is correct.** To multiply three fractions, multiply the numerators and multiply the denominators, cross reducing when possible. For this problem, we can cross reduce the 9 and 18 and the 5 and 25, so  $\frac{4}{9} \times \frac{5}{7} \times \frac{18}{25}$  becomes  $\frac{4}{1} \times \frac{1}{7} \times \frac{2}{5}$ . Now multiply the numerators and multiply the denominator:  $\frac{4}{1} \times \frac{1}{7} \times \frac{2}{5} = \frac{8}{35}$ .
13. **Answer choice (D) is correct.** Perform the subtraction in the denominator first by first finding a common denominator and then subtracting the numerators:  $\frac{2}{3} - \frac{1}{2} = \frac{4}{6} - \frac{3}{6} = \frac{1}{6}$ . Now we have  $\frac{\frac{5}{6}}{\frac{1}{6}}$  which is the same as  $\frac{5}{6} \div \frac{1}{6}$ . Divide the fractions by multiplying the first fraction by the reciprocal of the second fraction, cross reducing when possible:  $\frac{5}{6} \div \frac{1}{6} = \frac{5}{6} \times \frac{6}{1} = \frac{5}{1} \times \frac{1}{1} = 5$ .
14. **Answer choice (B) is correct.** Using PEMDAS, we know to perform the multiplication before the addition. Multiply the two fractions by multiplying the numerators and multiplying the denominators, cross reducing when possible:  $\frac{1}{3} + \frac{3}{4} \times \frac{8}{9} = \frac{1}{3} + \frac{1}{1} \times \frac{2}{3} = \frac{1}{3} + \frac{2}{3}$ . Since the fractions have the same denominators, we can add them by adding the numerators:  $\frac{1}{3} + \frac{2}{3} = \frac{3}{3} = 1$ .
15. **Answer choice (D) is correct.** Multiplying a positive number by a number between 0 and 1 results in a smaller number. Therefore, answer choices (A) and (B) are less than  $\frac{x}{y}$ . Dividing a positive number by a number between 0 and 1 results in a larger number. Therefore, answer choices (C) and (D) are greater than  $\frac{x}{y}$ . Since  $\frac{3}{4}$  is less than  $\frac{4}{5}$ , when we divide  $\frac{x}{y}$  by  $\frac{3}{4}$ , the result is larger than when we divide  $\frac{x}{y}$  by  $\frac{4}{5}$ , so answer choice (D) has the greatest value.
16. **Answer choice (B) is correct.** Perform the multiplication first. Multiply the two fractions by multiplying the numerators and multiplying the denominators, cross reducing if possible:  $\frac{5}{9} \times \frac{3}{5} =$

$\frac{1}{3} \times \frac{1}{1} = \frac{1}{3}$ . Now we have  $\frac{\frac{1}{3}}{\frac{7}{8}}$  which can be rewritten as  $\frac{1}{3} \div \frac{7}{8}$ . Divide the fractions by multiplying the first fraction by the reciprocal of the second fraction, cross reducing if possible:  $\frac{1}{3} \div \frac{7}{8} = \frac{1}{3} \times \frac{8}{7} = \frac{8}{21}$ .

17. **Answer choice (A) is correct.** Since  $a > 0$  and  $b < 0$ ,  $\frac{a}{b}$  is negative. Subtracting a negative number is the same as adding the positive version of the number, so answer choice (A) is greater than  $\frac{3}{4}$ . Answer choice (B) is a negative number minus a negative number, so the result is negative. Therefore, answer choice (B) is less than answer choice (A). Answer choice (C) is a negative number plus positive  $\frac{3}{4}$ , so the result is less than  $\frac{3}{4}$ . Therefore, answer choice (C) is less than answer choice (A). Adding a negative is the same as subtracting, so answer choice (D) is less than  $\frac{1}{4}$ . Therefore, answer choice (D) is less than answer choice (A). Therefore, answer choice (A) has the greatest value.
18. **Answer choice (B) is correct.** Find a common denominator between  $\frac{4}{9}$ ,  $\frac{2}{5}$ , and  $\frac{3}{5}$  by turning each fraction into an equivalent fraction with a denominator of 45:  $\frac{4}{9} = \frac{20}{45}$ ,  $\frac{2}{5} = \frac{18}{45}$ , and  $\frac{3}{5} = \frac{27}{45}$ . Since  $\frac{20}{45}$  is between  $\frac{18}{45}$  and  $\frac{27}{45}$ ,  $\frac{4}{9}$  is between  $\frac{2}{5}$  and  $\frac{3}{5}$ .
19. **Answer choice (B) is correct.** Multiplying a positive number by a number greater than 1 results in a larger number, so answer choices (C) and (D) are greater than  $\frac{p}{q}$ . Dividing a positive number by a number greater than 1 results in a smaller number, so answer choices (A) and (B) are less than  $\frac{p}{q}$ . Therefore, we can eliminate answer choices (C) and (D). Since  $\frac{9}{4}$  is greater than  $\frac{6}{5}$ , dividing  $\frac{p}{q}$  by  $\frac{9}{4}$  results in a smaller number than dividing  $\frac{p}{q}$  by  $\frac{6}{5}$ , so answer choice (B) has the smallest value.
20. **Answer choice (D) is correct.** Add the fractions in the numerator first by making a common denominator and then adding the numerators:  $\frac{1}{4} + \frac{1}{2} = \frac{1}{4} + \frac{2}{4} = \frac{3}{4}$ . Subtract the fractions in the denominator by first making a common denominator and then subtracting the numerators:  $\frac{9}{10} - \frac{3}{5} = \frac{9}{10} - \frac{6}{10} = \frac{3}{10}$ . Now we have  $\frac{\frac{3}{4}}{\frac{3}{10}}$ , which can be rewritten as  $\frac{3}{4} \div \frac{3}{10}$ . Divide the fractions by multiplying the first fraction by the reciprocal of the second fraction, cross reducing when possible:  $\frac{3}{4} \div \frac{3}{10} = \frac{3}{4} \times \frac{10}{3} = \frac{1}{2} \times \frac{5}{1} = \frac{5}{2} = 2\frac{1}{2}$ .

## Operations with Fractions Practice Set 2

1. **Answer choice (C) is correct.** To add fractions, we need to find a common denominator by finding the LCM of the denominators. The LCM of 5 and 7 is 35, so change the denominator of each fraction

to 35:  $3\frac{4}{5} + 4\frac{5}{7} = 3\frac{28}{35} + 4\frac{25}{35}$ . Now add the whole numbers and the fractions:  $3\frac{28}{35} + 4\frac{25}{35} = 7\frac{53}{35}$ . Finally, simplify the improper fraction:  $7\frac{53}{35} = 8\frac{18}{35}$ .

- Answer choice (C) is correct.** To multiply mixed numbers, first change each mixed number into an improper fraction:  $6\frac{3}{4} \times 4\frac{2}{3} = \frac{27}{4} \times \frac{14}{3}$ . Now multiply the numerators and multiply the denominators, cross reducing first if possible:  $\frac{27}{4} \times \frac{14}{3} = \frac{9}{2} \times \frac{7}{1} = \frac{63}{2} = 31\frac{1}{2}$ .
- Answer choice (B) is correct.** To subtract fractions, we need to find a common denominator by finding the LCM of the denominators. The LCM of 8 and 4 is 8, so change the denominator of the second fraction to 8:  $4\frac{3}{8} - 1\frac{3}{4} = 4\frac{3}{8} - 1\frac{6}{8}$ . Since  $\frac{3}{8}$  is less than  $\frac{6}{8}$ , we need to borrow before subtracting:  $4\frac{3}{8} - 1\frac{6}{8} = 3\frac{11}{8} - 1\frac{6}{8}$ . Now subtract the whole numbers and the fractions:  $3\frac{11}{8} - 1\frac{6}{8} = 2\frac{5}{8}$ .
- Answer choice (C) is correct.** To multiply a fraction by a mixed numbers, first change the mixed number into an improper fraction:  $-\frac{6}{7} \times (-4\frac{2}{3}) = -\frac{6}{7} \times (-\frac{14}{3})$ . Now multiply the numerators and multiply the denominators, cross reducing first if possible. Remember that the product of two negative numbers is positive:  $-\frac{6}{7} \times (-\frac{14}{3}) = -\frac{2}{1} \times (-\frac{2}{1}) = 4$ .
- Answer choice (B) is correct.** To divide mixed numbers, first change each mixed number into an improper fraction:  $1\frac{4}{5} \div 2\frac{5}{8} = \frac{9}{5} \div \frac{21}{8}$ . Now divide the fractions by multiplying the first fraction by the reciprocal of the second fraction, cross reducing when possible:  $\frac{9}{5} \div \frac{21}{8} = \frac{9}{5} \cdot \frac{8}{21} = \frac{3}{5} \cdot \frac{8}{7} = \frac{24}{35}$ .
- Answer choice (D) is correct.** We are looking for the value that could NOT be  $x$ , so we are looking for a number less than  $\frac{2}{11}$  or greater than  $\frac{5}{12}$ . Half of 12 is 6, so  $\frac{5}{12}$  is less than one half. Half of 7 is 3.5, so  $\frac{4}{7}$  is greater than one half. Therefore,  $\frac{4}{7}$  is greater than  $\frac{5}{12}$ , so answer choice (D) is NOT a possible value of  $x$ .
- Answer choice (B) is correct.** To subtract fractions, we need to find a common denominator by finding the LCM of the denominators. The LCM of 2 and 3 is 6, so change the denominator of each fraction to 6:  $2\frac{1}{2} - 6\frac{1}{3} = 2\frac{3}{6} - 6\frac{2}{6}$ . When subtracting a larger number from a smaller number, change the order of the numbers and make the answer negative:  $2\frac{3}{6} - 6\frac{2}{6} = -(6\frac{2}{6} - 2\frac{3}{6})$ . Since  $\frac{2}{6}$  is less than  $\frac{3}{6}$ , we need to borrow before subtracting:  $-(6\frac{2}{6} - 2\frac{3}{6}) = -(5\frac{8}{6} - 2\frac{3}{6})$ . Now subtract the whole numbers and the fractions:  $-(5\frac{8}{6} - 2\frac{3}{6}) = -(3\frac{5}{6}) = -3\frac{5}{6}$ .

8. **Answer choice (B) is correct.** Half of 9 is 4.5, so  $\frac{4}{9}$  is less than half. Therefore, we can eliminate answer choices (C) and (D) because they are greater than or equal to one half. We can rewrite  $\frac{1}{4}$  as , which is less than  $\frac{2}{7}$ , so we can eliminate answer choice (A). We are left with answer choice (B) as the correct answer. You can also compare fractions by making them have a common denominator and then comparing their numerators.
9. **Answer choice (C) is correct.** First rewrite the equation as  $\frac{13}{6} - \frac{35}{9}$ . To subtract fractions, we need to find a common denominator by finding the LCM of the denominators. The LCM of 6 and 9 is 18, so change the denominator of each fraction to 18:  $\frac{13}{6} - \frac{35}{9} = \frac{39}{18} - \frac{70}{18}$ . When subtracting a larger number from a smaller number, change the order of the numbers and make the answer negative:  $\frac{39}{18} - \frac{70}{18} = -(\frac{70}{18} - \frac{39}{18})$ . Now subtract the fractions by subtracting the numerators:  $-(\frac{70}{18} - \frac{39}{18}) = -(\frac{31}{18}) = -1\frac{13}{18}$
10. **Answer choice (D) is correct.** Perform the operations from left to right by first making a common denominator using the LCM of 5, 15, and 10, which is 30:  $\frac{4}{5} - \frac{7}{15} + \frac{9}{10} = \frac{24}{30} - \frac{14}{30} + \frac{27}{30}$ . Now perform the subtraction first and then the addition:  $\frac{24}{30} - \frac{14}{30} + \frac{27}{30} = \frac{10}{30} + \frac{27}{30} = \frac{37}{30} = 1\frac{7}{30}$
11. **Answer choice (C) is correct.** Fraction bar means divide, so we can rewrite the expression as  $\frac{9}{2} \div \frac{15}{16}$ . Now divide the fractions by multiplying the first fraction by the reciprocal of the second fraction, cross reducing when possible:  $\frac{9}{2} \div \frac{15}{16} = \frac{9}{2} \cdot \frac{16}{15} = \frac{3}{1} \cdot \frac{8}{5} = \frac{24}{5} = 4\frac{4}{5}$
12. **Answer choice (A) is correct.** Perform the operations moving left to right, so perform the division first. To divide fraction, multiply the first fraction by the reciprocal of the second fraction, cross reducing when possible:  $\frac{3}{4} \div \frac{7}{8} \cdot \frac{21}{28} = \frac{3}{4} \cdot \frac{8}{7} \cdot \frac{21}{28} = \frac{3}{1} \cdot \frac{2}{7} \cdot \frac{21}{28} = \frac{6}{7} \cdot \frac{21}{28}$ . Now multiply the remaining two fractions, cross reducing when possible:  $\frac{6}{7} \cdot \frac{21}{28} = \frac{3}{1} \cdot \frac{3}{14} = \frac{9}{14}$
13. **Answer choice (A) is correct.** Dividing a positive number by a number between 0 and 1 results in a larger number, so answer choices (C) and (D) are greater than  $\frac{x}{y}$ . Multiplying a positive number by a number between 0 and 1 results in a smaller number, so answer choices (A) and (B) are less than  $\frac{x}{y}$ . Therefore, we can eliminate answer choices (C) and (D). Since  $\frac{2}{3}$  is less than  $\frac{7}{8}$ , multiplying  $\frac{x}{y}$  by  $\frac{2}{3}$  will result in a smaller number than multiplying  $\frac{x}{y}$  by  $\frac{7}{8}$ , so answer choice (A) has the smallest value.
14. **Answer choice (C) is correct.** Perform the subtraction in the numerator first by creating a common denominator and then subtracting the numerators:  $\frac{7}{8} - \frac{5}{12} = \frac{21}{24} - \frac{10}{24} = \frac{11}{24}$ . Now our expression

is  $\frac{11}{\frac{24}{3}}$ , which can be rewritten as  $\frac{11}{24} \div \frac{3}{4}$ . Divide the fractions by multiplying the first fraction by the reciprocal of the second fraction, cross reducing when possible:  $\frac{11}{24} \div \frac{3}{4} = \frac{11}{24} \cdot \frac{4}{3} = \frac{11}{6} \cdot \frac{1}{3} = \frac{11}{18}$

15. **Answer choice (D) is correct.** PEMDAS tells us to perform the multiplication before the addition. Multiply the two fractions by multiplying the numerators and multiplying the denominators, cross reducing when possible:  $\frac{2}{3} + \frac{5}{6} \times \frac{8}{9} = \frac{2}{3} + \frac{5}{3} \times \frac{4}{9} = \frac{2}{3} + \frac{20}{27}$ . Add the fractions by first making a common denominator and then adding the numerators:  $\frac{2}{3} + \frac{20}{27} = \frac{18}{27} + \frac{20}{27} = \frac{38}{27} = 1\frac{11}{27}$
16. **Answer choice (B) is correct.** Since  $m$  is negative and  $n$  is positive,  $\frac{m}{n}$  is negative. Answer choice (B) is less than  $\frac{m}{n}$  because we are subtracting a positive number from  $\frac{m}{n}$ . Answer choices (A) and (C) are greater than  $\frac{m}{n}$  because we are adding positive number to  $\frac{m}{n}$ . Subtracting a negative number is the same as adding the positive version of the number, so answer choice (D) is greater than  $\frac{5}{9}$ , which means it is positive and greater than  $\frac{m}{n}$ . Therefore, answer choice (B) has the smallest value.
17. **Answer choice (A) is correct.** Perform the subtraction in the numerator and the addition in the denominator by making common denominators for each pair of fractions:  $\frac{\frac{4}{5} - \frac{3}{4}}{\frac{3}{10} + \frac{3}{5}} = \frac{\frac{16}{20} - \frac{15}{20}}{\frac{3}{10} + \frac{6}{10}} = \frac{\frac{1}{20}}{\frac{9}{10}}$ . We can rewrite our new expression as  $\frac{1}{20} \div \frac{9}{10}$ . Divide the fractions by multiplying the first fraction by the reciprocal of the second fraction, cross reducing when possible:  $\frac{1}{20} \div \frac{9}{10} = \frac{1}{20} \cdot \frac{10}{9} = \frac{1}{2} \cdot \frac{1}{9} = \frac{1}{18}$
18. **Answer choice (A) is correct.** Since  $a$  and  $b$  are both negative,  $\frac{a}{b}$  is positive. Multiplying a positive number by a number between 0 and 1 results in a smaller number, so answer choices (C) and (D) are less than  $\frac{a}{b}$ . Dividing a positive number by a number between 0 and 1 results in a larger number, so answer choices (A) and (B) are greater than  $\frac{a}{b}$ . Therefore, we can eliminate answer choices (C) and (D). Since  $\frac{1}{8}$  is less than  $\frac{1}{4}$ , dividing  $\frac{a}{b}$  by  $\frac{1}{8}$  will result in a larger number than dividing  $\frac{a}{b}$  by  $\frac{1}{4}$ , so answer choice (A) has the greatest value.
19. **Answer choice (B) is correct.** Compare each answer choice to the two given fractions until you find one that is between  $\frac{4}{9}$  and  $\frac{5}{9}$ . We can rewrite answer choice (A) as  $\frac{3}{9}$ , which is less than  $\frac{4}{9}$ , so answer choice (A) is incorrect. We can compare answer choice (B) to the two given fractions by making all three fractions have a denominator of 99:  $\frac{5}{11} = \frac{45}{99}$ ,  $\frac{4}{9} = \frac{44}{99}$ , and  $\frac{5}{9} = \frac{55}{99}$ . Since  $\frac{45}{99}$  is between  $\frac{44}{99}$  and  $\frac{55}{99}$ ,  $\frac{5}{11}$  is between  $\frac{4}{9}$  and  $\frac{5}{9}$ , so answer choice (B) is correct.

20. **Answer choice (D) is correct.** First perform the multiplication in the numerator and the multiplication in the denominator, cross reducing if possible:  $\frac{\frac{5}{9} \times \frac{7}{10}}{\frac{1}{3} \times \frac{1}{2}} = \frac{\frac{1}{9} \times \frac{7}{2}}{\frac{1}{3} \times \frac{1}{2}} = \frac{\frac{7}{18}}{\frac{1}{6}}$ . We can rewrite our new expression as  $\frac{7}{18} \div \frac{1}{6}$ . Divide the fractions by multiplying the first fraction by the reciprocal of the second fraction, cross reducing when possible:  $\frac{7}{18} \div \frac{1}{6} = \frac{7}{18} \cdot \frac{6}{1} = \frac{7}{3} \cdot \frac{1}{1} = \frac{7}{3} = 2\frac{1}{3}$

### Operations with Decimals Practice Set 1

1. **Answer choice (A) is correct.** When adding decimals, line up the decimal point and add down like you would with whole numbers. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
2. **Answer choice (D) is correct.** When multiplying decimals, ignore the decimal points and multiply the two numbers: 8 times 7 equals 56. To determine where the decimal point goes, count up the total number of digits after the decimal point in the original numbers, which is 1. This means we want 1 digit after the decimal point in our number, so our answer is 5.6. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
3. **Answer choice (B) is correct.** When subtracting decimals, line up the decimal point and subtract down like you would with whole numbers. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
4. **Answer choice (A) is correct.** Multiplying a number by a number less than 1 results in a smaller number, so answer choices (C) and (D) are less than 48. Dividing a number by a number less than 1 results in a larger number, so answer choices (A) and (B) are greater than 48. Since the 48 in answer choice (A) is being divided by a *smaller* number than the 48 in answer choice (B), the value of answer choice (A) is greater than the value of answer choice (B).
5. **Answer choice (B) is correct.** When subtracting decimals, line up the decimal point and subtract down like you would with whole numbers. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
6. **Answer choice (A) is correct.** To divide decimals, move the decimal point of the divisor (2nd number) all the way to the right. Because the decimal point is already all the way to the right in the number 9, we can just divide 10.8 by 9 using long division. When you do this, you get 1.2. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
7. **Answer choice (C) is correct.** When multiplying decimals, ignore the decimal points and multiply the two numbers: 3 times 6 equals 18. To determine where the decimal point goes, count up the total number of digits after the decimal point in the original numbers, which is 2. This means we want 2 digits after the decimal point in our number, so our answer is 0.18. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)



8. **Answer choice (D) is correct.** When adding decimals, line up the decimal point and add down like you would with whole numbers. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
9. **Answer choice (D) is correct.** To divide decimals, move the decimal point of the divisor (2nd number) all the way to the right. We move the decimal point in 0.04 to the right two times to get 4. Now, do the same thing to the dividend (1st number). We move the decimal point in 0.59 to the right two times to get 59. Now divide 59 by 4 using long division and you get 14.75. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
10. **Answer choice (B) is correct.** When adding three decimals, stack the numbers on top of each other and line up the decimal points. Then add down like you would with whole numbers. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
11. **Answer choice (B) is correct.** When multiplying decimals, ignore the decimal points and multiply the two numbers: 1612 times 123 equals 198,276. To determine where the decimal point goes, count up the total number of digits after the decimal point in the original numbers, which is 2. This means we want 2 digits after the decimal point in our number, so our answer is 1,982.76. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
12. **Answer choice (A) is correct.** When subtracting three numbers, start by subtracting the second number from the first number:  $90 - 13.62 = 76.38$ . Then subtract the third number from the result:  $76.38 - 4.91 = 71.47$ . To see a step-by-step solution for each subtraction ( $90 - 13.62$  and  $76.38 - 4.91$ ), follow this link and type in each part of the problem: [how to solve operations with decimals](#)
13. **Answer choice (B) is correct.** Use PEMDAS to solve this problem: when choosing between subtraction and addition, move from left to right, so perform the subtraction first:  $81.245 - 15 = 66.245$ . Now add the result to 3.1:  $66.245 + 3.1 = 69.345$ . To see a step-by-step solution for each part of this problem, follow this link and type in each part of the problem: [how to solve operations with decimals](#)
14. **Answer choice (B) is correct.** When multiplying decimals, ignore the decimal points and multiply the two numbers: 98 times 538 equals 52,724. To determine where the decimal point goes, count up the total number of digits after the decimal point in the original numbers, which is 3. This means we want 3 digits after the decimal point in our number, so our answer is 52.724. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
15. **Answer choice (C) is correct.** To round a number to the hundredth, look at the number in the thousandth place and see if it is less than 5 (round down) or greater than or equal to 5 (round up). In

328.7963, 6 is in the thousandth place. Since 6 is greater than or equal to 5, we round the hundredths place up. When rounding up a 9, round up the number to the left of it and change the 9 to a 0. Therefore, we get 328.80 as our answer.

16. **Answer choice (C) is correct.** Use PEMDAS to solve this problem: when choosing between subtraction and addition, move from left to right, so perform the addition first:  $6.7 + 13.42 = 20.12$ . Now subtract 17.8 from 20.12:  $20.12 - 17.8 = 2.32$ . To see a step-by-step solution for each part of this problem, follow this link and type in each part of the problem: [how to solve operations with decimals](#)
17. **Answer choice (A) is correct.** To round a number to the thousandth, look at the number in the ten thousandth place and see if it is less than 5 (round down) or greater than or equal to 5 (round up). In 56.8364, 4 is in the ten thousandth place. Since 4 is less than 5, we round the thousandth place down (keep the thousandth digit the same), so we get 56.836.
18. **Answer choice (D) is correct.** To divide decimals, move the decimal point of the divisor (2nd number) all the way to the right. We move the decimal point in 0.9 to the right one time to get 9. Now, do the same thing to the dividend (1st number). We move the decimal point in 73.8 to the right one time to get 738. Now divide 738 by 9 using long division and you get 82. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
19. **Answer choice (B) is correct.** To divide decimals, move the decimal point of the divisor (2nd number) all the way to the right. We move the decimal point in 2.3 to the right one time to get 23. Now, do the same thing to the dividend (1st number). We move the decimal point in 0.483 to the right one time to get 4.83. Now divide 4.83 by 23 using long division and you get 0.21. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
20. **Answer choice (A) is correct.** Dividing a number by a number less than 1 results in a larger number, so answer choices (C) and (D) are greater than 0.5. Multiplying a number by a number less than 1 results in a smaller number, so answer choices (A) and (B) are less than 0.5. Since the 0.5 in answer choice (A) is being multiplied by a *smaller* number than the 0.5 in answer choice (B), answer choice (A) is smaller than answer choice (B).

## **Operations with Decimals Practice Set 2**

1. **Answer choice (A) is correct.** When subtracting decimals, line up the decimal point and subtract down like you would with whole numbers. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
2. **Answer choice (D) is correct.** When multiplying decimals, ignore the decimal points and multiply the two numbers: 4 times 7 equals 28. To determine where the decimal point goes, count up the total number of digits after the decimal point in the original numbers, which is 1. This means we want 1

digit after the decimal point in our number, so our answer is 2.8. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)

3. **Answer choice (B) is correct.** To round a number to the tenth, look at the number in the hundredths place and see if it is less than 5 (round down) or greater than or equal to 5 (round up). In 35.946, 4 is in the hundredth place. Since 4 is less than 5, we round the tenths place down (keep the tenths digit the same), so we get 35.9.
4. **Answer choice (B) is correct.** When adding decimals, line up the decimal point and add down like you would with whole numbers. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
5. **Answer choice (C) is correct.** To divide decimals, move the decimal point of the divisor (2nd number) all the way to the right. Because the decimal point is already all the way to the right in the number 12, we can just divide 28.8 by 12 using long division. When you do this, you get 2.4. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
6. **Answer choice (B) is correct.** When subtracting decimals, line up the decimal point and subtract down like you would with whole numbers. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
7. **Answer choice (D) is correct.** When adding decimals, line up the decimal point and add down like you would with whole numbers. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
8. **Answer choice (D) is correct.** To divide decimals, move the decimal point of the divisor (2nd number) all the way to the right. We move the decimal point in 0.05 to the right two times to get 5. Now, do the same thing to the dividend (1st number). We move the decimal point in 0.79 to the right two times to get 79. Now divide 79 by 5 using long division and you get 15.8. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
9. **Answer choice (C) is correct.** When multiplying decimals, ignore the decimal points and multiply the two numbers: 9 times 5 equals 45. To determine where the decimal point goes, count up the total number of digits after the decimal point in the original numbers, which is 2. This means we want 2 digits after the decimal point in our number, so our answer is 0.45. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
10. **Answer choice (D) is correct.** When adding three decimals, stack the numbers on top of each other and line up the decimal points. Then add down like you would with whole numbers. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)

11. **Answer choice (B) is correct.** When multiplying decimals, ignore the decimal points and multiply the two numbers: 2605 times 78 equals 203,190. To determine where the decimal point goes, count up the total number of digits after the decimal point in the original numbers, which is 2. This means we want 2 digits after the decimal point in our number, so our answer is 2031.9. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
12. **Answer choice (B) is correct.** To divide decimals, move the decimal point of the divisor (2nd number) all the way to the right. Then move the decimal point in the dividend (second number) the same number of times. Do this to each answer choice to get (A)  $56 \div 14$ , (B)  $5600 \div 14$ , (C)  $1.4 \div 56$ , (D)  $1.4 \div 56$ . Since answer choices (C) and (D) have the smallest dividend and the largest divisor, they result in the smallest quotient. Since answer choice (A) and (B) have the same divisor, the answer choice with the larger dividend will result in the greatest quotient. Therefore, answer choice (B) has the greatest value.
13. **Answer choice (A) is correct.** When subtracting three numbers, start by subtracting the second number from the first number:  $82.3 - 70 = 12.3$ . Then subtract the third number from the result:  $12.3 - 6.18 = 6.12$ . To see a step-by-step solution for each subtraction ( $82.3 - 70$  and  $12.3 - 6.18$ ), follow this link and type in each part of the problem: [how to solve operations with decimals](#)
14. **Answer choice (C) is correct.** To divide decimals, move the decimal point of the divisor (2nd number) all the way to the right. We move the decimal point in 0.3 to the right one time to get 3. Now, do the same thing to the dividend (1st number). We move the decimal point in 1.725 to the right one time to get 17.25. Now divide 17.25 by 3 using long division and you get 5.75. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
15. **Answer choice (C) is correct.** Use PEMDAS to solve this problem: when choosing between subtraction and addition, move from left to right, so perform the subtraction first:  $62.113 - 3.9 = 58.213$ . Now add 18.2 to 58.213:  $58.213 + 18.2 = 76.413$ . To see a step-by-step solution for each part of this problem, follow this link and type in each part of the problem: [how to solve operations with decimals](#)
16. **Answer choice (B) is correct.** Dividing a number by a number greater than 1 results in a smaller number, so answer choice (C) is less than 80. Multiplying a number by a number less than 1 results in a smaller number, so answer choice (B) is less than 80. Dividing a number by a number less than 1 results in a larger number, so answer choice (D) is greater than 80. Multiplying a number by a number greater than 1 results in a larger number, so answer choice (A) is greater than 80. Therefore, answer choices (B) and (C) are smaller than answer choices (A), and (D). Find the value of answer choices (B) and (C). Answer choice (B):  $80 \cdot 0.15 = 12$ . Answer choice (C):  $80 \div 1.5 = 53.\overline{3}$ . Therefore, answer choice (B) has the smallest value.
17. **Answer choice (B) is correct.** When multiplying decimals, ignore the decimal points and multiply the two numbers: 57 times 912 equals 51,984. To determine where the decimal point goes, count up

the total number of digits after the decimal point in the original numbers, which is 3. This means we want 3 digits after the decimal point in our number, so our answer is 51.984. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)

18. **Answer choice (C) is correct.** To round a number to the ten thousandth, look at the number in the hundred thousandth place and see if it is less than 5 (round down) or greater than or equal to 5 (round up). In 134.99897, 7 is in the hundred thousandth place. Since 7 is greater than 5, we round the thousandth place up. When rounding up a 9, round up the number to the left of it and change the 9 to a 0. Therefore, we get 134.9990.
19. **Answer choice (A) is correct.** To divide decimals, move the decimal point of the divisor (2nd number) all the way to the right. We move the decimal point in 1.6 to the right one time to get 16. Now, do the same thing to the dividend (1st number). We move the decimal point in 0.272 to the right one time to get 2.72. Now divide 2.72 by 16 using long division and you get 0.17. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
20. **Answer choice (A) is correct.** Use PEMDAS to solve this problem: when choosing between subtraction and addition, move from left to right, so perform the addition first:  $19.1 + 43.23 = 62.33$ . Now subtract 25.97 from 62.33:  $62.33 - 25.97 = 36.36$ . To see a step-by-step solution for each part of this problem, follow this link and type in each part of the problem: [how to solve operations with decimals](#)

### **Fraction & Decimal Word Problems Practice Set 1**

1. **Answer choice (C) is correct.** Since  $\frac{2}{5}$  of Ben's pens are blue, and there are 10 blue pens, we can find the total number of pens by answering the question, "10 is  $\frac{2}{5}$  of what number?" Set up the equation  $10 = \frac{2}{5} \cdot x$  and solve for  $x$  by dividing both sides by  $\frac{2}{5}$  to get  $x = 25$ . Since there are 25 total pens and 10 blue pens, the number of black pens equals  $25 - 10$  which equals 15.
2. **Answer choice (C) is correct.** To answer the question "Whisker's weight is how many times Snowball's weight?" we need to divide Whisker's weight by Snowball's weight. To do this, both weights need to be decimals or fractions: decimals are easier, so change  $13\frac{1}{2}$  to a decimal which equals 13.2. Now divide 13.2 by 4.8 to get 2.75.
3. **Answer choice (C) is correct.** If Christian drank  $\frac{3}{8}$  of the milk, then he has  $\frac{5}{8}$  left. Find  $\frac{5}{8}$  of 16 by multiplying  $\frac{5}{8}$  and 16 to get 10 cups.
4. **Answer choice (D) is correct.** 0.6 is the same as 0.600, which is 600 thousandths. Therefore,  $0.6 = 0.600 = \frac{600}{1000}$ .
5. **Answer choice (C) is correct.** Multiply the hourly rate of \$9.25 by the number of hours of rental (4 hours):  $9.25 \cdot 4 = \$37$ . Add the \$20 fee to get \$57.

6. **Answer choice (B) is correct.** Find the number of athletic shoes by finding  $\frac{5}{9}$  of 540:  $\frac{5}{9} \cdot 540 = 300$ . Find the number of basketball shoes by finding  $\frac{1}{3}$  of the 300 athletic shoes:  $\frac{1}{3} \cdot 300 = 100$  basketball shoes.
7. **Answer choice (D) is correct.** Since the problem does not tell us how much money Gil started with, we can choose any amount. Let's say Gil started with \$100. Find the amount he spent on rent by finding  $\frac{1}{5}$  of 100:  $\frac{1}{5} \cdot 100 = \$20$  spent on rent. Therefore, Gil has \$80 left after paying for rent. Now find the amount he spent on food by finding  $\frac{1}{8}$  of the remaining \$80:  $\frac{1}{8} \cdot 80 = \$10$ . Since he spent \$10 of his remaining \$80 on food, he has \$70 left. He has \$70 out of his original \$100, which means  $\frac{70}{100}$  or  $\frac{7}{10}$  of his paycheck remains.
8. **Answer choice (B) is correct.** Find the cost of purchasing five peppers by multiplying \$0.85 by 5 to get \$4.25. Find the cost of purchasing five onions by multiplying \$1.15 by 5 to get \$5.75. Add the two values together to get the final cost:  $\$4.25 + \$5.75 = \$10.00$ .
9. **Answer choice (C) is correct.** Since Harrison *cut* the wood into pieces, we want to *divide* the length of the wood by the length of each piece:  $24 \div \frac{3}{4} = 32$  pieces.
10. **Answer choice (C) is correct.** We need to answer the question, "720 is  $\frac{2}{3}$  of what number?" To do this, set up the following equation and solve for  $x$  (the original price of the computer):  $720 = \frac{2}{3} \cdot x$ . Divide both sides by  $\frac{2}{3}$  to get  $x = \$1080$ .
11. **Answer choice (B) is correct.** Find the amount of money Oscar made last week by multiplying \$25.60 by 40 to get \$1024. Since Oscar used  $\frac{1}{4}$  of his paycheck to pay taxes, he took home  $\frac{3}{4}$  of his paycheck. Find  $\frac{3}{4}$  of \$1024 by multiplying  $\frac{3}{4}$  by \$1024 to get \$768.
12. **Answer choice (A) is correct.** Since Resham's age is 1.5 times Pilar's age, we can find Pilar's age by dividing Resham's age by 1.5:  $72 \div 1.5 = 48$ . Since Pilar's age is 2.4 times Kit's age, we can find Kit's age by dividing Pilar's age by 2.4:  $48 \div 2.4 = 20$  years.
13. **Answer choice (D) is correct.** Find the number of packages that could not be fixed by finding  $\frac{3}{7}$  of 2800:  $\frac{3}{7} \cdot 2800 = 1200$ . Therefore, 1200 out of 4800 total packages could not be fixed, which simplifies to  $\frac{1}{4}$ .
14. **Answer choice (C) is correct.** Since the number of students in the class is 1.2 times the number of students who passed the exam, we can find the number of students who passed the exam by dividing the total number of students by 1.2:  $60 \div 1.2 = 50$  students.
15. **Answer choice (A) is correct.** In choice (A), there are 160 boys and 280 total students ( $160 + 120 = 280$ ). Therefore, the fraction of the students that are boys is  $\frac{160}{280}$  which simplifies to  $\frac{4}{7}$ .

16. **Answer choice (C) is correct.** Since Holly drank  $2\frac{2}{3}$  more cups than Michael, Michael drank  $2\frac{2}{3}$  fewer cups than Holly. Therefore, we can find the number of cups Michael drank by subtracting  $2\frac{2}{3}$  from the number of cups Holly drank:  $9\frac{4}{5} - 2\frac{2}{3} = 7\frac{2}{15}$ . Find the total number of cups that Holly and Michael drank by adding the number of cups each of them drank:  $9\frac{4}{5} + 7\frac{2}{15} = 16\frac{14}{15}$ .
17. **Answer choice (B) is correct.** Since  $\frac{3}{10}$  of the coins are dimes, and there are 18 dimes, we can find the total number of coins by answering the question “18 is  $\frac{3}{10}$  of what number?”. Set up the equation  $18 = \frac{3}{10} \cdot x$  (where  $x$  is the total number of coins), and solve for  $x$  by dividing both sides of the equation by  $\frac{3}{10}$  to get  $x = 60$ . Since there are 60 total coins and 18 dimes, there are 42 quarters ( $60 - 18 = 42$ ). Find the value of the dimes by multiplying  $18 \cdot 0.1$  to get \$1.80. Find the value of the quarters by multiplying  $42 \cdot 0.25$  to get \$10.50. Add \$1.80 to \$10.50 to get a total value of \$12.30.
18. **Answer choice (D) is correct.** If the cost of an apple is \$0.54 less than the cost of an avocado, the cost of the avocado is \$0.54 more than the cost of an apple. Find the cost of an avocado by adding \$0.54 to the cost of an apple:  $\$0.90 + \$0.54 = \$1.44$  per avocado. To answer the question, “The cost of an avocado is how many times the cost of an apple?” divide the cost of an avocado by the cost of an apple:  $\$1.44 \div \$0.90 = 1.6$ .
19. **Answer choice (A) is correct.** Find the number of cups Ingrid drank by finding  $\frac{5}{12}$  of 9:  $\frac{5}{12} \cdot 9 = 3\frac{3}{4} = 3.75$  cups. Find the number of cups Toby drank by finding  $\frac{1}{6}$  of 9:  $\frac{1}{6} \cdot 9 = 1\frac{1}{2} = 1.5$  cups. Find the total number of cups Ingrid and Toby drank by adding 3.75 and 1.5 to get 5.25 cups. Finally, find the remaining number of cups of juice by subtracting the total amount Ingrid and Toby drank from the starting amount of 9 cups:  $9 - 5.25 = 3.75$  cups.
20. **Answer choice (A) is correct.** Find the number of men by subtracting 8 from 20 to get 12 men. Find the total number of men and women by adding 20 women and 12 men to get 32 total people in the group. Therefore, there are 12 men out of 32 total people.  $\frac{12}{32}$  simplifies to  $\frac{3}{8}$ .

### **Fraction & Decimal Word Problems Practice Set 2**

1. **Answer choice (C) is correct.** If one third of the students are boys, then two thirds of the students are girls. Therefore, we can find the number of girls by finding two thirds of 36:  $\frac{2}{3}$  of 36 =  $\frac{2}{3} \cdot 36 = 24$  girls.
2. **Answer choice (D) is correct.** To answer the question “The height of the apartment building is how many times the height of the maple tree?” we need to divide the height of the apartment building by the height of the maple tree. To do this, both weights need to be decimals or fractions: the answer choices are written as fractions, so we will change 16.25 into a fraction. First change 16.25 into a mixed number by keeping the whole number portion of 16.25 and changing the decimal portion into a

fraction:  $16.25 = 16\frac{25}{100} = 16\frac{1}{4}$ . Now divide the height of the apartment building by the height of the maple tree, cross reducing when possible:  $16\frac{1}{4} \div 3\frac{1}{3} = \frac{65}{4} \div \frac{10}{3} = \frac{65}{4} \cdot \frac{3}{10} = \frac{13}{4} \cdot \frac{3}{2} = \frac{39}{8} = 4\frac{7}{8}$

3. **Answer choice (B) is correct.** Find the number of slices of pizza Terry ate by finding  $\frac{1}{4}$  of 24:  $\frac{1}{4}$  of 24 =  $\frac{1}{4} \cdot 24 = 6$  slices. Find the remaining pizza by subtracting the 6 slices Terry ate from the total slices:  $24 - 6 = 18$  slices remaining. Now find the number of slices of pizza Jones ate by finding  $\frac{2}{3}$  of 18:  $\frac{2}{3}$  of 18 =  $\frac{2}{3} \cdot 18 = 12$  slices. Find the number of slices left by subtracting the 12 slices Jones ate from the 18 remaining slices:  $18 - 12 = 6$  slices left. Since Patrick ate the rest of the pizza, Patrick ate 6 slices.
4. **Answer choice (C) is correct.** Find the number of cherry trees by finding  $\frac{4}{5}$  of 320:  $\frac{4}{5}$  of 320 =  $\frac{4}{5} \cdot 320 = 256$  cherry trees. Since  $\frac{1}{8}$  of the cherry trees did not bloom this year,  $\frac{7}{8}$  of the cherry trees did bloom this year. Therefore, we can find the number of cherry trees that bloomed this year by finding  $\frac{7}{8}$  of 256:  $\frac{7}{8}$  of 256 =  $\frac{7}{8} \cdot 256 = 224$ .
5. **Answer choice (C) is correct.** 3.75 can be read as 3 and 75 hundredths, so we can write it as the following mixed number:  $3.75 = 3\frac{75}{100}$ . Now we can change it into an improper fraction:  $3\frac{75}{100} = \frac{375}{100}$ . Therefore, since  $3.75 = \frac{375}{100} = \frac{m}{100}$ ,  $m$  equals 375.
6. **Answer choice (D) is correct.** Since the problem didn't tell us how much money Jake started with, we can choose any number. Let's say Jake started with \$90, since \$90 is divisible by 3. Find the amount of money Jake spent on notebooks by finding  $\frac{1}{3}$  of \$90:  $\frac{1}{3}$  of \$90 =  $\frac{1}{3} \cdot \$90 = \$30$ . Find how much money he had remaining after buying notebooks by subtracting \$30 from \$90:  $\$90 - \$30 = \$60$ . Find how much money Jake spent on markers by finding  $\frac{1}{4}$  of his remaining \$60:  $\frac{1}{4}$  of \$60 =  $\frac{1}{4} \cdot \$60 = \$15$ . Find how much money Jake has left by subtracting the \$15 he spent on markers from \$60:  $\$60 - \$15 = \$45$ . Therefore, Jake has \$45 out of \$90, or  $\frac{45}{90}$  of his money left, which simplifies to  $\frac{1}{2}$ .
7. **Answer choice (C) is correct.** Find the amount of money Kevin spent on the three songs by multiplying 3 by the cost of each song, \$0.15:  $3 \cdot \$0.15 = \$0.45$ . Find the amount of money Kevin spent on the three video games by multiplying 3 by the cost of each video game, \$12.20:  $3 \cdot \$12.20 = \$36.60$ . Find the total money Kevin spent by adding the two results:  $\$0.45 + \$36.60 = \$37.05$ .
8. **Answer choice (C) is correct.** Find the number of batches of muffins Emily can make by dividing the number of sticks of butter she has by the number of sticks of butter needed for each batch of muffins:  $6 \div \frac{2}{3} = 6 \cdot \frac{3}{2} = 9$  batches.
9. **Answer choice (A) is correct.** The first two miles cost a flat fee of \$2.80, and each additional mile costs \$0.40 per mile. Therefore, for a 6 mile trip, we need to add \$2.80 to the cost of the remaining 4 miles. Find the cost of the remaining 4 miles by multiplying \$0.40 by 4:  $\$0.40 \cdot 4 = \$1.60$ . Add the result to \$2.80:  $\$2.80 + \$1.60 = \$4.40$



10. **Answer choice (D) is correct.** Since the microwave oven includes a sales tax that is  $\frac{1}{5}$  of the total price, the price of the microwave after tax is equal to  $\frac{6}{5}$  of the original price. Therefore, to find the original price, we can set up an equation that represents the statement, “The total cost of the microwave after tax is equal to  $\frac{6}{5}$  of the original price,” where  $x$  represents the original price of the microwave:  $\$960 = \frac{6}{5}x \rightarrow x = \$800$ .
11. **Answer choice (B) is correct.** Find the total number of ounces of milk Ruby bought by multiplying the number of cartons by the number of ounces of milk in each carton:  $5 \cdot 15.2 = 76$  ounces. Since Ruby used  $\frac{7}{8}$  of the milk to make milkshakes, she has  $\frac{1}{8}$  of the milk left. Therefore, we can find the number of ounces of milk she has left by finding  $\frac{1}{8}$  of 76:  $\frac{1}{8}$  of 76 =  $\frac{1}{8} \cdot 76 = \frac{76}{8} = 9.5$  ounces.
12. **Answer choice (D) is correct.** The width of Tom’s history book is 1.5 times the width of his English book, so we can find the width of Tom’s history book by multiplying the width of his English book by 1.5:  $2 \cdot 1.5 = 3$  inches. The width of Tom’s dictionary is  $\frac{9}{4}$  of the width of his history book, so we can find the width of Tom’s dictionary by finding  $\frac{9}{4}$  of the width of his history book:  $\frac{9}{4}$  of 3 =  $\frac{9}{4} \cdot 3 = \frac{27}{4} = 6.75$  inches.
13. **Answer choice (A) is correct.** First find the regular price of the bag by finding  $1\frac{2}{5}$  times the discounted price of \$340:  $1\frac{2}{5} \cdot \$340 = \$476$ . Now find how much money Amy saved by subtracting the discounted price from the regular price:  $\$476 - \$340 = \$136$ .
14. **Answer choice (B) is correct.** In answer choice (B), there are 6 vowels and 10 consonants, so there are 16 total tiles. Therefore, vowels make up  $\frac{6}{16}$  of the tiles, which simplifies to  $\frac{3}{8}$ .
15. **Answer choice (D) is correct.** Since the problem doesn’t tell us how many students Mr. Tom has, we can choose our own number. Let’s say Mr. Tom has 360 students because it is divisible by 4 and 9. Find the number of students who own a pet by finding  $\frac{3}{4}$  of 360:  $\frac{3}{4}$  of 360 =  $\frac{3}{4} \cdot 360 = 270$  students. Now find the number of students who own a dog by finding  $\frac{5}{9}$  of 270:  $\frac{5}{9}$  of 270 =  $\frac{5}{9} \cdot 270 = 150$  students. Now we know 150 out of 360 students have a dog, so find the number of students who do NOT own a dog by subtracting 150 from 360:  $360 - 150 = 210$ . Therefore, 210 out of 360 students, or  $\frac{210}{360}$  of students, do not have a dog. Simplify  $\frac{210}{360}$  to get  $\frac{7}{12}$ .
16. **Answer choice (C) is correct.** Since the answers are written as decimals, first change  $1\frac{7}{10}$  into a decimal:  $1\frac{7}{10} = 1.7$ . Since Edgar collected 1.7 fewer pounds of newspaper than Louise, Louise collected 1.7 pounds more newspaper than Edgar. Find the amount of newspaper Louise collected by adding 1.7 pounds to 3.5 pounds:  $3.5 + 1.7 = 5.2$  pounds. Finally, find the total number of pounds of

newspaper collected by Edgar and Louise by adding the amounts they each collected:  $3.5 + 5.2 = 8.7$  pounds.

17. **Answer choice (C) is correct.** Since  $\frac{5}{8}$  of the tokens are gold, and the remaining tokens are silver,  $\frac{3}{8}$  of the tokens are silver. Since  $\frac{5}{8}$  is five times  $\frac{1}{8}$ , we know that Gene collected five times as many gold tokens as he did silver tokens. Therefore, we can find the number of gold tokens he collected by multiplying the number of silver tokens he collected by 5:  $8 \cdot 5 = 40$  gold tokens. Now find the total number of points Gene has by multiplying the value of each gold token by the number of gold tokens, multiplying the value of each silver token by the number of silver tokens, and adding the results:  $40 \cdot 5 + 8 \cdot 2 = 200 + 16 = 216$  points.
18. **Answer choice (C) is correct.** There are 5 more female passengers than male passengers, so there are 5 fewer male passengers than female passengers. Therefore, we can find the number of male passengers by subtracting 5 from the number of female passengers:  $25 - 5 = 20$  male passengers. Now find the total number of passengers by adding the number of female and male passengers:  $25 + 20 = 45$ . Therefore, 20 out of 45 passengers, or  $\frac{20}{45}$  of passengers, are male, which simplifies to  $\frac{4}{9}$ .
19. **Answer choice (B) is correct.** Find Eric's height by subtracting 15 inches from Joseph's height:  $75 - 15 = 60$  inches. To answer the question, "Joseph's height is how many times Eric's height?" we need to divide Joseph's height by Eric's height:  $75 \div 60 = 1.25$
20. **Answer choice (B) is correct.** Find the number of red pins in each box by finding  $\frac{1}{4}$  of 80:  $\frac{1}{4}$  of 80 =  $\frac{1}{4} \cdot 80 = 20$  red pins in each box. Find the number of blue pins in each box by finding  $\frac{3}{8}$  of 80:  $\frac{3}{8}$  of 80 =  $\frac{3}{8} \cdot 80 = 30$  blue pins in each box. Find the number of black pins in each box by subtracting the number of red and blue pins in each box from 80:  $80 - 20 - 30 = 30$  black pins in each box. Finally, find the total number of black pins Megan has by multiplying 30 by 5 because she has 5 boxes of pins:  $30 \cdot 5 = 150$  black pins.

### **Converting Fractions, Decimals, & Percents Practice Set 1**

1. **Answer choice (B) is correct.** To change a percent into a fraction, put the percent over 100 and simplify:  $\frac{45}{100} = \frac{9}{20}$
2. **Answer choice (B) is correct.** To change a decimal into a percent, move the decimal point two places to the right:  $0.06 = 6\%$ .
3. **Answer choice (D) is correct.** To change a fraction into a percent, first change the fraction into a decimal by dividing the numerator by the denominator:  $4 \div 5 = 0.8$ . Therefore,  $1 \frac{4}{5} = 1.8$ . Now change the decimal into a percent by moving the decimal point two places to the right:  $1.8 = 180\%$ .

4. **Answer choice (A) is correct.** To change a decimal into a fraction, think about how you would read the decimal. 3.125 can be read as “3 and 125 thousandths,” which can be written as a mixed number:  $3\frac{125}{1000}$ . Now simplify the fraction part of the mixed number:  $3\frac{125}{1000} = 3\frac{1}{8}$ .
5. **Answer choice (A) is correct.** To change a percent into a decimal, move the decimal point two places to the left:  $0.09\% = 0.0009$ .
6. **Answer choice (C) is correct.** 7 out of 8 can be written as  $\frac{7}{8}$ . To change a fraction into a percent, first change the fraction into a decimal by dividing the numerator by the denominator:  $7 \div 8 = 0.875$ . Now change the decimal into a percent by moving the decimal point two places to the right:  $0.875 = 87.5\%$ .
7. **Answer choice (C) is correct.** To change a decimal into a percent, move the decimal point two places to the right:  $0.75 = 75\%$ .
8. **Answer choice (B) is correct.** To change a percent into a fraction, put the percent over 100 and simplify:  $\frac{24}{100} = \frac{6}{25}$ .
9. **Answer choice (B) is correct.** Start by changing  $\frac{3}{4}$  into a decimal by dividing the numerator by the denominator:  $3 \div 4 = 0.75$ . Now change the decimal into a percent by moving the decimal point two places to the right:  $0.75 = 75\%$ . Now add the percent of students who have only one pet to the percent of students who have more than one pet:  $10\% + 75\% = 85\%$ . Find the percent of Mr. Mack’s class that has no pets by subtracting 85% from 100%:  $100\% - 85\% = 15\%$ .
10. **Answer choice (D) is correct.** Two and a half can be written as the mixed number  $2\frac{1}{2}$ . Change this into a percent by first changing it into a decimal. To change a fraction into a decimal, divide the numerator by the denominator:  $1 \div 2 = 0.5$ , so  $2\frac{1}{2} = 2.5$ . Now change 2.5 into a percent by moving the decimal point two places to the right:  $2.5 = 250\%$ .
11. **Answer choice (A) is correct.** Change the fraction of the paper Greg has written into a decimal by dividing the numerator by the denominator:  $2 \div 5 = 0.4$ . Now change 0.4 into a decimal by moving the decimal point two places to the right:  $0.4 = 40\%$ . Add the percentage of the paper that Justin has written to the percentage of the paper Greg has written:  $35\% + 40\% = 75\%$ . Find the percentage of the paper left to write by subtracting 75% from 100% to get 25%.
12. **Answer choice (D) is correct.** Change all of the answer choices into decimals. To change 15% into a decimal, move the decimal point two places to the right to get 0.15. To change  $\frac{1}{8}$  into a decimal, divide 1 by 8 to get 0.125. To change  $\frac{1}{6}$  into a decimal, divide 1 by 6 to get  $0.\overline{16}$ . Therefore,  $\frac{1}{6}$  is the greatest number.
13. **Answer choice (D) is correct.** Since the problem does not tell us how much money Priyanka started with, we can choose any number. Let’s say Priyanka started with \$100. Find  $\frac{1}{5}$  of 100 to find the amount she spent on rent:  $\frac{1}{5}$  of 100 =  $\frac{1}{5} \cdot 100 = \$20$ . Therefore, she has \$80 left after paying for rent.

Now find the money she put into savings by finding 30% (or  $\frac{3}{10}$ ) of the remaining \$80: 30% of 80 =  $\frac{3}{10}$  of 80 = \$24. Since she spent \$24 of her remaining \$80, she has \$56 left ( $80 - 24 = 56$ ). She has \$56 left out of her starting \$100:  $\frac{56}{100} = 56\%$ .

14. **Answer choice (D) is correct.** First compare each number to  $\frac{1}{2}$ . Since  $\frac{4}{7}$  is the only number greater than  $\frac{1}{2}$ ,  $\frac{4}{7}$  is the largest. Change  $\frac{2}{9}$  into a decimal by dividing 2 by 9 to get  $0.\overline{2}$ . Change 45% into a decimal by moving the decimal point to the left two times:  $45\% = 0.45$ . Therefore,  $\frac{2}{9}$  is the smallest, then 0.35, then 45%, and finally  $\frac{4}{7}$ .
15. **Answer choice (B) is correct.** To find the fraction of students that received a score of 100%, we need to find  $\frac{1}{9}$  of 75%. To do this, first change 75% into a fraction  $75\% = \frac{75}{100} = \frac{3}{4}$ . Now find  $\frac{1}{9}$  of  $\frac{3}{4}$  by multiplying:  $\frac{1}{9} \cdot \frac{3}{4} = \frac{1}{12}$
16. **Answer choice (B) is correct.** Change each answer choice into a decimal. Change 420% into a decimal by moving the decimal point two places to the left to get 4.2. Change  $4\frac{1}{2}$  into a decimal by dividing 1 by 2 to get 4.5. Change  $4\frac{1}{3}$  into a decimal by dividing 1 by 3 to get  $4.\overline{3}$ . Therefore, 420% is the smallest number.
17. **Answer choice (A) is correct.** Change 1.25 into a percent by moving the decimal point two places to the right:  $1.25 = 125\%$ . Since Rasha’s grade at the end of the year was 125% of her grade at the beginning of the year, her grade increased by 25%.
18. **Answer choice (B) is correct.** Change each number into a decimal. Change  $\frac{3}{4}$  into a decimal by dividing 3 by 4 to get 0.75. Change  $\frac{4}{5}$  into a decimal by dividing 4 by 5 to get 0.8. Change 90% into a decimal by moving the decimal point two places to the left to get 0.9. Therefore, 0.7 is the smallest, followed by  $\frac{3}{4}$ , then  $\frac{4}{5}$ , and finally 90%.
19. **Answer choice (C) is correct.** We need to compare  $\frac{17}{20}$ , 85%, and 0.85. Change  $\frac{17}{20}$  into a decimal by dividing 17 by 20 to get 0.85. Change 85% into a decimal by moving the decimal point two places to the left to get 0.85. Therefore, all three numbers are equal, so Thomas, Kaitlyn, and Becca all answered the same number of questions correctly.
20. **Answer choice (C) is correct.** We know Chris’s age is 1.5 times Peter’s age, and Peter’s age is 0.8 times Karla’s age. First we want to answer the question, “Kris’s age is how many times Karla’s age?” and then we will change our answer into a fraction. To answer this question, we can multiply 1.5 by 0.8 to get 1.2, so Kris’s age is 1.2 times Karla’s age. Change 1.2 into a fraction by thinking about how we read the decimal: 1.2 can be read as “1 and 2 tenths” so  $1.2 = 1\frac{2}{10}$  which simplifies to  $1\frac{1}{5}$ .

## Converting Fractions, Decimals, & Percents Practice Set 2

1. **Answer choice (D) is correct.** The fact that Beth’s hair was 12 inches long last month is irrelevant. We need to change 1.1 times as long into a percent. To change a decimal into a percent, move the decimal point two places to the right:  $1.1 = 110\%$ .
2. **Answer choice (B) is correct.** Change each answer choice into a decimal. Change answer choice (B) into a decimal by dividing the numerator by the denominator:  $1 \div 4 = 0.25$ . Change answer choice (C) into a decimal by moving the decimal point two places to the left:  $18\% = 0.18$ . Now we are comparing 0.22, 0.25, 0.18, and 0.2. 0.25 is the greatest, so  $\frac{1}{4}$  is the greatest.
3. **Answer choice (B) is correct.** To change a mixed number into a percent, first change it into a decimal by dividing the numerator of the fraction part by the denominator of the fraction part:  $3 \div 8 = 0.375$ . Therefore,  $3\frac{3}{8} = 3.375$ . Change 3.375 into a percent by moving the decimal point two places to the right:  $3.375 = 337.5\%$
4. **Answer choice (A) is correct.** Change all three numbers into decimals and then order them from least to greatest. Change 60% into a decimal by moving the decimal point two places to the left:  $60\% = 0.6$ . Change  $\frac{5}{8}$  into a decimal by dividing the numerator by the denominator:  $5 \div 8 = 0.625$ . If we order these decimals from least to greatest, we get 0.6, 0.625, 0.7. Therefore, the numbers ordered from least to greatest are 60%,  $\frac{5}{8}$ , 0.7
5. **Answer choice (D) is correct.** Change answer choice (A) into a decimal by dividing the numerator by the denominator:  $3 \div 5 = 0.6$ . Change answer choice (C) into a decimal by dividing the numerator by the denominator:  $6 \div 10 = 0.6$ . Change answer choice (D) into a decimal by moving the decimal point two places to the left:  $6\% = 0.06$ . Therefore, answer choice (D) has a value different from answer choices (A), (B), and (C).
6. **Answer choice (B) is correct.** To change a percent into a fraction, put the percent over 100 and simplify the fraction:  $\frac{60}{100} = \frac{3}{5}$ .
7. **Answer choice (C) is correct.** To change a decimal into a percent, move the decimal point two places to the right:  $0.07 = 7\%$
8. **Answer choice (D) is correct.** Change answer choices (C) and (D) into decimals. Change  $\frac{1}{5}$  into a decimal by dividing the numerator by the denominator:  $1 \div 5 = 0.2$ . Change 5% into a decimal by moving the decimal point two places to the left:  $5\% = 0.05$ . Now we are comparing 0.15, 0.5, 0.2, and 0.05. Since 0.05 has the least value, 5% has the least value.

9. **Answer choice (C) is correct.** To change a decimal into a fraction, think about how you would read the decimal. 7.6 can be read as, “7 and 6 tenths,” which can be written as a mixed number  $7\frac{6}{10}$ . Simplify the mixed number to get  $7\frac{3}{5}$ .
10. **Answer choice (D) is correct.** The football team won 18 out of 24 games, so they won  $\frac{18}{24}$  of their games. First simplify  $\frac{18}{24}$  to get  $\frac{3}{4}$ . Now change  $\frac{3}{4}$  into a percent by first changing it into a decimal. To change  $\frac{3}{4}$  into a decimal, divide the numerator by a denominator:  $3 \div 4 = 0.75$ . Now change 0.75 into a percent by moving the decimal point two places to the right:  $0.75 = 75\%$ .
11. **Answer choice (A) is correct.** First change  $\frac{1}{5}$  into a percent by first changing it into a decimal. To change  $\frac{1}{5}$  into a decimal, divide the numerator by a denominator:  $1 \div 5 = 0.2$ . Now change 0.2 into a percent by moving the decimal point two places to the right:  $0.2 = 20\%$ . Find the percent of the container left to fill by subtracting the percent of the container Andrew and Gerry each filled from 100%:  $100\% - 25\% - 20\% = 55\%$
12. **Answer choice (B) is correct.** We know that  $\frac{4}{5}$  of 40% of Mrs. Andrew’s class passed the driving test, so to find the fraction of students that passed the driving test, we need to find  $\frac{4}{5}$  of 40%. Since the answer choices are written as fractions, first change 40% into a fraction by putting it over 100 and simplifying:  $40\% = \frac{40}{100} = \frac{2}{5}$ . Now find  $\frac{4}{5}$  of  $\frac{2}{5}$ :  $\frac{4}{5}$  of  $\frac{2}{5} = \frac{4}{5} \cdot \frac{2}{5} = \frac{8}{25}$ .
13. **Answer choice (D) is correct.** We know that 10% of  $\frac{4}{5}$  of the light bulbs are defective, high-powered light bulbs. Therefore, we can find the percent of light bulbs that are defective, high-powered light bulbs by finding 10% of  $\frac{4}{5}$ . Since the answer choices are written as percents, first change  $\frac{4}{5}$  into a percent. To do this, divide the numerator by the denominator and then move the decimal point two places to the right:  $4 \div 5 = 0.8 = 80\%$ . Now find 10% of 80%:  $10\% \text{ of } 80\% = 0.1 \cdot 0.8 = 0.08 = 8\%$ . Since 8% of the light bulbs are defective, high-powered light bulbs, we can find the percent of light bulbs that are NOT defective, high-powered light bulbs by subtracting 8% from 100%:  $100\% - 8\% = 92\%$ .
14. **Answer choice (A) is correct.** Change each number into a decimal. Change  $\frac{7}{2}$  into a decimal by dividing the numerator by the denominator:  $7 \div 2 = 3.5$ . Change  $\frac{10}{3}$  into a decimal by dividing the numerator by the denominator:  $10 \div 3 = 3.\overline{3}$ . Change 300% into a decimal by moving the decimal point two places to the left to get 3. Now order the decimals from greatest to least to get 3.5,  $3.\overline{3}$ , 3.2, 3. Therefore, the numbers ordered from greatest to least are  $\frac{7}{2}$ ,  $\frac{10}{3}$ , 3.2, 300%

15. **Answer choice (C) is correct.** 7 out of 20, or  $\frac{7}{20}$ , of Mr. Robert’s students received a scholarship. Change  $\frac{7}{20}$  into a percent by first changing it into a decimal. To change  $\frac{7}{20}$  into a decimal, divide the numerator by the denominator:  $7 \div 20 = 0.35$ . Now change 0.35 into a percent by moving the decimal point two places to the right to get 35%.
16. **Answer choice (C) is correct.** First change 1.3 into a percent by moving the decimal point two places to the right:  $1.3 = 130\%$ . Therefore, the height of the oak tree after three months is 130% of the initial height of the oak tree, so the oak tree’s height increased by 30%.
17. **Answer choice (D) is correct.** One and one-fourth can be written as  $1\frac{1}{4}$ . First change  $1\frac{1}{4}$  into a decimal by keeping the whole number the same and dividing the numerator of the fraction part by the denominator of the fraction part:  $1 \div 4 = 0.25$ , so  $1\frac{1}{4} = 1.25$ . Now change 1.25 into a percent by moving the decimal point two places to the right to get 125%.
18. **Answer choice (A) is correct.** Since the answer choices are written as percents, change  $\frac{2}{5}$  into a percent. First change  $\frac{2}{5}$  into a decimal by dividing the numerator by the denominator:  $2 \div 5 = 0.4$ . Now change 0.4 into a percent by moving the decimal point two places to the right:  $0.4 = 40\%$ . Find the percent of houses in Miriam’s neighborhood that have a yellow roof by subtracting the percent of houses that have red and blue roofs from 100%:  $100\% - 15\% - 40\% = 45\%$ .
19. **Answer choice (C) is correct.** Find the amount of money Emma spent on notebooks by finding 60% of \$100: 60% of \$100 = \$60. Therefore, she has \$40 remaining. Find the amount of money Emma spent on erasers by finding 0.25 of the remaining \$40: 0.25 of \$40 =  $0.25 \cdot \$40 = \$10$ . Therefore, Emma spent a total of \$70 out of \$100, so she has \$30 out of \$100. 30 out of 100 is equal to 30%, so Emma has 30% of her money left.
20. **Answer choice (A) is correct.** The height of the coconut tree is 1.25 times 0.5 times the height of the birch tree. Therefore, we can find the relationship between the height of the coconut tree and the height of the birch tree by multiplying 1.25 by 0.5:  $1.25 \cdot 0.5 = 0.625$ . Change 0.625 into a fraction by thinking about how you read the number 0.625. 0.625 can be read as, “625 thousandths,” so we can write it as  $\frac{625}{1000}$ , which simplifies to  $\frac{5}{8}$ .

### **Percents Practice Set 1**

1. **Answer choice (B) is correct.** To find 50% of 270, change 50% into a fraction or decimal and multiply the result by 270: 50% of 270 =  $0.5 \cdot 270 = 135$ .
2. **Answer choice (C) is correct.** To find 10% of 72, change 10% into a fraction or decimal and multiply the result by 72: 10% of 72 =  $0.1 \cdot 72 = 7.2$

3. **Answer choice (A) is correct.** To find 14% of 150, change 14% into a fraction or decimal and multiply the result by 150:  $14\% \text{ of } 150 = 0.14 \cdot 150 = 21$ .
4. **Answer choice (D) is correct.** To find 30% of 60, change 30% into a fraction or decimal and multiply the result by 60:  $30\% \text{ of } 60 = 0.3 \cdot 60 = 18$ .
5. **Answer choice (C) is correct.** To find 240% of 80, change 240% into a fraction or decimal and multiply the result by 80:  $240\% \text{ of } 80 = 2.4 \cdot 80 = 192$ .
6. **Answer choice (C) is correct.** Set up an equation that represents the question, “9 is what percent of 45?”:  $9 = x \cdot 45$  where  $x$  represents the percent as a decimal or fraction. Solve for  $x$  by dividing both sides of the equation by 45 to get  $x = 0.2$ . Change  $x$  into a percent by moving the decimal point two times to the right to get 20%.
7. **Answer choice (D) is correct.** Set up an equation that represents the question, “What percent of 40 is 80?”:  $x \cdot 40 = 80$  where  $x$  represents the percent as a decimal or fraction. Solve for  $x$  by dividing both sides of the equation by 40 to get  $x = 2$ . Change  $x$  into a percent by moving the decimal point two times to the right to get 200%.
8. **Answer choice (A) is correct.** Set up an equation that represents the question, “16 is what percent of 3,200?”:  $16 = x \cdot 3200$  where  $x$  represents the percent as a decimal or fraction. Solve for  $x$  by dividing both sides of the equation by 3200 to get  $x = 0.005$ . Change  $x$  into a percent by moving the decimal point two times to the right to get 0.5%.
9. **Answer choice (D) is correct.** Set up an equation that represents the question, “30 is what percent of 24?”:  $30 = x \cdot 24$  where  $x$  represents the percent as a decimal or fraction. Solve for  $x$  by dividing both sides of the equation by 24 to get  $x = 1.25$ . Change  $x$  into a percent by moving the decimal point two times to the right to get 125%.
10. **Answer choice (B) is correct.** Set up an equation that represents the question, “What percent of 70 is 21?”:  $x \cdot 70 = 21$  where  $x$  represents the percent as a decimal or fraction. Solve for  $x$  by dividing both sides of the equation by 70 to get  $x = 0.3$ . Change  $x$  into a percent by moving the decimal point two times to the right to get 30%.
11. **Answer choice (B) is correct.** Set up an equation that represents the question, “16 is 25% of what number?” (don’t forget to change the percent into a decimal or fraction):  $16 = 0.25 \cdot x$ . Solve the equation by dividing both sides of the equation by 0.25 to get  $x = 64$ .
12. **Answer choice (C) is correct.** Set up an equation that represents the question, “30 is 30% of what number?” (don’t forget to change the percent into a decimal or fraction):  $30 = 0.3 \cdot x$ . Solve the equation by dividing both sides of the equation by 0.3 to get  $x = 100$ .



13. **Answer choice (B) is correct.** Set up an equation that represents the question, “8 is 5% of what number?” (don’t forget to change the percent into a decimal or fraction):  $8 = 0.05 \cdot x$ . Solve the equation by dividing both sides of the equation by 0.05 to get  $x = 160$ .
14. **Answer choice (A) is correct.** Set up an equation that represents the question, “48 is 150% of what number?” (don’t forget to change the percent into a decimal or fraction):  $48 = 1.5 \cdot x$ . Solve the equation by dividing both sides of the equation by 1.5 to get  $x = 32$ .
15. **Answer choice (A) is correct.** Set up an equation that represents the question, “28 is 14% of what number?” (don’t forget to change the percent into a decimal or fraction):  $28 = 0.14 \cdot x$ . Solve the equation by dividing both sides of the equation by 0.14 to get  $x = 200$ .
16. **Answer choice (B) is correct.** First find 20% of 600:  $20\% \text{ of } 600 = 0.2 \cdot 600 = 120$ . Now find 10% of 120:  $10\% \text{ of } 120 = 0.1 \cdot 120 = 12$ .
17. **Answer choice (D) is correct.** First find 50% of 360:  $50\% \text{ of } 360 = 0.5 \cdot 360 = 180$ . Now find 15% of 180:  $15\% \text{ of } 180 = 0.15 \cdot 180 = 27$ .
18. **Answer choice (C) is correct.** First find 25% of 480:  $25\% \text{ of } 480 = 0.25 \cdot 480 = 120$ . Now find 30% of 120:  $30\% \text{ of } 120 = 0.3 \cdot 120 = 36$ .
19. **Answer choice (B) is correct.** First find 70% of 40:  $70\% \text{ of } 40 = 0.7 \cdot 40 = 28$ . Now find 10% of 28:  $10\% \text{ of } 28 = 0.1 \cdot 28 = 2.8$ .
20. **Answer choice (D) is correct.** First find 75% of 8400:  $75\% \text{ of } 8400 = 0.75 \cdot 8400 = 6300$ . Now find 1% of 6300:  $1\% \text{ of } 6300 = 0.01 \cdot 6300 = 63$ .

### **Percents Practice Set 2**

1. **Answer choice (C) is correct.** To find 75% of 84, change 75% into a fraction or decimal and multiply the result by 84:  $75\% \text{ of } 84 = 0.75 \cdot 84 = 63$ .
2. **Answer choice (B) is correct.** To find 310% of 50, change 310% into a fraction or decimal and multiply the result by 50:  $310\% \text{ of } 50 = 3.1 \cdot 50 = 155$ .
3. **Answer choice (C) is correct.** To find 27% of 300, change 27% into a fraction or decimal and multiply the result by 300:  $27\% \text{ of } 300 = 0.27 \cdot 300 = 81$ .
4. **Answer choice (A) is correct.** To find 5% of 70, change 5% into a fraction or decimal and multiply the result by 70:  $5\% \text{ of } 70 = 0.05 \cdot 70 = 3.5$ .
5. **Answer choice (D) is correct.** To find 225% of 16, change 225% into a fraction or decimal and multiply the result by 16:  $225\% \text{ of } 16 = 2.25 \cdot 16 = 36$ .

6. **Answer choice (B) is correct.** Set up an equation that represents the question, “48 is what percent of 60?”:  $48 = x \cdot 60$  where  $x$  represents the percent as a decimal or fraction. Solve for  $x$  by dividing both sides of the equation by 60 to get  $x = 0.8$ . Change  $x$  into a percent by moving the decimal point two times to the right to get 80%.
7. **Answer choice (C) is correct.** Set up an equation that represents the question, “What percent of 45 is 72?”:  $x \cdot 45 = 72$  where  $x$  represents the percent as a decimal or fraction. Solve for  $x$  by dividing both sides of the equation by 45 to get  $x = 1.6$ . Change  $x$  into a percent by moving the decimal point two times to the right to get 160%.
8. **Answer choice (B) is correct.** Set up an equation that represents the question, “63 is what percent of 63,000?”:  $63 = x \cdot 63,000$  where  $x$  represents the percent as a decimal or fraction. Solve for  $x$  by dividing both sides of the equation by 63,000 to get  $x = 0.001$ . Change  $x$  into a percent by moving the decimal point two times to the right to get 0.1%.
9. **Answer choice (A) is correct.** Set up an equation that represents the question, “550 is what percent of 440?”:  $550 = x \cdot 440$  where  $x$  represents the percent as a decimal or fraction. Solve for  $x$  by dividing both sides of the equation by 440 to get  $x = 1.25$ . Change  $x$  into a percent by moving the decimal point two times to the right to get 125%.
10. **Answer choice (A) is correct.** Set up an equation that represents the question, “What percent of 80 is 56?”:  $x \cdot 80 = 56$  where  $x$  represents the percent as a decimal or fraction. Solve for  $x$  by dividing both sides of the equation by 80 to get  $x = 0.7$ . Change  $x$  into a percent by moving the decimal point two times to the right to get 70%.
11. **Answer choice (C) is correct.** Set up an equation that represents the question, “18 is 15% of what number?” (don’t forget to change the percent into a decimal or fraction):  $18 = 0.15 \cdot x$ . Solve the equation by dividing both sides of the equation by 0.15 to get  $x = 120$ .
12. **Answer choice (B) is correct.** Set up an equation that represents the question, “42 is 70% of what number?” (don’t forget to change the percent into a decimal or fraction):  $42 = 0.7 \cdot x$ . Solve the equation by dividing both sides of the equation by 0.7 to get  $x = 60$ .
13. **Answer choice (D) is correct.** Set up an equation that represents the question, “40 is 16% of what number?” (don’t forget to change the percent into a decimal or fraction):  $40 = 0.16 \cdot x$ . Solve the equation by dividing both sides of the equation by 0.16 to get  $x = 250$ .
14. **Answer choice (A) is correct.** Set up an equation that represents the question, “105 is 140% of what number?” (don’t forget to change the percent into a decimal or fraction):  $105 = 1.4 \cdot x$ . Solve the equation by dividing both sides of the equation by 1.4 to get  $x = 75$ .
15. **Answer choice (B) is correct.** Set up an equation that represents the question, “9.5 is 1% of what number?” (don’t forget to change the percent into a decimal or fraction):  $9.5 = 0.01 \cdot x$ . Solve the equation by dividing both sides of the equation by 0.01 to get  $x = 950$ .

16. **Answer choice (B) is correct.** First find 10% of 5600:  $10\% \text{ of } 5600 = 0.1 \cdot 5600 = 560$ . Now find 5% of 560:  $5\% \text{ of } 560 = 0.05 \cdot 560 = 28$ .
17. **Answer choice (B) is correct.** First find 15% of 7200:  $15\% \text{ of } 7200 = 0.15 \cdot 7200 = 1080$ . Now find 20% of 1080:  $20\% \text{ of } 1080 = 0.2 \cdot 1080 = 216$ .
18. **Answer choice (C) is correct.** First find 40% of 600:  $40\% \text{ of } 600 = 0.4 \cdot 600 = 240$ . Now find 75% of 240:  $75\% \text{ of } 240 = 0.75 \cdot 240 = 180$ .
19. **Answer choice (D) is correct.** First find 80% of 50:  $80\% \text{ of } 50 = 0.8 \cdot 50 = 40$ . Now find 30% of 40:  $30\% \text{ of } 40 = 0.3 \cdot 40 = 12$ .
20. **Answer choice (B) is correct.** First find 1% of 15,000:  $1\% \text{ of } 15,000 = 0.01 \cdot 15,000 = 150$ . Now find 60% of 150:  $60\% \text{ of } 150 = 0.6 \cdot 150 = 90$ .

### **Percent Word Problems Practice Set 1**

1. **Answer choice (C) is correct.** Find the total number of buttons by adding 8 black buttons, 2 white buttons, and 10 gold buttons:  $8 + 2 + 10 = 20$  total buttons. Find the percent of Greg's buttons that are black by answering the question, "8 black buttons is what percent of 20 total buttons?" or "8 is what percent of 20?" Set up an equation to represent the question and solve for  $x$ :  $8 = x \cdot 20 \rightarrow x = 0.4$ . Change  $x$  into a percent by moving the decimal point two places to the right:  $x = 40\%$ .
2. **Answer choice (C) is correct.** Find 20% of 1200:  $20\% \text{ of } 1200 = 0.2 \cdot 1200 = 240$ . Add 240 to Brenda's original score to get her goal score:  $1200 + 240 = 1440$ .
3. **Answer choice (B) is correct.** Find the total amount of money the members of the club want to raise by answering the question, "\$600 is 75% of what number?" Set up an equation to represent the question and solve for  $x$ :  $600 = 0.75 \cdot x \rightarrow x = 800$ . Find how much more money the members of the club need to raise to reach their goal by subtracting the \$600 they've raised from the \$800 goal:  $\$800 - \$600 = \$200$ .
4. **Answer choice (D) is correct.** Find the dollar increase from \$4.00 to \$5.20:  $\$5.20 - \$4.00 = \$1.20$ . To find the percent increase in the price of a gallon of gas we need to answer the question, "\$1.20 (the dollar increase) is what percent of \$4.00 (the original price)?" Set up an equation to represent the question and solve for  $x$ :  $1.20 = x \cdot 4.00 \rightarrow x = 0.3$ . Change  $x$  into a percent by moving the decimal point two places to the right:  $x = 30\%$ .
5. **Answer choice (A) is correct.** Find the price of the television after the 15% discount by subtracting 15% of \$500 from \$500:  $\$500 - 15\% \text{ of } \$500 = \$500 - 0.15 \cdot \$500 = \$500 - \$75 = \$425$ . Now find the price of the television after then additional 20% off by subtracting 20% of \$425 from \$425:  $\$425 - 20\% \text{ of } \$425 = \$425 - 0.2 \cdot \$425 = \$425 - \$85 = \$340$ .

6. **Answer choice (B) is correct.** Since Ava is buying two shirts that each cost \$15, she is buying \$30 worth of shirts. Find the price of the two shirts after taxes by adding 8% of \$30 to \$30:  $\$30 + 8\% \text{ of } \$30 = \$30 + 0.08 \cdot \$30 = \$30 + \$2.4 = \$32.40$ . Ava handed the cashier two \$20 bills, so she handed the cashier a total of \$40. Find the amount of change she should receive by subtracting the price of the two shirts after tax from \$40:  $\$40 - \$32.40 = \$7.60$ .
7. **Answer choice (A) is correct.** Find the total number of coins in the jar by answering the question, “24 is 30% of what number?” Set up an equation to answer the question and solve for  $x$ :  $24 = 0.3 \cdot x \rightarrow x = 80$ . Find the number of dimes in the jar by subtracting the 24 quarters from the 80 total coins:  $80 - 24 = 56$  dimes. Find the value of the dimes by multiplying the value of one dime (\$0.10) by the number of dimes:  $\$0.10 \cdot 56 = \$5.60$ .
8. **Answer choice (C) is correct.** Find the number of baked goods that were sold by finding 75% of 800:  $75\% \text{ of } 800 = 0.75 \cdot 800 = 600$ . Find the number of scones sold by finding 15% of 600:  $15\% \text{ of } 600 = 0.15 \cdot 600 = 90$  scones.
9. **Answer choice (C) is correct.** Find how much Michaela’s hourly wage is increasing by by finding 125% of \$12:  $125\% \text{ of } \$12 = 1.25 \cdot \$12 = \$15$ . Find Michaela’s new hourly wage by adding the increase of \$15 to the original wage of \$12:  $\$12 + \$15 = \$27$ .
10. **Answer choice (B) is correct.** We know that after 10% sales tax was added, the price of a desk was \$220. This means that the price of the desk after tax is 110% of the price of the desk before tax. Therefore, to find the original price of the desk, we need to answer the question, “\$220 is 110% of what number?” Set up an equation that represents this question and solve for  $x$ :  $\$220 = 1.10x \rightarrow x = \$200$ .
11. **Answer choice (A) is correct.** If Carlton answered 10% of the questions incorrectly, then he answered 90% of the questions correctly. Therefore, to find the total questions on the quiz, we need to answer the question, “18 is 90% of what number?” Set up an equation to answer this question and solve for  $x$ :  $18 = 0.9 \cdot x \rightarrow x = 20$
12. **Answer choice (C) is correct.** If there are 6 fewer girls than boys in the class, then there are 6 more boys than girls in the class. Find the number of boys by adding 6 to the number of girls:  $12 + 6 = 18$  boys. Therefore, there are a total of 30 students in the class ( $18 \text{ boys} + 12 \text{ girls} = 30 \text{ students}$ ). Find what percent of the class boys make up by answering the question, “18 is what percent of 30?” Set up an equation to answer this question and solve for  $x$ :  $18 = x \cdot 30 \rightarrow x = 0.6$ . Change  $x$  into a percent by moving the decimal point two places to the right to get  $x = 60\%$ .
13. **Answer choice (B) is correct.** If the Sharks lost 25% of their games, then they won 75% of their games since they didn’t tie any. Find the total number of games the Sharks played by answering the question, “24 is 75% of what number?” Set up an equation to represent the question and solve for  $x$ :  $24 = 0.75 \cdot x \rightarrow x = 32$ . Find the number of games the Sharks lost by subtracting the 24 games they won from the 32 games they played:  $32 - 24 = 8$  games lost.

14. **Answer choice (A) is correct.** Since the problem does not tell us how much money Hank received from his paycheck, we can choose any number. Let's say Hank's paycheck was for \$100 (\$100 is a nice number to use with percent problems). Find the amount of money Hank spent on rent by finding 30% of 100:  $30\% \text{ of } \$100 = 0.3 \cdot \$100 = \$30$ . Therefore, after paying for rent, Hank has \$70. Now find how much Hank put into savings by finding 10% of the remaining \$70:  $10\% \text{ of } \$70 = 0.1 \cdot 70 = \$7$ . He put \$7 out of his original \$100 into savings which equals 7% of his money.
15. **Answer choice (D) is correct.** Since there are 20 students in 7th grade, 12 of which are boys, there are 8 girls in 7th grade ( $20 - 12 = 8$ ). Since there are 40 total girls in the group, 8 of which are in 7th grade, 32 are NOT in 7th grade ( $40 - 8 = 32$ ). Therefore, we need to answer the question, "32 is what percent of 40?" Set up an equation that represents this question and solve for  $x$ :  $32 = x \cdot 40 \rightarrow x = 0.8$ . Change 0.8 into a percent by moving the decimal point two places to the right to get 80%.
16. **Answer choice (C) is correct.** We know that after a 10% decrease in price, the price of a sandwich is \$6.30. This means that \$6.30 is 90% of the original price of the sandwich. Therefore, to find the original price of the sandwich, we need to answer the question, "\$6.30 is 90% of what number?" Set up an equation that represents this question and solve for  $x$ :  $6.30 = 0.9 \cdot x \rightarrow x = \$7.00$ .
17. **Answer choice (D) is correct.** We know 40% of students who play a sport play soccer, and 120 students play soccer. Find the number of students who play a sport by answering the question, "120 is 40% of what number?" Set up an equation that represents this question and solve for  $x$ :  $120 = 0.4 \cdot x \rightarrow x = 300$ . Now we know that 300 students play a sport and that 80% of the total students play a sport. Find the total number of students by answering the question, "300 is 80% of what number?" Set up an equation to represent this question and solve for  $x$ :  $300 = 0.8 \cdot x \rightarrow x = 375$  total students.
18. **Answer choice (A) is correct.** We know that after a 20% discount, an item costs \$120. Therefore, \$120 is 80% of the original price of the item. Find the original price of the item by answering the question, "\$120 is 80% of what number?" Set up an equation to represent the question and solve for  $x$ :  $\$120 = 0.8 \cdot x \rightarrow x = \$150$ .
19. **Answer choice (C) is correct.** Since the problem does not tell us what the original number is, we can pick our own number. Let the original number be 100 (100 is a good number to use with percentages). Increase 100 by 20%:  $100 + 20\% \text{ of } 100 = 100 + 0.2 \cdot 100 = 100 + 20 = 120$ . Now decrease 120 by 20%:  $120 - 20\% \text{ of } 120 = 120 - 0.2 \cdot 120 = 120 - 24 = 96$ . Therefore, our number decreased from 100 to 96 which is a decrease of 4. A decrease of 4 out of our original 100 is equal to a 4% decrease.
20. **Answer choice (C) is correct.** Since the problem does not tell us what the price of the item is, we can pick our own price. Let the original price of an item be \$100 (100 is a good number to use with percentages). Find the price of the item on Sunday by decreasing \$100 by 50%:  $\$100 - 50\% \text{ of } \$100 = \$100 - 0.5 \cdot \$100 = \$100 - \$50 = \$50$ . Since the sale is only on Sunday, on Monday, the price of the item will be back to its original price of \$100, so we need to find the percent increase from the price of \$50 on Sunday to the original price of \$100. To find the percent increase, find the difference between the two numbers and divide it by the starting number (\$50). Then change your answer into a percent:  $\$100 - \$50 = \$50 \rightarrow \$50 \div \$50 = 1 \rightarrow 1 = 100\% \text{ increase}$ .

## **Percent Word Problems Practice Set 2**

- Answer choice (D) is correct.** Find the number of pages Phillip has left to read by subtracting 10 from 25:  $25 - 10 = 15$  pages left. Now we need to answer the question, “15 is what percent of 25?” To do so, set up and solve the following equation for  $x$ , where  $x$  is the percent as a decimal or fraction:  $15 = x \cdot 25 \rightarrow x = 0.6$ . Change 0.6 into a percent by moving the decimal point two places to the right to get 60%.
- Answer choice (C) is correct.** Increase \$7,000 by 30% by adding 30% of \$7,000 to \$7,000:  $\$7,000 + 30\% \text{ of } \$7,000 = \$7,000 + 0.3 \cdot \$7,000 = \$7,000 + \$2,100 = \$9,100$ .
- Answer choice (B) is correct.** Find the total amount of money Margie spent by adding 10% of her bill before tax to her bill before tax:  $\$35 + 10\% \text{ of } \$35 = \$35 + \$3.50 = \$38.50$
- Answer choice (C) is correct.** We need to answer the question, “30 is what percent of 35?” To do so, set up and solve the following equation for  $x$ , where  $x$  is the percent as a decimal or fraction:  $30 = x \cdot 35 \rightarrow x = 1.2$ . Change 1.2 into a percent by moving the decimal point two places to the right to get 120%.
- Answer choice (B) is correct.** Find the amount of interest Mindy will pay by finding 8% of \$650:  $8\% \text{ of } \$650 = 0.08 \cdot \$650 = \$52$ .
- Answer choice (C) is correct.** Find the weight of a medium bag of potatoes by increasing the weight of the small bag of potatoes by 25%:  $16 + 25\% \text{ of } 16 = 16 + 0.25 \cdot 16 = 16 + 4 = 20$  pounds. Find the weight of a large bag of potatoes by increasing the weight of a medium bag of potatoes by 15%:  $20 + 15\% \text{ of } 20 = 20 + 0.15 \cdot 20 = 20 + 3 = 23$  pounds.
- Answer choice (C) is correct.** Since iron balls make up 45% of the total balls, and there are 9 iron balls, we can find the total number of balls in the box by answering the question, “9 is 45% of what number?” To do this, set up and solve the following equation for  $x$ , the total number of balls:  $9 = 0.45x \rightarrow x = 20$  total balls. Now find the number of copper balls by subtracting the number of iron balls from the total number of balls:  $20 - 9 = 11$  copper balls. Finally, find the combined weight of all the copper balls by multiplying the number of copper balls by the weight of each copper ball, 3 grams:  $11 \cdot 3 \text{ grams} = 33 \text{ grams}$ .
- Answer choice (C) is correct.** Find the number of senior students taking a foreign language elective by finding 80% of 240:  $80\% \text{ of } 240 = 0.8 \cdot 240 = 192$ . Find the number of students taking Spanish by finding 25% of the students who are taking a foreign language:  $25\% \text{ of } 192 = 0.25 \cdot 192 = 48$  students.
- Answer choice (A) is correct.** The TV was discounted by \$90 because  $\$450 - \$360 = \$90$ . Now we need to answer the question, “The \$90 discount is what percent of the original price of \$450.” To do this, set up and solve the following equation, where  $x$  represents the percent as a decimal or fraction:

$\$90 = x \cdot \$450 \rightarrow x = 0.2$ . Change 0.2 into a percent by moving the decimal point two places to the right to get a 20% discount.

10. **Answer choice (D) is correct.** Find the length of Jake’s presentation after the final edits by decreasing 50 by 12% of itself:  $50 - 12\% \text{ of } 50 = 50 - 0.12 \cdot 50 = 50 - 6 = 44$  minutes.
11. **Answer choice (B) is correct.** We know the amount of time to print one photo decreased, so we can eliminate answer choices (C) and (D). The amount of time to print one photo decreased by 4 seconds because  $20 - 16 = 4$ . To find the percent decrease in the time to print one photo, we need to answer the question, “4 seconds is what percent of the original printing time (20 seconds).” To do this, set up and solve the following equation, where  $x$  is the percent as a decimal or fraction:  $4 = x \cdot 20 \rightarrow x = 0.2$ . Change 0.2 into a percent by moving the decimal point two places to the right to get 20%.
12. **Answer choice (D) is correct.** Since Henry answered 30% of the questions incorrectly, he answered 70% of the questions correctly. To find the total number of questions on the test, we need to answer the question, “28 is 70% of what number?” To do this, set up and solve the following equation for  $x$ , the total number of questions on the test:  $28 = 0.7x \rightarrow x = 40$  questions.
13. **Answer choice (C) is correct.** We know 60% of the students at Thompson High School are boys, so 40% of the students are not boys. Since there are 240 students who are not boys, we can find the total number of students by answering the question, “240 is 40% of what number?” To do this, set up and solve the following equation, where  $x$  represents the total number of students at the school:  $240 = 0.4x \rightarrow x = 600$  students. Find the number of boys by subtracting 240 from 600:  $600 - 240 = 360$  boys. Find the number of boys that play football by finding 25% of 360:  $25\% \text{ of } 360 = 0.25 \cdot 360 = 90$ .
14. **Answer choice (C) is correct.** We know the average score in 2018 was 25% higher than the average score in 2017, so the average score in 2018 was 125% of the average score in 2017. Therefore, to find the average score in 2017, we need to answer the question, “80 is 125% of what number?” To do so, set up and solve the following equation, where  $x$  represents the score in 2017:  $80 = 1.25x \rightarrow x = 64$ .
15. **Answer choice (D) is correct.** We need to answer the question, “\$52 is what percent of \$40?” To do so, set up and solve the following equation for  $x$ , where  $x$  is the percent as a decimal or fraction:  $52 = x \cdot 40 \rightarrow x = 1.3$ . Change 1.3 into a percent by moving the decimal point two places to the right to get 130%.
16. **Answer choice (D) is correct.** There are 6 fewer children than adults on the bus, so there are 6 more adults than children on the bus. Therefore, we can find the number of adults on the bus by adding 6 to the number of children:  $12 + 6 = 18$  adults. Find the total number of passengers on the bus by adding the number of adults and children:  $18 + 12 = 30$  total passengers. Now we need to answer the question, “18 adults is what percent of 30 total passengers?” To do so, set up and solve the following equation:  $18 = x \cdot 30 \rightarrow x = 0.6$ . Change 0.6 into a percent by moving the decimal point two places to the right:  $0.6 = 60\%$

17. **Answer choice (C) is correct.** After increasing by 25%, the height of the tree was 5 feet tall. Therefore, 5 feet is 125% of the original height of the tree, so to find how tall the tree was when Will planted it in his backyard, we need to answer the question, “5 is 125% of what number?” To do this, set up and solve the following equation, where  $x$  represents the original height of the tree:  $5 = 1.25x \rightarrow x = 4$  feet.
18. **Answer choice (C) is correct.** Since the problem doesn’t tell us Tina’s age, we can choose our own number for Tina’s age. Let’s say Tina is 100 years old. Find Pat’s age by finding 80% of Tina’s age: 80% of 100 = 80 years old. Find Carlton’s age by finding 60% of Tina’s age: 60% of 100 = 60 years old. Now we need to answer the question, “Pat’s age (80 years) is what percent of Carlton’s age (60 years)?” To do so, set up and solve the following equation:  $80 = x \cdot 60 \rightarrow x = 1.\overline{3}$ . Change  $1.\overline{3}$  into a percent by moving the decimal point two places to the right to get  $133.\overline{3}$  %.
19. **Answer choice (B) is correct.** Since the problem didn’t tell us the original number, we can choose our own number. Let’s say the original number is 100. Decrease 100 by 10%:  $100 - 10\% \text{ of } 100 = 100 - 0.1 \cdot 100 = 100 - 10 = 90$ . Now decrease 90 by 10%:  $90 - 10\% \text{ of } 90 = 90 - 0.1 \cdot 90 = 90 - 9 = 81$ . Therefore, our number decreased from 100 to 81 which is a decrease of 19. A decrease of 19 out of our original 100 is equal to a 19% decrease.
20. **Answer choice (C) is correct.** Since the problem doesn’t tell us how much money Bernard received from his paycheck, we can choose our own number. Let’s say Bernard received \$100. Find the amount Bernard spent by finding 40% of \$100:  $40\% \text{ of } \$100 = 0.4 \cdot \$100 = \$40$ . Find the amount of money Bernard has remaining by subtracting \$40 from \$100:  $\$100 - \$40 = \$60$ . Find the amount of money Bernard put into his savings account by finding 10% of the remaining \$60:  $10\% \text{ of } \$60 = 0.1 \cdot \$60 = \$6$ . Therefore, Bernard put \$6 out of his original \$100 into his savings, which is equal to 6%.

### **Number Lines Practice Set 1**

1. **Answer choice (A) is correct.** The difference between  $-2.1$  and  $1.5$  is  $3.6$ , and there are 6 spaces between  $-2.1$  and  $1.5$ . To find the distance between each space, divide  $3.6$  by  $6$  to get  $0.6$ . This means that the number line counts by  $0.6$ . Find D by subtracting  $0.6$  from  $-2.1$  two times to get  $-3.3$ . Find E by adding  $0.6$  to  $-2.1$  to get  $-1.5$ . Find F by adding  $0.6$  to  $1.5$  to get  $2.1$ .
2. **Answer choice (C) is correct.** There are three spaces between each pair of whole numbers on the number line, so each space is  $\frac{1}{3}$  units long. This means the number line counts by  $\frac{1}{3}$ . Find P by adding  $\frac{1}{3}$  to  $-2$  to get  $-1\frac{2}{3}$ . Find Q by adding  $\frac{1}{3}$  to  $2$  to get  $2\frac{1}{3}$ . Find the sum of P and Q by adding  $-1\frac{2}{3}$  to  $2\frac{1}{3}$  to get  $\frac{2}{3}$ .
3. **Answer choice (C) is correct.** There are five spaces between each pair of whole numbers on the number line, so each space is  $\frac{1}{5}$  units long. This means the number line counts by  $\frac{1}{5}$  which equals  $0.2$ . Find the leftmost dot by subtracting  $0.2$  from  $-1$  to get  $-1.2$ . Find the middle dot by adding  $0.2$  to  $0$  twice to get  $0.4$ . Find the rightmost dot by adding  $0.2$  to  $2$  three times to get  $2.6$ . Find the sum by adding  $-1.2$ ,  $0.4$ , and  $2.6$  to get  $1.8$ .



4. **Answer choice (B) is correct.** The number line shows the number  $-6$ ,  $-5$ ,  $-4$ ,  $-3$ ,  $-2$ , and  $-1$  but not any of the numbers between. Therefore, the number line is only showing integers greater than  $-7$  and less than  $0$ .
5. **Answer choice (C) is correct.** The difference between  $-9$  and  $12$  is  $21$ , and there are  $7$  spaces between  $-9$  and  $21$ . To find the distance between each space, divide  $21$  by  $7$  to get  $3$ . Therefore, the number line counts by  $3$ . Find  $P$  by subtracting  $3$  from  $-9$  to get  $-12$ , and find  $Q$  by subtraction  $3$  from  $12$  twice to get  $6$ . Find the average of  $-12$  and  $6$  by adding the two numbers together and dividing by two:  $-12 + 6 = -6 \rightarrow -6 \div 2 = -3$ .
6. **Answer choice (D) is correct.**  $-0.75$  is between  $-1$  and  $0$  and is closer to  $-1$ , so  $E$  represents  $-0.75$ .  $-2\frac{2}{3}$  is between  $-3$  and  $-2$  and is closer to  $-3$ , so  $B$  represents  $-2\frac{2}{3}$ .  $5/4$  is greater than  $1$ , so  $H$  represents  $5/4$ .
7. **Answer choice (B) is correct.** There are  $8$  spaces between  $7$  and  $8$ , so each space is  $\frac{1}{8}$  units long. That means the number line counts by  $\frac{1}{8}$ . Find the value of  $A$  by adding  $\frac{1}{8}$  to  $7$  three times to get  $7\frac{3}{8}$ . Find the value of  $B$  by subtracting  $\frac{1}{8}$  from  $8$  to get  $7\frac{7}{8}$ . Find the difference between  $7\frac{7}{8}$  and  $7\frac{3}{8}$  by subtracting  $7\frac{7}{8} - 7\frac{3}{8}$  to get  $\frac{4}{8}$  which simplifies to  $\frac{1}{2}$ .
8. **Answer choice (D) is correct.** The number line is filled in between  $0$  and  $5$  with filled in circles on both  $0$  and  $5$ . Therefore, the number line shows all of the numbers between  $0$  and  $5$  including  $0$  and  $5$ .
9. **Answer choice (D) is correct.** The difference between  $7$  and  $19$  is  $12$ , and there are three spaces between  $7$  and  $19$ . To find the distance between each space, divide  $12$  by  $3$  to get  $4$ . Therefore, the number line counts by  $4$ . Find  $Q$  by adding  $4$  to  $7$  to get  $11$ , and find  $R$  by adding  $4$  to  $19$  to get  $23$ . The question says that  $R$  is the average of  $Q$  and another number, so  $23$  is the average of  $11$  and another number. The average of two numbers is the *middle* of the two numbers.  $23$  is in the middle of  $11$  and  $35$ , so the other number is  $35$ .
10. **Answer choice (A) is correct.** There are five spaces between each pair of whole numbers, so each space is  $\frac{1}{5}$  units.  $Q$  halfway between the tick marks that represent  $-\frac{4}{5}$  and  $-\frac{3}{5}$ , which can be written as  $-\frac{8}{10}$  and  $-\frac{6}{10}$  respectively. Therefore,  $Q$  is  $-\frac{7}{10}$ .  $R$  is  $1$  space to the left of  $0$ , so it represents  $-\frac{1}{5}$ .  $S$  is two spaces to the right of  $0$ , so it represents  $\frac{2}{5}$  or  $0.4$ .  $T$  is halfway between  $1$  and  $1\frac{1}{5}$  which can be written as  $1.2$ , so  $T$  represents  $1.1$ .

## Number Lines Practice Set 2

1. **Answer choice (C) is correct.** There are five spaces between each pair of whole numbers on the number line, so each space is  $\frac{1}{5}$  units long. This means the number line counts by  $\frac{1}{5}$ . Find the leftmost dot by subtracting  $\frac{2}{5}$  from  $-2$  to get  $-2\frac{2}{5}$ . Find the rightmost dot by adding  $\frac{4}{5}$  to  $1$  to get  $1\frac{4}{5}$ . Find the sum of the two dots:  $-2\frac{2}{5} + 1\frac{4}{5} = -\frac{3}{5}$ .

2. **Answer choice (B) is correct.** The number line is filled in between  $-10$  and  $-1$  with filled in circles on both  $-10$  and  $-1$ . Therefore, the number line shows all negative numbers between  $-10$  and  $-1$  inclusive, which means including  $-10$  and  $-1$ .
3. **Answer choice (A) is correct.** The difference between  $-1.3$  and  $0.7$  is  $2$ , and there are  $5$  spaces between  $-1.3$  and  $0.7$ . To find the distance between each space, divide  $2$  by  $5$  to get  $0.4$ . This means that the number line counts by  $0.4$ . Find A by subtracting  $0.4$  from  $0.7$  three times to get  $-0.5$ . Find B by subtracting  $0.4$  from  $0.7$  to get  $0.3$ . Find C by adding  $0.4$  to  $0.7$  four times to get  $2.3$ .
4. **Answer choice (B) is correct.** The difference between  $8$  and  $11$  is  $3$ , and there are  $6$  spaces between  $8$  and  $11$ . To find the distance between each space, divide  $3$  by  $6$  to get  $0.5$ . Therefore, the number line counts by  $0.5$ . Find Q by subtracting  $0.5$  from  $8$  to get  $7.5$ , and find R by subtracting  $0.5$  from  $11$  to get  $10.5$ . Find the average of  $7.5$  and  $10.5$  by adding the two numbers together and dividing by two:  $7.5 + 10.5 = 18 \rightarrow 18 \div 2 = 9$ .
5. **Answer choice (D) is correct.**  $-1.5$  is halfway between  $-1$  and  $-2$ , so point D is located at  $-1.5$ .  $-3\frac{1}{4}$  is between  $-3\frac{1}{2}$  and  $-3$ , so point B is located at  $-3\frac{1}{4}$ .  $0.75$  is located between  $0.5$  and  $1$ , so point I is located at  $0.75$ .  $-\frac{5}{8}$  more to than left than  $-\frac{1}{2}$ , but more to the right than  $-1$ , so point F is located at  $-\frac{5}{8}$ .
6. **Answer choice (B) is correct.** There are four spaces between each pair of whole numbers on the number line, so each space is  $\frac{1}{4}$  units long. This means the number line counts by  $\frac{1}{4}$ . Find J by adding  $\frac{1}{4}$  to  $-3$  to get  $-2\frac{3}{4}$ . Find K by subtracting  $\frac{1}{4}$  from  $0$  to get  $-\frac{1}{4}$ . Find L by adding  $\frac{2}{4}$  to  $1$  to get  $1\frac{2}{4}$ . Now find the sum of J, K, and L:  $-2\frac{3}{4} + -\frac{1}{4} + 1\frac{2}{4} = -1\frac{2}{4} = -1\frac{1}{2} = -1.5$
7. **Answer choice (C) is correct.** There are six spaces between each pair of whole numbers on the number line, so each space is  $\frac{1}{6}$  units long. This means that the number line counts by  $\frac{1}{6}$ . Find R by subtract  $\frac{1}{6}$  from  $5$  to get  $4\frac{5}{6}$ . Find S by adding  $\frac{2}{6}$  to  $5$  to get  $5\frac{2}{6}$ . Find the sum of R and S:  $4\frac{5}{6} + 5\frac{2}{6} = 10\frac{1}{6}$ .
8. **Answer choice (D) is correct.** The difference between  $-6$  and  $4$  is  $10$ , and there are five spaces between  $-6$  and  $4$ . To find the distance between each space, divide  $10$  by  $5$  to get  $2$ . Therefore, the number line counts by  $2$ . Find Y by subtracting  $2$  two  $-6$  two times to get  $-10$ , and find X by adding  $2$  to  $-6$  two times to get  $-2$ . The question says that X is the average of Y and another number, so  $-2$  is the average of  $-10$  and another number. The average of two numbers is the *middle* of the two numbers.  $-2$  is in the middle of  $-10$  and  $6$ , so the other number is  $6$ .
9. **Answer choice (C) is correct.** The number line shows the number  $0, 1, 2, 3, 4, 5,$  and  $6$  but not any of the numbers between. Therefore, the number line is only showing integers between  $0$  and  $6$  inclusive.

10. **Answer choice (A) is correct.** There are 5 spaces between each pair of whole numbers on the number line, so each space is  $\frac{1}{5}$  or 0.2 units long. This means the number line counts by  $\frac{1}{5}$  or 0.2. W is one space to the right of 0, so W is located at  $\frac{1}{5}$  or 0.2. X is located halfway between  $\frac{1}{5}$  and  $\frac{2}{5}$ , so X is located at  $\frac{3}{10}$ . Y is located two spaces or  $\frac{2}{5}$  to the right of 1, so Y is located at  $1\frac{2}{5}$ . Z is located halfway between 1.8 and 2, so Z is located at 1.9.

### **Estimating Practice Set 1**

1. **Answer choice (D) is correct.** Round 72 down to 70, and round 68 up to 70. Multiply  $70 \cdot 70$  to get 4900. Now we have  $4900 \div 4$  which is close to  $4800 \div 4$  which equals 120.
2. **Answer choice (C) is correct.** Round 292 up to 300 and round 58 up to 60. Divide 300 by 60 to get 5. Square 5 to get 25.
3. **Answer choice (B) is correct.** Round 78 up to 80, round 513 down to 500, and round 207 down to 200. Multiply 80 by 500 to get 40,000, and then divide 40,000 by 200 to get 200.
4. **Answer choice (D) is correct.** Round 33 down to 30, round 56 up to 60, round 813 down to 810, and round 92 down to 90. Multiply 30 by 60 in the numerator to get 1800, and divide 810 by 90 in the denominator to get 9. Now we have 1800 over 9: divide 1800 by 9 to get 200.
5. **Answer choice (B) is correct.** Since Laura expects 50 to 100 people to come to the gallery each day, we will use 75 people to estimate. Find the total revenue Laura expects to make by multiplying the 75 expected people by \$18 per ticket by 10 days:  $75 \cdot \$18 \cdot 10 = \$13,500$ . Since Laura expects it will cost her between \$500 and \$1500 to set up, we will use \$1000 to estimate. Find Laura's profit by subtracting the \$1000 set up cost from the \$13,500 revenue to get \$12,500.
6. **Answer choice (B) is correct.** Round 9.2 to 9, 6.9 to 7, 5.6 to 6, 3.3 to 3, and 2.6 to 3. Now add the rounded values:  $9 + 7 + 6 + 3 + 3 = 28$ . Divide 28 by 8 to get  $3\frac{1}{2}$ .
7. **Answer choice (B) is correct.** Since Sharon wants the width of the garden to be between 3 and 5 feet, we will use 4 feet as the width to estimate. Since Sharon wants the length of the garden to be between 6 and 8 feet, we will use 7 feet as the length to estimate. Sharon is putting the fence around the garden, so we want to find the estimated perimeter of the garden. Find the perimeter by adding up all four sides:  $4\text{ feet} + 4\text{ feet} + 7\text{ feet} + 7\text{ feet} = 22\text{ feet}$ . The fence costs \$20 per foot, so multiply 22 feet by \$20 to find the estimated cost:  $22 \cdot \$20 = \$440$ .
8. **Answer choice (C) is correct.** Since the cafe sells 600 to 800 baked goods every five days, we will use 700 baked goods sold every five days to estimate. Find the estimated number of baked goods the cafe sells each day by dividing 700 by 5 to get 140 baked goods sold per day. If approximately one-third of the customers each day buy baked goods, we can find the approximate total number of customers in the cafe each day by multiplying 140 by 3 to get 420 customers.

9. **Answer choice (B) is correct.** Round 387 up to 400 and round 78% up to 80%. Find 80% of 400:  $80\% \text{ of } 400 = 0.8 \cdot 400 = 320$ . Round 12% to 10%, and then find 10% of 320:  $10\% \text{ of } 320 = 0.1 \cdot 320 = 32$  students. 32 is closest to 35.
10. **Answer choice (B) is correct.** Since Haley spends 0.25 to 0.75 hours working on English homework each night, we will use 0.5 hours to estimate. Since Haley spends 0.75 to 1.25 hours working on math homework each night, we will use 1 hour to estimate. Find the estimated time Haley spent on English and math homework by adding 0.5 to 1 to get 1.5 hours. Find the approximate number of hours Haley spent on Spanish homework by subtracting the number of hours she spent on English and math homework from the total number of hours she spent on homework:  $3.25 - 1.5 - 1.75$  hours.

### **Estimating Practice Set 2**

1. **Answer choice (B) is correct.** Round 83 down to 80, and round 39 up to 40. Multiply  $80 \cdot 40$  to get 3200. Now we have  $63,000 \div 3,200$  which is close to  $60,000 \div 3,000$  which equals 20.
2. **Answer choice (D) is correct.** Round 351 up to 360, and round 87 up to 90. Now divide  $360 \div 90$  which equals 4. Now we have  $4^3$ , which equals  $4 \cdot 4 \cdot 4$ , which equals 64.
3. **Answer choice (A) is correct.** Round 412 down to 400, round 58 up to 60, and round 813 down to 800. Now we have  $\frac{400}{60 \cdot 800}$ . Multiply 60 by 800, which equals 48,000. Now we have  $\frac{400}{48,000}$ . Divide the top and bottom of the fraction by 400 to get  $\frac{1}{120}$ .
4. **Answer choice (D) is correct.** Round 78 up to 80, round 62 down to 60, round 364 down to 360, and round 29 up to 30. Now we have  $\frac{80 \cdot 60}{360 \div 30}$ . Perform the multiplication in the numerator and the division in the denominator and then simplify the fraction:  $\frac{80 \cdot 60}{360 \div 30} = \frac{4800}{12} = 400$ .
5. **Answer choice (C) is correct.** Round 38 boxes up to 40 boxes, and round 42 books per box down to 40 books for box. Find the estimated total number of donated books the library received last month by multiplying the number of boxes by the number of books in each box:  $40 \cdot 40 = 1600$  books.
6. **Answer choice (C) is correct.** Since there are 1,300 to 1,400 scheduled flights daily into Newark Airport, we will use 1,350 flights to estimate. Since each flight has 80 to 120 passengers, we will use 100 passengers to estimate. Find the total estimated number of passengers into Newark Airport each day by multiplying 1,350 by 100 to get 135,000. If approximately one-third of the flights are domestic flights, then approximately two-thirds of the flights are international. We can find the approximate number of passengers that fly into Newark Airport on international flights each day by finding two-thirds of 135,000:  $\frac{2}{3} \text{ of } 135,000 = \frac{2}{3} \cdot 135,000 = 90,000$  passengers.
7. **Answer choice (C) is correct.** Since the contractor has a budget of \$80,000 to \$90,000 for a project, we will use a budget of \$85,000 to estimate. Since the project runs for 5 days, we can find the contractor's daily budget by dividing \$85,000 by 5:  $\$85,000 \div 5 = \$17,000$ . The contractor expects to

hire between 4 and 6 engineers, so we will use 5 engineers to estimate. Find the approximate daily pay for each engineer by dividing the contractors daily budget by 5:  $\$17,000 \div 5 = \$3,400$ .

8. **Answer choice (B) is correct.** Gwen plans to use 1 to 3 lemons for each pitcher of lemonade, so we will estimate using 2 lemons per pitcher. She expects to sell between 25 and 35 pitchers of lemonade over summer break, so we will estimate using 30 pitchers. We can find the estimated number of lemons she will need by multiplying the estimated number of lemons per pitcher by the estimated number of pitchers:  $2 \cdot 30 = 60$  lemons. Find the approximate amount Gwen will spend on lemons by multiplying the 60 lemons by 10 cents, or \$0.10, per lemon:  $60 \cdot \$0.10 = \$6.00$
9. **Answer choice (B) is correct.** Find the estimated number of members who live in the US by estimated one-fourth of 16,172. Round 16,172 down to 16,000, and find one-fourth of 16,000:  $\frac{1}{4}$  of 16,000 =  $\frac{1}{4} \cdot 16,000 = 4,000$ . Round 18% up to 20%, and find the estimated number of members living in New York City by finding 20% of 4,000:  $20\%$  of 4,000 =  $0.2 \cdot 4,000 = 800$ .
10. **Answer choice (C) is correct.** Each section of Lucy’s test had between 30 and 50 questions, so we will use 40 questions to estimate. Each question is worth 1.5 to 3.5 points, so we will use 2.5 points to estimate. Find the total number of points each section is worth by multiplying 40 questions per section by 2.5 points per question:  $40 \cdot 2.5 = 100$  points. Find the total number of points the test is worth by multiplying 100 points per section by 3 sections:  $100 \cdot 3 = 300$  points. Lucy estimates that she answered 75% of the questions correctly, so find the estimated number of points Lucy received by finding 75% of 300:  $75\%$  of 300 =  $0.75 \cdot 300 = 225$  points.

### **Quantitative Comparisons Practice Set 1**

1. **Answer choice (A) is correct.**  $\frac{2}{5}$  is greater than  $\frac{1}{5}$ , and  $\frac{1}{3}$  is greater than  $\frac{1}{4}$ , therefore,  $\frac{2}{5} + \frac{1}{3}$  is greater than  $\frac{1}{5} + \frac{1}{4}$ , so the quantity in Column A is greater than the quantity in Column B.
2. **Answer choice (C) is correct.** Since  $60\% = \frac{3}{5}$ , 60% of 80 equals  $\frac{3}{5}$  of 80, so the quantities in Column A and Column B are equal.
3. **Answer choice (B) is correct.** Change  $\frac{23}{25} = \frac{92}{100}$  which equals 92%. Therefore, Natalie answered more questions correctly than Tate, so Tate answered more questions incorrectly than Natalie. This means the quantity in Column B is greater than the quantity in Column A.
4. **Answer choice (B) is correct.** 0.6 is smaller than 0.7, and  $\frac{1}{4}$  is greater than  $\frac{1}{5}$ , therefore,  $0.7 \div \frac{1}{5}$  is greater than  $0.6 \div \frac{1}{4}$  (dividing by a larger number results in a smaller answer). This means Column B is greater than Column A.
5. **Answer choice (B) is correct.** Since  $x$  and  $y$  are both positive,  $\frac{x}{y}$  is positive. This means Column A and B will both be positive. Multiplying a number by a number less than 1 results in a number smaller than the original number. Therefore, Column A is less than  $\frac{x}{y}$ . Dividing a number by a number less

than 1 results in a number larger than the original number. Therefore, Column B is greater than  $\frac{x}{y}$ . Therefore, the quantity in Column B is greater than the quantity in Column A.

6. **Answer choice (B) is correct.** Find the quantity in Column A first. Since Michelle made 80% of the foul shots she attempted, she missed 20% of the foul shots. We know she missed 10 foul shots, so we can find the total number of foul shots Michelle attempted by answering the question, “10 is 20% of what number?” Set up an equation that represents this question and solve for  $x$ ;  $10 = 0.2 \cdot x \rightarrow x = 50$ . Therefore, Michelle attempted 50 foul shots, and she missed 10 foul shots, so she made 40 foul shots. Therefore, Column A equals 40, so the quantity in Column B is greater than the quantity in Column A.
7. **Answer choice (C) is correct.** When multiplying decimals, remove the decimal points and multiply the two numbers. Then determine where the decimal point is placed by counting the number of digits to the right of the decimal point in our original number. If we remove the decimal points in both columns, then Column A and Column B are both multiplying  $84 \cdot 75$ . Each Column has a total of 4 digits to the right of the decimal point in the original numbers, so the two quantities are equal.
8. **Answer choice (A) is correct.** Since  $\frac{5}{3}$  is greater than 150%, Gene’s age is greater than Mike’s age. Therefore, the quantity in Column A is greater than the quantity in Column B.
9. **Answer choice (A) is correct.** Find the quantity in Column A:  $0.8 - 0.15 = 0.65$ . Change the fractions in Column B into decimals and find the quantity in Column B:  $\frac{3}{4} - \frac{1}{2} = 0.75 - 0.4 = 0.35$ . Therefore, the quantity in Column A is greater than the quantity in Column B.
10. **Answer choice (C) is correct.** Since 50% is double 25%, taking 50% of  $x$  is equal to taking 25% of double  $x$ , or  $2x$ . Therefore, the quantities in both columns are equal.
11. **Answer choice (B) is correct.** Since the problem doesn’t tell us how many slices of pizza Allie originally bought, we can choose our own number. Let’s say Allie bought 9 slices of pizza. On Monday, she ate  $\frac{1}{3}$  of the pizza, so she ate 3 slices. This means she had 6 slices left. On Tuesday, she ate  $\frac{1}{3}$  of the remaining pizza, so she ate 2 slices. In total, she ate 5 out of 9 slices of pizza, or  $\frac{5}{9}$  of the pizza. Since  $\frac{2}{3}$  is greater than  $\frac{5}{9}$ , the quantity in Column B is greater than the quantity in Column A.
12. **Answer choice (B) is correct.** If 13 of the 25 balls in the bin are red, then 12 of the 25 balls in the bin are NOT red. 12 is less than half of 25, so  $\frac{12}{25}$  is less than 50%. Therefore, the percent of balls in the bin that are NOT red is less than 50%, so the quantity in Column B is greater than the quantity in Column A.
13. **Answer choice (C) is correct.** When finding a fraction of a fraction, multiply the two fractions together (in math the word “of” means multiplication). Therefore, both columns equal  $\frac{2}{3} \cdot \frac{1}{2}$ , so the quantities in both columns are equal.

14. **Answer choice (B) is correct.** Find the quantity in Column A by reducing 200 by 40%:  $200 - 40\%$  of  $200 = 200 - 0.4 \cdot 200 = 200 - 80 = 120$ . Find the quantity in Column B by reducing 200 by 20%, and then reducing the result by 20%:  $200 - 20\%$  of  $200 = 200 - 0.2 \cdot 200 = 200 - 40 = 160 \rightarrow 160 - 20\%$  of  $160 = 160 - 0.2 \cdot 160 = 160 - 32 = 128$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
15. **Answer choice (D) is correct.** If  $a = 100$ , then Column A equals 80 and Column B equals 70, so Column A is greater than Column B. However, if  $a = 0$ , then Column A and Column B both equal 0. Therefore, the relationship between the two columns cannot be determined from the information given.
16. **Answer choice (A) is correct.** Simplify the denominator of each column. For Column A,  $\frac{1}{4} = 0.25$ , and  $0.9 - 0.25 = 0.65$ . Therefore, Column A is  $40 \div 0.7$  and Column B is  $40 \div 0.65$ . For Column B,  $\frac{2}{5}$  equals 0.4, and  $0.3 + 0.4 = 0.7$ . Dividing by a smaller number results in a larger answer, so Column A is greater than column B.
17. **Answer choice (B) is correct.** Find the quantity in Column A by multiplying  $\frac{5}{6}$  by 12 to get 10 cups. Find the quantity in Column B by multiplying  $\frac{2}{3}$  by 18 to get 12 cups. Therefore, the quantity in Column B is greater than the quantity in Column A.
18. **Answer choice (A) is correct.** Find the quantity in Column A. To find the percent increase from 100 to 200, first find the difference between the two numbers:  $200 - 100 = 100$ . Divide the result by the original number (100) and multiply the result by 100 to turn it into a percent:  $100 \div 100 = 1 \rightarrow 1 \cdot 100 = 100\%$ . Find the quantity in Column B. To find the percent increase from 200 to 300, first find the difference between the two numbers:  $300 - 200 = 100$ . Divide the result by the original number (200) and multiply the result by 100 to turn it into a percent:  $100 \div 200 = 0.5 \rightarrow 0.5 \cdot 100 = 50\%$ . Therefore, the quantity in Column A is greater than the quantity in Column B.
19. **Answer choice (A) is correct.**  $\frac{1}{3}$  written as a decimal is  $0.\overline{3}$ , which is an infinite number of digits.  $\frac{9}{20}$  written as a decimal is 0.45, which is 2 digits. Infinity is greater than 2, so the quantity in Column A is greater than the quantity in Column B.
20. **Answer choice (A) is correct.** C is located around  $-2.3$ , and D is located at  $-1.5$ . G is located at 0.75, and H is located at 1.25. Therefore, the product of C and D is greater than the product of G and H, so the quantity in Column A is greater than the quantity in Column B.

### **Quantitative Comparisons Practice Set 2**

1. **Answer choice (B) is correct.** Change 75% into a fraction by putting 75 over 100 and simplifying:  $75\% = \frac{75}{100} = \frac{3}{4}$ . Since  $\frac{4}{5}$  is greater than  $\frac{3}{4}$ ,  $\frac{4}{5}$  of 135 is greater than  $\frac{3}{4}$  of 135, so the quantity in Column B is greater than the quantity in Column A.

2. **Answer choice (C) is correct.** Mike missed 35% of his foul shots, so he made 65% of his foul shots. Change 65% into a fraction by putting 65 over 100 and simplifying:  $65\% = \frac{65}{100} = \frac{13}{20}$ . Therefore, Rob and Mike made the same number of foul shots, so the quantity in Column A is equal to the quantity in Column B.
3. **Answer choice (A) is correct.**  $\frac{3}{4}$  is greater than  $\frac{2}{3}$ , and  $\frac{1}{6}$  is less than  $\frac{1}{5}$ . Therefore,  $\frac{3}{4} - \frac{1}{6}$  is greater than  $\frac{2}{3} - \frac{1}{5}$ , so the quantity in Column A is greater than the quantity in Column B. You could also find the value of the quantities in Columns A and B by finding a common denominator and subtracting each pair of fractions.
4. **Answer choice (A) is correct.** Choose a number for  $x$  less than 0. Let's say  $x$  equals  $-30$  because  $-30$  is divisible by 6 and 5. Find the quantity in Column A:  $-30 \div 0.6 = -50$ . Find the quantity in Column B:  $-30 \div 0.5 = -60$ . Therefore, the quantity in Column A is greater than the quantity in Column B. Since Column A is being divided by a larger number than Column B, the quantity in Column A will always be less negative than the quantity in Column B, so the quantity in Column A will always be greater than the quantity in Column B.
5. **Answer choice (B) is correct.** To find the quantity in Column B, change the percent into a decimal and multiply. Therefore, 30% of 70 becomes  $0.3 \cdot 70$ . Now we are comparing  $0.03 \cdot 70$  and  $0.3 \cdot 70$ . Since 0.3 is greater than 0.03,  $0.3 \cdot 70$  is greater than  $0.03 \cdot 70$ , so the quantity in Column B is greater than the quantity in Column A.
6. **Answer choice (D) is correct.** Since we don't know the values of  $a$  and  $b$ , we cannot determine the relationship between the two columns. If  $a = 2$  and  $b = 1$ , Column A equals  $\frac{9}{8} \cdot \frac{2}{1} = \frac{9}{4}$ , and Column B equals  $\frac{9}{8} \div \frac{2}{1} = \frac{9}{8} \cdot \frac{1}{2} = \frac{9}{16}$ , so Column A is greater than Column B. However if  $a = 1$  and  $b = 2$ , Column A equals  $\frac{9}{8} \cdot \frac{1}{2} = \frac{9}{16}$ , and Column B equals  $\frac{9}{8} \div \frac{2}{1} = \frac{9}{8} \cdot \frac{1}{2} = \frac{9}{16}$ , so Column B is greater than Column A. Since we get a different relationship depending on what numbers we plug in for  $a$  and  $b$ , the relationship cannot be determined from the given information.
7. **Answer choice (B) is correct.** Change 0.8 into a fraction by thinking about how the decimal is read: 0.8 is read as, "8 tenths," so 0.8 equals  $\frac{8}{10}$ . Since  $\frac{8}{9}$  is greater than  $\frac{8}{10}$ , Christie's height is greater than Jan's height, so the quantity in Column B is greater than the quantity in Column A.
8. **Answer choice (B) is correct.** When dividing decimals, move the decimal point of the divisor (2nd number) all the way to the right, and then move the decimal point of the dividend (1st number) the same number of places. Therefore,  $12.5 \div 0.4$  becomes  $125 \div 4$ , and  $125 \div 0.04$  becomes  $12,500 \div 4$ . Now we are comparing  $125 \div 4$  and  $12,500 \div 4$ . Since 125 and 12,500 are both being divided by 4, we can compare 125 and 12,500. Since 12,500 is greater than 125,  $12,500 \div 4$  is greater than  $125 \div 4$ , so the quantity in Column B is greater than the quantity in Column A.



9. **Answer choice (D) is correct.** Let's choose different numbers for  $x$  to see if we can determine the relationship between the two columns. Let's say  $x = 0$  first. Find the value of Column A:  $80\%$  of  $2(0) = 80\%$  of  $0 = 0$ . Find the value of Column B:  $30\%$  of  $0 = 0$ . Therefore, if  $x = 0$ , the quantities in both columns are equal. Now let's say  $x = 100$ . Find the value of Column A:  $80\%$  of  $2(100) = 80\%$  of  $200 = 160$ . Find the value of Column B:  $30\%$  of  $100 = 30$ . Therefore, if  $x = 100$ , the quantity in Column A is greater than the quantity in Column B. Since the relationship between the two columns changes depending on what values we choose for  $x$ , the relationship cannot be determined from the given information.
10. **Answer choice (A) is correct.** We know that after increasing by  $10\%$ , the price of a laptop is  $\$220$ . Therefore,  $\$220$  is  $110\%$  of the original price of the laptop, so we can find the original price of the laptop by answering the question, “ $\$220$  is  $110\%$  of what number?” Set up and solve the following equation to answer the question:  $\$220 = 1.1x \rightarrow x = \$200$ . Therefore, the original price of the laptop is  $\$200$ , so the quantity in Column A is greater than the quantity in Column B.
11. **Answer choice (A) is correct.** Since the problem doesn't tell us how many pages Clifton needed to write for his English paper, we can choose our own number. Let's say Clifton needed to write 8 pages: On Monday, he wrote half of the pages, so he wrote 4 pages and he had 4 pages left to write. On Tuesday, he wrote one fourth of the remaining 4 pages, so he wrote 1 page and had 3 pages left to write. Therefore, he had 3 out of 8 pages left to write, which is  $\frac{3}{8}$  of his paper. Since  $\frac{3}{8}$  is greater than  $\frac{1}{4}$ , the quantity in Column A is greater than the quantity in Column B.
12. **Answer choice (C) is correct.** In both columns, the original number was decreased by half of itself. Therefore, the percent decrease in each column is  $50\%$ , so the quantity in Column A is equal to the quantity in Column B.
13. **Answer choice (B) is correct.** Find the number of blue pens Gina has by subtracting the number of black pens from the total number of pens:  $36 - 19 = 17$  blue pens. Since 17 is less than half of 36, the percent of Gina's pens that are blue is less than  $50\%$  ( $50\% = \frac{1}{2}$ ). Therefore, the quantity in Column B is greater than the quantity in Column A.
14. **Answer choice (C) is correct.** Find the quantity in Column A by first turning  $40\%$  into a fraction or decimal and then multiplying by 60:  $40\%$  of  $60 = 0.4 \cdot 60 = 24$ . Find the quantity in Column B by first turning  $60\%$  into a fraction or decimal and then multiplying by 40:  $60\%$  of  $40 = 0.6 \cdot 40 = 24$ . Therefore, the quantity in Column A is equal to the quantity in Column B.
15. **Answer choice (A) is correct.** Since the problem didn't tell us the price of the stock before Monday night, we can choose our own number. Let's say the stock price was  $\$100$  before Monday night. Find the price of the stock on Monday by decreasing  $\$100$  by  $10\%$ :  $\$100 - 10\%$  of  $\$100 = \$100 - 0.1 \cdot \$100 = \$100 - \$10 = \$90$ . Now find the price of the stock after Tuesday morning by increasing  $\$90$  by  $10\%$ :  $\$90 + 10\%$  of  $\$90 = \$90 + 0.1 \cdot \$90 = \$90 + \$9 = \$99$ . Therefore, the price of the stock before Monday night is greater than the price of the stock after Tuesday morning, so the quantity in Column A is greater than the quantity in Column B.

16. **Answer choice (C) is correct.** Find the value of the expression in Column A by turning the fractions into decimals, adding the terms in the numerator, and then dividing the result by the denominator:

$$\frac{0.4 + \frac{1}{2}}{\frac{2}{5}} = \frac{0.4 + 0.5}{0.4} = \frac{0.9}{0.4} = 2.25.$$
 Find the value of the expression in Column B by turning the

fractions into decimals, adding the terms in the numerator, and then dividing the result by the denominator:  $\frac{0.2 + \frac{1}{4}}{\frac{1}{5}} = \frac{0.2 + 0.25}{0.2} = \frac{0.45}{0.2} = 2.25$ . Therefore, the quantity in Column A is equal to the quantity in Column B.

17. **Answer choice (D) is correct.** While we know that  $x$  is greater than  $y$ , we don't know the values of  $x$  and  $y$ . Therefore, we need to choose different values for  $x$  and  $y$  that fit the restriction to see if we can determine the relationship between the two columns. First let's say  $x = 30$  and  $y = 20$ . Column A is equal to 20% of 30: 20% of 30 =  $0.2 \cdot 30 = 6$ . Column B is equal to 30% of 20: 30% of 20 =  $0.3 \cdot 20 = 6$ . Therefore, when  $x = 30$  and  $y = 20$ , the quantities in both columns are equal. Now let's say  $x = 100$  and  $y = 10$ . Column A is equal to 20% of 100: 20% of 100 =  $0.2 \cdot 100 = 20$ . Column B is equal to 30% of 10: 30% of 10 =  $0.3 \cdot 10 = 3$ . Therefore, when  $x = 100$  and  $y = 10$ , the quantity in Column A is greater than the quantity in Column B. Since we get a different relationship when we plug in different values for  $x$  and  $y$ , the relationship cannot be determined from the given information.

18. **Answer choice (A) is correct.** Find the quantity in Column A. First find the number of cupcakes Kylie expects to sell by finding  $\frac{4}{5}$  of 100:  $\frac{4}{5}$  of 100 =  $\frac{4}{5} \cdot 100 = 80$ . Now find the amount of money Kylie expects to make by multiplying the expected number of cupcakes by \$1.75:  $80 \cdot \$1.75 = \$140$ . Therefore, the quantity in Column A is greater than the quantity in Column B.

19. **Answer choice (A) is correct.** The difference between two numbers on a number line is equal to the distance between them. Therefore, since the distance between points A and E is greater than the distance between points D and F, the difference between points A and E is greater than the distance between points D and F. This means the quantity in Column A is greater than the quantity in Column B.

20. **Answer choice (C) is correct.** Find the quantity in Column A by turning  $2\frac{3}{5}$  into an improper fraction:  $2\frac{3}{5} = \frac{13}{5}$ . Therefore, there are 13 fifths in  $2\frac{3}{5}$ . Find the quantity in Column B by turning  $4\frac{1}{3}$  into an improper fraction:  $4\frac{1}{3} = \frac{13}{3}$ . Therefore, there are 13 thirds in  $4\frac{1}{3}$ , so the quantity in Column A is equal to the quantity in Column B.

## ***Algebraic Expressions***

### **Patterns Practice Set 1**

1. **Answer choice (C) is correct.** As Xavier's age increases by 1 year, the total cost of admissions doubles. Therefore, when Xavier is 10 years old, his allowance will be \$16. When Xavier is 11 years old, his allowance will be \$32. When Xavier is 12 years old, his allowance will be \$64.
2. **Answer choice (B) is correct.** The price of a ticket increases by \$10, then \$8, and then \$6, so the increase in price decreases by \$2 with each additional ticket. Therefore, 5 tickets cost \$4 more than 4 tickets, so 5 tickets cost \$40, and 6 tickets cost \$2 more than 5 tickets, so 6 tickets cost \$42.
3. **Answer choice (C) is correct.** As  $x$  increases by 1,  $y$  increases by 1, then 2, and then 3. Therefore, the increase in  $y$  increases by 1 with each additional 1 point increase in  $x$ . Using this rule, when  $x$  is 7,  $y$  is 10 ( $y$  increases by 4). When  $x$  is 8,  $y$  is 15 ( $y$  increases by 5). When  $x$  is 9,  $y$  is 21 ( $y$  increases by 6).
4. **Answer choice (C) is correct.** The pattern repeats every 4 terms. Therefore, any term that is multiple of 4 will be a heart, so the 96th term is a heart. This means the 97th term is a circle, the 98th term is a square, and the 99th term is a triangle.
5. **Answer choice (B) is correct.** Each term in the pattern is a perfect square:  $1^2 = 1$ ,  $2^2 = 4$ ,  $3^2 = 9$ ,  $4^2 = 16$ ,  $5^2 = 25$ ,  $6^2 = 36$ , and  $7^2 = 49$ . Therefore, the next term is  $8^2$  which equals 64.
6. **Answer choice (B) is correct.** To get from the first element to the second element, a square was added on top. To get from the second element to the third element, a square is added on the right. To get from the third to the fourth element, a square is added on top, and to get from the fourth to the fifth element, a square is added on the right. Therefore, the pattern alternates between adding a square to the top and adding a square to the right, so to find the sixth element, add a square to the top of the fifth element, which is answer choice (B).
7. **Answer choice (D) is correct.** Before Wednesday, only Bredna knew the secret, so 1 person knew the secret. On Wednesday, she told 2 friends, so  $1 + 2$  people knew the secret. On Thursday, each of the two friends told 2 people, so  $1 + 2 + 2^2$  knew the secret. On Friday, each of the two new friends told 2 people, so  $1 + 2 + 2^2 + 2^3$  knew the secret. This pattern continues for Saturday, Sunday, and Monday, so on Monday,  $1 + 2 + 2^2 + 2^3 + 2^4 + 2^5 + 2^6$  will know the secret.
8. **Answer choice (A) is correct.** To get from the first element to the second element, three circles were removed from the left side of the figure. To get from the second element to the third element, three circles were moved from the top. To get from the third element to the fourth element, three circles were removed from the right side of the figure. Therefore, three circles are removed between each pair of elements in a clockwise pattern (left, top, right), so to get from the fourth element to the fifth element, remove three circles from the bottom to get answer choice (A).

9. **Answer choice (A) is correct.** The first figure has 1 triangle, the second figure has 4 triangles, the third figure has 7 triangles, and the fourth triangle has 10 triangles. Therefore, every even figure has an even number of triangles, so the sixth figure has an even number of triangles.
10. **Answer choice (C) is correct.** The pattern repeats every 5 terms. Therefore, any term that is multiple of 5 will be an 8, so the 20th term is an 8. This means the 21st term is a 3, the 22nd term is a 0, the 23rd term is a 5, and the 24th term is 2. The product of 3 and 2 is 6.

### **Patterns Practice Set 2**

1. **Answer choice (B) is correct.** As the number of hours increases by 1, the number of cups of coffee remaining is cut in half. Therefore, after 5 hours, there will be 2 cups of coffee, after 6 hours, there will be 1 cup of coffee, and after 7 hours, there will be 0.5 cups of coffee.
2. **Answer choice (C) is correct.** The number of paper clips in the second box is 1 more than the number of paper clips in the first box. The number of paper clips in the third box is 3 more than the number of paper clips in the second box. The number of paper clips in the fourth box is 5 more than the number of paper clips in the third box. Therefore, the difference between the number of paper clips in consecutive boxes increases by 2, so the number of paper clips in the fifth box will be 7 more than the number of paper clips in the fourth box:  $21 + 7 = 28$ . The number of paper clips in the sixth box will be 9 more than the number of paper clips in the fifth box:  $28 + 9 = 37$ .
3. **Answer choice (B) is correct.** The value of  $b$  is equal to one more than the respective value of  $a$  squared. For example, when  $a = 2$  and  $b = 9$ ,  $b = (2 + 1)^2 = 9$ . Therefore, when  $a = 9$ ,  $b = b = (9 + 1)^2 = 100$ . When  $a = 10$ ,  $b = b = (10 + 1)^2 = 121$ . When  $a = 11$ ,  $b = b = (11 + 1)^2 = 144$ . Therefore, when  $b = 144$ ,  $a = 11$ .
4. **Answer choice (C) is correct.** The number of blocks in the first layer is equal to 49, which equals  $7^2$ . The number of blocks in the second layer is equal to 36, which equals  $6^2$ . The number of blocks in the third layer is equal to 25, which equals  $5^2$ . The number of blocks in the fourth layer is equal to 16, which equals  $4^2$ . Therefore, the number of blocks Marco will use on the fifth layer will equal  $3^2$  which equals 9, and the number of blocks Marco will use on the sixth layer will equal  $2^2$  which equals 4. The total number of blocks Marco will use on the fifth and sixth layers equals  $9 + 4 = 13$ .
5. **Answer choice (D) is correct.** The pattern repeats every 4 terms. Therefore, any term that is multiple of 4 will be a circle with vertical lines, so the 100th term is a circle with vertical lines.
6. **Answer choice (C) is correct.** Test each number in the pattern using the rule in answer choice (C) to verify that it is correct:  $3 \cdot 2 + 1 = 7$ ,  $7 \cdot 2 + 1 = 15$ ,  $15 \cdot 2 + 1 = 31$ ,  $31 \cdot 2 + 1 = 63$ , and  $63 \cdot 2 + 1 = 127$ .
7. **Answer choice (B) is correct.** The pattern repeats every 6 terms. Since the sixth term is the number 7, any term that is a multiple of 6 will be the number 7. Therefore, the 30th term is the number 7, the

31st term is the number 5, the 32nd term is the number 8, the 33rd term is the number 4, and the 34th term is the number 0. Find the sum of the 30th and 34th terms:  $7 + 0 = 7$ .

8. **Answer choice (A) is correct.** To create the second element, a block was added to the top left and bottom right of the first element. To create the third element, a block was added directly to the right of the previous block that was added to the top left, and a block was added directly on top of the previous block that was added to the bottom right. To create the fourth element, a block was added to the top left and bottom right of the third element. To create the fifth element, a block was added directly to the right of the previous block that was added to the top left, and a block was added directly on top of the previous block that was added to the bottom right. Therefore, to create the sixth element in the pattern, a block needs to be added on the top left of the fifth element and on the bottom right of the fifth element, which creates the figure in answer choice (A).
9. **Answer choice (A) is correct.** Every hour, half of the water in the bucket evaporates, so half of the water remains. Therefore, every hour, the amount of water in the bucket gets cut in half or multiplied by 0.5. After the first hour, there are  $0.5 \cdot 0.5$  gallons of water remaining in the bucket, which can be written as  $0.5^2$ . After two hours, there are  $0.5^2 \cdot 0.5$  gallons of water remaining in the bucket, which can be written as  $0.5^3$ . If this pattern continues, after three hours, there are  $0.5^4$  gallons of water remaining. After four hours, there are  $0.5^5$  gallons of water remaining. After five hours, there are  $0.5^6$  gallons of water remaining.
10. **Answer choice (B) is correct.** The top two numbers in each triangle add to the bottom number:  $2 + 3 = 5$ , and  $4 + 6 = 10$ . Therefore, the missing number in the third triangle added to 9 must equal 15. Since  $6 + 9 = 15$ , the missing number is 6.

### **Solving Equations Practice Set 1**

1. **Answer choice (A) is correct.** Subtract 15 from both sides of the equation:  $5x + 15 = 40 \rightarrow 5x = 25$ . Divide both sides of the equation by 5:  $5x = 25 \rightarrow x = 5$ .
2. **Answer choice (A) is correct.** To isolate  $a$ , subtract  $b$  from both sides of the equation:  $a + b = 12 \rightarrow a = 12 - b$ .
3. **Answer choice (B) is correct.** Solve for  $m$  by adding 8 to both sides of the equation:  $m - 8 = 12 \rightarrow m = 20$ . Solve for  $n$  by first subtracting 17 from both sides:  $17 - n = 11 \rightarrow -n = -6$ . Now divide both sides of the equation by  $-1$ :  $-n = 6 \rightarrow n = 6$ . Therefore,  $n - m = 6 - 20 = -14$ .
4. **Answer choice (B) is correct.** Divide both sides of the equation by 3:  $3(w + 6) = 36 \rightarrow w + 6 = 12$ . Subtract 6 from both sides of the equation:  $w = 6$ .
5. **Answer choice (C) is correct.** Subtract 20 from both sides of the equation:  $\frac{3}{4}x = 12$ . Divide both sides of the equation by  $\frac{3}{4}$  which is the same as multiplying by  $\frac{4}{3}$ :  $x = 16$ .

6. **Answer choice (A) is correct.** To isolate  $c$ , multiply both sides of the equation by  $d$ :  $c \div d = 4 \rightarrow c = 4d$ .
7. **Answer choice (C) is correct.** First get both  $x$  terms on the same side of the equation by adding  $x$  to both sides of the equation:  $3x - 3 = 17 - x \rightarrow 4x - 3 = 17$ . Now add 3 to both sides of the equation:  $4x - 3 + 3 = 17 + 3 \rightarrow 4x = 20$ . Finally, divide both sides of the equation by 4:  $4x = 20 \rightarrow x = 5$ .
8. **Answer choice (A) is correct.** Cross multiply:  $\frac{k+4}{k} = \frac{5}{7} \rightarrow 7(k+4) = 5k$ . Distribute the 7:  $7(k+4) = 5k \rightarrow 7k + 28 = 5k$ . Subtract  $7k$  from both sides of the equation:  $7k + 28 = 5k \rightarrow 28 = -2k$ . Divide both sides of the equation by  $-2$ :  $28 = -2k \rightarrow -14 = k$ .
9. **Answer choice (D) is correct.** Subtract 27 from both sides of the equation:  $27 - \frac{b}{3} = 18 \rightarrow -\frac{b}{3} = -9$ . Multiply both sides of the equation by  $-3$ :  $-\frac{b}{3} = -9 \rightarrow b = 27$ .
10. **Answer choice (D) is correct.** To isolate  $n$ , first subtract  $m$  from both sides of the equation:  $m - n = 9 \rightarrow -n = 9 - m$ . Now divide both sides of the equation by  $-1$ :  $-n = 9 - m \rightarrow n = -9 + m$ .
11. **Answer choice (A) is correct.** Plug in 18 for  $y$  to get  $18 = 2x + 26$ . Now solve for  $x$  by first subtracting 26 from both sides of the equation:  $18 = 2x + 26 \rightarrow -8 = 2x$ . Divide both sides of the equation by 2:  $-8 = 2x \rightarrow -4 = x$ .
12. **Answer choice (B) is correct.** Cross multiply:  $\frac{x}{14-x} = \frac{2}{5} \rightarrow 5x = 2(14-x)$ . Distribute the 2:  $5x = 28 - 2x$ . Add  $2x$  to both sides of the equation:  $5x = 28 - 2x \rightarrow 7x = 28$ . Divide both sides of the equation by 7:  $7x = 28 \rightarrow x = 4$ .
13. **Answer choice (D) is correct.** Solve for  $p$  by multiplying both sides of the equation by 6:  $p \div 6 = 12 \rightarrow p = 72$ . Solve for  $q$  by dividing both sides of the equation by  $\frac{5}{7}$ , which is the same as multiplying by  $\frac{7}{5}$ :  $\frac{5}{7}q = 35 \rightarrow q = 49$ . Therefore,  $p + q = 72 + 49 = 121$ .
14. **Answer choice (A) is correct.** Solve for  $y$  by first subtracting  $y$  from both sides of the equation:  $3y - 23 = y - 49 \rightarrow 2y - 23 = -49$ . Add 23 to both sides of the equation:  $2y - 23 = -49 \rightarrow 2y = -26$ . Divide both sides of the equation by 2:  $2y = -26 \rightarrow y = -13$ . Therefore,  $y - 5 = -13 - 5 = -18$ .
15. **Answer choice (B) is correct.** Plug in 3 for  $a$  and simplify:  $6(3) = 2b + 16 \rightarrow 18 = 2b + 16$ . Now subtract 16 from both sides of the equation:  $18 = 2b + 16 \rightarrow 2 = 2b$ . Divide both sides of the equation:  $2 = 2b \rightarrow b = 1$ .
16. **Answer choice (D) is correct.** Isolate  $k$  by first subtracting  $10j$  from both sides of the equation:  $5k + 10j = 30 \rightarrow 5k = 30 - 10j$ . Divide both sides of the equation by 5:  $k = 6 - 2j$ .

17. **Answer choice (A) is correct.** Solve for  $r$  by subtracting 7 from both sides of the equation:  $7 - r = 9 \rightarrow -r = 2$ . Divide both sides of the equation by  $-1$ :  $-r = 2 \rightarrow r = -2$ . Replace  $r$  in the second equation with  $-2$ :  $s \div r = 8 \rightarrow s \div (-2) = 8$ . Solve for  $s$  by multiplying both sides of the equation by  $-2$ :  $s \div (-2) = 8 \rightarrow s = -16$ .
18. **Answer choice (B) is correct.** Add 9 to both sides of the equation:  $x^2 - 9 = 16 \rightarrow x^2 = 25$ . Since  $x > 0$ ,  $x = 5$  because  $5^2 = 25$ . Therefore,  $2x = 2(5) = 10$ .
19. **Answer choice (D) is correct.** Subtract  $\frac{1}{2}z$  from both sides of the equation:  $\frac{2}{3}z + 19 = \frac{1}{2}z + 37 \rightarrow \frac{1}{6}z + 19 = 37$ . Subtract 19 from both sides of the equation:  $\frac{1}{6}z + 19 = 37 \rightarrow \frac{1}{6}z = 18$ . Divide both sides of the equation by  $\frac{1}{6}$ , which is the same as multiplying by 6:  $\frac{1}{6}z = 18 \rightarrow z = 108$ .
20. **Answer choice (C) is correct.** Replace  $P$  with 16 and  $l$  with 14 and simplify:  $P = 2l + 2w \rightarrow 16 = 2(14) + 2w \rightarrow 16 = 28 + 2w$ . Subtract 28 from both sides of the equation:  $16 = 28 + 2w \rightarrow -12 = 2w$ . Divide both sides of the equation by 2:  $-12 = 2w \rightarrow w = -6$

### Solving Equations Practice Set 2

1. **Answer choice (D) is correct.** Subtract 7 from both sides of the equation:  $3r + 7 = 25 \rightarrow 3r = 18$ . Divide both sides of the equation by 3:  $3r = 18 \rightarrow r = 6$ .
2. **Answer choice (D) is correct.** Plug in 6 for  $y$ :  $6 = 3x - 6$ . Add 6 to both sides of the equation:  $12 = 3x$ . Divide both sides of the equation by 3:  $4 = x$ .
3. **Answer choice (A) is correct.** Subtract  $x$  from both sides of the equation:  $x - y = 15 \rightarrow -y = 15 - x$ . Divide both sides of the equation by  $-1$ :  $-y = 15 - x \rightarrow y = -15 + x$  which is the same as  $y = x - 15$ .
4. **Answer choice (A) is correct.** Find the value of  $s$  by multiplying both sides of the first equation by 7:  $s \div 7 = 8 \rightarrow s = 56$ . Find the value of  $t$  by dividing both sides of the second equation by  $\frac{1}{6}$ , which is the same as multiplying both sides by 6:  $\frac{1}{6}t = 6 \rightarrow t = 36$ . Find the value of  $s - t$ :  $s - t = 56 - 36 = 20$ .
5. **Answer choice (B) is correct.** Plug in 14 for  $s$  and 5 for  $n$ :  $14 = 3m + 4(5)$ . Simplify  $4(5)$ :  $14 = 3m + 4(5) \rightarrow 14 = 3m + 20$ . Subtract 20 from both sides of the equation:  $14 = 3m + 20 \rightarrow -6 = 3m$ . Divide both sides of the equation by 3:  $-6 = 3m \rightarrow m = -2$ .
6. **Answer choice (C) is correct.** First get both  $t$  terms on the same side of the equation by subtracting  $3t$  from both sides:  $5t - 9 = 7 + 3t \rightarrow 2t - 9 = 7$ . Now add 9 to both sides of the equation:  $2t - 9 = 7 \rightarrow 2t = 16$ . Divide both sides of the equation by 2:  $2t = 16 \rightarrow t = 8$ .

7. **Answer choice (B) is correct.** Divide both sides of the equation by 7:  $7(5 - w) = 35 \rightarrow 5 - w = 5$ . Subtract 5 from both sides of the equation  $5 - w = 5 \rightarrow -w = 0$ . Divide both sides of the equation by  $-1$ :  $-w = 0 \rightarrow w = 0$ .
8. **Answer choice (D) is correct.** First get both  $k$  terms together by subtracting  $\frac{1}{2}k$  from both sides of the equation:  $\frac{3}{4}k - 8 = \frac{1}{2}k + 8 \rightarrow \frac{1}{4}k - 8 = 8$ . Now add 8 to both sides of the equation:  $\frac{1}{4}k - 8 = 8 \rightarrow \frac{1}{4}k = 16$ . Finally, divide both sides of the equation by  $\frac{1}{4}$ , which is the same as multiplying both sides by 4:  $\frac{1}{4}k = 16 \rightarrow k = 64$ .
9. **Answer choice (B) is correct.** First find the value of  $a$  by adding 3 to both sides of the first equation:  $a - 3 = 47 \rightarrow a = 50$ . Now find  $b$  by plugging 50 in for  $a$  in the second equation:  $50 \div b = 10$ . Solve this equation by first multiplying both sides by  $b$  and then dividing both sides by 10:  $50 \div b = 10 \rightarrow 50 = 10b \rightarrow b = 5$ . Finally, find the value of  $2b$ :  $2b = 2(5) = 10$ .
10. **Answer choice (D) is correct.** Subtract 3 from both sides of the equation;  $3 + \frac{5}{6}c = 23 \rightarrow \frac{5}{6}c = 20$ . Divide both sides of the equation by  $\frac{5}{6}$ , which is the same as multiplying both sides by  $\frac{6}{5}$ :  $\frac{5}{6}c = 20 \rightarrow c = 24$ .
11. **Answer choice (A) is correct.** Isolate  $a$  by multiplying both sides of the equation by 2:  $\frac{a}{2} = b \rightarrow a = 2b$ .
12. **Answer choice (D) is correct.** First find the value of  $z$  by first subtracting  $2z$  from both sides of the equation:  $5z - 3 = 2z + 21 \rightarrow 3z - 3 = 21$ . Now add 3 to both sides of the equation:  $3z - 3 = 21 \rightarrow 3z = 24$ . Divide both sides of the equation by 3:  $3z = 24 \rightarrow z = 8$ . Find  $z + 7$  by adding 7 to 8:  $z + 7 = 8 + 7 = 15$ .
13. **Answer choice (A) is correct.** Subtract 5 from both sides of the equation:  $\frac{5}{2}y + 5 = 15 \rightarrow \frac{5}{2}y = 10$ . Divide both sides of the equation by  $\frac{5}{2}$ , which is the same as multiplying both sides of the equation by  $\frac{2}{5}$ :  $\frac{5}{2}y = 10 \rightarrow y = 4$ .
14. **Answer choice (C) is correct.** First solve for  $x$  by first subtracting 4 from both sides of the first equation:  $x^2 + 4 = 85 \rightarrow x^2 = 81$ . Now think about what positive number square equals 81.  $9 \cdot 9 = 81$ , so  $9^2 = 81$ . Therefore,  $x = 9$ . Finally, find the value of  $2x - 1$  by plugging in 9 for  $x$  and simplifying:  $2(9) - 1 = 18 - 1 = 17$ .
15. **Answer choice (A) is correct.** Find the value of  $p$  by subtracting 3 from both sides of the first equation:  $3 + p = -2 \rightarrow p = -5$ . Find the value of  $q$  by adding 7 to both sides of the second equation:  $-7 = 5 \rightarrow q = 12$ . Find the value of  $p - q$ :  $p - q = -5 - 12 = -17$ .



16. **Answer choice (D) is correct.** Isolate  $c$  by first subtracting  $12d$  from both sides of the equation:  $3c + 12d = 24 \rightarrow 3c = 24 - 12d$ . Now divide both sides of the equation by 3:  $3c = 24 - 12d \rightarrow c = 8 - 4d$ .
17. **Answer choice (A) is correct.** Plug in 3 for  $f$  and simplify the left side of the equation:  $8(3) = 3g + 24 \rightarrow 24 = 3g + 24$ . Subtract 24 from both sides of the equation:  $24 = 3g + 24 \rightarrow 0 = 3g$ . Divide both sides of the equation by 3:  $g = 0$ .
18. **Answer choice (B) is correct.** Cross multiply:  $\frac{q}{9q+9} = \frac{1}{18} \rightarrow 18q = 1(9q+9)$ . Distribute the 1:  $18q = 9q + 9$ . Subtract  $9q$  from both sides of the equation:  $18q = 9q + 9 \rightarrow 9q = 9$ . Divide both sides of the equation by 9:  $9q = 9 \rightarrow q = 1$ .
19. **Answer choice (A) is correct.** Cross multiply:  $\frac{g+14}{g} = \frac{2}{3} \rightarrow 3(g+14) = 2g$ . Distribute the 3:  $3g + 42 = 2g$ . Subtract  $3g$  from both sides of the equation:  $3g + 42 = 2g \rightarrow 42 = -g$ . Divide both sides of the equation by  $-1$ :  $42 = -g \rightarrow -42 = g$ .
20. **Answer choice (B) is correct.** Find the value of  $h$  by adding 12 to both sides of the first equation:  $h - 12 = 20 \rightarrow h = 32$ . Find the value of  $k$  by plugging in 32 for  $h$  in the second equation and then dividing both sides of the equation by 32:  $h \cdot k = 16 \rightarrow 32 \cdot k = 16 \rightarrow k = 0.5$ .

### **Manipulating Equations Practice Set 1**

- Answer choice (C) is correct.** To change  $4y - 3$  into  $8y - 6$ , we need to multiply by 2. Therefore, multiply both sides of the equation by 2:  $2(4y - 3) = 2(15)$ . Distribute the 2 and simplify the right side of the equation to get  $8y - 6 = 30$ .
- Answer choice (D) is correct.** If you plug in 9 for  $b$ , then the equation is  $9a + 9 = 9a + 9$ . Since both sides of the equation are equal when you plug in 9 for  $b$ ,  $b$  equals 9.
- Answer choice (A) is correct.** We want to write 24 in terms of  $x$ , so we want to change the right side of our equation to be 24. To turn 72 into 24, divide by 3 on both sides of the equation:  $6x = 72 \rightarrow 2x = 24$ .
- Answer choice (B) is correct.** We want to manipulate the equation to isolate  $a - b$ . To do this, first add 11 to both sides of the equation to get  $a = b - 8$ . Now subtract  $b$  from both sides of the equation to get  $a - b = -8$ .
- Answer choice (B) is correct.** To change  $9x - 6y$  into  $3x - 2y$ , we need to divide it by 3. Therefore, divide both sides of the equation by 3 to determine the value of  $3x - 2y$ :  $\frac{9x-6y}{3} = \frac{18}{3} \rightarrow 3x - 2y = 6$ .
- Answer choice (A) is correct.** First turn  $6x$  into  $12x$  by multiplying both sides of the equation by 2:  $6x = 4y \rightarrow 12x = 8y$ . Now add 2 to both sides of the equation:  $12x = 8y \rightarrow 12x + 2 = 8y + 2$ .

7. **Answer choice (C) is correct.** Distribute the  $\frac{z}{x}$  to get  $\frac{zx}{xy} + \frac{z^2}{xy}$ . Factor out  $\frac{z}{y}$  to get  $\frac{z}{y}\left(\frac{x}{x} + \frac{z}{x}\right)$ . Simplify  $\frac{x}{x}$  to 1 to get  $\frac{z}{y}\left(1 + \frac{z}{x}\right)$ .
8. **Answer choice (A) is correct.** First isolate  $5x - 4y$  by first subtracting 2 from both sides of the equation to get  $5x = 4y - 9$ , and then subtracting  $4y$  from both sides of the equation to get  $5x - 4y = -9$ . Now multiply both sides of the equation by 2:  $2(5x - 4y) = 2(9) \rightarrow 10x - 8y = 18$ .
9. **Answer choice (C) is correct.** Subtract 6 from both sides of the equation to get  $k - 6 = h - 14$ .
10. **Answer choice (D) is correct.** Multiply both sides of the equation by 3 to get  $3x = 3(9 - 6y)$ . Distribute the 3 to get  $3x = 27 - 18y$ .
11. **Answer choice (B) is correct.** Multiply both sides of the equation by  $\frac{1}{2}$  and simplify:  $\frac{1}{2}\left(\frac{a}{2} + \frac{a}{3}\right) = \frac{1}{2}b \rightarrow \frac{a}{4} + \frac{a}{6} = \frac{1}{2}b$ .
12. **Answer choice (C) is correct.** Simplify the given expression by first simplifying the square root of 36 to 6 and the square root of 4 to 2:  $\frac{4(\sqrt{36} - 8x)}{\sqrt{4}} = \frac{4(6 - 8x)}{2}$ . Now divide the 4 in the numerator by the 2 in the denominator to get  $2(6 - 8x)$ . Finally, distribute the 2 to get  $12 - 16x$ . If you distribute the 2 in answer choice (C) you get  $6 - 8x$ , which is NOT equivalent to  $12 - 16x$ .
13. **Answer choice (D) is correct.** Multiply both sides of the equation by 4 to get  $b = 32a + 8$ . Subtract 8 from both sides of the equation to get  $b - 8 = 32a$ .
14. **Answer choice (D) is correct.** Distribute the  $a$  to get  $ab - ac = 120$ . Since  $ac = 40$ , we can replace  $ac$  in our equation with 40 to get  $ab - 40 = 120$ . Add 40 to both sides of the equation to get  $ab = 160$ .
15. **Answer choice (A) is correct.** Distribute the  $3x$  to get  $6xy + 3xz = 90$ . Since  $6xy = 30$ , we can replace  $6xy$  in our equation with 30 to get  $30 + 3xz = 90$ . Subtract 30 from both sides of the equation to get  $3xz = 60$ , and divide both sides of the equation by 3 to get  $xz = 20$ .

### Manipulating Equations Practice Set 2

1. **Answer choice (D) is correct.** If you plug in 5 for  $y$ , then the equation is  $5x + 25 = 5x + 5 \cdot 5$  which simplifies to  $5x + 25 = 5x + 25$ . Since both sides of the equation are equal when you plug in 5 for  $y$ ,  $y$  equals 5.
2. **Answer choice (C) is correct.** To change  $7x + 6$  into  $14x + 12$ , we need to multiply by 2. Therefore, multiply both sides of the equation by 2:  $2(7x + 6) = 2(18)$ . Distribute the 2 and simplify the right side of the equation to get  $14x + 12 = 36$ .

3. **Answer choice (D) is correct.** We need to rearrange the equation to get  $n - m$  by itself. First, add 21 to both sides of the equation:  $m + 24 = n - 21 \rightarrow m + 45 = n$ . Now subtract  $m$  from both sides of the equation:  $m + 45 = n \rightarrow 45 = n - m$ .
4. **Answer choice (A) is correct.** We need to get the value of 12 in terms of  $z$ , so we want to turn the right side of the equation into 12. To do this, divide both sides of the equation by 12:  $8z = 144 \rightarrow \frac{8}{12}z = 12$ . Simplify the left side of the equation to get  $\frac{2}{3}z = 12$ .
5. **Answer choice (C) is correct.** To change  $12x - 18y$  into  $2x - 3y$ , we need to divide by 6. Therefore, divide both sides of the equation by 6:  $\frac{12x - 18y}{6} = \frac{96}{6} \rightarrow 2x - 3y = 16$ .
6. **Answer choice (D) is correct.** Distribute the  $\frac{a}{b}$  to get  $\frac{a^2}{bc} - \frac{ab}{bc}$ . Factor out  $\frac{a}{c}$  to get  $\frac{a}{c}\left(\frac{a}{b} - \frac{b}{b}\right)$ . Simplify  $\frac{b}{b}$  to 1 to get  $\frac{a}{c}\left(\frac{a}{b} - 1\right)$ .
7. **Answer choice (A) is correct.** Subtract 19 from both sides of the equation and simplify the right side:  $m - 19 = n + 12 - 19 \rightarrow m - 19 = n - 7$ .
8. **Answer choice (B) is correct.** First find the value of  $9y$  in terms of  $x$  by dividing both sides of the given equation by 2:  $\frac{12x}{2} = \frac{18y}{2} \rightarrow 6x = 9y$ . Now find the value of  $9y$  in terms of  $x$  by adding 10 to both sides of the equation:  $6x + 10 = 9y + 10$ .
9. **Answer choice (D) is correct.** Multiply both sides of the equation by 4:  $4y = 4(12 - 16x)$ . Distribute the 4:  $4y = 48 - 64x$ .
10. **Answer choice (A) is correct.** First get the  $x$  term and the  $y$  term on the same side of the given equation by subtracting  $9y$  from both sides of the equation:  $7x + 7 = 9y - 3 \rightarrow 7x - 9y + 7 = -3$ . Subtract 7 from both sides of the equation:  $7x - 9y + 7 = -3 \rightarrow 7x - 9y = -10$ . To change  $7x - 9y$  into  $28x - 36y$ , we need to multiply by 4, so multiply both sides of the equation by 4:  $4(7x - 9y) = 4(-10) \rightarrow 28x - 36y = -40$ .
11. **Answer choice (C) is correct.** Simplify the given expression by first simplifying the square root of 36 to 6 and the square root of 9 to 3:  $\frac{9(\sqrt{36} - 12x)}{\sqrt{9}} = \frac{9(6 - 12x)}{3}$ . Now divide the 9 in the numerator by the 3 in the denominator to get  $3(6 - 12x)$ . Therefore, answer choice (B) is incorrect because it is equivalent to the given expression. Distribute the 3 to get  $18 - 36x$ . Therefore, answer choice (D) is incorrect because it is equivalent to the given expression. Finally, factor out a 9 to get  $9(2 - 4x)$ . Therefore, answer choice (A) is incorrect because it is equivalent to the given expression. We are left with answer choice (C) as the correct answer.
12. **Answer choice (B) is correct.** Multiply both sides of the equation by 2 and simplify:  $2\left(\frac{m}{4} + \frac{m}{6}\right) = 2n \rightarrow \frac{m}{2} + \frac{m}{3} = 2n$ .

13. **Answer choice (C) is correct.** Distribute the  $x$  in the first equation:  $x(y + z) = 64 \rightarrow xy + xz = 64$ . Since  $xy = 16$ , we can replace  $xy$  with 16 in our equation:  $xy + xz = 64 \rightarrow 16 + xz = 64$ . Subtract 16 from both sides of the equation to get that  $xz = 48$ .
14. **Answer choice (B) is correct.** Divide both sides of the equation by  $\frac{2}{3}$ , which is the same as multiplying both sides by  $\frac{3}{2}$ :  $\frac{2m}{3} = 6n + 4 \rightarrow m = 9n + 6$ . Subtract  $m$  from both sides to get that  $m - 6 = 9n$ .
15. **Answer choice (B) is correct.** Distribute  $4a$  in the first equation:  $4a(3b - 2c) = 100 \rightarrow 12ab - 8ac = 100$ . Since  $12ab$  equals 52, we can replace  $12ab$  with 52 in our equation:  $12ab - 8ac = 100 \rightarrow 52 - 8ac = 100$ . Now subtract 52 from both sides of the equation:  $52 - 8ac = 100 \rightarrow -8ac = 48$ . Finally, divide both sides of the equation by  $-8$ :  $-8ac = 48 \rightarrow ac = -6$ .

### **Interpreting Equations Practice Set 1**

1. **Answer choice (C) is correct.** As the number of toppings,  $t$ , increases by 1, the total cost of the ice cream increases by \$0.75. Therefore, the cost of each topping is \$0.75 or 75 cents. You can verify this by plugging in different values for  $t$  and solving for  $c$ . For example, plug in 0 for  $t$  and  $c$  equals \$4. Plug in 1 for  $t$  and  $c$  equals \$4.75. Plug in 2 for  $t$  and  $c = \$5.50$ . This shows that with each additional topping, the price increases by 75 cents.
2. **Answer choice (B) is correct.** As the number of books sold,  $x$ , increases by one, the total profit increases by \$8. Therefore, for every additional 1 book sold, the profit increases by \$8. You can verify this by plugging in different values for  $x$  and solving for  $y$ . For example, plug in 10 for  $x$  and  $y$  equals \$20. Plug in 11 for  $x$  and  $y$  equals \$28. Plug in 12 for  $x$  and  $y$  equals \$36. Therefore, for each additional book sold, the profit increases by \$8.
3. **Answer choice (D) is correct.** 0.3 is equal to 30%, so  $0.3p$  is equal to 30% of  $p$ . Therefore, the 0.3 shows that Jim spends 30% of his paycheck on rent each month.
4. **Answer choice (C) is correct.** If you plug 0 in for  $m$  in the equation, you will get that  $y$  equals 3. Therefore, the 3 represents the floor Hank was on after 0 minutes, which means Hank got onto the elevator on floor three.
5. **Answer choice (B) is correct.** As the number of hours,  $t$ , increases by 1, the height of the plane decreases by 200 feet. This means the plane descends (goes down) 200 feet every hour. You can verify this by plugging in different values of  $t$  and solving for  $h$ . For example, plug in 1 for  $t$  and  $h$  equals 2800 ft. Plug in 2 for  $t$  and  $h$  equals 2600 ft. Plug in 3 for  $t$  and  $h$  equals 2400 ft. Therefore, the plane descends 200 feet every hour.
6. **Answer choice (A) is correct.** With each additional hour, Jenny walks  $\frac{4}{5}$  of a mile. This means Jenny walks 4 miles every 5 hours. You can verify this by plugging in 5 hours for  $h$  and 10 hours for  $h$  and

solving for  $d$ . If  $h$  equals 5, then  $d = 4$  miles. If  $h$  equals 10, then  $d$  equals 8 miles. Therefore, every 5 hours, Jenny walks 4 miles.

7. **Answer choice (A) is correct.** Since the equation represents the total price of purchasing  $x$  packs of pencils and  $y$  packs of pens, and 6 is being multiplied by the number of packs of pencils,  $x$ , each pack of pencils costs \$6.
8. **Answer choice (B) is correct.** If you plug in 0 for  $C$  and solve for  $F$ , you will get that  $F$  equals  $32^\circ$  when  $C$  equals  $0^\circ$ .
9. **Answer choice (D) is correct.** For every additional question answered incorrectly, the total score decreases by 2. Therefore, for every 1 question answered incorrectly, 2 points are lost. You can verify this by plugging in numbers for  $q$  and solving for  $t$ . For example, plug in 1 for  $q$  and  $t$  equals 98. Plug in 2 for  $q$  and  $t$  equals 96. Plug in 3 for  $q$  and  $t$  equals 94. Therefore, every question answered incorrectly results in a loss of 2 points.
10. **Answer choice (A) is correct.** Since the price of each adult ticket is \$8, and the 8 is being multiplied by the  $x$  in the equation, the  $x$  represents the number of adult tickets sold.  $8x$  represents the total profit from the adult tickets sold.

### **Interpreting Equations Practice Set 2**

1. **Answer choice (A) is correct.** Since the equation represents the total price of purchasing a certain number of packs of baseball cards for \$15 each and purchasing a certain number of packs of basketball cards for \$12 each, the  $y$  represents the number of packs of baseball cards bought since it is being multiplied by 15.
2. **Answer choice (D) is correct.** If you plug 0 in for  $h$  in the equation, you will get that  $J$  equals 1,350. Therefore, the 1,350 represents the number of jars of peaches left at the store after 0 hours, which is the same as saying the 1,350 means the store initially had 1,350 jars of peaches in stock.
3. **Answer choice (B) is correct.** The one-time application fee does not depend on the number of months of membership, so the 50 in the equation represents the one-time application fee since it is not being multiplied by  $m$ . The monthly fee is \$32 since it is being multiplied by  $m$ , so the total cost of being a member of the yacht club increases by \$32 every month.
4. **Answer choice (A) is correct.** If you plug in 0 for  $w$  in the equation, you will get that  $H$  equals 8. Therefore, the 8 represents the height of the tree after 0 weeks, which is the same as saying the 8 means the initial height of the tree is 8 feet.
5. **Answer choice (C) is correct.** Since the equation represents the total price of purchasing  $x$  hardbound books and  $y$  paperback books, and 24 is being multiplied by the number of hardbound books,  $x$ , each hardbound book costs \$24. Therefore, the 24 represents the price of one hardbound book.

6. **Answer choice (A) is correct.** Since the equation represents the total number of points Robert earned, 19,000, from collecting  $g$  gold crystals and  $r$  red crystals, and 100 is being multiplied by  $r$ , each red crystal is worth 100 points.
7. **Answer choice (C) is correct.** With each additional bag of flour, Lily can bake  $\frac{2}{3}$  of a cake. This means Lily can bake 2 cakes for every 3 bags of flour. You can verify this by plugging in 3 for  $f$  and 6 for  $f$  and solving for  $C$ . If you plug in 3 for  $f$ , you get that  $C = 2$ , so Lily can bake 2 cakes with 3 bags of flour. If you plug in 6 for  $f$ , you get that  $C = 4$ , so Lily can bake 4 cakes with 6 bags of sugar. Therefore, for every 3 bags of sugar, Lily can bake 2 cakes.
8. **Answer choice (B) is correct.** As the number of minutes,  $m$ , increases by 1, the total cost of the call increases by \$0.15 or 15 cents. Therefore, it costs 15 cents for every minute of the call. You can verify this by plugging in different values for  $m$  and solving for  $C$ . Plug in 1 for  $m$  and  $C$  equals \$2.15. Plug in 2 for  $m$  and  $C$  equals \$2.30. This shows that with each additional minute, the cost increases by 15 cents.
9. **Answer choice (A) is correct.** As the number of parcels,  $p$ , increases by 1, the total number of stamps Carl needs increases by 4. Therefore, Carl needs 4 stamps per parcel. You can verify this by plugging in different values for  $p$  and solving for  $s$ . Plug in 1 for  $p$  and  $s$  equal 4. Plug in 2 for  $p$  and  $s$  equals 8. Therefore, with every additional parcel Carl sends, he needs 4 additional stamps, so Carl needs 4 stamps per parcel.
10. **Answer choice (D) is correct.** As the number of billboards printed increases by 1, the amount of ink decreases by 0.2 liters. Therefore, the machine uses 0.2 liters of ink to print each billboard. You can verify this by plugging in different values for  $b$  and solving for  $I$ . Plug in 1 for  $b$  and  $I$  equals 19.8. Plug in 2 for  $b$  and  $I$  equals 19.6. Therefore, with every additional billboard the machine prints, the machine loses 0.2 liters of ink.

### **Creating Equations and Expressions Practice Set 1**

1. **Answer choice (A) is correct.** Dahlia is 5 years older than Christina, so add 5 to Christina's age to find Dahlia's age. Therefore, if Christina is  $c$  years old, Dahlia is  $c + 5$  years old.
2. **Answer choice (C) is correct.** The Sharks have won 7 more soccer games than the Lions, so the Lions have won 7 fewer soccer games than the Sharks. Therefore, subtract 7 from the number of games the Sharks have won to find the number of games the Lions have won: the Sharks won  $s$  games, so the Lions won  $s - 7$  games.
3. **Answer choice (D) is correct.** Set up an equation to represent the sentence, "Six less than three-fourths of a number is 18.":  $\frac{3}{4}x - 6 = 18$ . Solve the equation by adding 6 to both sides of the equation and then dividing both sides of the equation by  $\frac{3}{4}$ :  $\frac{3}{4}x = 24 \rightarrow x = 32$ .
4. **Answer choice (D) is correct.** Find Jan's age now by multiplying Michael's age by 3 to get  $3m$  as Jan's current age. To find Jan's age in 6 years, add 6 to Jan's current age to get  $3m + 6$ .

5. **Answer choice (A) is correct.** Since Brian’s age is four times Ken’s age, Ken’s age is one-fourth of Brian’s age. Therefore, if Ben’s current age is  $b$ , then Ken’s current age is  $\frac{1}{4}b$ . Find Ken’s age eight years ago by subtracting 8 from his current age to get  $\frac{1}{4}b - 8$ .
6. **Answer choice (B) is correct.** Since Carl withdraws \$75 every month, after  $m$  months, he will have withdrawn  $75m$  dollars. He started with \$1000, so to find the amount of money remaining in his account after  $m$  months, subtract the amount he has withdrawn after  $m$  months from his starting amount to get  $A = 1000 - 75m$ .
7. **Answer choice (C) is correct.** Since each of Gary’s five friends gave him  $q$  pencils on the first day of school, he received (addition)  $5q$  pencils on the first day of school, so now Gary had  $p + 5q$  pencils. Since Gary loses (subtraction)  $r$  pencils throughout the year, he has  $p + 5q - r$  pencils left at the end of the year.
8. **Answer choice (B) is correct.** Let  $t$  represent the amount of money Tina has. Therefore, since Kit has \$20 more than Tina,  $t + 20$  represents the amount of money Kit has. Since Susy has \$40 more than Kit,  $t + 20 + 40$  represents the amount of money Susy has, which simplifies to  $t + 60$ . Since Susy, Kit, and Tina have a total of \$170, we can add each individual amount and set it equal to \$170. Then we can solve the equation for  $t$ :  $t + t + 20 + t + 60 = 170 \rightarrow 3t + 80 = 170 \rightarrow 3t = 90 \rightarrow t = 30$ . Therefore, Tina has \$30, which means Kit has \$50.
9. **Answer choice (B) is correct.** Deandra scored four times as many points as Gracen, who scored  $g$  points. Therefore, Deandra scores  $4g$  points. Nancy scored three times as many points as Deandra, so Nancy scores  $3 \cdot 4g$  points which simplifies to  $12g$  points. Therefore,  $n = 12g$ .
10. **Answer choice (D) is correct.** Kevin makes  $m$  dollars per month, so he makes  $12m$  dollars per year. He saves 20% of his yearly salary, so find 20% of  $12m$ :  $20\% \text{ of } 12m = 0.2 \cdot 12m = 2.4m$ .
11. **Answer choice (C) is correct.** Since the \$6 flat rate does not depend on the number of hours you use the parking garage, the 6 should not be attached to a variable in the equation. Therefore, we can eliminate answer choices (A) and (B). It costs \$4 for each additional hour after the first three hours (example: if you use the garage for 5 hours, you pay \$4 for each of the last 2 hours), so we multiply 4 by  $n - 3$  to find the cost of using the parking garage for each additional hour after 3 hours. Therefore, the total cost of using the parking garage for  $n$  hours, where  $n$  is a whole number greater than 3, is  $6 + 4(n - 3)$ .
12. **Answer choice (C) is correct.** Let  $b$  represent Bob’s current age. Therefore, three years ago, Bob’s age was  $b - 3$ . In six years, Bob’s age will be  $b + 6$ . Set up an equation that represents the sentence, “Bob’s age three years ago was half of Bob’s age in six years.”:  $b - 3 = \frac{1}{2}(b + 6)$ . Solve this equation for  $b$  by first dividing both sides by  $\frac{1}{2}$ :  $b - 3 = \frac{1}{2}(b + 6) \rightarrow 2b - 6 = b + 6 \rightarrow b - 6 = 6 \rightarrow b = 12$ . Therefore, Bob’s current age is 12 years old.

13. **Answer choice (C) is correct.** Let  $k$  represent the number of miles Kelly ran, and let  $r$  represent the number of miles Ryan ran. Set up an equation that represents the sentence, “The number of miles Kelly ran is four more than half the number of miles Ryan ran.”:  $k = \frac{1}{2}r + 4$ . We know Kelly ran 10 miles, so plug in 10 for  $k$  and solve for  $r$ :  $10 = \frac{1}{2}r + 4 \rightarrow 6 = \frac{1}{2}r \rightarrow r = 12$  miles.
14. **Answer choice (D) is correct.** Andy is three years older than Ian, so Andy is  $x + 3$  years old. To find Andy’s and Ian’s ages in two years, add two to both of their current ages: Andy will be  $x + 5$  in two years and Ian will be  $x + 2$  in two years. Combine their ages together and simplify:  $x + 5 + x + 2 = 2x + 7$ .
15. **Answer choice (B) is correct.** Let  $x$  represent the number of cans Polly collected, so  $x + 10$  represents the number of cans Peter collected. Since they collected a total of 60 cans, we can write the equation  $x + x + 10 = 60$ . Solve this equation for  $x$ :  $x + x + 10 = 60 \rightarrow 2x + 10 = 60 \rightarrow 2x = 50 \rightarrow x = 25$ . Therefore, Polly collected 25 cans.
16. **Answer choice (A) is correct.** Since the \$20 monthly fee does not change depending on the number of text messages you send, we do not want to multiply the 20 by  $t$ . This eliminates answer choices (C) and (D). Each text message costs 5 cents, or \$0.05. Therefore,  $t$  text messages cost  $0.05t$ , so the total monthly cost,  $C$ , of sending  $t$  text messages is  $C = 0.05t + 20$ .
17. **Answer choice (C) is correct.** Since Mac has  $x$  quarters, and he has four more dimes than quarters, he has  $x + 4$  dimes. The value of one quarter is 25 cents or 0.25 dollars, so the value of  $x$  quarters is  $0.25x$ . The value of one dime is 10 cents or 0.1 dollars, so the value of  $x + 4$  dimes is  $0.1(x + 4)$ . Therefore, the total value of Mac’s dimes and quarters can be represented by  $0.25x + 0.1(x + 4)$ , and since Mac has a total of \$3.55, we can set this expression equal to \$3.55 to get  $0.25x + 0.1(x + 4) = 3.55$ .
18. **Answer choice (C) is correct.** The number of black marbles is one-third the number of white marbles, so the number of white marbles is three times the number of black marbles. Let  $b$  represent the number of black marbles, so  $3b$  represents the number of white marbles. Set up an equation that says, “the total number of black and white marbles is 36” and solve for  $b$ :  $b + 3b = 36 \rightarrow 4b = 36 \rightarrow b = 9$ . Therefore, there are 9 black marbles and 27 white marbles in the bag. In order to have the same number of black and white marbles, we need to remove 18 white marbles from the bag.
19. **Answer choice (B) is correct.** Since there are the same number of bicycles and tricycles in the parking lot, let  $x$  equal the number of bicycles and the number of tricycles. Bicycles have two wheels, so the total number of wheels on all  $x$  bicycles can be represented by  $2x$ . Tricycles have three wheels, so the total number of wheels on all  $x$  tricycles can be represented by  $3x$ . Therefore, the total number of wheels on the bicycles and tricycles is  $2x + 3x$  which equals  $5x$ . Set this equal to 60 to find the value of  $x$ :  $5x = 60 \rightarrow x = 12$ . Therefore, there are 12 bicycles and 12 tricycles.
20. **Answer choice (A) is correct.** Use the answer choices to solve this problem. Start with (A): assume Dwight has 2 quarters, which means he would have 6 nickels (he has a total of 8 coins). Therefore, the value of his coins would be  $2 \cdot \$0.25 + 6 \cdot \$0.05 = \$0.50 + \$0.30 = \$0.80$ . If the nickels and



quarters were switched, Dwight would have 6 quarters and 2 dimes. Therefore, the value of his coins would be  $6 \cdot \$0.25 + 2 \cdot \$0.05 = \$1.50 + \$0.10 = \$1.60$ . Since \$1.60 is twice as much as \$0.80, answer choice (A) is correct.

### **Creating Equations and Expressions Practice Set 2**

1. **Answer choice (B) is correct.** Since Gene *gave away* 24 marbles to his brother, find the number of marbles Gene has left by *subtracting* 24 from  $m$  to get  $m - 24$ .
2. **Answer choice (A) is correct.** Since the bus has 15 passengers *after* arriving at the bus stop and picking up  $p$  passengers, the bus had  $p$  fewer passengers *before* arriving at the bus stop. Therefore, find the number of passengers on the bus before it arrived at the bus stop by subtracting  $p$  from 15 to get  $15 - p$ .
3. **Answer choice (D) is correct.** Since the height of Kim's apartment is four times the height of the lamp post, the height of the lamp post is one-fourth the height of Kim's apartment. Therefore, we can find an expression for the height of the lamp post by multiplying the height of Kim's apartment by  $\frac{1}{4}$ :  $\frac{1}{4}(4x + 16) = x + 4$ .
4. **Answer choice (C) is correct.** Since each notebook costs \$2, and Caleb bought  $n$  notebooks, he spent  $2n$  dollars on notebooks. Add this to the 3 dollars he spent on the marker to get a total cost of  $3 + 2n$ .
5. **Answer choice (B) is correct.** Let  $h$  represent the number of miles Harry ran. Since Prince ran 6 *more* miles than Harry, add 6 to  $h$  to get that Prince ran  $h + 6$  miles. Since Harry ran 4 fewer miles than Wren, Wren ran 4 more miles than Harry. Therefore, we can find the number of miles Wren ran by adding 4 to  $h$  to get  $4 + h$ . Set the total number of miles ran by Prince, Harry, and Wren equal to 55 and solve for  $h$ :  $h + h + 6 + h + 4 = 55 \rightarrow 3h + 10 = 55 \rightarrow 3h = 45 \rightarrow h = 15$ . Finally, find the number of miles Wren ran by adding 4 to the number of miles Harry ran:  $15 + 4 = 19$  miles.
6. **Answer choice (D) is correct.** Since Anabelle used 2 glitter beads and  $b$  solid-colored beads to make each bracelet, she used a total of  $2 + b$  beads to make each bracelet. Find the total number of beads Anabelle used to make 8 bracelets by multiplying  $2 + b$  by 8 to get  $8(2 + b)$ .
7. **Answer choice (C) is correct.** Since each ride costs  $c$  dollars, the cost to ride 5 rides is  $5c$ . Since Donald *spent* \$12 on an entrance ticket and  $5c$  on rides, we need to *subtract* 12 and  $5c$  from the 30 dollars Donald brought to the fair:  $30 - 12 - 5c = 18 - 5c$ .
8. **Answer choice (D) is correct.** Emma collected 3 times as many bottles as Amy, so multiply the number of bottles Amy collected by 3 to get that Emma collected  $3a$  bottles. Sam collected 4 more bottles than Emma, so add 4 bottles to the number of bottles Emma collected to get that Sam collected  $3a + 4$  bottles. Now write an expression for the total number of bottles the three girls collected by finding the sum of the number of bottles each girl collected:  $a + 3a + 3a + 4$ . This is equivalent to answer choice (C), so eliminate answer choice (C). If we combine the first two terms,  $a + 3a + 3a + 4$  becomes  $4a + 3a + 4$ , which is equivalent to answer choice (B), so eliminate answer choice (B).

Simplify  $4a + 3a + 4$  by adding  $4a$  and  $3a$  to get  $7a + 4$ . Therefore, we can eliminate answer choice (A). We are left with answer choice (D) as the expression that is NOT equivalent.

9. **Answer choice (B) is correct.** Let  $k$  represent Kevin's age now. In five years, Kevin will be  $k + 5$  years old, and six years ago, Kevin's age was  $k - 6$ . Now write an expression that represents the statement, "In five years, Kevin's age will be twice what it was six years ago" and solve for  $k$ :  $k + 5 = 2(k - 6) \rightarrow k + 5 = 2k - 12 \rightarrow 5 = k - 12 \rightarrow k = 17$  years old.
10. **Answer choice (A) is correct.** Every day, the restaurant uses  $\frac{1}{8}$  bags of potatoes, so after  $d$  days, the restaurant has used  $\frac{1}{8}d$  bags of potatoes. Since the restaurant is *using* the potatoes, we want to *subtract*  $\frac{1}{8}d$  from the 16 bags of potatoes the restaurant started with to get  $16 - \frac{1}{8}d$ .
11. **Answer choice (B) is correct.** Let  $c$  represent the number of points Chris scored. Since Mic scored 12 *more* points than Chris, add 12 to  $c$  to get that Mic scores  $c + 12$  points. Set the combined points Chris and Mic scored equal to 48 and solve for  $c$ :  $c + c + 12 = 48 \rightarrow 2c + 12 = 48 \rightarrow 2c = 36 \rightarrow c = 18$  points.
12. **Answer choice (B) is correct.** Since Robert earns 20% commission on his weekly sales, if he had  $d$  dollars of sales last week, he earns an additional 20% of  $d$  on top of his weekly \$450 salary. 20% of  $d$  is equal to  $0.2d$ , so Robert earns a total of  $450 + 0.2d$  dollars.
13. **Answer choice (A) is correct.** Since the \$4 flat fee does not depend on the number of minutes you talk on the phone, the 4 should not be attached to a variable. It costs \$0.65 for each additional minute after the first five minutes (example: if you make a 7-minute phone call, you pay \$0.65 for each of the last 2 minutes). Therefore, we multiply \$0.65 by  $(m - 5)$  to find the additional cost of making a phone call longer than 5 minutes. Therefore, the total cost of making a long-distance phone call that lasted  $m$  minutes is  $4 + 0.65(m - 5)$ .
14. **Answer choice (D) is correct.** While you could solve this problem algebraically, it is probably easier to pick a number for the number of miles Megan ran and then find the number of miles Carl and Gina ran. Let's say Megan ran 2 miles. Since Carl ran six times the number of miles Megan ran, Carl ran 12 miles. Since Gina ran half the number of miles Megan ran, Gina ran 1 mile. Now we need to find an equation that represents the relationship between the 12 miles Carl ran and the 1 mile Gina ran. Carl ran 12 times as many miles as Gina, so the equation  $c = 12g$  correctly represents the relationship between the number of miles Carl ran and the number of miles Gina ran.
15. **Answer choice (A) is correct.** Alexa reads 5 books each month, so after  $m$  months, Alexa has read  $5m$  books. Since Alexa's goal is to read 60 books, and every month she is  $5m$  books closer to reaching her goal, to find the number of books Alexa still needs to read after  $m$  months to reach her goal, subtract  $5m$  from 60 to get  $60 - 5m$ .
16. **Answer choice (D) is correct.** Tina has  $d$  dimes, and the value of 1 dime is \$0.1. Therefore, the value of Tina's  $d$  dimes is  $0.1d$ . Since Tina has three fewer dimes than she does nickels, she has three more

nickels than she does dimes. Therefore, she has  $d + 3$  nickels. 1 nickel is worth \$0.05, so the value of Tina's nickels is  $0.05(d + 3)$ . Set the total value of Tina's dimes and nickels equal to \$1.20 to get  $0.1d + 0.05(d + 3) = 1.20$ .

17. **Answer choice (B) is correct.** Since the farm has the same number of horses and chickens, let  $x$  represent the number of chickens and the number of horses. Every horse has 4 legs, so the total number of legs on the horses is  $4x$ . Every chicken has 2 legs, so the total number of legs on the chickens is  $2x$ . Set the total number of legs on the horses and chicken equal to 30 and solve for  $x$ :  $4x + 2x = 30 \rightarrow 6x = 30 \rightarrow x = 5$ . Therefore, there are 5 chickens and 5 horses on the farm.
18. **Answer choice (A) is correct.** Since Patricia answered  $q$  questions incorrectly, and she loses 1 point for every incorrect answer, she lost  $q$  points for the questions she answered incorrectly. Since she answered  $q$  out of 20 questions incorrectly, she answered  $20 - q$  questions correctly. Patricia gains 3 points for every correct answer, so Patricia gained  $3(20 - q)$  points for the questions she answered correctly. Therefore, her total score equals the points she gained from her correct answers minus the points she lost from her incorrect answer:  $3(20 - q) - q$
19. **Answer choice (C) is correct.** Let's say Griffin has  $d$  dimes. He has twice as many nickels as dimes, so he has  $2d$  nickels. The value of one dime is \$0.1, so the value of Griffin's  $d$  dimes is  $0.1d$  dollars. The value of one nickel is \$0.05, so the value of Griffin's  $2d$  nickels is  $0.05(2d)$  dollars. Set the value of Griffin's dimes and nickels equal to 2.00 dollars and solve for  $d$ :  $0.1d + 0.05(2d) = 2.00 \rightarrow 0.1d + 0.1d = 2.00 \rightarrow 0.2d = 2.00 \rightarrow d = 10$ . Finally, find the number of nickels Griffin has by multiplying the number of dimes he has by 2:  $2 \cdot 10 = 20$  nickels.
20. **Answer choice (C) is correct.** Let  $x$  represent the number of black cows, so  $3x$  represents the number of brown cows. Set the total number of black and brown cows equal to 12 and solve for  $x$ :  $x + 3x = 12 \rightarrow 4x = 12 \rightarrow x = 3$  black cows. Find the number of brown cows by multiplying the number of black cows by 3:  $3 \cdot 3 = 9$  brown cows. In order for there to be an equal number of brown and black cows on the farm, 6 black cows must be added to the farm.

### Functions Practice Set 1

1. **Answer choice (C) is correct.** If you plug each value of  $x$  into  $y = 4x + 4$ , you will get the corresponding  $y$  values from the table. Plug in  $x = 2$ :  $y = 4(2) + 4 \rightarrow y = 12$ . Plug in  $x = 3$ :  $y = 4(3) + 4 \rightarrow y = 16$ . Plug in  $x = 5$ :  $y = 4(5) + 4 \rightarrow y = 24$ . Plug in  $x = 8$ :  $y = 4(8) + 4 \rightarrow y = 36$ .
2. **Answer choice (A) is correct.** Replace  $a$  with 6 on both sides of the equation and simplify the right side:  $\#a = 10 - a \rightarrow \#6 = 10 - 6 \rightarrow \#6 = 4$ .
3. **Answer choice (D) is correct.** If you plug each value of  $x$  into  $y = -5x + 4$ , you will get the corresponding  $y$  values from the table. Plug in  $x = 3$ :  $y = -5(3) + 4 \rightarrow y = -11$ . Plug in  $x = 5$ :  $y = -5(5) + 4 \rightarrow y = -21$ . Plug in  $x = 9$ :  $y = -5(9) + 4 \rightarrow y = -41$ . Plug in  $x = 12$ :  $y = -5(12) + 4 \rightarrow y = -56$ .

4. **Answer choice (C) is correct.** Replace  $x$  with 4 and  $y$  with 8 on both sides of the equation and simplify the right side:  $x \diamond y = 2x + 3y \rightarrow 4 \diamond 8 = 2(4) + 3(8) \rightarrow 4 \diamond 8 = 8 + 24 \rightarrow 4 \diamond 8 = 32$ .
5. **Answer choice (A) is correct.** Use the rule to find the value of  $x$  and  $y$ . Plug in  $-13$  for  $n$  and  $x$  for  $m$  and solve for  $x$ :  $-13 = 5x - 3 \rightarrow -10 = 5x \rightarrow x = -2$ . Plug in 5 for  $m$  and  $y$  for  $n$  and solve for  $y$ :  $y = 5(5) - 3 \rightarrow y = 25 - 3 \rightarrow y = 22$ . Therefore,  $x + y = -2 + 22 = 20$ .
6. **Answer choice (B) is correct.** Find  $\square 2$  by replacing  $n$  with 2 on both sides of the equation and simplifying the right side:  $\square n = 5n - 4 \rightarrow \square 2 = 5(2) - 4 \rightarrow \square 2 = 10 - 4 \rightarrow \square 2 = 6$ . Find  $\square 6$  by replacing  $n$  with 6 on both sides of the equation and simplifying the right side:  $\square n = 5n - 4 \rightarrow \square 6 = 5(6) - 4 \rightarrow \square 6 = 30 - 4 \rightarrow \square 6 = 26$ . Therefore,  $\square 2 - \square 6 = 6 - 26 = -20$ .
7. **Answer choice (A) is correct.** First replace  $x$  with  $y$  on both sides of the equation to get  $@y = 2y + 7$ . Now replace  $@y$  with 1 and solve for  $y$ :  $@y = 2y + 7 \rightarrow 1 = 2y + 7 \rightarrow -6 = 2y \rightarrow y = -3$ .
8. **Answer choice (B) is correct.** Use the rule to find the value of  $x$  and  $y$ . Plug in  $-4$  for  $b$  and  $x$  for  $a$  and solve for  $x$ :  $10 - 2x = -4 \rightarrow -2x = -14 \rightarrow x = 7$ . Plug in 10 for  $a$  and  $y$  for  $b$  and solve for  $y$ :  $10 - 2(10) = y \rightarrow 10 - 20 = y \rightarrow -10 = y$ . Therefore,  $xy = 7(-10) = -70$ .
9. **Answer choice (A) is correct.** Replace  $a$  with  $-4$  and  $b$  with 2 on both sides of the equation and simplify the right side:  $a !! b = a^2 \div b \rightarrow -4 !! 2 = (-4)^2 \div (-2) \rightarrow -4 !! 2 = 16 \div (-2) \rightarrow -4 !! 2 = -8$ .
10. **Answer choice (A) is correct.** First replace  $p$  with  $q$  on both sides of the equation to get  $\{q\} = \frac{3}{4}q + 9$ . Now replace  $\{q\}$  with 15 and solve for  $q$ :  $\{q\} = \frac{3}{4}q + 9 \rightarrow 15 = \frac{3}{4}q + 9 \rightarrow \frac{3}{4}q = 6 \rightarrow q = 8$ .

### Functions Practice Set 2

1. **Answer choice (C) is correct.** Replace  $x$  with 2 on both sides of the equation and simplify:  $\nabla x = 18 - 4x \rightarrow \nabla 2 = 18 - 4(2) \rightarrow \nabla 2 = 18 - 8 \rightarrow \nabla 2 = 10$ .
2. **Answer choice (B) is correct.** If you plug each value of  $m$  into  $n = 2m - 3$ , you will get the corresponding  $n$  values from the table. Plug in  $m = 2$ :  $n = 2(2) - 3 \rightarrow n = 1$ . Plug in  $m = 4$ :  $2(4) - 3 \rightarrow n = 5$ . Plug in  $m = 6$ :  $2(6) - 3 \rightarrow n = 9$ . Plug in  $m = 10$ :  $2(10) - 3 \rightarrow n = 17$ .
3. **Answer choice (C) is correct.** Replace  $x$  with 4 on both sides of the equation and simplify:  $!x! = 100 \div x \rightarrow !4! = 100 \div 4 \rightarrow !4! = 25$ .
4. **Answer choice (A) is correct.** Replace  $m$  with 6 and  $n$  with 12 on both sides of the equation and simplify:  $m \diamond n = 3m \div n \rightarrow 6 \diamond 12 = 3(6) \div 12 \rightarrow 6 \diamond 12 = 18 \div 12 \rightarrow 6 \diamond 12 = 1.5$ .
5. **Answer choice (B) is correct.** Find  $\varnothing 5$  by replacing  $x$  with 5 on both sides of the equation and simplifying:  $\varnothing x = 7x - 5 \rightarrow \varnothing 5 = 7(5) - 5 \rightarrow \varnothing 5 = 35 - 5 \rightarrow \varnothing 5 = 30$ . Find  $\varnothing 7$  by replacing  $x$  with 7 on

both sides of the equation and simplifying:  $\varnothing x = 7x - 5 \rightarrow \varnothing 7 = 7(7) - 5 \rightarrow \varnothing 7 = 49 - 5 \rightarrow \varnothing 7 = 44$ .  
Therefore,  $\varnothing 5 - \varnothing 7 = 30 - 44 = -14$ .

6. **Answer choice (D) is correct.** If you plug each value of  $x$  into  $y = 6x - 1$ , you will get the corresponding  $y$  values from the table. Plug in  $x = 1$ :  $y = 6(1) - 1 \rightarrow y = 5$ . Plug in  $x = 2$ :  $y = 6(2) - 1 \rightarrow y = 11$ . Plug in  $x = 3$ :  $y = 6(3) - 1 \rightarrow y = 17$ . Plug in  $x = 5$ :  $y = 6(5) - 1 \rightarrow y = 29$ .
7. **Answer choice (C) is correct.** Replace  $x$  with  $-2$  and  $y$  with  $3$  on both sides of the equation and simplify:  $x \oplus y = 5(x + y) \rightarrow -2 \oplus 3 = 5(-2 + 3) \rightarrow -2 \oplus 3 = 5(1) \rightarrow -2 \oplus 3 = 5$ .
8. **Answer choice (A) is correct.** Find the value of  $x$  by plugging in  $12$  for  $b$  and  $x$  for  $a$  into the given equation and solving for  $x$ :  $b = 15 + 3x \rightarrow 12 = 15 + 3x \rightarrow -3 = 3x \rightarrow -1 = x$ . Find the value of  $y$  by plugging in  $5$  for  $a$  and  $y$  for  $b$  into the given equation and solving for  $y$ :  $b = 15 + 3a \rightarrow y = 15 + 3(5) \rightarrow y = 15 + 15 \rightarrow y = 30$ . Find the value of  $x + y$ :  $-1 + 30 = 29$ .
9. **Answer choice (B) is correct.** Replace  $x$  with  $y$  on both sides of the equation to get  $\llcorner y \gg = 6 + \frac{4}{3}y$ . Now replace  $\llcorner y \gg$  with  $22$  and solve for  $y$ :  $22 = 6 + \frac{4}{3}y \rightarrow 16 = \frac{4}{3}y \rightarrow y = 12$ .
10. **Answer choice (A) is correct.** Find the value of  $a$  by replacing  $x$  with  $a$  and  $y$  with  $18$  in the given equation and solving for  $a$ :  $y = 7x - 3 \rightarrow 18 = 7a - 3 \rightarrow 21 = 7a \rightarrow a = 3$ . Find the value of  $b$  by replacing  $x$  with  $4$  and  $y$  with  $b$  in the given equation and solving for  $b$ :  $y = 7x - 3 \rightarrow b = 7(4) - 3 \rightarrow b = 28 - 3 \rightarrow b = 25$ . Find the value of  $a - b$ :  $3 - 25 = -22$ .

### **Ratios and Proportions Practice Set 1**

1. **Answer choice (C) is correct.** Simplify the right side of the equation, and then use cross multiplication to solve the proportion:  $\frac{42}{a} = \frac{36}{30} \rightarrow \frac{42}{a} = \frac{6}{5} \rightarrow 210 = 6a \rightarrow a = 35$ .
2. **Answer choice (B) is correct.** Simplify the left side of the equation, and then use cross multiplication to solve the proportion:  $\frac{9}{12} = \frac{x}{20} \rightarrow \frac{3}{4} = \frac{x}{20} \rightarrow 60 = 4x \rightarrow x = 15$ .
3. **Answer choice (C) is correct.** When creating a ratio with two quantities, both quantities need to be in the same units. 2 hours is equal to 120 minutes, so the ratio of the time Daniel spent playing basketball to the time Chris spent playing basketball is 120:30 which simplifies to 4:1.
4. **Answer choice (D) is correct.** Barney's car uses  $\frac{1}{4}$  tank of gas to drive 120 miles, so on one full tank of gas, Barney can drive  $120 \cdot 4 = 480$  miles. Therefore, on two tanks of gas, Barney can drive  $480 \cdot 2 = 960$  miles.
5. **Answer choice (D) is correct.** There are six more girls than boys, so there are six fewer boys than girls. Therefore, since there are 18 girls, there are 12 boys ( $18 - 6 = 12$ ) and 30 total students ( $18 \text{ girls} + 12 \text{ boys} = 30 \text{ total students}$ ). The ratio of boys to total students is 12:30 which simplifies to 2:5.

6. **Answer choice (B) is correct.** At the same time of day and in the same place, the height to shadow ratio of different objects will be the same. Therefore, we can set up the following proportion and solve, where  $h$  represents Chelsea's height:  $\frac{15}{10} = \frac{h}{3} \rightarrow 10h = 45 \rightarrow h = 4.5$  feet.
7. **Answer choice (A) is correct.** Find the number of apples in the bowl by setting up and solving the following proportion, where  $a$  represents the number of apples:  $\frac{3}{2} = \frac{a}{6} \rightarrow 18 = 2a \rightarrow a = 9$ .  
Therefore, there are 9 oranges and 6 apples, so there are 15 total pieces of fruit.
8. **Answer choice (C) is correct.** When creating a ratio with two quantities, both quantities need to be in the same units. There are 12 inches in 1 foot, so the width to height ratio is 9:12, which simplifies to 3:4.
9. **Answer choice (D) is correct.** When setting up proportions, we either need the same quantities in the numerators of both fractions and the same quantities in the denominators of both fractions, or we need the same quantities in the same fraction. This means we can put cups of sugar in the numerators of both fractions and cups of flour in the denominators of both fractions:  $\frac{6}{15} = \frac{2}{f}$ . We could've also written the proportion in these three ways:  $\frac{15}{6} = \frac{f}{2}$ ,  $\frac{15}{f} = \frac{6}{2}$ ,  $\frac{f}{15} = \frac{2}{6}$ .
10. **Answer choice (A) is correct.** Set up and solve the following proportion using cross multiplication, where  $w$  represents the width of the model:  $\frac{2}{30} = \frac{w}{45} \rightarrow 90 = 30w \rightarrow w = 3$  inches.
11. **Answer choice (B) is correct.** The ratio of pink to green marbles is 6:7, which means for every 6 pink marbles, there are 7 green marbles. This means for every 7 green marbles, there are 13 total marbles (6 pink + 7 green = 13 total). Therefore, the ratio of green marbles to total marbles is 7:13. Use this ratio to set up the following proportion to solve for the number of green marbles in the bag,  $g$ :  $\frac{7}{13} = \frac{g}{52} \rightarrow 364 = 13g \rightarrow g = 28$  marbles.
12. **Answer choice (B) is correct.** The ratio of yellow to green apples is 5:3, which means for every 5 yellow apples, there are 3 green apples. This means for every 5 yellow apples, there are 8 total apples (5 yellow apples + 3 green apples = 8 total apples). Therefore, the ratio of yellow apples to total apples is 5:8. Use this ratio to set up the following proportion to solve for the number of yellow apples,  $y$ :  $\frac{5}{8} = \frac{y}{72} \rightarrow 360 = 8y \rightarrow y = 45$  yellow apples. We know there are 72 total apples, and 45 yellow apples, so there are 27 green apples ( $72 - 45 = 27$ ). Find the difference between the number of yellow and green apples:  $45 - 27 = 18$ .
13. **Answer choice (C) is correct.** First change 1.5 hours into minutes by multiplying it by 60:  $1.5 \cdot 60 = 90$  minutes. Now set up the following proportion and solve for  $p$ , the number of pages Justin can read in 1.5 hours, or 90 minutes:  $\frac{18}{15} = \frac{g}{90} \rightarrow \frac{6}{5} = \frac{g}{90} \rightarrow 540 = 5g \rightarrow g = 108$  pages.

14. **Answer choice (C) is correct.** Set up and solve the following proportions by cross multiplying, where  $d$  represents the distance between the two towns in real life:  $\frac{5}{18} = \frac{7.5}{d} \rightarrow 5d = 135 \rightarrow d = 27$  km.
15. **Answer choice (B) is correct.** The initial ratio of girls to boys is 15:20 which simplifies to 3:4. If 8 boys are added, there are now 28 boys. Determine the total number of girls needed to keep the ratio of girls to boys at 3:4 by setting up and solve the following proportion, where  $g$  represents the new total number of girls:  $\frac{3}{4} = \frac{g}{28} \rightarrow 84 = 4g \rightarrow g = 21$ . There needs to be 21 girls to keep the ratio the same, so we need to add 6 girls to the class ( $15 + 6 = 21$ ).
16. **Answer choice (C) is correct.** The ratio of three numbers is 3:2:6, so we can let  $3x$ ,  $2x$ , and  $6x$  represent the three numbers. Set up and solve an equation that represents the sentence, “The sum of the three numbers is 44.”:  $3x + 2x + 6x = 44 \rightarrow 11x = 44 \rightarrow x = 4$ . Therefore, the largest number,  $6x$ , equals  $6 \cdot 4 = 24$ .
17. **Answer choice (A) is correct.** Find the total number of blocks by setting up and solving the following proportion, where  $t$  represents the total number of blocks:  $\frac{1}{2} = \frac{8}{t} \rightarrow t = 16$  blocks. There are 16 total blocks: 8 black blocks, 6 white blocks, and the remaining blocks are red. Find the number of red blocks by subtracting the number of black and white blocks from the total:  $16 - 8 - 6 = 2$  red blocks.
18. **Answer choice (B) is correct.** Set up and solve the following proportion, where  $m$  represents the number of inches on the map that represents 36 miles in real life:  $\frac{3.6}{54} = \frac{m}{36} \rightarrow 129.6 = 54m \rightarrow m = 2.4$  inches.
19. **Answer choice (A) is correct.** The ratio of beads to pins is 5:3. Use this ratio to set up and solve the following proportion, where  $p$  represents the number of pins:  $\frac{5}{3} = \frac{20}{p} \rightarrow 5p = 60 \rightarrow p = 12$  pins. The ratio of pins to buttons is 2:1. Use this ratio to set up and solve the following proportion, where  $b$  represents the number of buttons:  $\frac{2}{1} = \frac{12}{b} \rightarrow 2b = 12 \rightarrow b = 6$  buttons.
20. **Answer choice (D) is correct.** If there are 26 total cookies and 10 chocolate chip cookies, and the rest of the cookies are sugar cookies, there are 16 sugar cookies ( $26 - 10 = 16$ ). Therefore, the ratio of chocolate chip cookies to sugar cookies is 10:16 which simplifies to 5:8.

## Ratios and Proportions Practice Set 2

1. **Answer choice (B) is correct.** Simplify the left side of the equation, and then use cross multiplication to solve the proportion:  $\frac{27}{39} = \frac{m}{91} \rightarrow \frac{9}{13} = \frac{m}{91} \rightarrow 819 = 13m \rightarrow m = 63$ .

2. **Answer choice (A) is correct.** Simplify the right side of the equation, and then use cross multiplication to solve the proportion:  $\frac{p}{84} = \frac{21}{49} \rightarrow \frac{p}{84} = \frac{3}{7} \rightarrow 7p = 252 \rightarrow p = 36$ .
3. **Answer choice (C) is correct.** When creating a ratio with two quantities, both quantities need to be in the same units. There are 12 inches in 1 foot, so convert the length of the yellow ribbon into inches by multiplying 2 by 12 to get 24 inches. Therefore, the ratio of the length of the red ribbon to the length of the yellow ribbon is 10:24 which simplifies to 5:12 or 5 to 12.
4. **Answer choice (D) is correct.** If a machine can make 100 widgets in  $\frac{1}{3}$  of an hour, we can find the number of widgets the machine can make in 1 hour by multiplying 100 by 3 to get 300 widgets per hour. Now we know the machine can make 300 widgets per hour, so in 2 hours, the machine can make  $2 \cdot 300 = 600$  widgets.
5. **Answer choice (B) is correct.** William won 3 more gold medals than silver medals, so he won 3 fewer silver medals than gold medals. Therefore, we can find the number of silver medals he won by subtracting 3 from the number of gold medals he won:  $18 - 3 = 15$  silver medals. Therefore, the ratio of gold medals to silver medals that William won is 18:15 which simplifies to 6:5.
6. **Answer choice (A) is correct.** At the same time of day and in the same place, the height to shadow ratio of different objects will be the same. Therefore, we can set up the following proportion and solve, where  $s$  represents the length of Gerry's shadow:  $\frac{12}{4} = \frac{6}{s} \rightarrow 12s = 24 \rightarrow s = 2$  feet.
7. **Answer choice (B) is correct.** The ratio means that for every 4 boys, there are 3 girls. If there are 4 boys and 3 girls, there are 7 total students. If there are 8 boys, there are 6 girls, and there are 14 total students. If there are 12 boys, there are 9 girls, and there are 21 total students. Therefore, the total number of students in the class must be a multiple of 7 because both parts of the ratio add up to 7. Answer choice (C) is the only number that is a multiple of 7.
8. **Answer choice (C) is correct.** If there are 6 white balls and 4 black balls, there are 10 total balls. Therefore, the ratio of white balls to total balls is 6:10 which simplifies to 3:5.
9. **Answer choice (B) is correct.** When setting up proportions, we either need the same quantities in the numerators of both fractions and the same quantities in the denominators of both fractions, or we need the same quantities in the same fraction. This means we can put scoops of detergent in the numerators of both fractions and number of shirts in the denominators of both fractions:  $\frac{3}{10} = \frac{s}{25}$ . We could've also written the proportion in these three ways:  $\frac{10}{3} = \frac{25}{s}$ ,  $\frac{3}{s} = \frac{10}{25}$ ,  $\frac{s}{3} = \frac{25}{10}$ .
10. **Answer choice (C) is correct.** Set up and solve the following proportion, where  $m$  represents the number of miles in real life that 7 inches on the map represents:  $\frac{2}{2.5} = \frac{7}{m} \rightarrow 2m = 17.5 \rightarrow m = 8.75$  miles.



11. **Answer choice (A) is correct.** The ratio of dimes to quarters is 5:1, so we can let  $5x$  represent the number of dimes and  $x$  represent the number of quarters. We know the total number of dimes and quarters is 36, so we can set up and solve the following equation:  $5x + x = 36 \rightarrow 6x = 36 \rightarrow x = 6$ . Therefore, there are 6 quarters in the piggy bank. The value of 1 quarter is \$0.25, so find the value of 6 quarters by multiplying 6 by \$0.25 to get \$1.50.
12. **Answer choice (B) is correct.** The ratio of brown to black cows is 7:5, so we can let  $7x$  represent the number of brown cows and  $5x$  represent the number of black cows on the farm. We know there are a total of 60 cows on Mary's farm, so we can set up and solve the following equation:  $7x + 5x = 60 \rightarrow 12x = 60 \rightarrow x = 5$ . Therefore, there are  $7(5) = 35$  brown cows and  $5(5) = 25$  black cows. Find the difference between the number of brown and black cows:  $35 - 25 = 10$ .
13. **Answer choice (C) is correct.** First change 3 hours into minutes. There are 60 minutes in 1 hour, so multiply 3 by 60 to get that there are 180 minutes in 3 hours. Set up and solve the following proportion, where  $m$  represents the number of miles the train can travel in 180 minutes, or 3 hours:  
$$\frac{25}{20} = \frac{m}{180} \rightarrow \frac{5}{4} = \frac{m}{180} \rightarrow 900 = 4m \rightarrow m = 225 \text{ miles.}$$
14. **Answer choice (C) is correct.** Set up and solve the following proportion, where  $h$  represents the height of Jake's model:  $\frac{3}{10} = \frac{h}{45} \rightarrow 135 = 10h \rightarrow h = 13.5$  centimeters.
15. **Answer choice (C) is correct.** The ratio of three numbers is 1:2:3, so we can let  $x$ ,  $2x$ , and  $3x$  represent the three numbers. Set up and solve an equation that represents the sentence, "The sum of the three numbers is 30.":  $x + 2x + 3x = 30 \rightarrow 6x = 30 \rightarrow x = 5$ . Therefore, the smallest number is 5.
16. **Answer choice (D) is correct.** The initial ratio of red to green apples is 6:16 which simplifies to 3:8. If 3 red apples are added, there are now 9 red apples. Determine the total number of green apples needed to keep the ratio of red to green apples at 3:8 by setting up and solve the following proportion, where  $g$  represents the new total number of green apples:  $\frac{3}{8} = \frac{9}{g} \rightarrow 3g = 72 \rightarrow g = 24$ . There needs to be 24 green apples to keep the ratio the same, so we need to add 8 green apples to the basket ( $16 + 8 = 24$ ).
17. **Answer choice (B) is correct.** Set up and solve the following proportion, where  $t$  represents the total number of people in the park:  $\frac{2}{5} = \frac{12}{t} \rightarrow 2t = 60 \rightarrow t = 30$ . Now we know there are 30 total people at the park, 9 of which are women and 12 of which are men. Find the number of children at the park by subtracting the number of men and women from the total number of people:  $30 - 9 - 12 = 9$  children.
18. **Answer choice (B) is correct.** Set up and solve the following proportion, where  $c$  represents the cost to purchase 7 avocados:  $\frac{6.40}{4} = \frac{c}{7} \rightarrow 44.8 = 4c \rightarrow c = \$11.20$ .
19. **Answer choice (C) is correct.** The ratio of red to white flags is 2:5. Use this ratio to set up and solve the following proportion, where  $w$  represents the number of white flags Emily needs to make:  $\frac{2}{5} = \frac{8}{w}$

$\rightarrow 2w = 40 \rightarrow w = 20$  white flags. The ratio of white to blue flags is 4:5. Use this ratio to set up and solve the following proportion, where  $b$  represents the number of blue flags Emily needs to make:

$$\frac{4}{5} = \frac{20}{b} \rightarrow 4b = 100 \rightarrow b = 25 \text{ blue flags.}$$

20. **Answer choice (A) is correct.** The ratio of muffins to cookies Giselle baked is 3:2. Use this ratio to set up and solve the following proportion, where  $c$  represents the number of cookies:  $\frac{3}{2} = \frac{24}{c} \rightarrow 3c = 48 \rightarrow c = 16$  cookies. Answer choice (A) is the only answer choice with 16 cookies, so answer choice (A) is correct.

### **Rates Practice Set 1**

1. **Answer choice (D) is correct.** Use the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Plug in 5 hours for the time and 35 miles per hour for the rate and solve for the distance:  $d = 5 \cdot 35 \rightarrow d = 175$  miles.
2. **Answer choice (C) is correct.** Use the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Plug in 1350 miles for the distance and 9 hours for the time and solve for the rate:  $1350 = 9r \rightarrow r = 150$  miles per hour.
3. **Answer choice (C) is correct.** Use the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Plug in 375 miles for the distance and 50 miles per hour for the rate and solve for the time:  $375 = 50t \rightarrow t = 7.5$  hours.
4. **Answer choice (D) is correct.** First change 20 minutes into seconds by multiplying by 60:  $20 \cdot 60 = 1200$  seconds. Use the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Plug in 1200 seconds for the time and 6 meters per second for the rate and solve for the distance:  $d = 1200 \cdot 6 \rightarrow d = 7200$  meters.
5. **Answer choice (D) is correct.** If we know the difference between Kinga and Rea's speeds, we can find the number of minutes it took Kinga to catch up to Rea. Assume the difference in their speeds was 50 meters per minute. This means that every minute, Kinga runs 50 more meters than Rea, so every minute she catches up by 50 m. Using this, we could determine that it takes 2 minutes for Kinga to catch up to Rea.
6. **Answer choice (A) is correct.** Determine the number of minutes it will take to fill up the pool by dividing the total capacity of the pool, 15,000 gallons, by the rate of the hose, 20 gallons per minute:  $15,000 \div 20 = 750$  minutes. Change 750 minutes into hours by dividing by 60:  $750 \div 60 = 12.5$  hours.
7. **Answer choice (B) is correct.** Use the equation  $d = rt$ , here  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Plug in  $s$  for the rate and 100 for the distance and solve for time:  $100 = st \rightarrow t = 100 \div s$ .

8. **Answer choice (A) is correct.** The number of people and the time it takes to paint the room are inversely related. This means that the more people there are, the less time it will take to paint the room. This eliminates answer choices (C) and (D). 6 people can paint a room in 3 hours, so if we multiply the number of people we have by 2 to get 12 people, we have to divide the time it takes by 2. 3 hours divided by 2 equals 1.5 hours.
9. **Answer choice (A) is correct.** Use the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Find the time it will take Crosby to run 20 miles by plugging in 8 miles per hour for the rate and 20 miles for the distance, and then solve for the time:  $20 = 8t \rightarrow t = 2.5$  hours. Find the time it will take Crispin to run 20 miles by plugging in 5 miles per hour for the rate and 20 miles for the distance, and then solve for the time:  $20 = 5t \rightarrow t = 4$  hours. Therefore, it will take Crispin 1.5 more hours to run 20 miles than Crosby (4 hours – 2.5 hours = 1.5 hours).
10. **Answer choice (B) is correct.** Since Rachel runs twice as fast as Tara walks, Rachel runs twice as far as Tara walks in the same amount of time. Therefore, if Tara walks 5 miles in 80 minutes, Rachel can run twice as far, or 10 miles, in 80 minutes.
11. **Answer choice (D) is correct.** If Justin can mow  $\frac{2}{9}$  of the lawn in 14 minutes, then he can mow  $\frac{1}{9}$  of the lawn in 7 minutes. Therefore, to find the total time it takes him to mow the entire lawn, or  $\frac{9}{9}$  of the lawn, multiply 7 by 9:  $7 \cdot 9 = 63$  minutes.
12. **Answer choice (C) is correct.** Since we have Grace's typing speed in words per minute, we need to change the time into minutes. 1 hour = 60 minutes, so 1 hour and 30 minutes equals 90 minutes ( $60 + 30 = 90$ ). To find the number of words Grace can type in 90 minutes, multiply her typing speed by 90 minutes to get  $90w$ .
13. **Answer choice (B) is correct.** Enid can read  $\frac{6}{13}$  of a book in 2.4 hours. Divide 2.4 hours by 6 to find the time it takes Enid to read  $\frac{1}{13}$  of the book:  $2.4 \div 6 = 0.4$  hours. Since Enid has read  $\frac{6}{13}$  of the book, she has  $\frac{7}{13}$  of the book left to read. Find the time it takes Enid to read the remaining  $\frac{7}{13}$  of the book by multiplying the time it takes Enid to read  $\frac{1}{13}$  of the book (0.4 hours) by 7:  $0.4 \cdot 7 = 2.8$  hours.
14. **Answer choice (B) is correct.** If 80% of the bucket is filled, 20% of the bucket is not filled, so we need to determine how long it will take to fill the remaining 20% of the bucket. 20% is one fourth of 80%, so the time it will take to fill the remaining 20% of the bucket is one fourth the time it took to fill the first 80%. Therefore, it will take  $\frac{1}{4}m$  minutes to fill the rest of the bucket which is equivalent to  $0.25m$ .
15. **Answer choice (B) is correct.** Use the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Find how many miles Ethan runs in 2 hours by plugging in 2 hours for time and 8 miles per hour for rate:  $d = 8 \cdot 2 \rightarrow d = 16$  miles. Find how many miles Kevin runs in 2 hours by plugging in 2 hours for time and 7.25 miles per hour for rate:  $d = 7.25 \cdot 2 \rightarrow d = 14.5$  miles. Find how far behind Ethan Kevin is by subtracting the distances:  $16 - 14.5 = 1.5$  miles.

## **Rates Practice Set 2**

1. **Answer choice (B) is correct.** Use the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Plug in 3 hours for the time and 1260 miles for the distance, and solve for the rate:  $1260 = r \cdot 3 \rightarrow r = 420$  miles per hour.
2. **Answer choice (C) is correct.** Use the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Plug in 3.75 hours for the time and 40 miles per hour for rate, and solve for the distance:  $d = 40 \cdot 3.75 \rightarrow d = 150$  miles.
3. **Answer choice (B) is correct.** Use the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Plug in 560 meters for the distance and 40 meters per minute for the rate, and solve for the time:  $560 = 40 \cdot t \rightarrow t = 14$  minutes.
4. **Answer choice (A) is correct.** Find the number of hours it will take Ryan to fill up his gas tank by dividing the number of gallons his gas tank can hold by the rate at which gas flows out of the pump:  $25 \div 500 = 0.05$ . There are 60 minutes in 1 hour, so change 0.05 hours into minutes by multiplying by 60:  $0.05 \cdot 60 = 3$  minutes.
5. **Answer choice (A) is correct.** Use the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Plug in  $s$  for the rate and  $t$  for the time:  $d = st$
6. **Answer choice (B) is correct.** If we know the distance that Ed and Earl skated, we can find Ed's time by using the equation  $d = rt$ . If we know Ed's time, we can compare it to Earl's time to see who won. The difference between Ed and Earl's finishing times will not help us because we still won't know who had the faster time. The number of laps will not help us because it will not tell us the distance.
7. **Answer choice (B) is correct.** If Alan can run twice as fast as David, Alan can run twice as far as David can in the same amount of time. Therefore, since David can run 5 miles in 45 minutes, Alan can run 10 miles in 45 minutes. We want to find how long it take Alan to run 20 miles, which is twice as far as 10 miles, so we can multiply the time it takes Alan to run 10 miles by 2:  $45 \text{ minutes} \cdot 2 = 90$  minutes. Finally, since there are 60 minutes in 1 hour, change 90 minutes into hours by dividing by 60:  $90 \div 60 = 1.5$  hours.
8. **Answer choice (A) is correct.** Since Scott and Gina drove for the same amount of time, and the distance Gina drove is one third the distance Scott drove, Gina's speed must be one third Scott's speed. Therefore, find Gina's speed by finding one third of 60 mph:  $\frac{1}{3}$  of 60 =  $\frac{1}{3} \cdot 60 = 20$  mph.
9. **Answer choice (D) is correct.** Karina can paint two-third of a painting in five hours, so she can paint one third of a painting in half the time, which is 2.5 hours. Therefore, she can paint one whole painting in three time the time it takes her to paint one third of a painting:  $3 \cdot 2.5 = 7.5$  hours to paint one painting. Find the time it takes Karina to paint four paintings by multiplying the time it takes her to paint one painting by 4:  $7.5 \cdot 4 = 30$  hours.

10. **Answer choice (A) is correct.** Find the difference between Michelle’s and Jessica’s running speeds:  $7.5 \text{ mph} - 5 \text{ mph} = 2.5 \text{ mph}$ . This means that every hour, Jessica runs 2.5 miles more than Michelle. We want to find how many more miles Jessica will run in 90 minutes, so we first need to change 90 minutes into hours. There are 60 minutes in an hour, so divide 90 by 60 to get that 90 minutes equals 1.5 hours. Now we can multiply 2.5 by 1.5 to find how many more miles Jessica will run in 90 minutes:  $2.5 \cdot 1.5 = 3.75$  miles. You could also use the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time, to find the distance Michelle and Jessica each run in 90 minutes, and then you can find the difference between the two distances.
11. **Answer choice (B) is correct.** Since our speed is in miles per hour and our time is in minutes, we need to change our time into hours. There are 60 minutes in 1 hour, so change 45 minutes into hours by dividing by 60:  $45 \div 60 = 0.75$  hours. Now use the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Plug in  $m$  for the rate and 0.75 for the time and solve for the distance:  $d = m \cdot 0.75$  which can be written as  $d = 0.75m$ .
12. **Answer choice (B) is correct.** Augustus completed  $\frac{7}{11}$  of his homework in 42 minutes. Divide 42 by 7 to find the time it takes Augustus to complete  $\frac{1}{11}$  of his homework:  $42 \div 7 = 6$  minutes. Since Augustus has completed  $\frac{7}{11}$  of his homework, he has  $\frac{4}{11}$  left to complete. Find the time it will take Augustus to complete his homework by multiplying the time it take Augustus to complete  $\frac{1}{11}$  of his homework (6 minutes) by 4:  $6 \cdot 4 = 24$  minutes.
13. **Answer choice (C) is correct.** The number of people and the time it takes to build the shed are inversely related. This means that the fewer people there are, the more time it will take to build the shed. This eliminates answer choice (A). 9 people can build a shed in 1.5 weeks, so if we divide the number of people building the shed by 3 to get 3 people, we have to multiply the time it takes by 3: 1.5 weeks multiplied by 3 equals 4.5 weeks.
14. **Answer choice (D) is correct.** Olivia can wash  $\frac{3}{7}$  of the windows in her house in 24 minutes. Divide 24 by 3 to find the time it takes Olivia to wash  $\frac{1}{7}$  of the windows in her house:  $24 \div 3 = 8$  minutes. We want to know how long it will take Olivia to wash all of the windows in her house, or  $\frac{7}{7}$  of the windows, so multiply the time it takes her to wash  $\frac{1}{7}$  of the windows (8 minutes) by 7:  $8 \cdot 7 = 56$  minutes.
15. **Answer choice (B) is correct.** Yasmin drives at an average speed of 40 miles per hour, so every hour, Yasmin drives 40 miles. Vida drives at an average speed of 60 mph, so every hour, Vida drives 60 miles. Therefore, every hour, Yasmin and Vida drive a total of 100 miles ( $40 + 60 = 100$ ). Since Yasmin and Vida are driving towards each other on the same 500 mile route, they need to drive a total of 500 miles between the two of them to meet up. Therefore, we can divide 500 miles between them by the 100 miles they drive each hour to find the time it takes them to meet:  $500 \div 100 = 5$  hours.

### **Quantitative Comparisons Practice Set 1**

- Answer choice (B) is correct.** Distribute the 3 in Column A to get  $15a - 18$ .  $15a - 6$  is greater than  $15a - 18$  because we are subtracting a smaller number from  $15a$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
- Answer choice (A) is correct.** Find the value of  $x$  by multiplying both sides of the top equation by 4 to get  $x = 48$ . Find the value of  $y$  by dividing both sides of the bottom equation by 3 to get  $y = 40$ . Therefore,  $x$  is greater than  $y$ , so the quantity in Column A is greater than the quantity in Column B.
- Answer choice (C) is correct.** The pattern repeats every 5 terms. Therefore, any term that is a multiple of 5 (5th term, 10th term, 15th term, etc.) will be the same: they will all be 7. Therefore, since the 40th and 55th terms are both multiples of 5, they will be the same, so the quantities in both columns are equal.
- Answer choice (D) is correct.** Since we are only given one equation and two variables, we cannot determine the value of  $k$  and  $j$ . For example,  $k$  could equal 3, which would make  $j$  equal 0. Or  $j$  could equal 10, which would make  $k$  equal 9. Therefore, the relationship between the two quantities cannot be determined by the information given.
- Answer choice (A) is correct.** Tom is 12 years older than Kara, so Kara is 12 years *younger* than Tom. Therefore, Kara's age is  $t - 12$  which is smaller than  $t + 12$ , so the quantity in Column A is greater than the quantity in Column B.
- Answer choice (B) is correct.** If 4.5 inches represents 30 miles, then 9 inches represents 60 miles:  $4.5 \cdot 2 = 9$  and  $30 \cdot 2 = 60$ . Therefore, the number of inches that represent 50 miles will be less than 9, so the quantity in Column B is greater than the quantity in Column A.
- Answer choice (C) is correct.** Find the quantity in Column A by plugging 32 into the equation for  $y$  and solving for  $x$ :  $32 = 8 - 6x \rightarrow 24 = -6x \rightarrow x = -4$ . Find the quantity in Column B by plugging 2 into the equation for  $x$  and solving for  $y$ :  $y = 8 - 6(2) \rightarrow y = 8 - 12 \rightarrow y = -4$ . Therefore, the quantities in both columns are equal.
- Answer choice (A) is correct.** Find the quantity in Column A by replacing  $a$  with  $-5$  on both sides of the equation and simplifying the right side:  $(-5) = (-5)^2 - (-5) \rightarrow (-5) = 25 + 5 \rightarrow (-5) = 30$ . Find the quantity in Column B by replacing  $a$  with 5 on both sides of the equation and simplifying the right side:  $(5) = 5^2 - 5 \rightarrow (5) = 25 - 5 \rightarrow (5) = 20$ . Therefore, the quantity in Column A is greater than the quantity in Column B.
- Answer choice (D) is correct.** Isolate  $q$  in the equation by first subtracting  $p$  from both sides of the equation to get  $-q = 12 - p$ . Then divide both sides of the equation by  $-1$  to get  $q = -12 + p$  which is the same as  $q = p - 12$ . Now we are comparing Column A, which is  $12 - p$ , and Column B which is  $p - 12$ . Plug in different values of  $p$  to see if we can determine the relationship. If  $p$  equals 15, Column A equals  $-3$  and Column B equals 3, so Column B is greater than Column A. However, if  $p$  equals 10, Column A equals 2 and Column B equals  $-2$ , so Column A is greater than Column B. Since the

answer changes depending on what numbers we plug in for  $p$ , we cannot determine the relationship between the two quantities with the information given.

10. **Answer choice (D) is correct.** Solve the equation by first distributing the 3 on the right side to get  $3x - 6 = 3x - 6$ . Since both sides of the equation are exactly the same, there are infinite solutions to this equation. Therefore, since  $x$  can be any value, the relationship between the quantity in Column A and the quantity in Column B cannot be determined.
11. **Answer choice (A) is correct.** Find the quantity in Column A by using the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Plug in 3.25 hours for the time and 20 miles per hours for the rate and solve for the distance Evan rode:  $d = 20 \cdot 3.25 \rightarrow d = 65$  miles. Therefore, the quantity in Column A is greater than the quantity in Column B.
12. **Answer choice (B) is the correct answer.** The ratio of yellow to total marbles is 5:9, which means for every 5 yellow marbles there are 9 total marbles. Therefore, yellow marbles make up more than half of the total marbles, so there are more yellow marbles than green marbles in the bag. Therefore, the quantity in Column B is greater than the quantity in Column A.
13. **Answer choice (B) is correct.** Solve for  $x$  by cross multiplying:  $\frac{x}{4} = \frac{9}{6} \rightarrow 6x = 36 \rightarrow x = 6$ . Solve for  $y$  by cross multiplying:  $\frac{9}{y} = \frac{4}{3} \rightarrow 27 = 4y \rightarrow y = 6.75$ . Therefore,  $y$  is greater than  $x$ , so the quantity in Column B is greater than the quantity in Column A.
14. **Answer choice (B) is correct.** Let  $x$  represent the number of games the team lost. Therefore,  $4x$  represents the number of games the team won. Set the sum of the number of games lost and the number of games won equal to 20 total games and solve for  $x$ :  $x + 4x = 20 \rightarrow 5x = 20 \rightarrow x = 4$ . Therefore, the team lost 4 games, so the quantity in Column B is greater than the quantity in Column A.
15. **Answer choice (A) is correct.** Find the number of star stickers by setting up and solving the following proportion, where  $s$  represents the number of star stickers:  $\frac{3}{4} = \frac{s}{20} \rightarrow 60 = 4s \rightarrow s = 15$ . Find the number of circle stickers by setting up and solving the following proportion, where  $c$  represents the number of circle stickers:  $\frac{5}{3} = \frac{20}{c} \rightarrow 5c = 60 \rightarrow c = 12$ . Therefore, there are more star stickers than circle stickers, so the quantity in Column A is greater than the quantity in Column B.
16. **Answer choice (C) is the correct answer.** Rewrite  $5p$  in terms of  $q$  by first subtracting 4 from both sides of the given equation to get  $p = q - 4$ . Now multiply both sides of the equation by 5 and simplify the right side:  $5p = 5(q - 4) \rightarrow 5p = 5q - 20$ . Therefore, Column A equals  $5q - 20$ , so the quantities in Column A and Column B are equal.
17. **Answer choice (B) is correct.** Find the value of  $m$  by replacing the square with  $m$  and the triangle with 12 in the given equation, and then solve for  $m$ :  $2m - 6 = 12 \rightarrow 2m = 18 \rightarrow m = 9$ . Find the value of  $n$  by replacing the square with 8 and the triangle with  $n$  in the given equation, and then solve for  $n$ :

$2(8) - 6 = n \rightarrow 16 - 6 = n \rightarrow 10 = n$ . Therefore,  $n$  is greater than  $m$ , so the quantity in Column B is greater than the quantity in Column A.

18. **Answer choice (A) is correct.** Let  $f$  represent the number of five dollar bills DJ has. Therefore,  $2f$  represents the number of ten dollar bills DJ has. The value of DJ's five dollar bills is  $\$5 \cdot f$  or  $5f$ . The value of DJ's ten dollar bills is  $\$10 \cdot 2f$  or  $20f$ . Set the sum of the value of DJ's five dollar bills and the value of DJ's ten dollar bills equal to 90 and solve for  $f$ :  $5f + 20f = 100 \rightarrow 25f = 100 \rightarrow f = 4$ . Therefore, DJ has 4 five dollar bills and 8 ten dollar bills, so the quantity in Column A is greater than the quantity in Column B.
19. **Answer choice (A) is correct.** Divide both sides of the given equation by 2 to get the value of Column A:  $(6a + 4b) \div 2 = -4 \div 2 \rightarrow 3a + 2b = -2$ . Multiply both sides of the given equation by 2 to get the value of Column B:  $2(6a + 4b) = -4 \cdot 2 \rightarrow 12a + 8b = -8$ . Therefore, the quantity in Column A is greater than the quantity in Column B.
20. **Answer choice (A) is correct.** Use the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Solve for the number of hours Tina drove by plugin in 40 miles for the distance and 60 mph for the rate. Then solve for  $t$ :  $40 = 60t \rightarrow t = \frac{2}{3}$  hours. Solve for the number of hours Max drove by plugin in 20 miles for the distance and 40 mph for the rate. Then solve for  $t$ :  $20 = 40t \rightarrow t = \frac{1}{2}$  hours. Therefore, the number of hours Tina drove is greater than the number of hours Max drove, so the quantity in Column A is greater than the quantity in Column B.

## Quantitative Comparisons Practice Set 2

1. **Answer choice (B) is correct.** Find the quantity in Column A by plugging in 12 for  $a$  in the given equation and solving for  $b$ :  $\frac{1}{2}(12) + 2b = 10 \rightarrow 6 + 2b = 10 \rightarrow 2b = 4 \rightarrow b = 2$ . Find the quantity in Column B by plugging in 3 for  $b$  in the given equation and solving for  $a$ :  $\frac{1}{2}a + 2(3) = 10 \rightarrow \frac{1}{2}a + 6 = 10 \rightarrow \frac{1}{2}a = 4 \rightarrow a = 8$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
2. **Answer choice (C) is correct.** Find Mia's hourly rate by dividing \$84 by 7 hours to get that Mia makes \$12 per hour. Find the quantity in Column A by multiplying Mia's hourly rate by 15 hours:  $\$12 \cdot 15 = \$180$ . Find Sean's hourly rate by dividing \$75 by 5 hours to get that Sean makes \$15 per hour. Find the quantity in Column B by multiplying Sean's hourly rate by 12 hours:  $\$15 \cdot 12 = \$180$ .
3. **Answer choice (C) is correct.** Find the quantity in Column A by plugging in  $-3$  for  $x$  on both sides of the given equation:  $\{x\} = x^4 + x^2 \rightarrow \{-3\} = (-3)^4 + (-3)^2 \rightarrow \{-3\} = 81 + 9 \rightarrow \{-3\} = 90$ . Find the quantity in Column B by plugging in 3 for  $x$  on both sides of the given equation:  $\{x\} = x^4 + x^2 \rightarrow \{3\} = (3)^4 + (3)^2 \rightarrow \{3\} = 81 + 9 \rightarrow \{3\} = 90$ . Therefore, the quantity in Column A is equal to the quantity in Column B.
4. **Answer choice (A) is correct.** Since the ratio of men to women is 3:2, and 3 is greater than 2, the number of men at the company is greater than the number of women. Therefore, the quantity in Column A is greater than 60, so the quantity in Column A is greater than the quantity in Column B.



5. **Answer choice (B) is correct.** Solve for  $a$  by subtracting 6 from both sides of the top equation:  $a + 6 = -8 \rightarrow a = -14$ . Solve for  $b$  by first subtracting 12 from both sides of the bottom equation and then dividing both sides of the equation by  $-1$ :  $12 - b = -2 \rightarrow -b = -14 \rightarrow b = 14$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
6. **Answer choice (A) is correct.** Since Jack's time was 10 minutes slower than Jill's time, it took Jack 10 minutes longer to finish the race than it did Jill. Therefore, the time it took Jack to finish the race is equal to  $j + 10$ . Adding 10 to  $j$  is always greater than subtracting 10 from  $j$ , regardless of what  $j$  is, so the quantity in Column A is greater than the quantity in Column B.
7. **Answer choice (C) is correct.** Cross multiply the given proportion to get that  $wz = xy$ , so the quantity in Column A is equal to the quantity in Column B.
8. **Answer choice (B) is correct.** The number of children and the time it takes to build the sandcastle are inversely related. This means that the more children there are, the less time it will take to build the sandcastle. Therefore, the time it takes 8 children to build the sandcastle is less than the time it takes 4 children to build a sandcastle, 2 hours, so the quantity in Column B is greater than the quantity in Column A.
9. **Answer choice (D) is correct.** Plug in different values for  $p$  and solve for  $q$  to see if the relationship can be determined. Plug in 0 for  $p$  and solve for  $q$ :  $5(0) - 4q = 20 \rightarrow -4q = 20 \rightarrow q = -5$ . In this case,  $p$  is greater than  $q$ . Plug in 25 for  $p$  and solve for  $q$ :  $5(25) - 4q = 20 \rightarrow 125 - 4q = 20 \rightarrow -4q = -105 \rightarrow q = 26.25$ . In this case,  $q$  is greater than  $p$ . Since we get a different relationship when we plug in different numbers for  $p$ , the relationship cannot be determined with the given information.
10. **Answer choice (A) is correct.** Find the quantity in Column A by isolating  $m - n$  in the given equation. First subtract  $n$  from both sides of the equation:  $m - 5 = n - 12 \rightarrow m - n - 5 = -12$ . Now add 5 to both sides of the equation:  $m - n - 5 = -12 \rightarrow m - n = -7$ . Therefore, Column A equals  $-7$ , so the quantity in Column A is greater than the quantity in Column B.
11. **Answer choice (A) is correct.** Since the number of four-leaf clovers and the number of three-leaf clovers are equal, let both equal  $x$ . The number of leaves on the four-leaf clovers is  $4x$ , and the number of leaves on the three-leaf clovers is  $3x$ . Set the total number of leaves equal to 70 and solve for  $x$ :  $3x + 4x = 70 \rightarrow 7x = 70 \rightarrow x = 10$ . This tells us there are 10 three-leaf clovers and 10 four-leaf clovers, so there are 20 total clovers. Therefore, the quantity in Column A is greater than the quantity in Column B.
12. **Answer choice (A) is correct.** Meseker drove for 9 hours at a speed of 60 mph, and he only drove for 1 hour at a speed of 30 mph. Since 9 hours is way longer than 1 hour, Meseker's average speed will be closer to 60 mph than it will be to 30 mph. Since 45 mph is directly in the middle of 30 mph and 60 mph, we know that Meseker's average speed is greater than 45 mph, so the quantity in Column A is greater than the quantity in Column B. You could also find his average speed using the equation  $average\ speed = (total\ distance) \div (total\ time)$ . Find Meseker's distance for the first part of his trip by

using the equation  $d = rt$ :  $d = 60 \cdot 9 = 540$  miles. Find Meseker's distance for the second part of his trip using the same equation:  $d = 30 \cdot 1 = 30$  miles. Now use the equation  $average\ speed = (total\ distance) \div (total\ time)$ :  $average\ speed = (540 + 30) \div (9 + 1) = 570 \div 10 = 57$  mph.

13. **Answer choice (A) is correct.** Find the number of words Sal can type in 1 hour (60 minutes) by setting up and solving the following proportion, where  $w$  represents the number of words Sal can type in 1 hour:  $\frac{200}{5} = \frac{x}{60} \rightarrow 40 = \frac{x}{60} \rightarrow x = 2400$  words. Since every page has an average of 300 words, find the number of pages Sal can type in an hour by dividing the number of words he can type in an hour by 300:  $2400 \div 300 = 8$  pages. Therefore, the quantity in Column A is greater than the quantity in Column B.
14. **Answer choice (B) is correct.** Find the quantity in Column A by isolating  $2j$  in the given equation. Start by subtracting  $3k$  from both sides of the equation:  $3k - 6j = 12 \rightarrow -6j = 12 - 3k$ . Now divide both sides of the equation by  $-3$ :  $-6j = 12 - 3k \rightarrow 2j = -4 + k$  which is the same as  $2j = k - 4$ . Now we are comparing Column A, which is  $k - 4$ , and Column B, which is  $k + 4$ . Adding 4 to  $k$  is always greater than subtracting 4 from  $k$ , regardless of what  $k$  is, so the quantity in Column B is greater than the quantity in Column A.
15. **Answer choice (C) is correct.** Each figure is a square of dots with side lengths of whatever number figure it is. For example, figure 1 is a 1 by 1 square, figure 2 is a 2 by square, figure 3 is a 3 by 3 square, and figure 4 is a 4 by 4 square. Therefore, figure 8 will be an 8 by 8 square, so the total number of dots equals  $8 \cdot 8$  which equals 64. Therefore, the quantity in Column A is equal to the quantity in Column B.
16. **Answer choice (B) is correct.** Assume Terry has the number of dimes in Column B, 12. The value of her dimes would be  $12 \cdot \$0.1 = \$1.20$ . Since Terry has five fewer dimes than nickels, she has five more nickels than dimes, so she has 17 nickels. The value of her nickels would be  $17 \cdot \$0.05 = \$0.85$ . The total value of her dimes and nickels would be  $\$1.20 + \$0.85 = \$2.05$ . Since  $\$2.05$  is greater than the actual value of Terry's dimes and nickels,  $\$1.75$ , we know that she must have fewer than 12 dimes, so the quantity in Column B is greater than the quantity in Column A.
17. **Answer choice (B) is correct.** Solve the given equation by first subtracting 12 from both sides and then dividing both sides of the equation by  $\frac{4}{3}$ , which is the same as multiplying by  $\frac{3}{4}$ :  $\frac{4}{3}x + 12 = 24 \rightarrow \frac{4}{3}x = 12 \rightarrow x = 9$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
18. **Answer choice (D) is correct.** Distribute the 5 in the expression in Column A to get  $15 - 5j$ . Now we are comparing Column A,  $15 - 5j$ , with Column B,  $15 - j$ . Plug in different values for  $j$  to see if the relationship can be determined. If  $j$  equals 0, both columns equal 15. If  $j$  equals 1, Column A equals 10 and Column B equals 14, so Column B is greater than Column A. Since we get a different relationship between the columns when we plug in different values for  $j$ , the relationship cannot be determined from the given information.

19. **Answer choice (C) is correct.** If you plug each  $x$  value from the table into the expression in Column A, you will get the corresponding  $y$  value. Plug in 4 for  $x$ :  $3(4 - 1) = 9$ . Plug in 5 for  $x$ :  $3(5 - 1) = 12$ . Plug in 8 for  $x$ :  $3(8 - 1) = 21$ . Plug in 10 for  $x$ :  $3(10 - 1) = 27$ . Therefore,  $3(x - 1) = y$  based on the table, so the quantity in Column A is equal to the quantity in Column B.
20. **Answer choice (A) is correct.** Set up and solve the following proportion to find the number of beads that equals 15 stickers, where  $b$  represents the number of beads:  $\frac{5}{8} = \frac{15}{b} \rightarrow 5b = 120 \rightarrow b = 24$ . Therefore, Column A is equal to 24 beads. Set up and solve the following proportion to find the number of beads that equals 15 stamps, where  $b$  represents the number of beads:  $\frac{4}{3} = \frac{b}{15} \rightarrow 3b = 60 \rightarrow b = 20$ . Therefore, Column B is equal to 20 beads, so the quantity in Column A is greater than the quantity in Column B.
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## ***Geometry and Measurement***

### **Appropriate Units Practice Set 1**

1. **Answer choice (A) is correct.** 7 Feet, 7 yards, and 7 miles are too large to represent the length of a pencil. 7 inches is about half of a foot, which is a reasonable length of a pencil.
2. **Answer choice (D) is correct.** Centimeters and meters measure length, so answer choices (A) and (B) are incorrect. Square inches measure area, but the length and width of a classroom are too long to be measured in inches, so the area would not be in square inches. We are left with square feet as the most reasonable unit.
3. **Answer choice (C) is correct.** A truck is very heavy, so 3000 milligrams, 3000 grams, and 3000 ounces are all too small to represent the weight of a truck. 3000 kilograms could represent the weight of a truck.
4. **Answer choice (C) is correct.** Grams measure weight, and square yards measure area, so answer choices (B) and (D) are incorrect. Miles could measure height, but miles are too large to measure the height of a tree. We are left with meters as the most reasonable unit.
5. **Answer choice (B) is correct.** 170 mm is too small to represent the height of an adult. 170 m and 170 km are too large to represent the height of an adult. 170 cm is 1.7 meters which is a reasonable height for an adult.
6. **Answer choice (A) is correct.** Square meters measure area, so answer choice (D) is incorrect. Centimeters and inches are too small to use when measuring the length of a soccer field, so we are left with yards as the most reasonable unit.

7. **Answer choice (A) is correct.** A standard water bottle holds around 3 to 6 cups, so 32 cups, 32 quarts, and 32 gallons are too big for the volume of liquid in a standard water bottle. 32 ounces equals 4 cups, so 32 ounces could represent the volume of liquid in a standard water bottle.
8. **Answer choice (D) is correct.** 25 square mm is too small for the area of a rug. 25 square mi and 25 square km are way too big for the area of a rug. 25 square feet could represent the area of a rug.
9. **Answer choice (D) is correct.** Inches, millimeters, and centimeters are all too small to use when measuring the distance between two cities. Kilometers are similar to miles, so kilometers is the most reasonable unit to use.
10. **Answer choice (A) is correct.** A toothbrush is very light, so 8 tons, 8 pounds, and 8 kilograms are all too heavy to represent the weight of a toothbrush. 8 grams is light, so 8 grams could represent the weight of a toothbrush.

### **Appropriate Units Practice Set 2**

1. **Answer choice (C) is correct.** Square centimeters measure area, so answer choice (D) is incorrect. A piece of paper has a length of around 1 foot, so miles and meters are too big to use when measuring the length of a piece of paper. We are left with inches as the best unit to use when measuring the length of a piece of paper.
2. **Answer choice (D) is correct.** Miles measures distance or length, not time, so answer choice (C) is incorrect. Seconds and milliseconds are too small to use when measuring the time it takes to drive between two cities. It likely takes at least 30 to 60 minutes to drive between two cities, so hours is the most reasonable unit to use.
3. **Answer choice (C) is correct.** If you think about a time when you've been in a pool, you likely could either barely stand or not stand, especially in the deep end. Therefore, the depth of the pool is around the height of a human, if not slightly taller. 10 mm and 10 cm are way shorter than a human, and 10 km is way taller than a human. 10 ft is about 4 to 5 feet taller than the average human, so 10 feet could represent the depth of a pool.
4. **Answer choice (A) is correct.** Kilograms and ounces measure weight, so answer choices (B) and (C) are incorrect. While cups measure volume, cups are too small to measure the volume of water in a bathtub. Cubic feet measure volume and are a reasonable unit to use when measuring the volume of water in a bathtub because the dimensions of a bathtub can reasonably be measured in feet.
5. **Answer choice (C) is correct.** Dogs typically weigh 10 to 100 pounds. Kilograms are similar to pounds, so 30 kg could represent the weight of a dog. 30 mg and 30 g are both too small to represent the weight of a dog: a dozen pennies weighs about 30 g, and 30 feathers weigh around 30 mg. 30 tons is way too big to represent the weight of a dog: a car weighs around 1.5 tons, so 30 tons is extremely heavy.

6. **Answer choice (C) is correct.** The width of the tip of a pencil is about 1 mm, so  $20 \text{ mm}^2$  is too small for the area of a standard bedroom. The width of a paperclip is about 3 cm, so  $20 \text{ cm}^2$  is too small for the area of a standard bedroom. Because km are similar to miles,  $20 \text{ km}^2$  is too large for the area of a standard bedroom. A meter is around 3 feet, or the width of a doorway, so  $20 \text{ m}^2$  could represent the area of a standard bedroom.
7. **Answer choice (D) is correct.** Miles and feet measure distance or length, not area, so answer choices (B) and (C) are incorrect. Square centimeters measure area, but square centimeters are too small to measure the area of a soccer field. Square yards is the most reasonable unit to use when measuring the area of a soccer field.
8. **Answer choice (B) is correct.** Square centimeters measure area and liters measure volume, so answer choices (C) and (D) are incorrect. While grams measure weight, grams are too small to measure the weight of a couch: a penny weighs around 2 to 3 grams. Pounds is the most reasonable unit to use when measuring the weight of a couch.
9. **Answer choice (B) is correct.** 150 miles and 150 kilometers are similar and are both way too large to represent the height of a skyscraper. 150 inches is way too small (150 inches is 12.5 feet) to represent the height of a skyscraper. We are left with 150 meters, which is around 500 feet, as the most reasonable representation of the height of a skyscraper.
10. **Answer choice (A) is correct.** 2 mm, 2 cm, and 2 m are all too small to measure the circumference of a lake. 2 mm is about the width of a crayon tip, 2 cm is slightly shorter than the length of a paperclip, and 2 m is the height of a tall man. 2 km, which is similar to 2 miles, is a reasonable unit to measure the circumference of a lake.

### **Lines and Angles Practice Set 1**

1. **Answer choice (A) is correct.** The sum of the angles in any triangle is  $180^\circ$ , so set the sum of the three angles equal to 180 and solve for  $x$ :  $90 + 4x + 6x = 180 \rightarrow 90 + 10x = 180 \rightarrow 10x = 90 \rightarrow x = 9$ .
2. **Answer choice (A) is correct.**  $AB + BC = AC$ , so  $BC = AC - AB$ . Replace AC with  $6x$  and AB with  $2x + 4$  and simplify to find BC:  $BC = AC - AB \rightarrow BC = 6x - (2x + 4) \rightarrow BC = 6x - 2x - 4 \rightarrow BC = 4x - 4$ .
3. **Answer choice (B) is correct.** The sum of the angles in any quadrilateral is  $360^\circ$ , so set the sum of the four angles in the trapezoid equal to 360 and solve for  $x$ :  $x + 100 + 80 + 65 = 360 \rightarrow x + 245 = 360 \rightarrow x = 115$ .
4. **Answer choice (C) is correct.** Answer choice (A) is incorrect because it includes a route from X to Z. Answer choice (B) is incorrect because it does not include a route from Z to Y. Answer choice (D) is incorrect because it includes a route from X to Z and does not include a route from W to Y. We are left with answer choice (C).

- Answer choice (B) is correct.** Because the hexagon is regular, all six angles have the same measure. Find the value of  $x$  by setting the sum of all six angles equal to 720 and solving for  $x$ :  $3x + 3x + 3x + 3x + 3x + 3x = 720 \rightarrow 18x = 720 \rightarrow x = 40$ .
- Answer choice (B) is correct.** Since AB is perpendicular to BC, they form a right angle. Therefore, angle ABC has a measure of  $90^\circ$ , so we can find  $x$  by setting  $5x + 4x = 90$  and solving for  $x$ :  $5x + 4x = 90 \rightarrow 9x = 90 \rightarrow x = 10$ .
- Answer choice (D) is correct.** The fewer sides a polygon has, the smaller the sum of the interior angles. Therefore, since a triangle has fewer sides than a square, and a square has fewer sides than a pentagon, a triangle has the smallest sum of interior angles and a pentagon has the largest sum of interior angles.
- Answer choice (C) is correct.** The angle measuring  $40^\circ$  and the angle measuring  $x^\circ$  are vertical angles, so they are congruent (equal). Therefore,  $x$  equals  $40^\circ$ . The angle measuring  $x^\circ$  and the angle measuring  $y^\circ$  form a straight line, so they add to  $180^\circ$ . Therefore,  $y$  equals 140, so  $y - x = 140 - 40 = 100$ .
- Answer choice (A) is correct.** The sum of the angles in any triangle is  $180^\circ$ . Since the triangle is isosceles, and angle B is obtuse, angle A and C are equal. Let  $x$  equal the measure of angle A and C. Set up and solve the following equation to find the measure of angle A:  $x + x + 130 = 180 \rightarrow 2x + 130 = 180 \rightarrow 2x = 50 \rightarrow x = 25$ , so the measure of angle A is  $25^\circ$ .
- Answer choice (A) is correct.** The length of segment QR is one-third of the length of segment PS, so the length of segment PS is three times the length of segment QR. Therefore, the length of segment PS is  $3 \cdot 12 = 36$  inches. The length of segment PQ is one-fourth of the length of segment PS, so the length of segment PQ is  $\frac{1}{4} \cdot 36 = 9$  inches. Find the length of segment RS by subtracting the length of segments PQ and QR from PS:  $36 - 9 - 12 = 15$  inches.

### **Lines and Angles Practice Set 2**

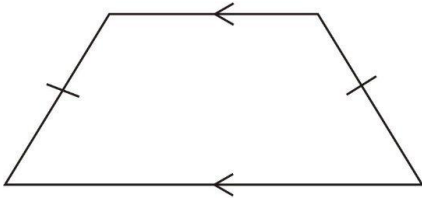
- Answer choice (A) is correct.** The sum of the angles in any triangle is  $180^\circ$ , so set the sum of the three angles equal to 180 and solve for  $x + y$ :  $x + y + 115 = 180 \rightarrow x + y = 65$ .
- Answer choice (C) is correct.** We know AB is  $\frac{3}{4}$  of BC, so we can set up the following equation:  $AB = \frac{3}{4} \cdot BC$ . Plug in  $12x$  for AB and solve the equation for BC:  $12x = \frac{3}{4} \cdot BC \rightarrow BC = 16x$ . AC is equal to  $AB + BC$ , so find AC by adding AB and BC:  $12x + 16x = 28x$ .
- Answer choice (B) is correct.** Consecutive angles in a parallelogram are supplementary, meaning they have a sum of  $180^\circ$ . Therefore, we can set up and solve the following equation:  $96 + x = 180 \rightarrow x = 84$ .
- Answer choice (C) is correct.** When two angles form a straight line, their measures add up to  $180^\circ$ . Therefore, we can set up and solve the following equation:  $7k + 5k = 180 \rightarrow 12k = 180 \rightarrow k = 15$ .

5. **Answer choice (D) is correct.** Find the measure of each interior angle of the regular octagon by plugging in 27 for  $x$  in the expression  $5x^\circ$ :  $5(27)^\circ = 135^\circ$ . Since the octagon is regular, all eight angles have the same measure. Therefore, we can find the sum of the interior angles by multiplying  $135^\circ$  by 8:  $135^\circ \cdot 8 = 1,080^\circ$ .
6. **Answer choice (B) is correct.** First find the length of XY using the fact that  $XY + YZ = XZ$ . Plug in 14 for XZ and 9 for YZ and solve for XY:  $XY + 8 = 14 \rightarrow XY = 6$ . Since M is the midpoint of segment XY, XM equals half of XY. Therefore, we can find the length of segment XM by finding half of 6:  $\frac{1}{2}$  of 6 =  $\frac{1}{2} \cdot 6 = 3$ .
7. **Answer choice (A) is correct.** The fewer sides a regular shape has, the larger the measure of each exterior angle. Since a square has 4 sides, a pentagon has 5 sides, and a hexagon has 6 sides, answer choice (A) is ordered from the fewest number of sides to the most number of sides, so it is ordered from the largest exterior angle to the smallest exterior angle.
8. **Answer choice (B) is correct.** Since the left and right side of the triangle are congruent, the bottom two angles in the triangle are congruent. Therefore, the angle right next to the angle measuring  $a^\circ$  is also  $45^\circ$ . Since the angle measuring  $a^\circ$  and the bottom left angle of the triangle make a straight line, they add up to  $180^\circ$ . Therefore, we can set up and solve the following equation:  $a + 45 = 180 \rightarrow a = 135$ .
9. **Answer choice (B) is correct.** Here are the routes from A to C without retracing your steps:
- (1) A  $\rightarrow$  B  $\rightarrow$  C
  - (2) A  $\rightarrow$  D  $\rightarrow$  C
  - (3) A  $\rightarrow$  D  $\rightarrow$  B  $\rightarrow$  C
  - (4) A  $\rightarrow$  B  $\rightarrow$  D  $\rightarrow$  C
10. **Answer choice (C) is correct.** The angle measuring  $y^\circ$  and the angle measure  $w^\circ$  are congruent (equal) because they are vertical angles. Therefore, statement I is correct. The angle measuring  $x^\circ$  and the angle measuring  $z^\circ$  are also congruent (equal) because they are vertical angles. Therefore, since  $y = w$  and  $x = z$ ,  $y - x = w - z$ . This means statement III is correct. We do not know if  $x + z = 180^\circ$  because they don't form a straight line, so statement II is not necessarily true. Therefore, only statements I and III are true.

### **Properties of Shapes and Figures Practice Set 1**

1. **Answer choice (B) is correct.** The sum of the angles in any triangle is  $180^\circ$ , so the missing angle has a measure of  $40^\circ$ . Since all of the angles have different measures, the triangle is scalene. Since the triangle has one right angle, the triangle is right.

2. **Answer choice (A) is correct.** An isosceles trapezoid is shown below. From the picture, you can see that the top and bottom lines are parallel, and the left and right lines are not. Therefore, an isosceles trapezoid has exactly one pair of parallel lines.



3. **Answer choice (A) is correct.** A square has the following four lines of symmetry: vertically down the middle, horizontally down the middle, diagonally from the top right corner to the bottom left corner, and diagonally from the top left corner to the bottom right corner.
4. **Answer choice (D) is correct.** A rhombus is a parallelogram with four equal sides. A square is a parallelogram with all equal sides and angles. Therefore, a square is always a rhombus.
5. **Answer choice (C) is correct.** A quadrilateral is a polygon with four sides. A heptagon is a polygon with seven sides, so a heptagon is NOT a quadrilateral.
6. **Answer choice (D) is correct.** An obtuse triangle has one angle that is larger than  $90^\circ$ . An equilateral triangle has three angles that each measure  $60^\circ$ . Therefore, an obtuse triangle can never be equilateral.
7. **Answer choice (B) is correct.** A cylinder is a prism with circular bases.
8. **Answer choice (C) is correct.** A rhombus is a quadrilateral with four equal sides.
9. **Answer choice (C) is correct.** The edges of a cube are where two faces meet. Therefore, a cube has 12 edges.
10. **Answer choice (C) is correct.** The sum of the angles in any triangle is  $180^\circ$ , so if the measure of angle J is less than  $60^\circ$ , then the measure of angle L is greater than  $90^\circ$ . An obtuse triangle is a triangle that has one angle with a measure greater than  $90^\circ$ .

### **Properties of Shapes and Figures Practice Set 2**

1. **Answer choice (C) is correct.** The sum of the angles in any triangle is  $180^\circ$ , so the missing angle has a measure of  $60^\circ$ . Since all of the angles have the same measure, all of the sides are the same length, so the triangle is equilateral.
2. **Answer choice (D) is correct.** Perpendicular lines form a right angle. No two lines in an equilateral triangle form a right angle.



3. **Answer choice (A) is correct.** A rectangle is a four-sided shape with four right angles and two pairs of opposite sides that are congruent and parallel. A square is a specific type of rectangle that has four equal sides, so a square is always a rectangle.
4. **Answer choice (C) is correct.** Answer choice (A) has four lines of symmetry, answer choice (B) has five lines of symmetry, and answer choice (D) has three lines of symmetry. Answer choice (C) only has one line of symmetry.
5. **Answer choice (B) is correct.** An equilateral triangle is a triangle with three congruent (equal) sides and three congruent (equal) angles. Since the sum of the angles in any triangle is  $180^\circ$ , each angle in an equilateral triangle measures  $60^\circ$ . An acute triangle is a triangle that has three acute angles (angles measuring less than  $90^\circ$ ), so an equilateral triangle is always an acute triangle.
6. **Answer choice (C) is correct.** A cone is a 3-dimensional figure with a circle base and a body that has curved sides leading up to a narrow point at the top. Think of an orange traffic cone or an ice cream cone.
7. **Answer choice (D) is correct.** A parallelogram is a four-sided shape with two pairs of opposite sides that are congruent and parallel. Therefore, the figure in answer choice (D) is a parallelogram.
8. **Answer choice (B) is correct.** Faces are the flat surfaces that make up the outside of a 3-dimensional figure. Therefore, a rectangular prism has 6 faces.
9. **Answer choice (A) is correct.** A pentagon is a five-sided shape and a quadrilateral is a four-sided shape. Therefore, a pentagon can never be a quadrilateral.
10. **Answer choice (C) is correct.** The sum of the angles in any quadrilateral is  $360^\circ$ . If angles A, B, C, and D are all congruent (equal), then they each have a measure of  $90^\circ$ . A rectangle is a four-sided shape with four right angles, so if angle A, B, C, and D all measure  $90^\circ$ , then quadrilateral ABCD is a rectangle. Answer choice (A) is incorrect because if A and B are right angles, D and C are not necessarily right angles. Answer choice (B) is incorrect because while opposite sides of a rectangle are equal, if opposite sides of a quadrilateral are equal, it doesn't mean the quadrilateral is a rectangle: it could be a parallelogram without right angles. Answer choice (D) is incorrect because while opposite sides of a rectangle are parallel, if opposite sides of a quadrilateral are parallel, it doesn't mean the quadrilateral is a rectangle: it could be a parallelogram without right angles.

### **Area and Perimeter Practice Set 1**

1. **Answer choice (D) is correct.** Find the side length of the square by dividing the perimeter by 4:  $64 \div 4 = 16$  inches. The area of a square is equal to the side length squared:  $16^2 = 256$  square inches.

2. **Answer choice (B) is correct.** The area of a square is equal to the side length squared. Therefore, if the area of a square is  $36 \text{ cm}^2$ , the side length is 6 cm because  $6^2 = 36$ . Find the perimeter by multiplying the side length by 4:  $6 \text{ cm} \cdot 4 = 24 \text{ cm}$ .
3. **Answer choice (A) is correct.** The formula for the area of a triangle is  $A = \frac{1}{2}bh$ . Plug in 6 for  $b$  and 8 for  $h$  (or vice versa) and solve for  $A$ :  $A = \frac{1}{2}(6)(8) \rightarrow A = 24 \text{ m}^2$ .
4. **Answer choice (D) is correct.** The area of a square is equal to the side length squared, so the area of the square is  $6^2 = 36$  square feet. The formula for the area of a triangle is  $A = \frac{1}{2}bh$ . Plug in 36 for  $A$  and 12 for  $h$  and solve for  $b$ :  $36 = \frac{1}{2}b \cdot 12 \rightarrow 36 = 6b \rightarrow b = 6$  feet.
5. **Answer choice (B) is correct.** First change the dimensions of each wall into yards by dividing by 3 (3 feet = 1 yard).  $12 \div 3 = 4$  and  $15 \div 3 = 5$ , so the dimensions of each wall are 4 yards by 5 yards. Find the area of each wall by multiplying the dimensions:  $4 \text{ yard} \cdot 5 \text{ yards} = 20$  square yards. Multiply by 4 to find the total area Phyllis needs to paint:  $20 \text{ square yards} \cdot 4 = 80$  square yards. Finally, since one can of paint covers 10 square yards, find the number of cans Phyllis needs by dividing the total area she needs to paint by 10:  $80 \div 10 = 8$  cans of paint.
6. **Answer choice (A) is correct.** Plug in 16 for  $b_1$ , 24 for  $b_2$ , and 12 for  $h$  in the given equation and solve for the area:  $A = \frac{1}{2}(16 + 24)(12) \rightarrow A = \frac{1}{2}(40)(12) \rightarrow A = (20)(12) \rightarrow A = 240 \text{ cm}^2$ .
7. **Answer choice (D) is correct.** The formula for the area of a triangle is  $A = \frac{1}{2}bh$ . Plug in 84 for  $A$  and 12 for  $h$  and solve for  $b$ :  $84 = \frac{1}{2}b \cdot 12 \rightarrow 84 = 6b \rightarrow b = 14$  feet.
8. **Answer choice (A) is correct.** The area of a parallelogram equals the base times the height. If you draw the height of the parallelogram, it will form a right triangle with the side measuring 5 cm as the hypotenuse. Therefore, the height of the parallelogram is less than 5 cm because the hypotenuse is always the longest side of a right triangle. Therefore, the area of the triangle is less than  $50 \text{ cm}^2$  because the base of the parallelogram is 10 cm and the height is less than 5 cm.
9. **Answer choice (D) is correct.** The perimeter of a rectangle is equal to the sum of all four sides:  $P = 2l + 2w$ . Plug in 72 for  $P$  and 8 for  $w$  and solve for  $l$ :  $72 = 2l + 2(8) \rightarrow 72 = 2l + 16 \rightarrow 56 = 2l \rightarrow l = 28$  m. Find the area by multiplying the length by the width:  $8 \cdot 28 = 224 \text{ m}^2$ .
10. **Answer choice (C) is correct.** The area of a rectangle is equal to the length times the width:  $A = lw$ . Plug in 48 for  $A$  and 8 for  $l$  and solve for  $w$ :  $48 = 8w \rightarrow w = 6$ . The perimeter of a rectangle is equal to the sum of all four sides:  $P = 8 + 8 + 6 + 6 = 28$  meters.
11. **Answer choice (B) is correct.** The average of two numbers is equal to the sum of the numbers divided by two, or multiplied by  $\frac{1}{2}$ . Therefore,  $\frac{1}{2}(b_1 + b_2)$  represents the average of the bases of the trapezoid. Plug in 16 for  $\frac{1}{2}(b_1 + b_2)$  and 9 for  $h$  in the given equation and solve for  $A$ :  $A = 16 \cdot 9 \rightarrow A = 144 \text{ ft}^2$ .

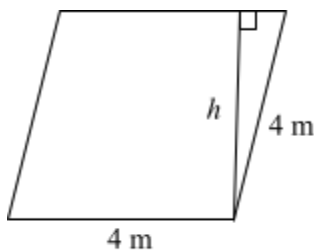
12. **Answer choice (C) is correct.** Since the problem does not tell us the original length and width of the rectangle, we can choose our own numbers. Let the length and width both equal 10, so the area is 100. Increase the length and width by 10%, so the length and width are now 11 and the area is now 121. The percent increase from 100 to 121 is 21%.
13. **Answer choice (C) is correct.** To find the smallest possible perimeter, we want to get as close to a square as possible. With an area of  $30 \text{ cm}^2$ , the closest we can get to a square is 5 cm by 6 cm, so the perimeter is  $5 + 5 + 6 + 6 = 22 \text{ cm}$ .
14. **Answer choice (B) is correct.**  $1 \text{ km} = 1,000 \text{ m}$ . Find the area of the larger square by squaring the side length:  $1,000^2 = 1,000,000$ . Find the area of the smaller square by squaring the side length:  $10^2 = 100$ . Find the number of smaller squares that can be cut from the larger square by dividing the area of the larger square by the area of the smaller square:  $1,000,000 \div 100 = 10,000$ .
15. **Answer choice (B) is correct.** To make the smallest possible area, we want to make one dimension equal to 1 meter. This means the other dimension is 11 meters because  $1 + 1 + 11 + 11$  equals a perimeter of 24 meters. Therefore, the area is  $11 \cdot 1 = 11$  square meters.
16. **Answer choice (B) is correct.** Plug 150 in for  $A$ , 25 for  $b_1$  and 35 for  $b_2$  in the given equation and solve for  $h$ :  $150 = \frac{1}{2}(25 + 35) \cdot h \rightarrow 150 = \frac{1}{2}(60) \cdot h \rightarrow 150 = 30h \rightarrow h = 5 \text{ in}$ .
17. **Answer choice (C) is correct.** Since the problem does not tell us the original length and width of the triangle, we can choose our own numbers. Let the length and width both equal 10, so the area is 50 ( $A = \frac{1}{2}bh$ ). Increase the length by 20%, so the new length is 12. Decrease the width by 20%, so the new width is 8. Therefore, the new area is 48 ( $A = \frac{1}{2}bh$ ). The percent change from 50 to 48 is a 4% decrease.
18. **Answer choice (A) is correct.** The area of a square is equal to the side length squared. Therefore, the side length of square A is 3 inches because  $3^2 = 9$ , and the area of square B is 9 inches because  $9^2 = 81$ . The ratio of the side length of square A to the side length of square B is 3:9 which simplifies to 1:3.
19. **Answer choice (D) is correct.** The perimeter of the irregular shapes is equal to the perimeter of a rectangle with a width of 14 m and a length of 30 m (all of the horizontal lines on the top of the shape add up to 30 m, and all of the vertical lines on the right side of the shape add up to 14 m). Therefore, the perimeter equals  $14 + 14 + 30 + 30 = 88 \text{ m}$ .
20. **Answer choice (B) is correct.** First find the missing dimensions using the knowledge that the top three horizontal lines add up to 30m, and the right three vertical lines add up to 14 m. Therefore, the top right horizontal line is 10 m, and the top left vertical line is 6 m. Divide the shape into three rectangles by drawing two vertical lines. The area of the right rectangle is  $8 \cdot 14 = 112 \text{ m}^2$ . The area of the middle rectangle is  $12 \cdot 8 = 96 \text{ m}^2$ . The area of the left rectangle is  $10 \cdot 4 = 40 \text{ m}^2$ . Add up the three areas to find the total area:  $112 \text{ m}^2 + 96 \text{ m}^2 + 40 \text{ m}^2 = 248 \text{ m}^2$ .

## Area and Perimeter Practice Set 2

1. **Answer choice (D) is correct.** The area of a square is equal to the side length squared. Therefore, if the area of a square is  $64 \text{ in}^2$ , the side length is 8 in because  $8^2 = 64$ . Find the perimeter by multiplying the side length by 4:  $8 \text{ in} \cdot 4 = 32 \text{ in}$ .
2. **Answer choice (C) is correct.** Since the triangle is isosceles and right, both legs are congruent (equal). The legs of a right triangle represent the base and height, so the triangle has a base of 6 inches and a height of 6 inches. The formula for the area of a triangle is  $A = \frac{1}{2}bh$ . Plug in 6 in for  $b$  and 6 in for  $h$  and solve for  $A$ :  $A = \frac{1}{2}(6 \text{ in})(6 \text{ in}) \rightarrow A = 18 \text{ in}^2$ .
3. **Answer choice (B) is correct.** An equilateral triangle is a triangle with three equal sides. Therefore, we can find the side length of the equilateral triangle by dividing the perimeter by 3:  $48 \text{ ft} \div 3 = 16 \text{ ft}$ .
4. **Answer choice (C) is correct.** First find the area of the floor by multiplying the length by the width:  $14 \text{ ft} \cdot 16 \text{ ft} = 224 \text{ ft}^2$ . Now find the area of each square tile. Since the perimeter of a square is equal to four times the side length, we can find the side length of each square tile by dividing the perimeter by 4:  $8 \text{ ft} \div 4 = 2 \text{ ft}$ . The area of a square is equal to the side length squared, so find the area of the square tile by squaring the side length:  $(2 \text{ ft})^2 = 4 \text{ ft}^2$ . To find the number of tiles Teddy needs to cover his kitchen floor, divide the area of the floor by the area of each tile:  $224 \text{ ft}^2 \div 4 \text{ ft}^2 = 56$  tiles.
5. **Answer choice (A) is correct.** Use the given equation and plug 8 cm in for  $b_1$ , 12 cm in for  $b_2$ , and 6 cm in for  $h$  and simplify to find the area:  $\text{Area} = \frac{1}{2}(8 \text{ cm} + 12 \text{ cm})(6 \text{ cm}) \rightarrow \text{Area} = \frac{1}{2}(20 \text{ cm})(6 \text{ cm}) \rightarrow \text{Area} = 60 \text{ cm}^2$ .
6. **Answer choice (C) is correct.** The formula for the area of a triangle is  $A = \frac{1}{2}bh$ . Plug in  $21 \text{ in}^2$  for  $A$  and 7 in for  $b$  and solve for  $h$ :  $21 \text{ in}^2 = \frac{1}{2}(7 \text{ in})(h) \rightarrow 21 \text{ in}^2 = (3.5 \text{ in})h \rightarrow h = 6 \text{ in}$ .
7. **Answer choice (C) is correct.** The area of a rectangle is equal to the length multiplied by the width, so we need to think of two numbers that multiply to 32 where one number is twice the other. To do this, write down the factor pairs of 32: 1 and 32, 2 and 16, 4 and 8. Since  $4 \cdot 8 = 32$  and 8 is twice 4, the dimensions of the rectangle are 4 meters and 8 meters. Now find the perimeter by adding up all four sides:  $4 \text{ m} + 4 \text{ m} + 8 \text{ m} + 8 \text{ m} = 24 \text{ m}$ .
8. **Answer choice (D) is correct.** Since we only know the difference between the two bases, we cannot find the area because we need to know the sum of the two bases. You can prove this by looking at the sum of various number pairs with a difference of 2: 6 and 4 have a difference of 2 and a sum of 10, but 12 and 10 also have a difference of 2 but have a sum of 22. Therefore, depending on which two numbers we choose, we will get a different sum for the bases, which will result in a different area of the trapezoid.
9. **Answer choice (D) is correct.** Since we are looking for how many square feet each roll of wallpaper covers, we need to change the given dimensions into feet before finding the area of each wall. There are 3 feet in 1 yard, so convert the dimensions into feet by multiplying the given dimensions by 3:  $3 \cdot$

$3 = 9$  feet,  $4 \cdot 3 = 12$  feet,  $6 \cdot 3 = 18$  feet. Find the area of each wall measuring 3 yards (9 feet) by 4 yards (12 feet) by multiplying the dimensions:  $9 \text{ ft} \cdot 12 \text{ ft} = 108 \text{ ft}^2$ . Find the area of each wall measuring 6 yards (18 feet) by 4 yards (12 feet) by multiplying the dimensions:  $18 \text{ ft} \cdot 12 \text{ ft} = 216 \text{ ft}^2$ . Now find the total area of all four walls:  $108 \text{ ft}^2 + 108 \text{ ft}^2 + 216 \text{ ft}^2 + 216 \text{ ft}^2 = 648 \text{ ft}^2$ . Finally, find the number of square feet each roll of wallpaper can cover by dividing the total area of the walls by the number of rolls of wallpaper Joy used to cover the walls:  $648 \text{ ft}^2 \div 12 = 54 \text{ ft}^2$ .

10. **Answer choice (D) is correct.** The perimeter of a rectangle is equal to the sum of all four sides:  $P = 2l + 2w$ . Plug in 40 for  $P$  and 8 for  $w$  and solve for  $l$ :  $40 = 2l + 2(8) \rightarrow 40 = 2l + 16 \rightarrow 24 = 2l \rightarrow l = 12$  m. Find the area by multiplying the length by the width:  $8 \cdot 12 = 96 \text{ cm}^2$ .
11. **Answer choice (A) is correct.** The area of a rhombus is equal to the base multiplied by the height. A rhombus has four equal sides, so the bottom side of the rhombus is 4 m. If you draw the height of the rhombus from the bottom right corner of the rhombus, you will create a right triangle, as shown below. Since the right side of the rhombus is the hypotenuse of the right triangle, it is longer than  $h$ . Therefore, since  $h$  is less than 4, the area of the rhombus is less than  $4 \cdot 4$  which is 16, so the area is less than 16 square meters.



12. **Answer choice (D) is correct.** Since the problem does not tell us the original side length of the square, we can choose our own number. Let the side length of the original square equal 10, so the area is 100 ( $A = s^2$ ). Increase the side length by 20%, so the new side length is 12. Therefore, the new area is  $12^2 = 144$ . The percent change from 100 to 144 is 44%.
13. **Answer choice (C) is correct.** There are 100 cm in 1 m, so 2 m equals 200 cm. Find the area of Lisa's ribbon by multiplying 200 cm by 2 cm:  $200 \text{ cm} \cdot 2 \text{ cm} = 400 \text{ cm}^2$ . Find the area of each square Lisa wants to cut by multiplying 2 cm by 2 cm:  $2 \text{ cm} \cdot 2 \text{ cm} = 4 \text{ cm}^2$ . Find the number of squares Lisa can cut by dividing the area of the ribbon by the area of each square:  $400 \text{ cm}^2 \div 4 \text{ cm}^2 = 100$  squares.
14. **Answer choice (C) is correct.** To find the smallest possible perimeter, we want to make as skinny of a rectangle as possible. With an area of  $56 \text{ m}^2$ , the skinniest rectangle we can make if all sides are integers is a rectangle measuring 1 m by 56 m. The perimeter equals all four sides added together:  $1 \text{ m} + 1 \text{ m} + 56 \text{ m} + 56 \text{ m} = 114 \text{ m}$ .
15. **Answer choice (C) is correct.** To find the largest possible area, we want to get as close to a square as possible. With a perimeter of 36 meters, we can create a 9 meter by 9 meter square. The area is equal to the length times the width:  $9 \text{ m} \cdot 9 \text{ m} = 81 \text{ m}^2$ .

16. **Answer choice (A) is correct.** The formula for the area of a parallelogram is  $A = bh$ , so plug in 12 inches for  $b$  and 48 for  $A$  and solve for  $h$ :  $48 = 12h \rightarrow h = 4$  inches.
17. **Answer choice (A) is correct.** Since the problem does not tell us the original length and width of the rectangle, we can choose our own numbers. Let the length and width each equal 10, so the original area is 100. Increase the length by 20% to get 12, and decrease the width by 40% to get 6, so the new area is 72. The percent change from 100 to 72 is a 28% decrease.
18. **Answer choice (D) is correct.** We need to find an answer choice with an area of 60 square inches, so we can eliminate answer choice (C) because  $12 \text{ in} \cdot 20 \text{ in} = 240$  square inches. We also need to find an answer choice with a length to width ratio of 5:3. The length to width ratio in answer choice (A) is 30:2 which simplifies to 15:1, so answer choice (A) is incorrect. The length to width ratio in answer choice (B) is 15:4, so answer choice (B) is incorrect. The length to width ratio in answer choice (D) is 10:6 which simplifies to 5:3, and the area of answer choice (D) is 60 square inches because  $6 \text{ in} \cdot 10 \text{ in} = 60$  square inches, so answer choice (D) is correct.
19. **Answer choice (D) is correct.** The perimeter of the shape is equal to the sum of all the sides. The left and right side are both 10 cm, the bottom side is 12 cm, and the sum of the three horizontal lines on the top is 12 cm, so the missing horizontal line measures 4 cm. The second and third vertical lines each measure 7 cm. Therefore, the perimeter is equal to  $10 \text{ cm} + 10 \text{ cm} + 12 \text{ cm} + 5 \text{ cm} + 4 \text{ cm} + 3 \text{ cm} + 7 \text{ cm} + 7 \text{ cm}$  which equals 58 cm.
20. **Answer choice (C) is correct.** Draw a horizontal line across the top of the figure. You now have a larger, outer rectangle measuring 10 cm by 12 cm, and a smaller, inner rectangle measuring 7 cm by 4 cm (from previous problem). The area of the original figure is equal to the area of the outer rectangle minus the area of the smaller rectangle:  $12 \text{ cm} \cdot 10 \text{ cm} - 7 \text{ cm} \cdot 4 \text{ cm} = 120 \text{ cm}^2 - 28 \text{ cm}^2 = 92 \text{ cm}^2$ .

### **Circles Practice Set 1**

1. **Answer choice (B) is correct.** The central angles of a circle add up to  $360^\circ$ , so set up and solve the following equation:  $85 + 165 + x = 360 \rightarrow 250 + x = 360 \rightarrow x = 110$ .
2. **Answer choice (C) is correct.** The equation for the circumference of a circle is  $C = 2\pi r$ , where  $r$  is the radius of the circle. Plug in 3 m for  $r$  to find the circumference:  $C = 2\pi \cdot 3 \rightarrow C = 6\pi$  m.
3. **Answer choice (B) is correct.** The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. The diameter of the circle is 10 cm, so the radius is 5 cm. Plug in 5 cm for  $r$  to find the area:  $A = \pi \cdot 5^2 \rightarrow A = 25\pi \text{ cm}^2$ .
4. **Answer choice (C) is correct.** The central angles of a circle add up to  $360^\circ$ . Since all five slices are equal, divide  $360^\circ$  by five to find the measure of the central angle of each slice:  $360^\circ \div 5 = 72^\circ$ .

5. **Answer choice (B) is correct.** The equation for the circumference of a circle is  $C = 2\pi r$ , where  $r$  is the radius of the circle. Find the radius of the circle by plugging in  $9\pi$  ft for  $C$  and solving for  $r$ :  $9\pi = 2\pi r \rightarrow r = 4.5$  ft.
6. **Answer choice (B) is correct.** The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Find the radius of the circle by plugging in  $121\pi$  cm<sup>2</sup> for  $A$  and solving for  $r$ :  $121\pi = \pi r^2 \rightarrow 121 = r^2 \rightarrow r = 11$  cm. Multiply the radius by two to get a diameter of 22 cm.
7. **Answer choice (D) is correct.** The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Plug in 20 inches for  $r$  to find the area:  $A = \pi \cdot 20^2 \rightarrow A = 400\pi$  in<sup>2</sup>.
8. **Answer choice (A) is correct.** The equation for the circumference of a circle is  $C = 2\pi r$  or  $C = \pi d$ , where  $r$  is the radius of the circle and  $d$  is the diameter of the circle. Plug in 13 yd for  $d$  in the second equation to find the circumference:  $C = \pi \cdot 13 \rightarrow C = 13\pi$  yd.
9. **Answer choice (B) is correct.** The equation for the circumference of a circle is  $C = 2\pi r$ , where  $r$  is the radius of the circle. Find the radius of the circle by plugging in  $4\pi$  ft for  $C$  and solving for  $r$ :  $4\pi = 2\pi r \rightarrow r = 2$  ft. The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Plug in 2 ft for  $r$  to find the area:  $A = \pi \cdot 2^2 \rightarrow A = 4\pi$  ft<sup>2</sup>.
10. **Answer choice (C) is correct.** The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Find the radius of the circle by plugging in  $36\pi$  in<sup>2</sup> for  $A$  and solving for  $r$ :  $36\pi = \pi r^2 \rightarrow 36 = r^2 \rightarrow r = 6$  in. The equation for the circumference of a circle is  $C = 2\pi r$ , where  $r$  is the radius of the circle. Plug in 6 inches for  $r$  to find the circumference:  $C = 2\pi \cdot 6 \rightarrow C = 12\pi$  inches.
11. **Answer choice (B) is correct.** To find the perimeter of a semicircle with a diameter of 10 cm, add the diameter of the semicircle to half of the circumference of a circle with a diameter of 10 cm. The equation for the circumference of a circle is  $C = 2\pi r$  or  $C = \pi d$ , where  $r$  is the radius of the circle and  $d$  is the diameter of the circle, so the circumference of a circle with a diameter of 10 cm is  $10\pi$  cm. Half of that circumference is  $5\pi$  cm, so the perimeter of the semicircle is  $5\pi + 10$  cm.
12. **Answer choice (D) is correct.** The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Therefore, the area of a circle with a radius of 2 inches is  $4\pi$  in<sup>2</sup>, and the area of a circle with a radius of 8 inches is  $64\pi$  in<sup>2</sup>. The ratio of  $4\pi$  to  $64\pi$  simplifies to 1 to 16.
13. **Answer choice (C) is correct.** There are  $360^\circ$  in a circle. Since the central angle of the shaded region is  $120^\circ$ , the fraction of the circle represented by the shaded region is  $\frac{120}{360}$  which simplifies to  $\frac{1}{3}$ .
14. **Answer choice (C) is correct.** To find the area of a quarter circle with a radius of 8 feet, find the area of a circle with a radius of 8 feet and divide the area by 4. The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Therefore, the area of a circle with a radius of 8 feet is  $64\pi$  ft<sup>2</sup>. Divide this by 4 to get an area of  $16\pi$  ft<sup>2</sup>.

15. **Answer choice (C) is correct.** There are  $360^\circ$  in a circle. Since the shaded region takes up 20% of the circle, we can find the value of  $x$  by finding 20% of  $360^\circ$ :  $20\%$  of  $360^\circ = 0.2 \cdot 360 = 72^\circ$ . Therefore,  $x = 72$ .

### Circles Practice Set 2

1. **Answer choice (C) is correct.** The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. The diameter of the circle is 12 mm, so the radius is 6 mm. Plug in 6 mm for  $r$  to find the area:  $A = \pi \cdot 6^2 \rightarrow A = 36\pi \text{ mm}^2$ .
2. **Answer choice (C) is correct.** The central angles of a circle add up to  $360^\circ$ . Since the measure of the central angle of each slice is  $60^\circ$ , we can find the number of slices by dividing  $360^\circ$  by  $60^\circ$ :  $360^\circ \div 60^\circ = 6$  slices.
3. **Answer choice (B) is correct.** The central angles of a circle add up to  $360^\circ$ , so we set up and solve the following equation:  $110 + 90 + 65 + x = 360 \rightarrow 265 + x = 360 \rightarrow x = 95$ .
4. **Answer choice (C) is correct.** The equation for the circumference of a circle is  $C = 2\pi r$ , where  $r$  is the radius of the circle. Plug in 7 in for  $r$  to find the circumference:  $C = 2\pi \cdot 7 \rightarrow C = 14\pi$  in.
5. **Answer choice (A) is correct.** The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Find the radius of the circle by plugging in  $64\pi \text{ cm}^2$  for  $A$  and solving for  $r$ :  $64\pi = \pi r^2 \rightarrow 64 = r^2 \rightarrow r = 8 \text{ cm}$ .
6. **Answer choice (D) is correct.** The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Plug in 12 in for  $r$  to find the area:  $A = \pi \cdot 12^2 \rightarrow A = 144\pi \text{ in}^2$ .
7. **Answer choice (B) is correct.** The equation for the circumference of a circle is  $C = 2\pi r$  or  $C = \pi d$ , where  $r$  is the radius of the circle and  $d$  is the diameter of the circle. Plug in 30 m for  $d$  in the second equation to find the circumference:  $C = \pi \cdot 30 \rightarrow C = 30\pi \text{ m}$ .
8. **Answer choice (B) is correct.** The equation for the circumference of a circle is  $C = 2\pi r$  or  $C = \pi d$ , where  $r$  is the radius of the circle and  $d$  is the diameter of the circle. Using the second equation, plug in  $15\pi \text{ ft}$  for  $C$  and solve for  $d$ :  $15\pi = \pi d \rightarrow d = 15 \text{ ft}$ .
9. **Answer choice (D) is correct.** The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Find the radius of the circle by plugging in  $81\pi \text{ ft}^2$  for  $A$  and solving for  $r$ :  $81\pi = \pi r^2 \rightarrow 81 = r^2 \rightarrow r = 9 \text{ ft}$ . The equation for the circumference of a circle is  $C = 2\pi r$ , where  $r$  is the radius of the circle. Plug in 9 ft for  $r$  to find the circumference:  $C = 2\pi \cdot 9 \rightarrow C = 18\pi \text{ ft}$ .
10. **Answer choice (B) is correct.** The equation for the circumference of a circle is  $C = 2\pi r$ , where  $r$  is the radius of the circle. Find the radius of the circle by plugging in  $16\pi \text{ m}$  for  $C$  and solving for  $r$ :  $16\pi = 2\pi r \rightarrow r = 8 \text{ m}$ . The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Plug in 8 m for  $r$  to find the area:  $A = \pi \cdot 8^2 \rightarrow A = 64\pi \text{ m}^2$ .



11. **Answer choice (C) is correct.** To find the area of a semicircle with a diameter of 12 cm, find the area of a circle with a diameter of 12 cm and divide the area by 2. The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Since the diameter of the circle is 12 cm, the radius is 6 cm. Plug in 6 cm for  $r$  to find the area of the circle:  $A = \pi(6)^2 \rightarrow A = 36\pi \text{ cm}^2$ . Divide this by 2 to get an area of  $18\pi \text{ cm}^2$ .
12. **Answer choice (A) is correct.** The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Therefore, the radius of a circle with an area of  $16\pi \text{ cm}^2$  is 4 cm, and the radius of a circle with an area of  $64\pi \text{ cm}^2$  is 8 cm. The ratio of 4 to 8 simplifies to 1 to 2.
13. **Answer choice (C) is correct.** To find the perimeter of a quarter circle with a radius of 4 inches, add one-fourth of the circumference of a circle with a radius of 4 inches to twice the radius. The equation for the circumference of a circle is  $C = 2\pi r$  or  $C = \pi d$ , where  $r$  is the radius of the circle and  $d$  is the diameter of the circle, so the circumference of a circle with a radius of 4 in is  $8\pi$  in. One fourth of that circumference is  $2\pi$  in. Add this to twice the radius to find the perimeter of the quarter circle:  $2\pi \text{ in} + 2(4 \text{ in}) = 2\pi + 8 \text{ in}$ .
14. **Answer choice (A) is correct.** There are  $360^\circ$  in a circle. Since the central angle of the shaded region is  $36^\circ$ , the fraction of the circle represented by the shaded region is  $\frac{36}{360}$  which simplifies to  $\frac{1}{10}$ . To change  $\frac{1}{10}$  into a percent, divide the numerator by the denominator to get 10%.
15. **Answer choice (B) is correct.** There are  $360^\circ$  in a circle. Since the shaded region takes up  $\frac{1}{12}$  of the circle, we can find the value of  $x$  by finding  $\frac{1}{12}$  of  $360^\circ$ :  $\frac{1}{12}$  of  $360^\circ = 30^\circ$ . Therefore,  $x = 30$ .

### Shaded and Composite Area Practice Set 1

1. **Answer choice (B) is correct.** There are 14 fully-shaded squares and 4 half-shaded squares. The 4 half-shaded squares represent 2 fully-shaded squares, so in total, there are 16 fully-shaded squares. Since the area of each square is 1 unit<sup>2</sup>, the shaded area is 16 unit<sup>2</sup>.
2. **Answer choice (B) is correct.** The area of the shaded region equals the area of the outer rectangle minus the area of the white triangle. The area of the outer rectangle equals  $9 \text{ ft} \cdot 14 \text{ ft} = 126 \text{ ft}^2$ . The area of the inner rectangle equals  $\frac{1}{2} \cdot 9 \text{ ft} \cdot 14 \text{ ft} = 63 \text{ ft}^2$ . Therefore, the area of the shaded region equals  $126 \text{ ft}^2 - 63 \text{ ft}^2 = 63 \text{ ft}^2$ .
3. **Answer choice (B) is correct.** The diameter of the circle equals the side length of the square. Therefore, the area of the square equals  $(10 \text{ cm})^2 = 100 \text{ cm}^2$ . The diameter of the circle is 10 cm, so the radius is 5 cm. The area of the half circle equals  $\frac{1}{2} \pi r^2 = \frac{1}{2} \pi (5 \text{ cm})^2 = \frac{1}{2} \pi \cdot 25 \text{ cm}^2 = 12.5\pi \text{ cm}^2$ . Therefore, the area of the entire shape is  $100 + 12.5\pi \text{ cm}^2$ .

4. **Answer choice (C) is correct.** The side length of each small square is 2 cm, so the area of each small square is  $4 \text{ cm}^2$ . There are 20 shaded squares, so find the area of the shaded region by multiplying the number of shaded squares by the area of each square:  $20 \cdot 4 \text{ cm}^2 = 80 \text{ cm}^2$ .
5. **Answer choice (C) is correct.** 16 triangles make up the entire rectangle. Find the area of each triangle by dividing the total area by 16:  $48 \text{ in}^2 \div 16 = 3 \text{ in}^2$ . Thirteen triangles are unshaded, so the area of the unshaded region equals  $13 \cdot 3 \text{ in}^2 = 39 \text{ in}^2$ .
6. **Answer choice (B) is correct.** The area of the shaded region is equal to the area of the square minus the area of the circle, so we need to find the area of the circle. The area of a square is equal to the side length squared, so if the area of the square is  $36 \text{ in}^2$ , the side length of the square is 6 because  $6^2 = 36$ . Therefore, the radius of the circle is 3 in. Find the area of the circle using the equation  $A = \pi r^2$ :  $A = \pi \cdot 3^2 \rightarrow A = 9\pi \text{ in}^2$ . Therefore, the area of the shaded region equals  $36 - 9\pi \text{ in}^2$ .
7. **Answer choice (A) is correct.** The area of the shaded region is equal to the area of the rectangle minus the area of the three circles, so we need to find the area of the rectangle and the area of the three circles. Since there are three circles inscribed in the rectangle, the diameter of each circle is one-third of 12 mm which is 4 mm, so the radius of each circle is 2 mm. Find the area of each circle using the equation  $A = \pi r^2$ :  $A = \pi \cdot 2^2 \rightarrow A = 4\pi \text{ mm}^2$ . Therefore, the area of all three circles is  $12\pi \text{ mm}^2$ . The width of the rectangle is equal to the diameter of each circle, which is 4 mm, so the area of the rectangle equals  $12 \text{ mm} \cdot 4 \text{ mm} = 48 \text{ mm}^2$ . Therefore, the area of the shaded region equals  $48 - 12\pi \text{ mm}^2$ .
8. **Answer choice (D) is correct.** The area of the shaded region is equal to the area of the outer square minus the area of the small square in the corner. The area of a square is equal to the side squared, so the area of the outer square is  $(2x)^2$  which equals  $4x^2$ . The area of the square cut out from the corner equals  $y^2$ . Therefore, the shaded area equals  $4x^2 - y^2$ .
9. **Answer choice (A) is correct.** The area of the shaded region is equal to the area of the square minus the area of the semicircle. Find the area of the semicircle by finding half of the area of a full circle with a radius of 10 ft:  $A = \frac{1}{2} \pi r^2$ :  $A = \frac{1}{2} \pi \cdot (10 \text{ ft})^2 \rightarrow A = \frac{1}{2} \pi \cdot 100 \text{ ft}^2 \rightarrow A = 50\pi \text{ ft}^2$ . The diameter of the circle is 20 ft, which is equal to the side length of the square, so the area of the square is  $(20 \text{ ft})^2$  which equals  $400 \text{ ft}^2$ . Therefore, the area of the shaded region is  $400 - 50\pi \text{ ft}^2$ .
10. **Answer choice (D) is correct.** The area of the shaded region is equal to the area of the outer square minus the area of the inner, white square. The area of the outer square equals  $(12 \text{ m})^2 = 144 \text{ m}^2$ . The width of the border is 2 m all around, so to find the side length of the inner square, subtract 4 m from the side length of the outer square to get a side length of 8 m. Therefore, the area of the outer square equals  $(8 \text{ m})^2 = 64 \text{ m}^2$ , so the area of the shaded region equals  $144 \text{ m}^2 - 64 \text{ m}^2 = 80 \text{ m}^2$ .

## **Shaded and Composite Area Practice Set 2**

- Answer choice (C) is correct.** There are 5 equal-sized, white slices, so find the area of each slice by dividing the total area of the white region by 4:  $40 \text{ m}^2 \div 5 = 8 \text{ m}^2$ . There are three shaded slices, so find the area of the shaded region by multiplying the area of one slice by 3:  $3 \cdot 8 \text{ m}^2 = 24 \text{ m}^2$ .
- Answer choice (B) is correct.** The area of the shaded region is equal to the area of the square minus the area of the trapezoid. The area of the outer square equals the side length squared:  $\text{Area} = (12 \text{ ft})^2 = 144 \text{ ft}^2$ . To find the area of the trapezoid, we need to find the lengths of the bases and the height. The bottom base and the height equal the side length of the square, so they each measure 12 ft. The top base is one-third of the bottom base: one-third of 12 is 4, so the top base is 4 ft. Plug in 12 ft for  $b_1$ , 4 ft for  $b_2$ , and 12 ft for  $h$  in the given equation to find the area of the trapezoid:  $\text{Area} = \frac{1}{2}(12 + 4)(12) \rightarrow \text{Area} = \frac{1}{2}(16)(12) \rightarrow \text{Area} = 96 \text{ ft}^2$ . Find the area of the shaded region by subtracting the area of the trapezoid from the area of the square:  $144 \text{ ft}^2 - 96 \text{ ft}^2 = 48 \text{ ft}^2$ .
- Answer choice (B) is correct.** If you count up the shaded squares, there are 18 fully-shaded squares and 4 half-shaded squares. 4 half-shaded squares is equal to 2 fully-shaded squares, so there are a total of 20 fully-shaded squares. Find the area of each small square by dividing the total shaded area by 20:  $10 \text{ m}^2 \div 20 = 0.5 \text{ m}^2$ .
- Answer choice (B) is correct.** The area of the shaded figures is equal to the sum of the area of the triangle and the area of the rectangle, so the area of the triangle is equal to the shaded area minus the area of the rectangle. The area of the rectangle is equal to length times width:  $10 \text{ m} \cdot 6 \text{ m} = 60 \text{ m}^2$ . Therefore, the area of the triangle equals  $85 \text{ m}^2 - 60 \text{ m}^2$  which equals  $25 \text{ m}^2$ . The formula for the area of a triangle is  $A = \frac{1}{2}bh$ , where  $b$  is the base of the triangle and  $h$  is the height. Plug in  $25 \text{ m}^2$  for  $A$  and 10 m for  $b$  and solve for the height of the triangle:  $25 = \frac{1}{2}(10)h \rightarrow 25 = 5h \rightarrow h = 5 \text{ m}$ .
- Answer choice (D) is correct.** The area of the shaded region is equal to the area of the outer circle minus the area of the inner circle. The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Therefore, the area of the outer circle is  $121\pi \text{ ft}^2$  and the area of the inner circle is  $64\pi \text{ ft}^2$ . Subtract the areas to find the area of the shaded region:  $121\pi \text{ ft}^2 - 64\pi \text{ ft}^2 = 57 \text{ ft}^2$ .
- Answer choice (A) is correct.** The area of the shaded region is equal to the area of the square minus the area of the white triangle. The area of the square is equal to the side length squared, so the area of the square is equal to  $b^2$ . The area of a triangle is equal to  $\frac{1}{2}bh$ , so the area of the triangle equals  $\frac{1}{2}(2a)(2a)$  which equals  $2a^2$ . Therefore, the area of the shaded region is  $b^2 - 2a^2$ .
- Answer choice (A) is correct.** The perimeter of a square is equal to four times the side length, so if the perimeter of each small square is 4 units, the side length of each small square is 1 unit. The area of a square is equal to the side length squared, so the area of each small square is equal to  $(1 \text{ unit})^2$ , which equals  $1 \text{ unit}^2$ . There are 20 shaded squares, each with an area of  $1 \text{ unit}^2$ , so the area of the shaded region is  $20 \text{ units}^2$ .
- Answer choice (C) is correct.** The area of the shaded region is equal to the area of the square minus the area of the circle. The area of a square is equal to the side length squared. If you draw a diameter through the given radius, you will see that the side length of the square is equal to the diameter of the

circle, which is 10 cm. Therefore, the area of the square is equal to  $(10 \text{ cm})^2$ , which equals  $100 \text{ cm}^2$ . The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle, so the area of the circle equals  $\pi(5 \text{ cm})^2$ , which equals  $25\pi \text{ cm}^2$ . Therefore, the area of the shaded region equals  $100 \text{ cm}^2 - 25\pi \text{ cm}^2$ .

9. **Answer choice (C) is correct.** The area of the shaded region is equal to the area of the outer square minus the area of the two semicircles. Since we have two same-size semicircles, we can treat them like one full circle. The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. The diameter of the semicircles is equal to the side length of the squares, 20 m, so the radius of the semicircle is 10 m. Therefore, the total area of the two semicircles equals  $\pi(10 \text{ m})^2$ , which equals  $100\pi \text{ m}^2$ . The area of the square is equal to the side length squared, so the area of the square is  $400 \text{ m}^2$ . Therefore, the area of the shaded region equals  $400 - 100\pi \text{ m}^2$ .
10. **Answer choice (B) is correct.** The area of the shaded region is equal to the area of the outer square minus the area of the four, same-sized circles. The diameter of each circle is 8 ft, so the radius of each circle is 4 ft. The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle, so the area of each circle is  $\pi(4 \text{ ft})^2$ , which equals  $16\pi \text{ ft}^2$ . Multiply this area by 4 to find the total area of all four circles:  $16\pi \text{ ft}^2 \cdot 4 = 64\pi \text{ ft}^2$ . The side length of the square is equal to twice the diameter of the circles, so the side length is 16 ft. The area of a square is equal to the side length squared, so the area of the square is  $256 \text{ ft}^2$ . Therefore, the area of the shaded region equals  $256 - 64\pi \text{ ft}^2$ .

### Surface Area, Volume, and 3D Figures Practice Set 1

1. **Answer choice (C) is correct.** Use the formula for the volume of a rectangular prism,  $V = lwh$  where  $l$  represents the length of the prism,  $w$  represents the width of the prism, and  $h$  represents the height of the prism:  $V = 12 \cdot 6 \cdot 10 \rightarrow V = 720 \text{ cm}^3$ .
2. **Answer choice (B) is correct.** Find the width of the prism by finding  $\frac{1}{2}$  of 10:  $\frac{1}{2}$  of 10 =  $\frac{1}{2} \cdot 10 = 4 \text{ ft}$ . Use the formula for the surface area of a rectangular prism,  $SA = 2lw + 2lh + 2wh$ , where  $l$  represents the length of the prism,  $w$  represents the width of the prism, and  $h$  represents the height of the prism:  $SA = 2(10)(4) + 2(10)(8) + 2(4)(8) \rightarrow SA = 80 + 160 + 64 \rightarrow SA = 304 \text{ ft}^2$ .
3. **Answer choice (A) is correct.** The formula for the surface area of a cube is  $SA = 6s^2$ , where  $s$  is the side length of the cube. Find the side length of the cube by plugging  $54 \text{ cm}^2$  in for the surface area in the equation and solving for  $s$ :  $54 = 6s^2 \rightarrow s^2 = 9 \rightarrow s = 3 \text{ cm}$ .
4. **Answer choice (D) is correct.** The formula for the volume of a cube is  $V = s^3$ , where  $s$  is the side length of the cube. Find the side length of the cube by plugging  $64 \text{ ft}^3$  in for the volume in the equation and solving for  $s$ :  $64 \text{ ft}^3 = s^3 \rightarrow s = 4 \text{ ft}$ . The formula for the surface area of a cube is  $SA = 6s^2$ , where  $s$  is the side length of the cube. Plug in 4 ft for  $s$  to find the surface area:  $SA = 6(4^2) \rightarrow SA = 6(16) \rightarrow SA = 96 \text{ ft}^2$ .

5. **Answer choice (A) is correct.** All cubes are similar. The ratio of the volume of two similar figures is equal to the ratio of the side lengths cubed. Therefore, the ratio of the side length of Cube A to Cube B is 1:2 because  $(1:2)^3 = 1:8$ , which is the ratio of the volumes.
6. **Answer choice (A) is correct.** The net shows two faces that are regular pentagons connected by five rectangles. Answer choice (A) is the only choice with a pentagon, so answer choice (A) is correct.
7. **Answer choice (C) is correct.** To find the surface area of a shape from a net, find the area of each face of the figure and add up the areas. The area of the top rectangle is  $5 \cdot 12 = 60$  units<sup>2</sup>. The area of the middle rectangle is  $4 \cdot 12 = 48$  units<sup>2</sup>. The area of the bottom rectangle is  $3 \cdot 12 = 36$  units<sup>2</sup>. The area of the left rectangle is  $\frac{1}{2} \cdot 3 \cdot 4 = 6$  units<sup>2</sup>. The area of the right rectangle is also  $\frac{1}{2} \cdot 3 \cdot 4 = 6$  units<sup>2</sup>. Therefore, the surface area equals  $60 + 48 + 36 + 6 + 6 = 156$  units<sup>2</sup>.
8. **Answer choice (A) is correct.** The net represents a triangular prism. To find the area of a triangular prism, multiply the area of the triangular base by the length of the prism (the distance between the two triangular faces). The area of the triangular base is  $\frac{1}{2} \cdot 3 \cdot 4 = 6$  units<sup>2</sup>, and the length of the prism is 12 units, so the volume is  $6 \cdot 12 = 72$  units<sup>3</sup>.
9. **Answer choice (A) is correct.** The formula for the volume of a triangular prism is  $V = Bh$  where  $B$  represents the area of the base and  $h$  represents the height of the prism. Plug in  $180 \text{ cm}^3$  for  $V$  and  $30 \text{ cm}^2$  for  $B$  and solve for  $h$ :  $180 = 30h \rightarrow h = 6 \text{ cm}$ .
10. **Answer choice (C) is correct.** The radius of a sphere is half of the diameter, so the radius of the sphere is 3 inches. Plug in 3 for  $r$  in the given equation and simplify to find the volume,  $V$ :  $V = \frac{4}{3}\pi(3)^3 \rightarrow V = \frac{4}{3}\pi(27) \rightarrow V = 36\pi \text{ in}^3$ .
11. **Answer choice (B) is correct.** Each dimension of the larger cube is 6 small cubes in length. Therefore, the total number of small cubes used to make the larger cube equals  $6 \cdot 6 \cdot 6$  which equals 216 cubes.
12. **Answer choice (C) is correct.** The formula for the volume of a cube is  $V = s^3$ . Find the volume of the large cube:  $V = (8 \text{ in})^3 = 512 \text{ in}^3$ . Find the volume of the small cube:  $V = (2 \text{ in})^3 = 8 \text{ in}^3$ . Divide the volume of the large cube by the volume of the small cube to find the number of small cubes that can fit inside the large cube:  $512 \text{ in}^3 \div 8 \text{ in}^3 = 64$  cubes.
13. **Answer choice (C) is correct.** The large cube is made up of 27 smaller cubes. Find the volume of each smaller cube by dividing the volume of the larger cube by 27:  $(18 \text{ mm}^3) \div 27 = \frac{2}{3} \text{ mm}^3$ .
14. **Answer choice (B) is correct.** The formula for the surface area of a cube is  $SA = 6s^2$ , where  $s$  is the side length of the cube. Find the surface area of the smaller cube by plugging in 1 km for  $s$ :  $SA = 6(1)^2 \rightarrow SA = 6 \text{ km}^2$ . Find the surface area of the larger cube by plugging in 2 km for  $s$ :  $SA = 6(2)^2 \rightarrow SA = 24 \text{ km}^2$ . Therefore, the ratio of the surface area of the smaller cube to the surface area of the larger cube is 6:24 which simplifies to 1:4.

15. **Answer choice (A) is correct.** The radius of a cylinder is half of the diameter, so the radius of the given cylinder is 2 cm. Find the surface area by plugging in 2 for  $r$  and 6 for  $h$  in the given equation and simplifying:  $SA = 2\pi(2)^2 + 2\pi(2)(6) \rightarrow SA = 2\pi(4) + 24\pi \rightarrow SA = 8\pi + 24\pi \rightarrow SA = 32\pi \text{ cm}^2$ .
16. **Answer choice (C) is correct.** Find the radius by finding  $\frac{2}{3}$  of 15 m:  $\frac{2}{3}$  of 15 =  $\frac{2}{3} \cdot 15 = 10$  m. Find the volume of the cone by plugging in 10 for  $r$  and 15 for  $h$  in the given equation and simplifying:  $V = \frac{1}{3}\pi(10)^2(15) \rightarrow V = \frac{1}{3}\pi(100)(15) \rightarrow V = 500\pi \text{ m}^3$ .
17. **Answer choice (C) is correct.** The bottom row of the figure measures 4 cubes by 4 cubes, so it is made up of 16 cubes. The second row of the figure is missing 5 cubes, so it is made up of 11 cubes. The third row of the figure is missing 9 cubes, so it is made up of 7 cubes. Therefore, the total number of cubes in the figure equals  $16 + 11 + 7 = 34$ .
18. **Answer choice (B) is correct.** Since 3 ft by 3 ft squares are cut from all four corners of the rectangle, the new width is  $12 \text{ ft} - 3 \text{ ft} - 3 \text{ ft} = 6 \text{ ft}$  and the new length is  $20 \text{ ft} - 3 \text{ ft} - 3 \text{ ft} = 14 \text{ ft}$ . Once the box is folded into a rectangular prism, the height will equal the side length of the square cut out, so the height is 3 ft. The volume of a rectangular prism can be found using the formula  $V = lwh$ , where  $l$  represents the length of the prism,  $w$  represents the width of the prism, and  $h$  represents the height of the prism. Plug in 6 ft for  $w$ , 14 ft for  $l$  and 3 ft for  $h$  and simplify to find the volume:  $V = 14 \cdot 6 \cdot 3 \rightarrow V = 252 \text{ ft}^3$ .
19. **Answer choice (A) is correct.** Plug in  $80\pi \text{ m}^3$  for  $V$  and 4 m for  $r$  in the given equation and solve for  $h$ :  $80\pi = \pi(4)^2h \rightarrow 80\pi = \pi(16)h \rightarrow h = 5 \text{ m}$ .
20. **Answer choice (C) is correct.** The tick marks show that 4 small cubes can fit along one side of the larger cube. Therefore, to find the total number of small cubes that can fit inside the larger cube, multiply  $4 \cdot 4 \cdot 4$  to get 64. Since the volume of each small cube is 2 units<sup>3</sup>, find the volume of the larger cube by multiplying 2 units<sup>3</sup> by 64 to get 128 units<sup>3</sup>.

### Surface Area, Volume, and 3D Figures Practice Set 2

1. **Answer choice (B) is correct.** Use the formula for the surface area of a rectangular prism,  $SA = 2lw + 2lh + 2wh$ , where  $l$  represents the length of the prism,  $w$  represents the width of the prism, and  $h$  represents the height of the prism:  $SA = 2(20)(4) + 2(20)(6) + 2(4)(6) \rightarrow SA = 160 + 240 + 48 \rightarrow SA = 448 \text{ in}^2$ .
2. **Answer choice (C) is correct.** The volume of a rectangular prism can be found using the formula  $V = lwh$  where  $l$  represents the length of the prism,  $w$  represents the width of the prism, and  $h$  represents the height of the prism. The problem told us that the area of the square base is  $64 \text{ m}^2$ , and the height of the prism is 15 m, so we know that the length multiplied by the width, or  $lw$ , is equal to  $64 \text{ m}^2$ . Therefore, we can find the volume by plugging in  $64 \text{ m}^2$  for  $lw$  and 15 m for  $h$  and simplifying to find  $V$ :  $V = (64 \text{ m}^2)(15 \text{ m}) \rightarrow V = 960 \text{ m}^3$ .

3. **Answer choice (B) is correct.** The formula for the volume of a cube is  $V = s^3$ , where  $s$  is the side length of the cube. Find the side length of the cube by plugging  $512 \text{ in}^3$  in for the volume in the equation and solving for  $s$ :  $512 \text{ in}^3 = s^3 \rightarrow s = 8 \text{ in}$ .
4. **Answer choice (C) is correct.** The formula for the surface area of a cube is  $SA = 6s^2$ , where  $s$  is the side length of the cube. First find the side length of the cube by plugging  $150 \text{ ft}^2$  in for the surface area in the equation and solving for  $s$ :  $150 = 6s^2 \rightarrow s^2 = 25 \rightarrow s = 5 \text{ ft}$ . Now find the volume by using the formula for the volume of a cube,  $V = s^3$ , where  $s$  is the side length of the cube:  $V = (5 \text{ ft})^3 \rightarrow V = 125 \text{ ft}^3$ .
5. **Answer choice (B) is correct.** All cubes are similar. The ratio of the surface area of two similar figures is equal to the ratio of the side lengths squared. Therefore, the ratio of the side length of Cube A to Cube B is 1:8 because  $(1:8)^2 = 1:64$ , which is the ratio of the surface areas.
6. **Answer choice (D) is correct.** The polyhedron shown is a triangular prism: it has three rectangular faces and two congruent triangular bases. Answer choices (A) and (B) do not have three rectangular faces and two triangular bases, so answer choices (A) and (B) are incorrect. Answer choices (C) and (D) are both nets for triangular prisms, and they each have three rectangular faces and two triangular bases. However, answer choice (C) shows two right triangles as the bases, but the given polyhedron does not have right triangles as bases, so answer choice (C) is incorrect. We are left with answer choice (D) as the correct answer.
7. **Answer choice (A) is correct.** To find the surface area of a shape from a net, find the area of each face of the figure and add up the areas. Each triangle is congruent, or equal, so we can find the area of one triangle and multiply it by four. The area of one of the triangle is  $\frac{1}{2} \cdot 4 \cdot 5 = 10 \text{ units}^2$ , so the area of all four triangles equals  $40 \text{ units}^2$ . The area of the square in the middle is  $4 \cdot 4 = 16 \text{ units}^2$ . Find the surface area by finding the sum of the areas:  $40 \text{ units}^2 + 16 \text{ units}^2 = 56 \text{ units}^2$ .
8. **Answer choice (D) is correct.** The net shown is a square pyramid. A square pyramid has a square base and four triangular faces.
9. **Answer choice (B) is correct.** The formula for the volume of a triangular prism is  $V = Bh$  where  $B$  represents the area of the base and  $h$  represents the height of the prism. Plug in  $360 \text{ ft}^3$  for  $V$  and  $18 \text{ ft}$  for  $h$  and solve for  $B$ :  $360 = B \cdot 18 \rightarrow B = 20 \text{ ft}^2$ .
10. **Answer choice (C) is correct.** The radius of a cone is half of the diameter, so the radius of the given cone is 6 inches. Plug in 6 inches for  $r$  and 10 for  $h$  in the given equation and simplify to find the volume,  $V$ :  $V = \frac{1}{3} \pi (6)^2 (10) \rightarrow V = \frac{1}{3} \pi (36)(10) \rightarrow V = 120\pi \text{ in}^3$ .
11. **Answer choice (C) is correct.** Each dimension of the larger cube is 4 small cubes in length. Therefore, the total number of small cubes used to make the larger cube equals  $4 \cdot 4 \cdot 4$  which equals 64 cubes.

12. **Answer choice (A) is correct.** First, we can find the volume of the large cube by cubing the side length:  $V = s^3 \rightarrow V = (10 \text{ ft})^3 \rightarrow V = 1000 \text{ ft}^3$ . Now we can find the volume of each small cube by dividing the volume of the large cube by 125:  $1000 \text{ ft}^3 \div 125 = 8 \text{ ft}^3$ . Finally, we can use the equation for the volume of a cube,  $V = s^3$ , to find the side length of the small cubes:  $V = s^3 \rightarrow 8 \text{ ft}^3 = s^3 \rightarrow s = 2 \text{ ft}$ .
13. **Answer choice (D) is correct.** The rectangular prism is made up of 32 smaller cubes. Therefore, we can find the volume of the rectangular prism by multiplying the volume of each small cube by 32:  $(2.5 \text{ m}^3) \cdot 32 = 80 \text{ m}^3$ .
14. **Answer choice (D) is correct.** The formula for the volume of a cube is  $V = s^3$ . Find the volume of the smaller cube:  $V = (3 \text{ ft})^3 = 27 \text{ ft}^3$ . Find the volume of the larger cube:  $V = (5 \text{ ft})^3 = 125 \text{ ft}^3$ . Therefore, the ratio of the volume of the smaller cube to the volume of the larger cube is 27:125.
15. **Answer choice (B) is correct.** First find the radius of the cylinder by finding 75% of the height: 75% of 8 cm =  $0.75 \cdot 8 \text{ cm} = 6 \text{ cm}$ . Now plug in 8 cm for  $h$  and 6 cm for  $r$  in the given equation, and simplify to find the volume,  $V$ :  $V = \pi(6)^2(8) \rightarrow V = \pi(36)(8) \rightarrow V = 288\pi \text{ cm}^3$ .
16. **Answer choice (A) is correct.** Plug in  $100\pi \text{ m}^2$  for  $SA$  in the given equation and solve for  $r$ :  $100\pi = 4\pi r^2 \rightarrow 25 = r^2 \rightarrow r = 5 \text{ m}$ .
17. **Answer choice (B) is correct.** There are 6 small cubes missing in the third row, and 9 small cubes missing on the top row. Therefore, 15 small cubes are needed to complete the larger cube.
18. **Answer choice (B) is correct.** First find the volume of the swimming pool by using the formula  $V = lwh$  where  $l$  represents the length of the prism,  $w$  represents the width of the prism, and  $h$  represents the height of the prism:  $V = (20 \text{ ft})(12 \text{ ft})(6 \text{ ft}) \rightarrow V = 1440 \text{ cubic feet}$ . Since water flows out of the hose at a rate of 3 cubic feet per minute, we can find the number of minutes it will take to fill the pool by dividing the volume of the pool by 3 cubic feet per minute:  $1440 \div 3 = 480 \text{ minutes}$ . Finally, there are 60 minutes in one hour, so divide 480 minutes by 60 to convert it into hours:  $480 \div 60 = 8 \text{ hours}$ .
19. **Answer choice (D) is correct.** Plug in  $150 \text{ m}^3$  for  $V$  and 5 m for  $s$  in the given formula and solve for  $h$ :  $150 = \frac{1}{3} \cdot (5)^2 \cdot h \rightarrow 150 = \frac{1}{3} \cdot 25 \cdot h \rightarrow 450 = 25h \rightarrow h = 18 \text{ m}$ .
20. **Answer choice (B) is correct.** The tick marks show that 4 small cubes can fit along one side of the larger cube. Therefore, to find the total number of small cubes that can fit inside the larger cube, multiply  $4 \cdot 4 \cdot 4$  to get 64. Since the volume of the larger cube is  $96 \text{ units}^3$ , find the volume of the smaller, shaded cube by dividing  $96 \text{ units}^3$  by 64 to get  $1.5 \text{ units}^3$ .

### Similar Figures and Scale Factor Practice Set 1



- Answer choice (B) is correct.** Find the ratio of any pair of corresponding sides (LN: QS, LM: QR, or NM:SR). Let's find LM:QR because they are both whole numbers: LM = 6 in and QR = 9 in, so the ratio of LM:QR = 6:9 which simplifies to 2:3.
- Answer choice (C) is correct.** Set up the following proportion to find EF:  $\frac{1.2}{2.7} = \frac{1.6}{EF}$ . Simplify the left fraction by first multiplying the top and bottom by 10 to get  $\frac{12}{27} = \frac{1.6}{EF}$ . Then divide the top and bottom of the left fraction by 3 to get  $\frac{4}{9} = \frac{1.6}{EF}$ . Cross multiply and solve:  $\frac{4}{9} = \frac{1.6}{EF} \rightarrow 4(EF) = 14.4 \rightarrow EF = 3.6$  ft.
- Answer choice (D) is correct.** Find LM by setting up and solving the following proportion:  $\frac{4}{5} = \frac{20}{LM} \rightarrow 4(LM) = 100 \rightarrow LM = 25$  m. Find the area of rectangle LMNO by multiplying 15 m by 25 m to get 375 m<sup>2</sup>.
- Answer choice (C) is correct.** The ratio of the area of similar figures is equal to the ratio of the corresponding sides squared. Therefore, the ratio of the area of triangle ABC to the area of triangle XYZ equals  $\left(\frac{3}{5}\right)^2 = \frac{9}{25} = 9:25$ .
- Answer choice (D) is correct.** Corresponding angles in similar figures are congruent (equal), so all of the angles in the smaller hexagon have measures of 120°. Therefore, the sum of the interior angles of the smaller hexagon is  $6 \cdot 120^\circ = 720^\circ$ .
- Answer choice (A) is correct.** Corresponding angles in similar figures are congruent (equal), so angles W and Y measure 110°. Consecutive angles in a parallelogram add up to 180°, so the measure of angle W plus the measure of angle X equals 180°, which means the measure of angle X is 70° ( $110^\circ + 70^\circ = 180^\circ$ ).
- Answer choice (D) is correct.** The scale is equal to the ratio of a dimension on the model sandbox to the corresponding dimension on the real sandbox. Since the model sandbox has a length of 4 inches, and the real sandbox has a length of 8 feet, the scale is equal to 4 inches : 8 feet which simplifies to 1 inch : 2 feet.
- Answer choice (A) is correct.** Find the dimensions of the similar triangle by multiplying the dimensions of the given triangle by  $\frac{3}{4}$ :  $\frac{3}{4} \cdot 12$  cm = 9 cm, and  $\frac{3}{4} \cdot 16$  cm = 12 cm. Therefore, the height of the similar triangle is 9 cm and the base is 12 cm. Find the area using the formula  $A = \frac{1}{2} bh$ :  $A = \frac{1}{2} (12)(9) \rightarrow A = 54$  cm<sup>2</sup>.
- Answer choice (C) is correct.** If the area of the square base on Jill's model is 36 in<sup>2</sup>, then the side length is 6 in. Therefore, Jill is using a scale of 6 in : 12 ft for her model. Find the height Jill should use for her pyramid by setting up and solving the following proportion, where  $h$  represents the height Jill should use for her pyramid:  $\frac{6 \text{ in}}{12 \text{ ft}} = \frac{h}{18 \text{ ft}} \rightarrow 108 = 12h \rightarrow h = 9$  inches.

10. **Answer choice (C) is correct.** Find the side length of the similar pentagon by multiplying the dimension of the given pentagon by  $\frac{6}{5}$ :  $\frac{6}{5} \cdot 30 \text{ cm} = 36 \text{ cm}$ . Find the perimeter of the similar pentagon by multiplying the side length by 5:  $5 \cdot 36 \text{ cm} = 180 \text{ cm}$ .

### Similar Figures and Scale Factor Practice Set 2

- Answer choice (D) is correct.** The ratio of side AB to side PQ is 6.25 : 2.5. We can simplify this by first multiplying each part of the ratio by 100 to get 625:250. Now we can divide each part by 125 to get 5:2.
- Answer choice (A) is correct.** Set up the following proportion to find EG:  $\frac{3}{9} = \frac{EG}{15}$ . Simplify the left fraction and then multiply both sides of the equation by 15:  $\frac{3}{9} = \frac{EG}{15} \rightarrow \frac{1}{3} = \frac{EG}{15} \rightarrow EG = 5 \text{ m}$ .
- Answer choice (C) is correct.** Find WX by setting up and solving the following proportion:  $\frac{2}{3} = \frac{4}{WX} \rightarrow 2(WX) = 12 \rightarrow WX = 6 \text{ ft}$ . Find the perimeter of rectangle WXYZ by adding up all four sides:  $9 \text{ ft} + 9 \text{ ft} + 6 \text{ ft} + 6 \text{ ft} = 30 \text{ ft}$ .
- Answer choice (B) is correct.** The ratio of the area of similar figures is equal to the ratio of the corresponding sides squared. Therefore, since the ratio of the area of rectangle ABCD to the area of rectangle EFGH equals  $\frac{4}{9}$ , the ratio of a side of rectangle ABCD to the corresponding side of rectangle EFGH equals  $\frac{2}{3}$  because  $\left(\frac{2}{3}\right)^2 = \frac{4}{9}$ .
- Answer choice (B) is correct.** The area of a square is equal to the side length squared, so if the area of the given square is  $36 \text{ in}^2$ , then the side length of the given square is 6 in. Now find the side length of a square similar to the given square with a scale factor of  $\frac{1}{3}$  by multiplying the side length of the given square by  $\frac{1}{3}$ :  $\frac{1}{3} \cdot 6 \text{ inches} = 2 \text{ inches}$ . Finally, find the perimeter of a square with a side length of 2 inches by multiplying the side length by 4:  $4 \cdot 2 \text{ inches} = 8 \text{ inches}$ .
- Answer choice (B) is correct.** Corresponding angles in similar figures are congruent (equal), so each angle in the larger hexagon has measures of  $108^\circ$ .
- Answer choice (C) is correct.** Corresponding angles in similar figures are congruent (equal), so angle E has a measure of  $43^\circ$ . The sum of the angles in any triangle is  $180^\circ$ , so set up and solve the following equation to find the measure of angle F,  $F$ :  $43^\circ + 25^\circ + F = 180^\circ \rightarrow 68^\circ + F = 180^\circ \rightarrow F = 112^\circ$ .
- Answer choice (D) is correct.** Set up the following proportion, where  $m$  represents the actual distance between the library and the museum in miles:  $\frac{2 \text{ in}}{3 \text{ mi}} = \frac{7 \text{ in}}{m} \rightarrow 2m = 21 \rightarrow m = 10.5 \text{ miles}$ .
- Answer choice (C) is correct.** The scale is equal to the ratio of a dimension on the model tower to the corresponding dimension on the real tower. The model tower has a height of 12 inches, and the

real tower has a height of 56 feet, so the scale equals 12 inches : 56 feet which simplifies to 3 inches : 14 feet.

10. **Answer choice (A) is correct.** Find the length of the similar rectangle by multiplying the length of the given rectangle by  $\frac{5}{6}$ :  $\frac{5}{6} \cdot 12 \text{ ft} = 10 \text{ ft}$ . Find the width of the similar rectangle by multiplying the width of the given rectangle by  $\frac{5}{6}$ :  $\frac{5}{6} \cdot 3 \text{ ft} = 2.5 \text{ ft}$ . Find the area of the similar rectangle by multiplying the length and the width:  $(10 \text{ ft})(2.5 \text{ ft}) = 25 \text{ ft}^2$ .

### **Coordinate Geometry Practice Set 1**

1. **Answer choice (B) is correct.** When writing the coordinate of a point, write it in the form  $(x, y)$ . The  $x$ -coordinate of point L is  $-2$ , and the  $y$ -coordinate is  $3$ , so the coordinates are  $(-2, 3)$ .
2. **Answer choice (C) is correct.** To translate a point 5 units up, add 5 to the  $y$ -coordinate, so 3 becomes 8. To translate a point 4 units right, add 4 to the  $x$ -coordinate, so  $-7$  becomes  $-3$ . Therefore, the new coordinates of point F are  $(-3, 8)$ .
3. **Answer choice (D) is correct.** When a point is reflected across the  $x$ -axis, the sign of the  $y$ -coordinate changes. Therefore, when  $(-2, 5)$  is reflected across the  $x$ -axis it becomes  $(-2, -5)$ . You can also plot the point and reflect it visually.
4. **Answer choice (D) is correct.** A trapezoid has at least one pair of parallel sides. If you plot the point  $(1, 2)$ , the top and bottom sides of the quadrilateral will be parallel, making it a trapezoid.
5. **Answer choice (D) is correct.** The distance between the points  $(-1, 3)$  and  $(5, 3)$  is 6 units, so the side length of the square is 6 units. Therefore, the area of the square is  $6^2$  which equals  $36 \text{ units}^2$ .
6. **Answer choice (B) is correct.** We are given the new coordinates of point J after it is translated 6 units down. Therefore, to find the original coordinates of point J, we need to translate it 6 units up. To translate a point 6 units up, add 6 to the  $y$ -coordinate:  $-4 + 6 = 2$ . Therefore, the original coordinates of point J are  $(-8, 2)$ .
7. **Answer choice (A) is correct.** The original coordinates of point A are  $(-2, 1)$ . To translate a point 3 units down, subtract 3 from the  $y$ -coordinate, so 1 becomes  $-2$ . To translate a point 2 units right, add 2 to the  $x$ -coordinate, so  $-2$  becomes 0. Therefore, the new coordinates of point A are  $(0, -2)$ .
8. **Answer choice (B) is correct.** When a point is rotated  $180^\circ$  around the origin, the  $x$  and  $y$  coordinates both change signs, so  $(-3, 4)$  becomes  $(3, -4)$ . You can also plot the point and rotate it visually.
9. **Answer choice (B) is correct.** The length of the radius of the circle is equal to the distance between the center of the circle and any point that lies on the circle. The distance between the points  $(0, 0)$  and  $(-8, 0)$  is 8 grid units, so the radius of the circle is 8 grid units. The equation for the circumference of

a circle is  $C = 2\pi r$ , where  $r$  is the radius of the circle. Therefore, the circumference of this circle is  $2\pi \cdot 8$  which equals  $16\pi$  grid units.

10. **Answer choice (C) is correct.** An isosceles triangle has two sides that are equal. If you plot the point  $(3, -4)$  on the coordinate grid, the top and bottom sides of the triangle are equal.
11. **Answer choice (B) is correct.** A square has four equal sides and four right angles. If you plot the given three points on the coordinate plane, the only way to create a four-sided shape with four equal sides and four right angles is to put the fourth vertex of the square at  $(-3, 3)$ .
12. **Answer choice (A) is correct.** When a point is rotated  $270^\circ$  clockwise around the origin, the point  $(x, y)$  becomes  $(-y, x)$ . Therefore, the point  $(12, 8)$  becomes  $(-8, 12)$ . You can also plot the point and rotate it visually.
13. **Answer choice (D) is correct.** A parallelogram is a four-sided shape with two pairs of opposite sides that are congruent (equal) and parallel. If you plot the points  $(-1, 1)$  and  $(5, -1)$  on the coordinate grid, the top and bottom sides of the quadrilateral are parallel and equal and the left and right sides of the quadrilateral are parallel and equal, so the shape is a parallelogram.
14. **Answer choice (C) is correct.** Point A is 3 units up and 2 units left of the origin. Any point that is 3 units in one direction and 2 units in another direction away from the origin will be the same distance from the origin as point A. Therefore, the following points are the same distance from the origin as point A:  $(-2, -3)$ ,  $(2, 3)$ ,  $(2, -3)$ ,  $(-3, -2)$ ,  $(-3, 2)$ ,  $(3, 2)$ , and  $(3, -2)$ . The only answer choice that is not in that list is choice (C).
15. **Answer choice (B) is correct.** Use the right side of the triangle as a base, so the length of the base is 7 units. The height of the triangle is the distance from the leftmost vertex to the base, which is 6 units. Find the area by using the formula for the area of a triangle:  $A = \frac{1}{2}bh \rightarrow A = \frac{1}{2}(7)(6) \rightarrow A = 21$  units<sup>2</sup>.

### **Coordinate Geometry Practice Set 2**

1. **Answer choice (C) is correct.** When writing the coordinate of a point, write it in the form  $(x, y)$ . The  $x$ -coordinate of point Y is 4, and the  $y$ -coordinate is  $-3$ , so the coordinates of point Y are  $(4, -3)$ .
2. **Answer choice (C) is correct.** To translate point A 3 units down, subtract 3 from the  $y$ -coordinate to get  $(7, 0)$ . Now translate the new point 4 units left by subtracting 4 from the  $x$ -coordinate to get  $(3, 0)$ .
3. **Answer choice (A) is correct.** When a point is reflected across the  $y$ -axis, the sign of the  $x$ -coordinate changes. Therefore, when  $(4, -1)$  is reflected across the  $y$ -axis it becomes  $(-4, -1)$ . You can also plot the point and reflect it visually.
4. **Answer choice (B) is correct.** A rhombus is a four-sided shape with four equal sides. If you place a point at  $(3, 0)$ , all four sides will be equal, making the shape a rhombus.

5. **Answer choice (B) is correct.** Plot the two given points. Since those points are opposite vertices of a square, the other two vertices must be located at  $(-4, 4)$  and  $(4, -4)$ . Plot the other two vertices and you will see that each side length is 8 units long. Therefore, the perimeter is equal to  $8 \cdot 4$  which equals 32 units.
6. **Answer choice (C) is correct.** Since point K has coordinates  $(2, 7)$  after being reflected across the  $x$ -axis, to find the original coordinate of point K, we must reflect the point  $(2, 7)$  back across the  $x$ -axis. When a point is reflected across the  $x$ -axis, the sign of the  $y$ -coordinate changes. Therefore, when the point  $(2, 7)$  is reflected across the  $x$ -axis it becomes  $(2, -7)$ . You can also plot the point and reflect it visually.
7. **Answer choice (C) is correct.** To translate a point 3 units right, add 3 to the  $x$  coordinate. Therefore, the new points of the parallelogram are  $P(1, 4)$ ,  $Q(1, -2)$ ,  $R(4, -4)$  and  $S(4, 2)$ . The point  $(-2, 2)$  is NOT one of the new vertices, so answer choice (C) is correct.
8. **Answer choice (A) is correct.** When a point is rotated  $90^\circ$  clockwise around the origin, the point  $(x, y)$  becomes  $(y, -x)$ . Therefore, the point  $(-4, 3)$  becomes  $(3, 4)$ . You can also plot the point and rotate it visually.
9. **Answer choice (B) is correct.** Since the diameter of the circle is 16 units, the radius is 8 units. Therefore, any point 8 units from the center will lie on the circle. Since the circle is centered at the origin, or the point  $(0, 0)$ , the point  $(0, -8)$  is 8 units away from the center, so the point  $(0, -8)$  lies on the circle.
10. **Answer choice (A) is correct.** A trapezoid has at least one pair of parallel sides. If you plot the point  $(-2, -3)$ , none of the sides of the shape are parallel, so the shape is NOT a trapezoid.
11. **Answer choice (B) is correct.** Plot the three given points. A rectangle is a four sided shape with four right angles, which means the consecutive sides of a rectangle are perpendicular. If you plot the point  $(3, -1)$ , you will see that consecutive sides are all perpendicular, so all four angles are right. Therefore, the shape is a rectangle.
12. **Answer choice (B) is correct.** When a point is reflected across the  $y$ -axis, the sign of the  $x$ -coordinate changes. Therefore, when  $(3, 8)$  is reflected across the  $y$ -axis it becomes  $(-3, 8)$ . When a point is reflected across the  $x$ -axis, the sign of the  $y$ -coordinate changes. Therefore, when  $(-3, 8)$  is reflected across the  $x$ -axis it becomes  $(-3, -8)$ . You can also plot the point and visually reflect it across the  $y$ -axis and then the  $x$ -axis.
13. **Answer choice (D) is correct.** Since we want to make a right triangle, we need two sides of the triangle to be perpendicular. To check if two lines are perpendicular, the slopes of the lines need to be opposite reciprocals (Example:  $\frac{2}{3}$  and  $-\frac{3}{2}$ ). If you plot the point  $(-2, -3)$ , the line connecting the

points  $(-2, -3)$  and  $(-4, 1)$  has a slope of  $-2$ , and the line connecting the points  $(-2, -3)$  and  $(2, -1)$  has a slope of  $\frac{1}{2}$ , so the lines are perpendicular and the triangle formed is a right triangle.

14. **Answer choice (C) is correct.** Since the two given points have the same  $x$ -coordinate, the midpoint of the two points will also have an  $x$ -coordinate of 7. To find the  $y$ -coordinate of the midpoint, we have to find the number directly in the middle of the two given  $y$ -coordinates, 5 and  $-3$ . We can do this visually by plotting the points, or we can find the average of 5 and  $-3$  by adding the two numbers and dividing by 2:  $\frac{5+(-3)}{2} = \frac{2}{2} = 1$ . Therefore, the  $y$ -coordinate of the midpoint is 1, so the midpoint is  $(7, 1)$ .
15. **Answer choice (B) is correct.** Plot the three given points and connect them to form a triangle. Use the segment connecting the points  $(-3, -1)$  and  $(3, -1)$  as the base of the triangle: this segment has a length of 6 units. Draw a line from the point  $(2, 5)$  to the base of the triangle, making a right angle. This is the height of the triangle, and it has a length of 6 units. Find the area of the triangle using the formula  $A = \frac{1}{2}bh$ :  $A = \frac{1}{2}(6 \text{ units})(6 \text{ units}) \rightarrow A = 18$  square units.

### Slope Practice Set 1

1. **Answer choice (B) is correct.** To find the slope between two points, use the equation  $\text{slope} = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point. Plug the given points into the formula and simplify:  $\text{slope} = \frac{4-6}{9-5} = \frac{-2}{4} = -\frac{1}{2}$
2. **Answer choice (A) is correct.** This linear equation is written in slope-intercept form:  $y = mx + b$ , where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept. Therefore, the slope of this line is  $-5$ .
3. **Answer choice (B) is correct.** To find the slope between two points, use the equation  $\text{slope} = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point. Plug the given points into the formula and simplify:  $\text{slope} = \frac{-1-8}{6-(-3)} = \frac{-9}{9} = -1$
4. **Answer choice (A) is correct.** We are looking for the equation where  $y$  increases at the greatest rate as  $x$  increases. Therefore, we are looking for the equation with the steepest positive slope. The slope of the equation in answer choice (A) is  $5/4$ , which is the steepest positive slope.
5. **Answer choice (B) is correct.** First rewrite the given equation in  $y = mx + b$  form by isolating  $y$ :  $4x + 7y = 21 \rightarrow 7y = -4x + 21 \rightarrow y = -\frac{4}{7}x + 3$ . Now the equation is written in slope-intercept form:  $y = mx + b$ , where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept. Therefore, the slope of this line is  $-\frac{4}{7}$ .

6. **Answer choice (B) is correct.** The given line is written in slope-intercept form:  $y = mx + b$ , where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept, so the slope of the given line is 3. Parallel lines have the same slope, so we need to find an answer choice with a slope of 3. The equation in answer choice (B) is the only equation with a slope of 3.
7. **Answer choice (A) is correct.** The given line is written in slope-intercept form:  $y = mx + b$ , where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept, so the slope of the given line is  $\frac{1}{2}$ . Perpendicular lines have opposite reciprocal slopes (example:  $\frac{4}{7}$  and  $-\frac{7}{4}$ ), so we are looking for an answer choice that has a slope of  $-2$ . The equation in answer choice (A) is the only equation with a slope of  $-2$ .
8. **Answer choice (C) is correct.** To find the slope between two points, use the equation  $slope = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point. Plug the slope and the given points into the formula and solve for  $x$ :  $4 = \frac{9-1}{x-2} \rightarrow 4 = \frac{8}{x-2} \rightarrow 4(x-2) = 8 \rightarrow x-2 = 2 \rightarrow x = 4$ .
9. **Answer choice (C) is correct.** The given line is written in slope-intercept form:  $y = mx + b$ , where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept, so the slope of the given line is 2. Parallel lines have the same slope, so we want the slope between the points  $(3, 4)$  and  $(a, 6)$  to equal 2. To find the slope between two points, use the equation  $slope = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point. Plug the slope and the given points into the formula and solve for  $a$ :  $2 = \frac{6-4}{a-3} \rightarrow 2 = \frac{2}{a-3} \rightarrow 2(a-3) = 2 \rightarrow a-3 = 1 \rightarrow a = 4$ .
10. **Answer choice (C) is correct.** To find the slope between two points, use the equation  $slope = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point. Plug the slope and the given points into the formula and solve for  $y$ :  $\frac{3}{5} = \frac{y-1}{12-2} \rightarrow \frac{3}{5} = \frac{y-1}{10} \rightarrow 6 = y-1 \rightarrow 7 = y$
11. **Answer choice (D) is correct.** When finding the slope between two points on a coordinate grid, you can use the slope formula,  $slope = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point, or count using the grid. Let's use the formula: find two points on the graph:  $(0, -3)$  and  $(2, 2)$ . Now plug the points into the slope formula and simplify:  $slope = \frac{2 - (-3)}{2 - 0} = \frac{5}{2}$
12. **Answer choice (C) is correct.** From the graph, we can see that Garret earns \$120 for 2 sales, and \$240 for 4 sales, so he earns \$60 for each sale ( $\$120 \div 2 = \$60$  and  $\$240 \div 4 = \$60$ ).

13. **Answer choice (B) is correct.** From the graph, we can see that after 3 hours, Brianna drank 2 ounces out of her water bottle because she started with 10 ounces and had 8 ounces left after 3 hours.

Therefore, she drinks 2 ounces every 3 hours, or  $\frac{2 \text{ ounces}}{3 \text{ hours}}$ , which is the same as  $\frac{2}{3}$  ounces per hour.

14. **Answer choice (C) is correct.** The graph compares the height of each plant ( $y$ ) to the time in days ( $x$ ), so the slope of each line represents the rate at which each plant grew. The line representing Plant 3 has the steepest slope, so Plant 3 grew at the fastest rate.

15. **Answer choice (D) is correct.** Plant 1 grew 4 inches in 8 days because it started at a height of 5 inches and ended at a height of 9 inches. 4 inches in 8 days can be written as  $\frac{4 \text{ inches}}{8 \text{ days}}$ , which is the same as  $\frac{4}{8}$  inches per day. Change  $\frac{4}{8}$  into a decimal to get 0.5 inches per day.

### Slope Practice Set 2

- Answer choice (D) is correct.** To find the slope between two points, use the equation  $slope = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point. Plug the given points into the formula and simplify:  $slope = \frac{-3 - 5}{-1 - 3} = \frac{-8}{-4} = 2$
- Answer choice (A) is correct.** This linear equation is written in slope-intercept form:  $y = mx + b$ , where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept. Therefore, the slope of this line is 35.
- Answer choice (B) is correct.** The origin is the point  $(0, 0)$ , so we need to find the slope between the points  $(0, 0)$  and  $(6, -3)$ . To find the slope between two points, use the equation  $slope = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point. Plug the given points into the formula and simplify:  $slope = \frac{-3 - 0}{6 - 0} = \frac{-3}{6} = -\frac{1}{2}$
- Answer choice (B) is correct.** First rewrite the given equation in  $y = mx + b$  form by isolating  $y$ :  $6x + 3y = -12 \rightarrow 3y = -6x - 12 \rightarrow y = -2x - 4$ . Now the equation is written in slope-intercept form:  $y = mx + b$ , where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept. Therefore, the slope of this line is  $-2$ .
- Answer choice (A) is correct.** We are looking for the equation where  $y$  decreases at the slowest rate as  $x$  increases. Therefore, we are looking for the equation with the least steep negative slope. The slope of the equation in answer choice (A) is  $-2$ , which is the least steep negative slope.
- Answer choice (A) is correct.** The given line is written in slope-intercept form:  $y = mx + b$ , where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept, so the slope of the given line is  $\frac{3}{2}$ .



Perpendicular lines have opposite reciprocal slopes (example:  $\frac{4}{7}$  and  $-\frac{7}{4}$ ), so we are looking for an answer choice that has a slope of  $-\frac{2}{3}$ . The equation in answer choice (A) is the only equation with a slope of  $-\frac{2}{3}$ .

7. **Answer choice (A) is correct.** The given line is written in slope-intercept form:  $y = mx + b$ , where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept, so the slope of the given line is  $-\frac{5}{2}$ . Parallel lines have the same slope, so we are looking for an answer choice that also has a slope of  $-\frac{5}{2}$ . The equation in answer choice (A) is the only equation with a slope of  $-\frac{5}{2}$ .
8. **Answer choice (C) is correct.** Check the slope between the given point and each answer choice until you find the answer choice that results in a slope of  $-2$ . To find the slope between two points, use the equation  $slope = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point. Check answer choice (A):  $slope = \frac{6-5}{2-4} = \frac{1}{-2} = -\frac{1}{2}$ , so answer choice (A) is incorrect. Check answer choice (B):  $slope = \frac{3-5}{3-4} = \frac{-2}{-1} = 2$ , so answer choice (B) is incorrect. Check answer choice (C):  $slope = \frac{3-5}{5-4} = \frac{-2}{1} = -2$ , so answer choice (C) is correct.
9. **Answer choice (D) is correct.** The given line is written in slope-intercept form:  $y = mx + b$ , where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept, so the slope of the given line is 3. Parallel lines have the same slope, so we want the slope between the points  $(a, 4)$  and  $(0, -5)$  to equal 3. To find the slope between two points, use the equation  $slope = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point. Plug the slope and the given points into the formula and solve for  $a$ :  $3 = \frac{-5-4}{0-a} \rightarrow 3 = \frac{-9}{-a} \rightarrow -3a = -9 \rightarrow a = 3$ .
10. **Answer choice (A) is correct.** The given line is written in slope-intercept form:  $y = mx + b$ , where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept, so the slope of the given line is 1. Perpendicular lines have opposite reciprocal slopes (example:  $\frac{4}{7}$  and  $-\frac{7}{4}$ ), so we want the slope between the points  $(-6, 5)$  and  $(3, b)$  to equal  $-1$ . To find the slope between two points, use the equation  $slope = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point. Plug the slope and the given points into the formula and solve for  $b$ :  $-1 = \frac{b-5}{3-(-6)} \rightarrow -1 = \frac{b-5}{9} \rightarrow -9 = b-5 \rightarrow b = -4$ .
11. **Answer choice (B) is correct.** From the graph, we can see that 4 months of membership costs \$60 and 8 months of membership costs \$120. Therefore, each month of membership costs \$15 because  $\$60 \div 4 = \$15$  and  $\$120 \div 8 = \$15$ .

12. **Answer choice (A) is correct.** When finding the slope between two points on a coordinate grid, you can use the slope formula,  $slope = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point, or count using the grid. Let's use the formula: find two points on the graph:  $(0, -3)$  and  $(-2, 1)$ . Now plug the points into the slope formula and simplify:  $slope = \frac{1 - (-3)}{-2 - 0} = \frac{4}{-2} = -2$ .
13. **Answer choice (C) is correct.** Mia started with \$450, and after 4 weeks she had \$400 left. Therefore, she withdrew \$50 in four weeks, so we can find the amount of money Mia withdrew from her account every week by dividing \$50 by 4:  $\$50 \div 4 = \$12.50$
14. **Answer choice (D) is correct.** Decelerating means slowing down, so we are looking for a car with a negative slope. This eliminates Car 1 and Car 3. Since we want the car that was decelerating at the fastest rate, we are looking for the car with the steepest slope. The slope of Car 4 is steeper than the slope of Car 2, so Car 4 was decelerating at the fastest rate.
15. **Answer choice (D) is correct.** At 0 minutes, Car 4 had a speed of 70 mph. At 8 minutes, Car 4 had a speed of 10 mph. Therefore, the speed of Car 4 decreased by 60 mph over 8 minutes, so we can find how many mph Car 4's speed decreased by every minute by dividing 60 mph by 8 minutes:  $(60 \text{ mph}) \div (8 \text{ minutes}) = 7.5 \text{ mph per minute}$ . Therefore, answer choice (D) is false.

### Equations of Lines Practice Set 1

1. **Answer choice (B) is correct.** All of the answer choices are linear equations written in *slope-intercept form*:  $y = mx + b$ , where  $m$  represents the slope and  $b$  represents the  $y$ -intercept. Therefore, to write the equation of a line with a slope of 4 and a  $y$ -intercept of  $-6$ , plug in 4 for  $m$  and  $-6$  for  $b$  to get  $y = 4x - 6$ .
2. **Answer choice (A) is correct.** All of the answer choices are linear equations written in *slope-intercept form*:  $y = mx + b$ , where  $m$  represents the slope and  $b$  represents the  $y$ -intercept. The problem gave us the slope of the line and told us the line passes through the point  $(0, 3)$ , which means the  $y$ -intercept of the line is 3. Therefore, we need to write the equation of a line with a slope of  $\frac{2}{3}$  and a  $y$ -intercept of 3, so we plug in  $\frac{2}{3}$  for  $m$  and 3 for  $b$  to get  $y = \frac{2}{3}x + 3$ .
3. **Answer choice (D) is correct.** To write a linear equation given the slope and a point, use *point-slope form*:  $y - y_1 = m(x - x_1)$ , where  $m$  represents the slope and  $(x_1, y_1)$  represents a point on the line. Plug in 2 for  $m$  and the point  $(6, 9)$  for  $(x_1, y_1)$ :  $y - 9 = 2(x - 6)$ . Now simplify the equation and isolate  $y$ :  $y - 9 = 2x - 12 \rightarrow y = 2x - 3$ .
4. **Answer choice (C) is correct.** To write a linear equation given two points, first find the slope:  $slope = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - 2}{5 - 3} = \frac{-1}{2} = -\frac{1}{2}$ . Now use *point-slope form*:  $y - y_1 = m(x - x_1)$ , where  $m$  represents the slope and  $(x_1, y_1)$  represents a point on the line. Plug in  $-\frac{1}{2}$  for  $m$  and either point, we will use  $(3, 2)$ ,

for  $(x_1, y_1)$ :  $y - 2 = -\frac{1}{2}(x - 3)$ . Now simplify the equation and isolate  $y$ :  $y - 2 = -\frac{1}{2}x + \frac{3}{2} \rightarrow y = -\frac{1}{2}x + \frac{7}{2}$ .

5. **Answer choice (A) is correct.** To write a linear equation given two points, first find the slope:  $\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 3}{-9 - (-7)} = \frac{4}{-2} = -2$ . Now use *point-slope form*:  $y - y_1 = m(x - x_1)$ , where  $m$  represents the slope and  $(x_1, y_1)$  represents a point on the line. Plug in  $-2$  for  $m$  and either point, we will use  $(-7, 3)$ , for  $(x_1, y_1)$ :  $y - 3 = -2(x - (-7))$ . Now simplify the equation and isolate  $y$ :  $y - 3 = -2(x + 7) \rightarrow y - 3 = -2x - 14 \rightarrow y = -2x - 11$ .
6. **Answer choice (B) is correct.** The slope of line  $m$  is 3, and parallel lines have the same slopes, so the slope of line  $n$  is also 3. To write a linear equation given the slope and a point, use *point-slope form*:  $y - y_1 = m(x - x_1)$ , where  $m$  represents the slope and  $(x_1, y_1)$  represents a point on the line. Plug in 3 for  $m$  and the point  $(4, 7)$  for  $(x_1, y_1)$ :  $y - 7 = 3(x - 4)$ . Now simplify the equation and isolate  $y$ :  $y - 7 = 3x - 12 \rightarrow y = 3x - 5$ .
7. **Answer choice (C) is correct.** The line crosses the  $x$ -axis at 4, which means it passes through the point  $(4, 0)$ . The line crosses the  $y$ -axis at 8, which means it passes through the point  $(0, 8)$ : this means the  $y$ -intercept of the line is 8. Find the slope of the line:  $\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 0}{0 - 4} = \frac{8}{-4} = -2$ . Now plug the slope and  $y$ -intercept into the equation  $y = mx + b$  (where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept) to get  $y = -2x + 8$ .
8. **Answer choice (A) is correct.** The slope of the given line is  $-\frac{1}{4}$ , and perpendicular lines have opposite reciprocal slopes, so the slope of the line we are trying to find is 4. The line passes the  $x$ -axis at  $-2$ , which means it passes through the point  $(-2, 0)$ . Use *point-slope form* to write the equation of the line:  $y - y_1 = m(x - x_1)$ , where  $m$  represents the slope and  $(x_1, y_1)$  represents a point on the line. Plug in 4 for  $m$  and  $(2, 0)$  for  $(x_1, y_1)$ :  $y - 0 = 4(x - (-2))$ . Simplify the equation and isolate  $y$ :  $y = 4(x + 2) \rightarrow y = 4x + 8$ .
9. **Answer choice (A) is correct.** The  $y$ -intercept of the line is  $-3$  because it crosses the  $y$ -axis at  $-3$ . The slope of the line is  $-\frac{1}{2}$  or  $-0.5$  because to get from the point  $(0, -3)$  to the point  $(-2, -2)$ , we move up 1 and left 2. Therefore, the equation of the line in  $y = mx + b$  form (where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept) is  $y = -0.5x - 3$ .
10. **Answer choice (D) is correct.** The slope of the given line is 1, so the slope of a line perpendicular to the given line is  $-1$  (perpendicular lines have opposite reciprocal slopes). Draw a line with a slope of  $-1$  that passes through the point  $(2, 3)$  and you will get a  $y$ -intercept of 5. Therefore, the equation of the line in  $y = mx + b$  form (where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept) is  $y = -x + 5$ .

## Equations of Lines Practice Set 2

- Answer choice (B) is correct.** All of the answer choices are linear equations written in *slope-intercept form*:  $y = mx + b$ , where  $m$  represents the slope and  $b$  represents the  $y$ -intercept. Therefore, to write the equation of a line with a slope of  $-1$  and a  $y$ -intercept of  $1$ , plug in  $-1$  for  $m$  and  $1$  for  $b$  to get  $y = -1x + 1$ , which simplifies to  $y = -x + 1$ .
- Answer choice (A) is correct.** Since the line crosses the  $x$ -axis at  $1$ , it passes through the point  $(1, 0)$ . To write a linear equation given the slope and a point, use *point-slope form*:  $y - y_1 = m(x - x_1)$ , where  $m$  represents the slope and  $(x_1, y_1)$  represents a point on the line. Plug in  $-3$  for  $m$  and the point  $(1, 0)$  for  $(x_1, y_1)$ :  $y - 0 = -3(x - 1)$ . Now simplify the equation and isolate  $y$ :  $y = -3x + 3$ .
- Answer choice (C) is correct.** To write a linear equation given the slope and a point, use *point-slope form*:  $y - y_1 = m(x - x_1)$ , where  $m$  represents the slope and  $(x_1, y_1)$  represents a point on the line. Plug in  $-\frac{5}{3}$  for  $m$  and the point  $(-3, 7)$  for  $(x_1, y_1)$ :  $y - 7 = -\frac{5}{3}(x - (-3))$ . Now simplify the equation and isolate  $y$ :  $y - 7 = -\frac{5}{3}(x + 3) \rightarrow y - 7 = -\frac{5}{3}x - 5 \rightarrow y = -\frac{5}{3}x + 2$ .
- Answer choice (A) is correct.** To write a linear equation given two points, first find the slope: *slope*  $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - 7}{4 - 2} = \frac{-8}{2} = -4$ . Now use *point-slope form*:  $y - y_1 = m(x - x_1)$ , where  $m$  represents the slope and  $(x_1, y_1)$  represents a point on the line. Plug in  $-4$  for  $m$  and either point, we will use  $(2, 7)$ , for  $(x_1, y_1)$ :  $y - 7 = -4(x - 2)$ . Simplify the equation and isolate  $y$ :  $y - 7 = -4x + 8 \rightarrow y = -4x + 15$ .
- Answer choice (D) is correct.** To write a linear equation given two points, first find the slope: *slope*  $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - (-2)}{3 - (-3)} = \frac{3}{6} = \frac{1}{2}$ . Now use *point-slope form*:  $y - y_1 = m(x - x_1)$ , where  $m$  represents the slope and  $(x_1, y_1)$  represents a point on the line. Plug in  $\frac{1}{2}$  for  $m$  and either point, we will use  $(3, 1)$ , for  $(x_1, y_1)$ :  $y - 1 = \frac{1}{2}(x - 3)$ . Simplify the equation and isolate  $y$ :  $y - 1 = \frac{1}{2}x - \frac{3}{2} \rightarrow y = \frac{1}{2}x - \frac{1}{2}$  which is the same as  $y = 0.5x - 0.5$ .
- Answer choice (C) is correct.** The slope of line  $p$  is  $4$ , and parallel lines have the same slopes, so the slope of line  $q$  is also  $4$ . To write a linear equation given the slope and a point, use *point-slope form*:  $y - y_1 = m(x - x_1)$ , where  $m$  represents the slope and  $(x_1, y_1)$  represents a point on the line. Plug in  $4$  for  $m$  and the point  $(3, 5)$  for  $(x_1, y_1)$ :  $y - 5 = 4(x - 3)$ . Now simplify the equation and isolate  $y$ :  $y - 5 = 4x - 12 \rightarrow y = 4x - 7$ .
- Answer choice (B) is correct.** The slope of the given line is  $3$ , and perpendicular lines have opposite reciprocal slopes, so the slope of the line we are trying to find is  $-\frac{1}{3}$ . To write a linear equation given the slope and a point, use *point-slope form*:  $y - y_1 = m(x - x_1)$ , where  $m$  represents the slope and  $(x_1, y_1)$  represents a point on the line. Plug in  $-\frac{1}{3}$  for  $m$  and the point  $(-6, -1)$  for  $(x_1, y_1)$ :  $y - (-1) = -\frac{1}{3}(x - (-6))$ . Now simplify the equation and isolate  $y$ :  $y + 1 = -\frac{1}{3}(x + 6) \rightarrow y + 1 = -\frac{1}{3}x - 2 \rightarrow y = -\frac{1}{3}x - 3$

8. **Answer choice (C) is correct.** The line crosses the  $x$ -axis at 3, which means it passes through the point (3, 0). The line crosses the  $y$ -axis at  $-9$ , which means it passes through the point (0,  $-9$ ): this means the  $y$ -intercept of the line is  $-9$ . Find the slope of the line:  $slope = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-9 - 0}{0 - 3} = \frac{-9}{-3} = 3$ . Now plug the slope and  $y$ -intercept into the equation  $y = mx + b$  (where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept) to get  $y = 3x - 9$ .
9. **Answer choice (A) is correct.** The  $y$ -intercept of the line is 1 because it crosses the  $y$ -axis at 1. The slope of the line is  $-\frac{3}{2}$  because to get from the point (2,  $-2$ ) to the point (0, 1), we move up 3 and left 2. Therefore, the equation of the line in  $y = mx + b$  form (where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept) is  $y = -\frac{3}{2}x + 1$ .
10. **Answer choice (D) is correct.** The given line passes through the points  $(-2, 0)$  and  $(0, 4)$ . Find the slope of the line:  $slope = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 0}{0 - (-2)} = \frac{4}{2} = 2$ . Parallel lines have the same slope, so we are looking for an answer choice with a slope of 2. Every answer choice is written in the form  $y = mx + b$  form (where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept), so the only answer choice with a slope of 2 is answer choice (D).

### Quantitative Comparisons Practice Set 1

1. **Answer choice (B) is correct.** Find the slope of the line in Column A by rewriting it in  $y = mx + b$  form:  $4x + 2y = 8 \rightarrow 2y = -4x + 8 \rightarrow y = -2x + 4$ . Therefore, the slope of the line in Column A is  $-2$ . Find the slope between the two points in Column B by using the slope formula:  $slope = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 2}{3 - 5} = \frac{1}{-2} = -\frac{1}{2}$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
2. **Answer choice (A) is correct.** The longer the legs of a right triangle, the longer the hypotenuse. Since both triangles have a leg measuring 4 m, the triangle with the second leg measuring 3 m has a longer hypotenuse than the triangle with the second leg measuring 2 m. Therefore,  $x$  is greater than  $y$ , so the quantity in Column A is greater than the quantity in Column B.
3. **Answer choice (D) is correct.** We do not know where C lies between A and B. If C lies closer to A, then  $AB > AC$ . However, if C lies closer to B, then  $AC > AB$ . Therefore, the relationship between the two columns cannot be determined from the information given.
4. **Answer choice (B) is correct.** The more sides a regular polygon has, the larger the measure of each interior angle. Therefore, since a pentagon has five sides and a hexagon has six sides, the measure of each interior angle in a regular hexagon is greater than the measure of each interior angle in a regular pentagon, so the quantity in Column B is greater than the quantity in Column A.

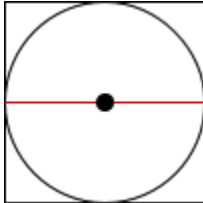
5. **Answer choice (A) is correct.** The side length of the inner, white square is 4 inches, and the border is 2 inches all around, so the side length of the outer square is 8 inches ( $4 + 2 + 2 = 8$ ). The area of the shaded region is equal to the area of the outer square minus the area of the inner square. The area of the outer square is  $(8 \text{ in})^2 = 64 \text{ in}^2$ , and the area of the inner square is  $(4 \text{ in})^2 = 16 \text{ in}^2$ , so the area of the shaded region is  $64 \text{ in}^2 - 16 \text{ in}^2 = 48 \text{ in}^2$ . Therefore, the quantity in Column A is greater than the quantity in Column B.
6. **Answer choice (B) is correct.** The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Find the radius of the circle in Column A by plugging in  $144\pi \text{ m}^2$  for  $A$  and solving for  $r$ :  $144\pi = \pi r^2 \rightarrow 144 = r^2 \rightarrow r = 12 \text{ m}$ . The equation for the circumference of a circle is  $C = 2\pi r$ , where  $r$  is the radius of the circle. Find the radius of the circle in Column B by plugging in  $36\pi \text{ m}$  for  $C$  and solving for  $r$ :  $36\pi = 2\pi r \rightarrow r = 18 \text{ m}$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
7. **Answer choice (C) is correct.** The volume of a cube is equal to the side length cubed, so the volume of the cube in Column A is  $(6 \text{ ft})^3 = 216 \text{ ft}^3$ . The surface area of a cube can be found using the equation  $SA = 6s^2$ , where  $s$  is the side length of the cube, so the surface area of the cube in Column B is  $6(6 \text{ ft})^2 = 216 \text{ ft}^2$ . Therefore, the quantities in both columns are equal.
8. **Answer choice (D) is correct.** Since we don't know the length of side BC, we cannot compare the measures of angle A and angle C. Therefore, the relationship between the two columns cannot be determined from the information given.
9. **Answer choice (B) is correct.** Let the side length of the original square be 10, so the area is 100. Decrease each side of the square by 30% to get a new side length of 7 and a new area of 49. The percent change from 100 to 49 is 51%, so the quantity in Column B is greater than the quantity in Column A.
10. **Answer choice (C) is correct.** The angles in any triangle add up to  $180^\circ$ , so  $a + b + 90 = 180$ , so  $a + b = 90$ , and  $c + d + 90 = 180$ , so  $c + d = 90$ . Therefore, the quantities in both columns are equal.
11. **Answer choice (B) is correct.** Find the side lengths of WXYZ by setting up and solving the following two proportions: (1)  $\frac{5}{WX} = \frac{2}{3} \rightarrow 15 = 2WX \rightarrow WX = 7.5 \text{ m}$  (2)  $\frac{4}{WZ} = \frac{2}{3} \rightarrow 12 = 2WZ \rightarrow WZ = 6 \text{ m}$ . Therefore, the area of WXYZ is  $6 \cdot 7.5 = 45 \text{ m}^2$ , so the quantity in Column B is greater than the quantity in Column A.
12. **Answer choice (C) is correct.** Because E, F, G, and H are midpoints of sides AB, BC, CD, and DA respectively, if you draw lines from E to G and H to F, you will divide the square into 8 equal triangles. Therefore, since the gray area is made up of 4 of those triangles and the white area is made up of 4 of those triangles, the gray and white areas are equal, so the quantities in both columns are equal.
13. **Answer choice (A) is correct.** Let the radius of the circle and the side length of the square both equal 2. The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle, so the area of a

circle with a radius of 2 equals  $\pi(2)^2 = 4\pi$ . The area of a square with a side length of 2 is 4. Since  $\pi$  equals around 3.14,  $4\pi$  is greater than 4, so the quantity in Column A is greater than the quantity in Column B.

14. **Answer choice (A) is the correct answer.** Find the value of  $a$  by setting the perimeter of the left rectangle equal to 120 cm and solving for  $a$ :  $3a + 3a + 2a + 2a = 120 \text{ cm} \rightarrow 10a = 120 \text{ cm} \rightarrow a = 12 \text{ cm}$ . Find the value of  $b$  by setting the area of the square equal to  $100 \text{ cm}^2$  and solving for  $b$ :  $b^2 = 100 \rightarrow b = 10 \text{ cm}$ . Therefore, the quantity in Column A is greater than the quantity in Column B.
15. **Answer choice (D) is correct.** We can find the perimeter of the square by using the area to first find the side length and then using the side length to find the perimeter. However, we cannot find the perimeter of the rectangle because we only know the area. There are a variety of rectangles that can have an area of 36, each having a different perimeter. Therefore, we cannot determine the relationship between the two columns using the information given.
16. **Answer choice (B) is correct.** Perpendicular lines have opposite reciprocal slopes. Therefore, since the slope of line  $n$  is negative based on its direction, the slope of line  $m$  must be positive, so the slope of line  $m$  is greater than the slope of line  $n$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
17. **Answer choice (B) is correct.** Find the radius of the sphere by plugging  $64\pi$  in for  $S$  in the given equation and solving for  $r$ :  $64\pi = 4\pi r^2 \rightarrow 16 = r^2 \rightarrow r = 4$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
18. **Answer choice (C) is correct.** Find the dimensions of the triangle in Column A by multiplying the dimensions of Triangle 1 by  $\frac{2}{3}$  to get 8 m for the height and 12 m for the base. Find the area of the triangle in Column A using the formula  $A = \frac{1}{2}bh$ :  $A = \frac{1}{2}(12 \text{ m})(8 \text{ m}) \rightarrow A = 48 \text{ m}^2$ . Find the dimensions of the triangle in Column B by multiplying the dimensions of Triangle 2 by  $\frac{4}{3}$  to get 12 m for the height and 8 m for the base. Find the area of the triangle in Column B using the formula  $A = \frac{1}{2}bh$ :  $A = \frac{1}{2}(8 \text{ m})(12 \text{ m}) \rightarrow A = 48 \text{ m}^2$ . Therefore, the quantities in both columns are equal.
19. **Answer choice (B) is correct.** The perimeter of Figure A is  $6 \text{ in} + 6 \text{ in} + 10 \text{ in} + 10 \text{ in} = 32 \text{ in}$ . To find the perimeter of Figure B, we need to realize that all three horizontal lines on the bottom of the figure add up to 10 in and the right side of the figure is also 6 in. So we know four of the side lengths are 6 in, 6 in, 10 in, and 10 in. There are also two vertical lines with unknown lengths, so we know the perimeter is greater than  $6 \text{ in} + 6 \text{ in} + 10 \text{ in} + 10 \text{ in}$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
20. **Answer choice (A) is correct.** The graph shows that Wes ran 16 meters in 3 seconds, which means his speed is  $\frac{16}{3}$  meters per second.  $\frac{16}{3}$  is greater than 5, so the quantity in Column A is greater than the quantity in Column B.

## Quantitative Comparisons Practice Set 2

1. **Answer choice (C) is correct.** Draw a circle inscribed in a square, as shown below. Draw the diameter of the circle, as shown below in red. From this, we can see that the diameter of the circle is equal to the side length of the square, so the quantity in Column A is equal to the quantity in Column B.



2. **Answer choice (A) is correct.** The area of the shaded region is equal to the area of the outer circle minus the area of the inner circle. The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Therefore, the area of the outer circle is  $16\pi \text{ in}^2$ , and the area of the inner circle is  $4\pi \text{ in}^2$ . Find the area of the shaded region by subtracting the two areas:  $16\pi \text{ in}^2 - 4\pi \text{ in}^2 = 12\pi \text{ in}^2$ . Therefore, the quantity in Column A is greater than the quantity in Column B.
3. **Answer choice (D) is correct.** The rectangle with a perimeter of 28 cm that produces the largest area is a square with side lengths of 7 cm. The area of a square with side lengths of 7 cm is  $49 \text{ cm}^2$ . The rectangle with a perimeter of 28 cm that produces the smallest area (assuming all sides are integers) is a rectangle measuring 1 cm by 13 cm. The area of this rectangle is  $13 \text{ cm}^2$ . Therefore, the quantity in Column A is between 13 cm and 49 cm inclusive, which means that sometimes the quantity in Column B is greater than the quantity in Column A, and sometimes it is equal. Therefore, we cannot determine the relationship between Column A and Column B from the given information.
4. **Answer choice (B) is correct.** To find the slopes of the lines in Column A and Column B, we need to rewrite the equations in  $y = mx + b$  form, where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept. Rewrite the equation in Column A:  $4y = 5x - 3 \rightarrow y = \frac{5}{4}x - \frac{3}{4}$ , so the slope is  $\frac{5}{4}$ . Rewrite the equation in Column B:  $2y = 3x + 6 \rightarrow y = \frac{3}{2}x + 3$ , so the slope is  $\frac{3}{2}$ .  $\frac{3}{2}$  is greater than  $\frac{5}{4}$ , so the quantity in Column B is greater than the quantity in Column A.
5. **Answer choice (A) is correct.** The volume of a cube is equal to the side length cubed ( $V = s^3$ ). Find the volume of the large cube:  $V = (9 \text{ ft})^3 \rightarrow V = 729 \text{ ft}^3$ . Find the volume of the small cube:  $V = (3 \text{ ft})^3 \rightarrow V = 27 \text{ ft}^3$ . To find the greatest number of small cubes that can fit inside the large cube, divide the volume of the large cube by the volume of the small cube:  $729 \text{ ft}^3 \div 27 \text{ ft}^3 = 27$ . Therefore, the quantity in Column A is greater than the quantity in Column B.
6. **Answer choice (C) is correct.** Since AB is perpendicular to BC, angle ABC is a right angle, so it has a measure of  $90^\circ$ . Therefore, we can set up the following equation:  $x + y = 90$ . Now we can isolate  $x$  to find the quantity in Column A:  $x + y = 90 \rightarrow x = 90 - y$ . Therefore, the quantity in Column A and the quantity in Column B are equal.



7. **Answer choice (A) is correct.** From the diagram, we can write the following equation:  $PR + RS = PS$ . Now we can plug in 24 for  $PR$  and 47 for  $PS$  and solve for  $RS$ :  $24 + RS = 47 \rightarrow RS = 23$ . Therefore, the quantity in Column A is greater than the quantity in Column B.
8. **Answer choice (C) is correct.** Since the two triangles are similar, corresponding sides are proportional. Therefore, we can write the following proportion:  $\frac{BC}{EF} = \frac{AC}{DF}$ . Now we can rearrange this proportion by first cross multiplying:  $(BC)(DF) = (AC)(EF)$ . Now divide both sides of the equation by  $AC$  and then divide both sides by  $DF$ :  $(BC)(DF) = (AC)(EF) \rightarrow \frac{(BC)(DF)}{AC} = EF \rightarrow \frac{BC}{AC} = \frac{EF}{DF}$ . Therefore, the quantity in Column A is equal to the quantity in Column B.
9. **Answer choice (A) is correct.** The equation for the circumference of a circle is  $C = 2\pi r$ , where  $r$  is the radius of the circle. Find the radius of the circle in Column A by plugging in  $16\pi$  m for  $C$  and solving for  $r$ :  $16\pi = 2\pi r \rightarrow r = 8$  mm. The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Find the area of the circle in Column A by plugging in 8 in for  $r$  and simplifying to find  $A$ :  $A = \pi(8)^2 \rightarrow A = 64\pi$  mm<sup>2</sup>. Find the radius of the circle in Column B by plugging in  $100\pi$  mm<sup>2</sup> for  $A$  and solving for  $r$  in the area equation:  $100\pi = \pi r^2 \rightarrow 100 = r^2 \rightarrow r = 10$ . Find the circumference of the circle in Column B by plugging in 10 for  $r$  in the circumference equation:  $C = 2\pi(10) \rightarrow C = 20\pi$  mm. Therefore, the quantity in Column A is greater than the quantity in Column B.
10. **Answer choice (D) is correct.** The perimeter of the square is  $4(2m)$  which equals  $8m$ . The perimeter of the rectangle is  $3n + 3n + n + n$  which equals  $8n$ . Since we don't know the values of  $m$  and  $n$ , we cannot determine the relationship between the two quantities.
11. **Answer choice (C) is correct.** Because B and D are the same distance away from A, and because the figure is symmetric across the line AC, the number of routes from A to B without retracing is equal to the number of routes from A to D without retracing. Therefore, the quantity in Column A is equal to the quantity in Column B.
12. **Answer choice (A) is correct.** The ratio of the areas of similar figures is equal to the ratio of corresponding side lengths squared. Therefore, since the ratio of the height of triangle ABC to the height of triangle XYZ is 2:3, the ratio of the area of triangle ABC to the area of triangle XYZ is  $(2:3)^2$  which equals 4:9. We can set up and solve the following proportion to find the area of XYZ, represented by  $A$ :  $\frac{4}{9} = \frac{8}{A} \rightarrow 4A = 72 \rightarrow A = 18$  cm<sup>2</sup>. Therefore, the quantity in Column A is greater than the quantity in Column B.
13. **Answer choice (B) is correct.** Plug in  $5\pi$  cm<sup>3</sup> for  $V$  and 2 cm for  $r$  in the given equation and solve for  $h$ :  $5\pi = \frac{1}{3} \cdot \pi \cdot 2^2 \cdot h \rightarrow 5\pi = \frac{1}{3} \cdot \pi \cdot 4 \cdot h \rightarrow 15 = 4h \rightarrow h = 3.75$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
14. **Answer choice (D) is correct.** Since all three sides of the triangles are equal, all three angles are equal. The sum of the angles in any triangle is  $180^\circ$ , so the measure of each angle in the triangle is  $60^\circ$ . Therefore, the value of  $x$  is 60. While all four sides of the quadrilateral are equal, we do not

know if all four angles are equal (the shape could be a rhombus or a square), so we cannot determine the value of  $y$ . Therefore, we cannot determine the relationship between the quantity in Column A and the quantity in Column B.

15. **Answer choice (A) is correct.** Find the value of  $x$  using the equation for the area of a triangle,  $A = \frac{1}{2}bh$ . Plug in  $20 \text{ cm}^2$  for  $A$ ,  $4 \text{ cm}$  for  $b$ , and  $x$  for  $h$ , and solve for  $x$ :  $20 = \frac{1}{2}(4)x \rightarrow 20 = 2x \rightarrow x = 10$  cm. Find the value of  $y$  using the equation for the perimeter of a square,  $P = 4s$ . Plug in  $36 \text{ cm}$  for  $P$  and  $y$  for  $s$ , and solve for  $y$ :  $36 = 4y \rightarrow y = 9$ . Therefore, the quantity in Column A is greater than the quantity in Column B.
16. **Answer choice (C) is correct.** Let the side length of the square equal  $x$ , so the area of the square is  $x^2$ . The area of a triangle is equal to  $\frac{1}{2}bh$ , so the area of the white triangle (unshaded region) is equal  $\frac{1}{2}(x)(x)$ , which equals  $\frac{1}{2}x^2$ . The area of the shaded region is equal to the area of the square minus the area of the white triangle:  $x^2 - \frac{1}{2}x^2 = \frac{1}{2}x^2$ . Therefore, the area of the shaded region is equal to the area of the unshaded region, so the quantities in Column A and B are equal.
17. **Answer choice (A) is correct.** Parallel lines have the same slope. Therefore, line  $m$  and line  $n$  have the same slope. The slope of line  $m$  is positive because it goes up and to the right, so the slope of line  $n$  is positive. Although we don't know the exact slope of line  $n$ , since it is positive, it will be greater than  $-2$ , so the quantity in Column A is greater than the quantity in Column B.
18. **Answer choice (D) is correct.** While the two triangles may look like they are similar, the problem did not tell us the triangles are similar, so we cannot assume they are. While we can find the measure of angle D since we have the measures of angles E and F, we cannot find the measure of angle A because we don't have the measure of angle B. Therefore, the relationship between the two columns cannot be determined from the given information.
19. **Answer choice (A) is correct.** The area of a parallelogram is equal to the base times the height,  $A = bh$ . Using this equation, we can plug in  $50 \text{ cm}^2$  for  $A$  and  $10 \text{ cm}$  for  $b$  and solve for  $h$ :  $50 = 10h \rightarrow h = 5$  cm. Now we know the height of the parallelogram, or the dotted line in the figure, is  $5 \text{ cm}$  long. Since the side labeled  $x \text{ cm}$  is the hypotenuse of a right triangle that has the height of  $5 \text{ cm}$  as one of the legs,  $x$  is greater than  $5$  because the hypotenuse of a right triangle is always the longest side. Therefore, the quantity in Column A is greater than the quantity in Column B.
20. **Answer choice (C) is correct.** The area of Figure A can be found by first drawing a horizontal line across the top of the figure. Now we need to find the length of the inner horizontal line. The bottom horizontal line is  $10 \text{ m}$ , and the top two horizontal lines are each  $2 \text{ m}$ . We can find the inner horizontal line by subtracting  $10 \text{ m} - 2 \text{ m} - 2 \text{ m}$  to get  $6 \text{ m}$ . To find the area of Figure A, we need to subtract the area of the inner rectangle that measures  $2 \text{ m}$  by  $6 \text{ m}$  from the area of the outer rectangle that measures  $6 \text{ m}$  by  $10 \text{ m}$ :  $6 \cdot 10 - 2 \cdot 6 = 60 - 12 = 48 \text{ m}^2$ . The area of Figure B can be found in the same way: first draw a horizontal line across the top of the figure. Now find the length of the inner horizontal line by subtracting  $10 \text{ m} - 3 \text{ m} - 3 \text{ m}$  to get  $4 \text{ m}$ . To find the area of Figure B, we need to subtract the area of the inner rectangle that measures  $3 \text{ m}$  by  $4 \text{ m}$  from the area of the outer rectangle

that measures 6 m by 10 m:  $6 \cdot 10 - 3 \cdot 4 = 60 - 12 = 48 \text{ m}^2$ . The area of Figure A is equal to the area of Figure B, so the quantities in both columns are equal.

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### Data Analysis and Probability

#### Probability Practice Set 1

- Answer choice (C) is correct.** To find the probability of a given event, divide the number of favorable outcomes by the number of total outcomes. There are 12 gray socks, so there are 12 favorable outcomes. There are a total of 28 socks ( $9 + 7 + 12 = 28$ ), so there are 28 total outcomes. Therefore, the probability is  $\frac{12}{28}$  or 12 out of 28. This simplifies to 3 out of 7.
- Answer choice (D) is correct.** To find the probability of a given event, divide the number of favorable outcomes by the number of total outcomes. We want to find the probability of landing on yellow or blue, so we need to find the number of spaces that are yellow or blue. There are 9 total sections, 3 of which are yellow, and 2 of which are red; the remaining sections are blue, so there are 4 blue sections. Therefore, there are 7 sections that are blue or yellow, so there are 7 favorable outcomes and 9 total outcomes, so the probability of the spinner landing on yellow or blue is  $\frac{7}{9}$ .
- Answer choice (A) is correct.** The probability of all outcomes in this situation must add to 1. The sum of the probability of choosing a white block and the probability of choosing a black block is 1. Therefore, there are only two colors present in the bucket: black and white.
- Answer choice (C) is correct.** List out the numbers from 1 to 12 inclusive: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12. There are 12 total numbers. There are 5 prime numbers (2, 3, 5, 7, 11), so the probability of choosing a prime number is 5 out of 12.
- Answer choice (D) is correct.** In probability, the word *or* means *add*. To find the probability of pulling a red *or* a green card, add the probability of choosing a red card and the probability of choosing a green card:  $\frac{4}{9} + \frac{1}{3} = \frac{7}{9}$
- Answer choice (A) is correct.** To find the probability of multiple events, multiply the probability of each event. Multiply the probability of landing on a blue space by the probability of landing on a yellow space:  $\frac{1}{8} \cdot \frac{1}{4} = \frac{1}{32}$
- Answer choice (B) is correct.** To find the probability of multiple events, multiply the probability of each event. There are 10 total numbers between 1 and 10 inclusive, 4 of which are less than 5 (1, 2, 3, 4). Therefore, the probability of choosing a number less than 5 is  $\frac{4}{10}$  or  $\frac{2}{5}$ . Multiply  $\frac{2}{5}$  by itself twice because we want to the probability of Tim and Anthony both choosing a number less than 5:  $\frac{2}{5} \cdot \frac{2}{5} = \frac{4}{25}$  which is the same as 4 out of 25.

8. **Answer choice (A) is correct.** Find the total number of outfits Peter can make by multiplying the number of shirts, pants, and shoes Peter has:  $5 \cdot 3 \cdot 2 = 30$  total outfits. To find the probability of a given event, divide the number of favorable outcomes by the number of total outcomes. Peter has exactly one red shirt, one red pair of pants, and one red pair of shoes, so there is one way Peter can choose an all red outfit. Therefore, there are 30 total outcomes and 1 favorable outcome, so the probability of choosing an all red outfit is  $\frac{1}{30}$ .
9. **Answer choice (B) is correct.** To find the probability of a given event, divide the number of favorable outcomes by the number of total outcomes. Kristin can choose 1, 2, 3, 4, or 5. Ken can choose 6, 7, or 8. Find the total number of outcomes by multiplying the number of numbers Kristin can choose by the number of numbers Ken can choose:  $5 \cdot 3 = 15$ . List out the possible ways Kristin and Ken can choose numbers that add to 11: 3 and 8, 4 and 7, 5 and 6. Therefore, there are 3 favorable outcomes, so the probability that the sum is 11 is  $\frac{3}{15}$  or  $\frac{1}{5}$ .
10. **Answer choice (B) is correct.** To find the probability of multiple events, multiply the probability of each event. A standard die has six sides numbered 1, 2, 3, 4, 5, and 6. Therefore, there are 6 total outcomes and 2 favorable outcomes (2 ways to land on a number greater than 4), so the probability of landing on a number greater than four is  $\frac{2}{6}$  or  $\frac{1}{3}$ . Multiply  $\frac{1}{3}$  by itself three times to find the probability of landing on a number greater than four three times:  $\frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3} = \frac{1}{27}$ .
11. **Answer choice (B) is correct.** We want to find the event that is most likely to happen, so we want to find the answer choice with the greatest probability. To find the probability of multiple events, multiply the probability of each event. Use this to write a product of two fractions that represents the probability of each answer choice. Choice (A):  $\frac{10}{22} \cdot \frac{9}{21}$ . Choice (B):  $\frac{16}{22} \cdot \frac{15}{21}$ . Choice (C):  $\frac{12}{22} \cdot \frac{6}{21}$ . Choice (D):  $\frac{12}{22} \cdot \frac{11}{21}$ . Both fractions in Choice (B) are greater than all of the fractions in choice (A), (C), and (D), so answer choice (B) is the greatest probability.
12. **Answer choice (B) is correct.** There are 36 possible ways you can roll two standard dice because each die has 6 sides and  $6 \cdot 6 = 36$ . To roll a sum of 10, you can roll the following combinations: 5 and 5, 4 and 6, 6 and 4. Therefore, there are 3 ways to roll a sum of ten and 36 total ways to roll two dice, so the probability of rolling a sum of ten is 3 out of 36.
13. **Answer choice (D) is correct.** Two events are said to be complementary when one event occurs if and only if the other does not. The probabilities of two complementary events add up to 1. Therefore, since  $\frac{7}{20} + \frac{13}{20} = 1$ , the probability of the complement is  $\frac{13}{20}$ .
14. **Answer choice (C) is correct.** The probability of choosing a green ball is 5 out of 12, or  $\frac{5}{12}$ , so  $\frac{5}{12}$  of the balls in the bucket are green. We can not have fractions of balls, so the number of balls in the bucket must be a multiple of 12: answer choice (C) is the only multiple of 12.

15. **Answer choice (A) is correct.** The probability of choosing a purple pen is  $\frac{3}{10}$ , so  $\frac{3}{10}$  of the pens are purple. Find the total number of pens by setting up and solving an equation answering the question, “6 is  $\frac{3}{10}$  of what number?”:  $6 = \frac{3}{10}x \rightarrow x = 10$ . Find the number of black pens by subtracting the number of red and purple pens from the total number of pens:  $10 - 3 - 6 = 1$  black pen.
16. **Answer choice (C) is correct.** The probability of choosing a boy is 3 out of 8, so boys make up  $\frac{3}{8}$  of the class. Therefore, girls make up  $\frac{5}{8}$  of the class. Find  $\frac{5}{8}$  of 96:  $\frac{5}{8}$  of 96 =  $\frac{5}{8} \cdot 96 = 60$  girls.
17. **Answer choice (B) is correct.** We want to find the probability that Jane chooses a vowel. It does not matter that Beth chose a vowel. To find the probability of a given event, divide the number of favorable outcomes by the number of total outcomes. There are 7 total letters and 2 vowels, so there are 7 total outcomes and 2 favorable outcomes. Therefore, the probability Jane chooses a vowel is  $\frac{2}{7}$ .
18. **Answer choice (A) is correct.** To find the probability of multiple events, multiply the probability of each event. A standard die has six sides numbered 1, 2, 3, 4, 5, and 6, so the probability that the die lands on 4 is  $\frac{1}{6}$ . A coin has two sides, heads and tails, so the probability of landing on tails is  $\frac{1}{2}$ . Multiply  $\frac{1}{6}$  by  $\frac{1}{2}$ :  $\frac{1}{6} \cdot \frac{1}{2} = \frac{1}{12}$ .
19. **Answer choice (C) is correct.** The probability of all outcomes in this situation must add to 1. The sum of the probability of choosing a green marble and the probability of choosing an orange marble is  $\frac{5}{6} (\frac{1}{2} + \frac{1}{3} = \frac{5}{6})$ . Since the sum of the probabilities is NOT 1, there are more than 2 colors. Since  $\frac{5}{6}$  is equal to  $\frac{10}{12}$ , and there are 12 total marbles, we know that we could have 3 colors (the probability of choosing the third color would be  $\frac{2}{12}$ ) or we could have 4 colors (the probability of choosing each color would be  $\frac{1}{12}$ ). Therefore, there can be 3 or 4 colors, so answer choice (C) is correct.
20. **Answer choice (B) is correct.** The probability of choosing a milk chocolate is 2 out of 5, or  $\frac{2}{5}$ , so  $\frac{2}{5}$  of the chocolates are milk chocolates. In answer choice (B), there are 6 milk chocolates and 9 other chocolates, so there are 15 total chocolates. 6 is  $\frac{2}{5}$  of 15, so the probability of choosing a milk chocolate in answer choice (B) is 2 out of 5.

### Probability Practice Set 2

1. **Answer choice (D) is correct.** To find the probability of a given event, divide the number of favorable outcomes by the number of total outcomes. There are 5 Americans, so there are 5 favorable outcomes. There are a total of 12 board directors ( $5 + 3 + 4 = 12$ ), so there are 12 total outcomes. Therefore, the probability is  $\frac{5}{12}$  or 5 out of 12.
2. **Answer choice (A) is correct.** The probability of spinning the spinner and landing on a white or blue space is 7 out of 12, so  $\frac{7}{12}$  of the spaces are white or blue. Since there are only 12 spaces on the

spinner, 7 of them are white or blue. Find the number of blue spaces by subtracting the number of white spaces from 7:  $7 - 5 = 2$  blue spaces.

3. **Answer choice (A) is correct.** The probability of all outcomes in this situation must add to 1. The sum of the probability of choosing a red gumball and the probability of choosing a green gumball is 1. Therefore, there are only two colors of gumballs in the jar: red and green.
4. **Answer choice (A) is correct.** To find the probability of multiple events, multiply the probability of each event. There are 6 total letters, 2 of which are vowels (A and E). Therefore, the probability of choosing a vowel is  $\frac{2}{6}$  or  $\frac{1}{3}$ . Multiply  $\frac{1}{3}$  by itself twice because we want the probability of Carl and Edna both choosing a vowel:  $\frac{1}{3} \cdot \frac{1}{3} = \frac{1}{9}$ , which is the same as 1 out of 9.
5. **Answer choice (C) is correct.** To find the probability of a given event, divide the number of favorable outcomes by the number of total outcomes. We want to find the probability of landing on an even number or a number less than four, so we need to find the number of spaces that are even or less than four. The numbers that are even or less than four are 1, 2, 3, 4, 6, and 8, so there are 6 favorable outcomes. There are 8 total outcomes because there are 8 total spaces, so the probability of the spinner landing on an even number or a number less than four is  $\frac{6}{8}$ , which simplifies to  $\frac{3}{4}$ .
6. **Answer choice (B) is correct.** First let's find the probability of choosing a ball that is red or blue. In probability, the word *or* means *add*. To find the probability of choosing a red *or* a blue ball, add the probability of choosing a red ball and the probability of choosing a blue ball:  $\frac{1}{3} + \frac{2}{5} = \frac{11}{15}$ . Now we need to find the probability of choosing a ball that is neither red nor blue. Choosing a ball that is neither red nor blue is the complement of choosing a ball that is either red or blue, so to find the probability of choosing a ball that is neither red nor blue, subtract the probability of choosing a ball that is either red or blue from 1:  $1 - \frac{11}{15} = \frac{4}{15}$ .
7. **Answer choice (B) is correct.** Since there are only 2 yellow chips in the bag, it is impossible for Miriam to choose 3 chips that are all yellow.
8. **Answer choice (C) is correct.** To find the probability of multiple events, multiply the probability of each event. First find the probability of the die landing on a prime number. There are 6 sides on a standard die, numbered with 1, 2, 3, 4, 5, and 6. Three of the sides are prime (2, 3, and 5), so there are 3 favorable outcomes and 6 total outcomes. Therefore, the probability of the die landing on a prime number is  $\frac{3}{6}$  which simplifies to  $\frac{1}{2}$ . Now find the probability of the die landing on an even number. There are 6 sides on a standard die, numbered with 1, 2, 3, 4, 5, and 6. Three of the sides are even (2, 4, and 6), so there are 3 favorable outcomes and 6 total outcomes. Therefore, the probability of the die landing on an even number is  $\frac{3}{6}$  which simplifies to  $\frac{1}{2}$ . Find the probability of the die landing on a prime number and then an even number by multiplying the two probabilities:  $\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$ .

9. **Answer choice (C) is correct.** We want to find the event that is least likely to happen, so we want to find the answer choice with the smallest probability. To find the probability of multiple events, multiply the probability of each event. Use this to write a product of two fractions that represents the probability of each answer choice. For now, we are going to skip answer choice (B) because writing a probability for that answer choice is challenging. We will use reasoning later on to compare answer choice (B) to the other answer choices. Choice (A):  $\frac{10}{24} \cdot \frac{9}{23}$ . Choice (C):  $\frac{6}{24} \cdot \frac{8}{23}$ . Choice (D):  $\frac{16}{24} \cdot \frac{15}{23}$ . Both fractions in answer choice (C) are smaller than both fractions in answer choice (A) and both fractions in answer choice (D), so out of these three answers, answer choice (C) is the smallest. Now we need to compare answer choices (B) and (C). Answer choice (B) says the probability that *at least* one chocolate is a milk chocolate. If we look at answer choice (A), it says the probability that both chocolates are milk chocolates. It is easier to choose *at least* one milk chocolate than it is to choose two milk chocolates, so the probability of answer choice (B) is greater than the probability of answer choice (A). Therefore, the probability of answer choice (B) is greater than the probability of answer choice (C), so answer choice (C) is the least likely to happen.
10. **Answer choice (B) is correct.** There are 36 possible ways you can roll two standard dice because each die has 6 sides and  $6 \cdot 6 = 36$ . To roll a product of 6, you can roll the following combinations: 1 and 6, 6 and 1, 2 and 3, 3 and 2. Therefore, there are 4 ways to roll a product of 6 and 36 total ways to roll two dice, so the probability of rolling a product of 6 is 4 out of 36, which simplifies to 1 out of 9.
11. **Answer choice (C) is correct.** To find the probability of a given event, divide the number of favorable outcomes by the number of total outcomes. Carl can choose 2, 3, 4, or 5, and Evelyn can choose 11, 12, 13, 14, or 15. Find the total number of outcomes by multiplying the number of numbers Carl can choose by the number of numbers Evelyn can choose:  $4 \cdot 5 = 20$ . List out the possible ways Carl and Evelyn can choose numbers that add to 17: 2 and 15, 3 and 14, 4 and 13, 5 and 12. Therefore, there are 4 favorable outcomes, so the probability that the sum is 17 is  $\frac{4}{20}$  or  $\frac{1}{5}$ .
12. **Answer choice (A) is correct.** To find the probability of multiple events, multiply the probability of each event. The probability of choosing a white ball from Box A is  $\frac{3}{10}$ . The probability of choosing a white ball from Box B is  $\frac{2}{4}$  or  $\frac{1}{2}$ . The probability of choosing a white ball from Box C is  $\frac{1}{5}$ . Find the probability of Glenda choosing three white balls by multiplying the three probabilities:  $\frac{3}{10} \cdot \frac{1}{2} \cdot \frac{1}{5} = \frac{3}{100}$ .
13. **Answer choice (B) is correct.** Two events are said to be complementary when one event occurs if and only if the other does not. The probabilities of two complementary events add up to 1. Therefore, since  $\frac{7}{9} + \frac{2}{9} = 1$ , the probability of the complement is  $\frac{2}{9}$ .
14. **Answer choice (C) is correct.** We want to find the probability that Lucy chooses a 16. It does not matter that Leo chose a 16. To find the probability of a given event, divide the number of favorable outcomes by the number of total outcomes. There are 10 total numbers between 11 and 20 inclusive, 1

of which is 16, so there are 10 total outcomes and 1 favorable outcome. Therefore, the probability Lucy chooses a 16 is  $\frac{1}{10}$ , which can be written as 1 out of 10.

15. **Answer choice (D) is correct.** The probability of choosing a girl from the class is  $\frac{3}{8}$ , so  $\frac{3}{8}$  of the class are girls. Therefore, the total number of students in the class must be a multiple of 8. Answer choice (D), 24 students, is the only multiple of 8 in the answer choices.
16. **Answer choice (C) is correct.** The probability of choosing an orange ball is 2 out of 7, or  $\frac{2}{7}$ , so  $\frac{2}{7}$  of the balls are orange. Find the number of orange balls by finding  $\frac{2}{7}$  of 42:  $\frac{2}{7}$  of 42 =  $\frac{2}{7} \cdot 42 = 12$  orange balls. Find the number of balls that are NOT orange by subtracting the number of orange balls from the total number of balls:  $42 - 12 = 30$  rubber balls.
17. **Answer choice (B) is correct.** To find the probability of multiple events, multiply the probability of each event. There are two ways in which a coin can land, one of which is heads. Therefore, the probability of the coin landing on heads is  $\frac{1}{2}$ . There are six ways in which a die can land, two of which are less than 3 (1 and 2). Therefore, the probability of the die landing on a number less than 3 is  $\frac{2}{6}$  or  $\frac{1}{3}$ . Find the probability of the coin landing on heads and the die landing on a number less than 3 by multiplying the two probabilities:  $\frac{1}{2} \cdot \frac{1}{3} = \frac{1}{6}$ .
18. **Answer choice (B) is correct.** There is a 1 out of 4, or  $\frac{1}{4}$ , chance of choosing a silver coin, so  $\frac{1}{4}$  of the coins are silver. Since there are 3 silver coins, we can find the total number of coins by multiplying 3 by 4:  $3 \cdot 4 = 12$  total coins. Now we can find the number of copper coins by subtracting the number of gold and silver coins from the total number of coins:  $12 - 5 - 3 = 4$  copper coins.
19. **Answer choice (B) is correct.** The probability of choosing a blue pen is  $\frac{3}{5}$ , so  $\frac{3}{5}$  of the pens are blue. Find the number of blue pens in the box by finding  $\frac{3}{5}$  of 15:  $\frac{3}{5}$  of 15 =  $\frac{3}{5} \cdot 15 = 9$  blue pens. The probability of choosing a black pen is  $\frac{1}{3}$ , so  $\frac{1}{3}$  of the pens are black. Find the number of black pens in the box by finding  $\frac{1}{3}$  of 15:  $\frac{1}{3}$  of 15 =  $\frac{1}{3} \cdot 15 = 5$  black pens. Therefore, there are 14 blue and black pens in the box. There are only 15 pens in the box, so there is only one color pen remaining ( $15 - 14 = 1$ ). Therefore, there are exactly 3 different color pens in the box.
20. **Answer choice (D) is correct.** The probability of selecting a girl is  $\frac{3}{7}$ , so  $\frac{3}{7}$  of the class is girls. In answer choice (D) there are 18 girls and 24 boys, so there are 42 total students ( $18 + 24 = 42$ ). Therefore, the probability of choosing a girl in answer choice (D) is  $\frac{18}{42}$ , which simplifies to  $\frac{3}{7}$ .

### **Mean, Median, Mode, & Range Practice Set 1**



- Answer choice (C) is correct.** The mean of a set of data is equal to the sum of the numbers divided by the number of terms:  $\frac{19 + 43 + 28 + 16 + 34 + 43 + 27 + 6 + 92 + 56}{10} = \frac{364}{10} = 36.4$
- Answer choice (B) is correct.** The median of a set of data is the middle number when the numbers are in order from least to greatest. Order the numbers from least to greatest: 6, 16, 19, 27, 28, 34, 43, 43, 56, 92. Because there are two middle numbers, 28 and 34, take the average (mean) of 28 and 34 to get 31.
- Answer choice (B) is correct.** The mode of a set of data is the number that appears the most. The number 43 appears twice, which is more than any other number, so 43 is the mode.
- Answer choice (C) is correct.** The range of a set of data equals the difference between the highest and lowest number. The highest number is 92 and the lowest number is 6, so the range is  $92 - 6$  which equals 86.
- Answer choice (B) is correct.** The interquartile range of a set of data is the difference between quartile 3 and quartile 1. Order the numbers from least to greatest, and find quartile 1 by finding the median of the first half of the data: 6, 16, 19, 27, 28, 34, 43, 43, 56, 92 → quartile 1 is the median of 6, 16, 19, 27, 28 which is 19. Order the numbers from least to greatest, and find quartile 3 by finding the median of the second half of the data: 6, 16, 19, 27, 28, 34, 43, 43, 56, 92 → quartile 3 is the median of 34, 43, 43, 56, 92 which is 43. Find the difference between quartile 3 and quartile 1:  $43 - 19 = 24$ .
- Answer choice (B) is correct.** The average, or mean, of a set of data is equal to the sum of the numbers divided by the number of terms:  $\frac{-18 + (-34) + 6 + 17 + (-1) + 4 + (-9)}{7} = \frac{-35}{7} = -5$ .
- Answer choice (D) is correct.** If you subtract 4 from every number in the data set, the mean, median, and mode each decrease by 4. However, the range stays the same because we are subtracting 4 from the highest and lowest number, so the difference between the numbers does not change. We can test this by creating a data set. Let's say our data set is 20, 30, 30, 40. The original median is 30, the original mode is 30, the original mean is 30, and the original range is 20. Subtract 4 from each number to get a new data set: 16, 26, 26, 36. The new median is 26, the new mode is 26, the new mean is 26, and the new range is 20.
- Answer choice (A) is correct.** If you add 8 to every number in the data set, the mean, median, and mode each increase by 8, and the range stays the same. We can test this by creating a data set. Let's say our data set is 20, 30, 30, 40. The original median is 30, the original mode is 30, the original mean is 30, and the original range is 20. Add 8 to each number to get a new data set: 28, 38, 38, 48. The new median is 38, the new mode is 38, the new mean is 38, and the new range is 20.
- Answer choice (C) is correct.** The range of a set of data equals the difference between the highest and lowest number. The highest number of points Bryce scored was 24, and the lowest was 3, so the range is  $24 - 3$  which equals 21 points.

10. **Answer choice (D) is correct.** The median of a data set is the middle number when the numbers are in order from least to greatest. If the median is not one of the data points, then exactly 50% of the data lies below the median and exactly 50% of the data lies above the median. Therefore, 50%, or half, of the class scored above the median of 78.
11. **Answer choice (D) is correct.** The mode of the data is the number that appears the most, which is 60. The mean of the data set is equal to the sum of the numbers divided by the number of terms:  
$$\frac{40 + 60 + 30 + 90 + 20 + 60 + 100 + 80}{8} = \frac{480}{8} = 60.$$
 Therefore, the mode is NOT greater than the mean, so answer choice (D) is false.
12. **Answer choice (C) is correct.** The range of a set of data equals the difference between the highest and lowest number. Therefore, if the range of the ages is 29, and the lowest age is 23, the highest age can be found by adding  $29 + 23$  to get 52 years.
13. **Answer choice (C) is correct.** The median of a data set is the middle number when the numbers are in order from least to greatest. Line up the numbers from least to greatest and find the median: 6, 70, 70, 73, 74, 75, 76 → the median is 73. Therefore, if we add 73 to the data set, we now have 6, 70, 70, 73, 73, 74, 75, 76 so the median is still 73. If we add any other number, the median of the data set will NOT be 73.
14. **Answer choice (B) is correct.** The mode of the data is the number that appears the most. Edna scored two 92s and four other scores that were all different. Therefore, 92 appears the most in Edna's scores, so 92 is the mode of her scores.
15. **Answer choice (A) is correct.** The median of a data set is the middle number when the numbers are in order from least to greatest. If the median is not one of the data points, then exactly 50% of the data lies below the median and exactly 50% of the data lies above the median. Therefore, since half of the people are over the age of 35, and no one is 35 years old, the median age must be 35 years.

### **Mean, Median, Mode, & Range Practice Set 2**

1. **Answer choice (C) is correct.** The median of a set of data is the middle number when the numbers are in order from least to greatest. Order the numbers from least to greatest: 5, 12, 17, 21, 24, 29, 35, 35, 78, 94. Because there are two middle numbers, 24 and 29, take the average (mean) of 24 and 29 to get 26.5.
2. **Answer choice (D) is correct.** The mean of a set of data is equal to the sum of the numbers divided by the number of terms: 
$$\frac{21 + 12 + 35 + 5 + 29 + 17 + 35 + 24 + 78 + 94}{10} = \frac{350}{10} = 35.$$
3. **Answer choice (D) is correct.** The range of a set of data equals the difference between the highest and lowest number. The highest number is 94 and the lowest number is 5, so the range is  $94 - 5$  which equals 89.

4. **Answer choice (A) is correct.** The interquartile range of a set of data is the difference between quartile 3 and quartile 1. Order the numbers from least to greatest, and find quartile 1 by finding the median of the first half of the data: 5, 12, 17, 21, 24, 29, 35, 35, 78, 94 → quartile 1 is the median of 5, 12, 17, 21, 24 which is 17. Order the numbers from least to greatest, and find quartile 3 by finding the median of the second half of the data: 5, 12, 17, 21, 24, 29, 35, 35, 78, 94 → quartile 3 is the median of 29, 35, 35, 78, 94 which is 35. Find the difference between quartile 3 and quartile 1:  $35 - 17 = 18$ .
5. **Answer choice (C) is correct.** The mode of a set of data is the number that appears the most. The number 35 appears twice, which is more than any other number, so 35 is the mode.
6. **Answer choice (C) is correct.** The average, or mean, of a set of data is equal to the sum of the numbers divided by the number of terms. First add up all five numbers:  $10\frac{4}{5} + 8\frac{2}{5} + 12\frac{3}{10} + 6\frac{9}{10} + 9\frac{3}{5} = 48$ . Now divide that by 5 since there are 5 terms:  $48 \div 5 = 9.6$  pounds.
7. **Answer choice (C) is correct.** If you add 5 to every number in the data set, the mean, median, and mode each increase by 5, and the interquartile range stays the same. We can test this by creating a data set. Let's say our data set is 10, 20, 30, 30, 30, 40, 50. The original median is 30, the original mode is 30, the original mean is 30, and the original interquartile range is 20. Add 5 to each number to get a new data set: 15, 25, 35, 35, 35, 45, 55. The new median is 35, the new mode is 35, the new mean is 35, and the new interquartile range is 20.
8. **Answer choice (A) is correct.** If you subtract 9 from every number in the data set, the mean, median, and mode each decrease by 9, and the range stays the same. We can test this by creating a data set. Let's say our data set is 10, 20, 30, 30, 30, 30, 40, 50. The original median is 30, the original mode is 30, the original mean is 30, and the original range is 40. Subtract 9 from each number to get a new data set: 1, 11, 21, 21, 21, 21, 31, 41. The new median is 21, the new mode is 21, the new mean is 21, and the new range is 40.
9. **Answer choice (D) is correct.** Since the data set has an even number of numbers, the median will be the average of the middle two numbers. Since no two numbers are the same, we know the middle two numbers cannot both be 12: they must be two different numbers that have an average of 12. Therefore, none of the numbers are 12.
10. **Answer choice (A) is correct.** The median of a data set is the middle number when the numbers are in order from least to greatest. If the median is not one of the data points, then exactly 50% of the data lies below the median and exactly 50% of the data lies above the median. Therefore, 50%, or half, of the people at the company are older than 32, and half of 20 is 10.
11. **Answer choice (C) is correct.** The mean of the data set is equal to the sum of the numbers divided by the number of terms:  $\frac{10 + 20 + 60 + 80 + 20 + 50 + 110}{7} = \frac{350}{7} = 50$ . The median of a data set is the middle number when the numbers are lined up from least to greatest or greatest to least. Line the numbers up

from least to greatest: 10, 20, 20, 50, 60, 80, 110. Since 50 is the middle number, 50 is the median, so the mean is equal to the median.

12. **Answer choice (D) is correct.** The mode is the number that appears the most, so we don't have enough information to determine the mode of the data set. Therefore, we cannot determine the number of miles Wanda ran.
13. **Answer choice (D) is correct.** In order to keep the mean of a data set the same when adding another number, you must add the mean to the data set. Therefore, to find the number added, we need to find the mean. The mean of the data set is equal to the sum of the numbers divided by the number of terms:  $\frac{50 + 50 + 60 + 70 + 80}{7} = \frac{310}{7} = 62$ . Since the mean is 62, the number added is 62.
14. **Answer choice (B) is correct.** Since Anthony scored a 79 on his first three tests, the average of his first three tests was a 79. Since Anthony scored more than 79 points on the remaining five tests, these tests brought up Anthony's average, so his overall test average was above a 79.
15. **Answer choice (D) is correct.** Since the temperature was the same the first four days, dropped to  $25^\circ$  on day 5, and then increased by  $10^\circ$  for days six, seven, eight, and nine, we know that the lowest temperature over the nine days was  $25^\circ$ . Therefore, the median cannot be  $25^\circ$  since the median is the middle number when the numbers are lined up from least to greatest or greatest to least.

### Average Word Problems Practice Set 1

1. **Answer choice (C) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Rearrange the equation to get  $sum = (average) \cdot (number\ of\ terms)$ . Use the equation and plug in 30 for the average and 15 for the number of terms and simplify to find the sum:  $sum = 30 \cdot 15 \rightarrow sum = 450$ .
2. **Answer choice (B) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Find the sum of the numbers:  $8\frac{3}{5} + 14\frac{9}{10} + 9\frac{1}{3} + 7\frac{2}{3} = 40\frac{1}{2}$ . Divide the sum by the total number of days, 5:  $40\frac{1}{2} \div 5 = 8\frac{1}{10}$ .
3. **Answer choice (B) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Rearrange the equation to get  $number\ of\ terms = \frac{sum}{average}$ . Use the equation and plug in 40 for the sum and 5 for the average and simplify to find the number of terms:  $number\ of\ terms = \frac{40}{5} \rightarrow 8$ .
4. **Answer choice (A) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Let  $x$  represent the other number, and set

up and solve the following equation for  $x$  by plugging in 18 for the average, 26 for the first number, and 2 for the number of terms:  $18 = \frac{26+x}{2} \rightarrow 36 = 26 + x \rightarrow x = 10$ .

5. **Answer choice (B) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Let  $x$  represent Maddie's brother's age, and set up and solve the following equation for  $x$  by plugging in 13 for the average, the ages of Maddie, Sophie, and Chloe, and 4 for the number of terms:  $13 = \frac{13+16+9+x}{4} \rightarrow 13 = \frac{38+x}{4} \rightarrow 52 = 38 + x \rightarrow x = 14$  years.
6. **Answer choice (D) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Rearrange the equation to get  $sum = (average) \cdot (number\ of\ terms)$ . Therefore, the sum of the weights of the three dogs is equal to  $25 \cdot 3$  which equals 75 pounds, and the sum of the weights of the two cats is equal to  $9 \cdot 2$  which equals 18 pounds. Now find the sum of the weights of all five animals by adding the two results from above: 75 pounds + 18 pounds = 93 pounds.
7. **Answer choice (B) is correct.** The information about the average and the range is irrelevant. Any time you remove the largest number from a data set (as long as every number in the data set is not the same), the average will decrease.
8. **Answer choice (B) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Plug in 120 for the average, 5 for the number of terms, and solve for  $x$ , the total amount of money Nathan made on Thursday and Friday:  $120 = \frac{85+125+90+x}{5} \rightarrow 120 = \frac{300+x}{5} \rightarrow 600 = 300 + x \rightarrow x = \$300$ .
9. **Answer choice (C) is correct.** Since the average of four numbers is 30, we can say each number is 30. So our original data set is 30, 30, 30, 30. If we increase two of the numbers by 12, we now have 42, 42, 30, 30. Find the average of these four numbers using the formula  $average = \frac{sum}{number\ of\ terms}$ :  $average = \frac{42+42+30+30}{4} \rightarrow average = \frac{144}{4} \rightarrow average = 36$ .
10. **Answer choice (B) is correct.** Since the average age of the five women is 40, we can say each woman is 40 years old. Since the average age of the three men is 56, we can say that each man is 56 years old. Now we can use the formula  $average = \frac{sum}{number\ of\ terms}$  to find the average of all eight adults:  $average = \frac{40+40+40+40+40+56+56+56}{8} \rightarrow average = \frac{368}{8} \rightarrow average = 46$ .
11. **Answer choice (C) is correct.** Since the 7 numbers have an average of 15, we can say each number is 15. Therefore, our original data set is 15, 15, 15, 15, 15, 15, 15. If we decrease each number by 1, our new data set is 14, 14, 14, 14, 14, 14, 14. Since all seven numbers are 14, the average of the new set is 14.

12. **Answer choice (D) is correct.** Since the average of the 9 pieces of ribbon is 60 inches, we can say each piece of ribbon is 60 inches. Therefore, our original data set is 60, 60, 60, 60, 60, 60, 60, 60, 60. If we cut 5 inches off each piece of ribbon, our new data set is 55, 55, 55, 55, 55, 55, 55, 55, 55. Since all nine numbers are 55, the new average length is 55.
13. **Answer choice (A) is correct.** Since a set of 10 numbers has a mean, or average, of 24, we can say each number is 24, so our original data set is 24, 24, 24, 24, 24, 24, 24, 24, 24, 24. Once we add the number 35 to our set, our new set is 24, 24, 24, 24, 24, 24, 24, 24, 24, 35. Find the mean, or average, of this set using the equation  $average = \frac{sum}{number\ of\ terms}$ :  $average = \frac{24 \cdot 10 + 35}{11} \rightarrow average = \frac{240 + 35}{11} \rightarrow average = \frac{275}{11} \rightarrow average = 25$ .
14. **Answer choice (A) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . We can rearrange the equation to get  $sum = (average) \cdot (number\ of\ terms)$ . Plug in 30 for the average and 2 for the number of terms:  $sum = 30 \cdot 2 \rightarrow sum = 60$ . Therefore,  $a + b$  must equal 60.
15. **Answer choice (B) is correct.** Since the average of the first six numbers is 12, we can say each of those six numbers is 12. Since the average of four different numbers is 8, we can say each of those four numbers is 8. Therefore, we can say the ten numbers we have are 12, 12, 12, 12, 12, 12, 8, 8, 8, 8. Find the average of these ten numbers using the formula  $average = \frac{sum}{number\ of\ terms}$ :  $average = \frac{12 \cdot 6 + 8 \cdot 4}{10} \rightarrow average = \frac{72 + 32}{10} \rightarrow average = \frac{104}{10} \rightarrow average = 10.4$
16. **Answer choice (B) is correct.** Since Kerry ran six miles and had an average mile time of 9 minutes, we can say she ran each of her first six miles in 9 minutes. Now we can solve for the sum of the mile times of her next three miles,  $x$ , by using the equation  $average = \frac{sum}{number\ of\ terms}$ . Plug in 8 minutes for the average and 9 for the number of terms and solve for  $x$ :  $8 = \frac{9 + 9 + 9 + 9 + 9 + 9 + x}{9} \rightarrow 8 = \frac{54 + x}{9} \rightarrow 72 = 54 + x \rightarrow x = 18$  minutes. Now we know that the sum of Kerry's next three miles must be 18 minutes, so find the average of her next three miles using the equation and plugging in 18 for the sum and 3 for the number of terms:  $average = \frac{18}{3} \rightarrow average = 6$  minutes.
17. **Answer choice (B) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . The sum of her first three quizzes was 270, and her most recent quiz was a 78, so the sum of her four quizzes is  $270 + 78$  which equals 348. Find Morgan's average quiz score by plugging 348 in for the sum and 4 in for the number of terms in the equation above:  $average = \frac{348}{4} \rightarrow average = 87$ .
18. **Answer choice (C) is correct.** Since Cara has a test average of 84 after five tests, we can say she scored an 84 on each of those five tests. The average of a set of numbers equals the sum of the

numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Using  $x$  to represent Cara's score on her sixth test, and plugin in 86 for the average and 6 for the number of terms, we can set up and solve the following equation:  $86 = \frac{84 + 84 + 84 + 84 + 84 + x}{6} \rightarrow 86 = \frac{420 + x}{6} \rightarrow 516 = 420 + x \rightarrow x = 96$ .

19. **Answer choice (D) is correct.** Since 8 numbers have a mean of 12, we can say each of the 8 numbers is equal to 12. The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Since we want to create a new set with a mean that is 4 more than the original mean of 12, we want the new average to be 16. Therefore, we can set up and solve the following equation, where  $x$  represents the additional number that needs to be included in the set:  $16 = \frac{8 \cdot 12 + x}{9} \rightarrow 16 = \frac{96 + x}{9} \rightarrow 144 = 96 + x \rightarrow x = 48$ .

20. **Answer choice (A) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Let  $x$  represent the sum of Shannon's last two tests needed for her to get a test average of 84, and set up and solve the following equation:  $84 = \frac{78 + 85 + 82 + 79 + x}{6} \rightarrow 84 = \frac{324 + x}{6} \rightarrow 504 = 324 + x \rightarrow 180 = x$ . Now we know the sum of Shannon's last two tests scores must be a 180, so to find the average of her last two test scores, we can plug in 180 for the sum and 2 for the number of terms in the average equation:  $average = \frac{180}{2} \rightarrow average = 90$ .

### Average Word Problems Practice Set 2

- Answer choice (D) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Use this equation and plug in 32 for the average, 12 for the number of terms, and 300 for the sum of the 10 largest numbers and solve for  $x$ , the sum of the two largest number:  $32 = \frac{300 + x}{12} \rightarrow 384 = 300 + x \rightarrow x = 84$ .
- Answer choice (A) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . First find the sum of the hours Jerry trained from Monday to Friday:  $1\frac{2}{3} + 2\frac{1}{2} + 6\frac{5}{6} = 11$ . Now divide the sum by 5 because we are finding the average over 5 days:  $11 \div 5 = 2\frac{1}{5}$  hours.
- Answer choice (B) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Rearrange the equation to get  $number\ of\ terms = \frac{sum}{average}$ . Use the equation and plug in 216 for the sum and 24 for the average and simplify to find the number of terms:  $number\ of\ terms = \frac{216}{24} \rightarrow 9$ .

4. **Answer choice (C) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Rearrange the equation to get  $sum = (average) \cdot (number\ of\ terms)$ . Therefore, if the average of 2 numbers is 15, we can find the sum by using the rearranged equation:  $sum = 15 \cdot 2 = 30$ . Now we need to find the answer choice that has two numbers that do NOT have a sum of 30. Since  $6 + 26 = 32$ , and not 30, the average of 6 and 26 is NOT 15.
5. **Answer choice (C) is correct.** The average height of the four rose bushes is 2 feet. The information about the heights of the shortest and tallest rose bushes is irrelevant. If a fifth rose bush is planted that is 5 feet tall, which is taller than the average, the average will increase. Any time a number is added to a data set and that number is higher than the average, the average of the data set will increase.
6. **Answer choice (D) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Plug in 65 inches for the average, 3 for the number of terms, and solve for  $x$ , the height of the third student:  $65 = \frac{72 + 60 + x}{3} \rightarrow 65 = \frac{132 + x}{3} \rightarrow 195 = 132 + x \rightarrow x = 63$  inches.
7. **Answer choice (B) is correct.** Since the average score of the three boys was 85, we can say that each boy scored an 85. Since the average score of the two girls was 90, we can say that each girl scored a 90. The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Use this equation to find the average score of all five students:  $average = \frac{85 + 85 + 85 + 90 + 90}{5} \rightarrow average = \frac{435}{5} \rightarrow average = 87$ .
8. **Answer choice (B) is correct.** Since the list of three numbers has an average of 20, we can say each of the three numbers is 20. Therefore, our original data set is 20, 20, 20. If we double each number, the new data set is 40, 40, 40. Since every number in the new data set is 40, the average is 40, so the average doubled.
9. **Answer choice (A) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Plug in 20 for the average and 5 for the number of days and solve for  $x$ , the total number of buckets of popcorn sold on Saturday and Sunday:  $20 = \frac{12 + 16 + 20 + x}{5} \rightarrow 20 = \frac{12 + 16 + 20 + x}{5} \rightarrow 20 = \frac{48 + x}{5} \rightarrow 100 = 48 + x \rightarrow x = 52$  buckets. Now we know a total of 52 buckets of popcorn were sold on Saturday and Sunday. Since the same number of buckets of popcorn were sold on Saturday and Sunday, we can find the number of buckets of popcorn sold on Saturday by dividing 52 by 2:  $52 \div 2 = 26$  buckets.
10. **Answer choice (C) is correct.** Since the average of the four numbers is 50, we can say each of the four numbers is 50. Therefore, our original data set is 50, 50, 50, 50. If we increase two of the numbers by 8 and decrease the other two numbers by 8, our new data set is 58, 58, 42, 42. Use the



equation  $average = \frac{sum}{number\ of\ terms}$  to find the new average of the four numbers:  $average = \frac{58 + 58 + 42 + 42}{4} \rightarrow average = \frac{200}{4} \rightarrow average = 50$ .

11. **Answer choice (C) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Plug in 12 for the average and 6 for the number of terms and solve for  $A + B$ :  $12 = \frac{12 + 15 + 20 + 10 + A + B}{6} \rightarrow 12 = \frac{57 + A + B}{6} \rightarrow 72 = 57 + A + B \rightarrow 15 = A + B$ .
12. **Answer choice (B) is correct.** Since the set of six numbers has an average of 8, we can say each number in the set is 8, so our original set is 8, 8, 8, 8, 8, 8. If we add the numbers  $-10$  and  $-14$  to the set, our new set is 8, 8, 8, 8, 8, 8,  $-10$ ,  $-14$ . Use the equation  $average = \frac{sum}{number\ of\ terms}$  to find the average of the new set:  $average = \frac{8 + 8 + 8 + 8 + 8 + 8 + (-10) + (-14)}{8} \rightarrow average = \frac{24}{8} \rightarrow average = 3$ .
13. **Answer choice (A) is correct.** Since the average weight of the 8 bags of peanuts is 80 ounces, we can say each bag of peanuts weighs 80 ounces, so our original data set is 80, 80, 80, 80, 80, 80, 80, 80. If 16 ounces are removed from each bag of peanuts, our new data set is 64, 64, 64, 64, 64, 64, 64, 64. Since every number in our new data set is 64, the average of the new data set is 64 ounces.
14. **Answer choice (B) is correct.** Since George's average on his first five tests was 78, we can say George scored 78 points on each of his first five tests. Now we can use the equation  $average = \frac{sum}{number\ of\ terms}$  to find George's average score on his six tests:  $average = \frac{78 + 78 + 78 + 78 + 78 + 90}{6} \rightarrow average = \frac{480}{6} \rightarrow average = 80$ .
15. **Answer choice (D) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . We can rearrange the equation to get  $sum = (average) \cdot (number\ of\ terms)$ . Plug in 24 for the average and 2 for the number of terms:  $sum = 24 \cdot 2 \rightarrow sum = 48$ . Therefore, the sum of the ages of John and Micahel must be 48 years.
16. **Answer choice (B) is correct.** Since Emily's average score on his first three history tests was 85, we can say Emily scored an 85 on each of the first three tests. Emily wants to increase her average by 3 points, so she wants to get an average of 88. We can use the equation  $average = \frac{sum}{number\ of\ terms}$  to find what Emily needs to score on her fourth test to get an average of 88, where  $x$  represents the score Emily needs on her fourth test:  $88 = \frac{85 + 85 + 85 + x}{4} \rightarrow 88 = \frac{255 + x}{4} \rightarrow 352 = 255 + x \rightarrow x = 97$ .
17. **Answer choice (B) is correct.** First find the average of 12, 20, 24, and 28 using the equation  $average = \frac{sum}{number\ of\ terms}$ :  $average = \frac{12 + 20 + 24 + 28}{4} \rightarrow average = \frac{84}{4} \rightarrow average = 21$ . We know this average is 6 more than the average of 15, 20 and some number, so the average of 15, 20, and some number is 6 less than 21, which is 15. Let  $x$  represent the missing number and use the above equation, plugging

in 15 for the average and 3 for the number of terms:  $15 = \frac{15 + 20 + x}{3} \rightarrow 15 = \frac{35 + x}{3} \rightarrow 45 = 35 + x \rightarrow x = 10$ .

18. **Answer choice (C) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Plug in \$24 for the sum of the prices of the first four baskets of plums, \$8.50 for the price of the fifth basket of plums, \$6.50 for the price of the sixth basket of plums, and 6 for the number of terms and simplify to find the average cost of the six baskets of plums:  $average = \frac{24 + 8.50 + 6.50}{6} \rightarrow average = \frac{39}{6} \rightarrow average = \$6.50$
19. **Answer choice (A) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Rearrange the equation to get  $sum = (average) \cdot (number\ of\ terms)$ . Since Robert divided the sum of his test scores by 7 and got an average of 88, we can find the sum of Robert's test scores by multiplying 88 by 7:  $sum = 88 \cdot 7 \rightarrow sum = 616$ . Since Robert took 8 tests, we can find his actual test average by dividing the sum by 8:  $average = \frac{616}{8} \rightarrow average = 77$ .
20. **Answer choice (B) is correct.** First find the sum of  $a$ ,  $b$ , and  $c$  using the equation  $average = \frac{sum}{number\ of\ terms}$ . Plug in 15 for the average and 5 for the number of terms and solve for  $a + b + c$ :  $15 = \frac{a + b + c + 18 + 20}{5} \rightarrow 15 = \frac{a + b + c + 38}{5} \rightarrow 75 = a + b + c + 38 \rightarrow a + b + c = 37$ . Now use this sum to find the average of  $a$ ,  $b$ ,  $c$ , and 11:  $average = \frac{a + b + c + 11}{4} \rightarrow average = \frac{37 + 11}{4} \rightarrow average = \frac{48}{4} \rightarrow average = 12$ .

### Tables Practice Set 1

- Answer choice (A) is correct.** Kevin has 40 nature stamps and 20 sports stamps, so he has a total of 60 nature and sports stamps. Add up all of his stamps to get a total of 300 stamps. Therefore, 60 out of 300 of Kevin's stamps are nature or sports stamps. Turn this into a fraction and convert it into a percent:  $\frac{60}{300} = \frac{20}{100} = 20\%$ .
- Answer choice (C) is correct.** Add up all of his stamps to get a total of 300 stamps. Kevin has 25 city stamps, so city stamps make up  $\frac{25}{300}$  of his collection. Simplify  $\frac{25}{300}$  to get  $\frac{1}{12}$ .
- Answer choice (B) is correct.** Turn each value in the table into a decimal and compare:  $80\% = 0.8$ ;  $17/20 = 0.85$ ;  $0.75 = 0.75$ ;  $19/30 = 0.6\bar{3}$ . Therefore, Carol received the highest score.
- Answer choice (B) is correct.** Change 80% and 0.75 into fractions:  $80\% = \frac{4}{5}$  and  $0.75 = \frac{3}{4}$ . Therefore, Ronald answered  $\frac{4}{5}$  of the questions correctly, Carol answers  $17/20$  of the questions correctly, Michelle answered  $\frac{3}{4}$  of the questions correctly, and Tony answered  $19/30$  of the questions correctly. Since each question was worth one point, and there was no partial credit given, the total

number of questions has to be divisible by each denominator from the table: 60 is the only answer choice that is divisible by 5, 4, 20, and 30.

5. **Answer choice (A) is correct.** We know the total cost, including tax and the shipping fee, of purchasing 5 mugs is \$30. We also know that each mug costs \$5.00 plus 6% sales tax. Find the cost of each mug after sales tax by adding 6% of \$5.00 to \$5.00:  $\$5.00 + 6\% \text{ of } \$5.00 = \$5.00 + 0.06 \cdot \$5.00 = \$5.00 + \$0.30 = \$5.30$ . Therefore, each mug costs \$5.30 after tax, so 5 mugs cost  $5 \cdot \$5.30 = \$26.50$  after tax. Find this shipping fee by subtracting the cost of 5 mugs after tax from the total cost of 5 mugs:  $\$30 - \$26.50 = \$3.50$ .
6. **Answer choice (C) is correct.** From problem 5, we know that the cost of each mug after tax is \$5.30 and the shipping fee is \$3.50. Find the total cost of 40 mugs by multiplying 40 by \$5.30 and adding \$3.50:  $40 \cdot \$5.30 + \$3.50 = \$212 + \$3.50 = \$215.50$ .
7. **Answer choice (C) is correct.** Find the number of bananas, apples, and peaches Gabriella bought by dividing the total she spent on each type of fruit by the price for one of each fruit: Bananas =  $\$1.80 \div 0.30 = 6$  bananas; Apple =  $\$2.70 \div \$0.90 = 3$  apples. Peaches =  $\$5.00 \div \$1.25 = 4$  peaches. Find the amount of money Gabriella spent on Plums by subtracting the amounts she spent on bananas, apples, and peaches from the total she spent:  $\$12.80 - \$1.80 - \$2.70 - \$5.00 = \$3.30$ . Find the number of plums she bought by dividing the total she spent on plums by the cost of each plum:  $\$3.30 \div \$1.10 = 3$  plums. Find the total pieces of fruit Gabriella purchased by adding the number of each type of fruit she purchased:  $6 + 3 + 4 + 3 = 16$  pieces.
8. **Answer choice (A) is correct.** Roy took out \$120 each month and Daryll took out \$70 each month, and the difference between these amounts is  $\$120 - \$70 = \$50$ .
9. **Answer choice (B) is correct.** Roy takes out \$120 each month, so in May he will have  $\$480 - \$120 = \$360$ , in June he will have  $\$360 - \$120 = \$240$ , in July he will have  $\$240 - \$120 = \$120$ , and in August he will have  $\$120 - \$120 = \$0$ .
10. **Answer choice (C) is correct.** Out of 60 total girls, 45 play video games, so  $45/60$  girls play video games. Turn this into a percent:  $\frac{45}{60} = \frac{3}{4} = 75\%$ .
11. **Answer choice (C) is correct.** Out of 150 total students, there are 50 boys who do not play video games, so the probability of choosing a boy who does not play video games is 50 out of 150, which simplifies to 1 out of 3.
12. **Answer choice (C) is correct.** The cost of purchasing a pizza with 0 toppings is \$12.75, so the base cost of a pizza is \$12.75. With each additional topping, the price of the pizza increases by \$0.75, so the cost of each topping is \$0.75.
13. **Answer choice (D) is correct.** We need to find the cost of purchasing a pizza with one topping and a pizza with three toppings. A pizza with one topping costs \$13.25 and a pizza with three toppings costs \$14.75:  $\$13.25 + \$14.75 = \$28.00$

14. **Answer choice (A) is correct.** 75% of women voted, so we can estimate that 24 SUMMER votes represents 75% of the total SUMMER votes when all women vote. Therefore, to find the predicted number of SUMMER votes when all women vote, we need to answer the question, “24 is 75% of what number?” Set up and solve an equation based on this question, where  $x$  represents the total number of women who are predicted to vote SUMMER:  $24 = 0.75x \rightarrow x = 32$ .
15. **Answer choice (C) is correct.** 75% of women voted, so we can estimate that 6 WINTER votes represents 75% of the total WINTER votes when all women vote. Therefore, to find the predicted number of WINTER votes when all women vote, we need to answer the question, “6 is 75% of what number?” Set up and solve an equation based on this question, where  $x$  represents the total number of women who are predicted to vote WINTER:  $6 = 0.75x \rightarrow x = 8$ . 40% of men voted, so we can estimate that 8 WINTER votes represents 40% of the total WINTER votes when all men vote. Therefore, to find the predicted number of WINTER votes when all men vote, we need to answer the question, “8 is 40% of what number?” Set up and solve an equation based on this question, where  $x$  represents the total number of men who are predicted to vote WINTER:  $8 = 0.4x \rightarrow x = 20$ . Therefore, the difference between the predicted number of men who vote for WINTER and the predicted number of women who vote for WINTER is  $20 - 8 = 12$ .

## Tables Practice Set 2

1. **Answer choice (C) is correct.** Find the total number of students by adding up the numbers in the right column of the table:  $15 + 70 + 75 + 50 + 95 + 45 = 350$ . There are 95 children who are 11 years old and 45 children who are 12 years old, so there are 140 children who are at least 11 years old ( $45 + 95 = 140$ ). Therefore, the fraction of children that are at least 11 years old is  $\frac{140}{350}$  which simplifies to  $\frac{2}{5}$ .
2. **Answer choice (A) is correct.** To answer the question, “The number of children who are 7 years old is how many times the number of children who are 9 years old?” divide the number of children who are 7 years old by the number of children who are 9 years old:  $15 \div 75 = 0.2$
3. **Answer choice (B) is correct.** Since the answer choices are written as decimals, first change the portions of pizza Teddy and Theo ate into decimals. Change 15% into a decimal by moving the decimal point two places to the left:  $15\% = 0.15$ . Change  $\frac{7}{20}$  into a decimal by dividing the numerator by the denominator:  $7 \div 20 = 0.35$ . Now find the difference between the two numbers:  $0.35 - 0.15 = 0.2$
4. **Answer choice (C) is correct.** First we need to find the total portion of the pizza eaten by the four teenagers. Since the answer choices are written as percents, we need to change the bottom three portions in the table into percents. Change  $\frac{1}{10}$  into a percent by first dividing the numerator by the denominator and then moving the decimal point of the result two places to the right:  $1 \div 10 = 0.1 = 10\%$ . Change  $\frac{7}{20}$  into a percent by first dividing the numerator by the denominator and then moving the decimal point of the result two places to the right:  $7 \div 20 = 0.35 = 35\%$ . Change 0.3 into a percent

by moving the decimal point two places to the right : $0.3 = 30\%$ . Now add up all four percents:  $15\% + 10\% + 35\% + 30\% = 90\%$ . Find the portion of pizza remaining by subtracting the portion of pizza that was eaten from  $100\%$ :  $100\% - 90\% = 10\%$ .

5. **Answer choice (B) is correct.** Let's look at the first row of the table. The shipping fee on each order is \$4.25, so we can find the total cost of the 4 t-shirts without the shipping cost by subtracting \$4.25 from \$82.25:  $\$82.25 - \$4.25 = \$78$ . Now divide the total cost with the shipping fee by 4 to find the cost of each t-shirt:  $\$78 \div 4 = \$19.50$
6. **Answer choice (D) is correct.** From problem 5, we know that the cost of each t-shirt is \$19.50, so find the cost of five t-shirts before the shipping fee by multiplying \$19.50 by 5:  $\$19.50 \cdot 5 = \$97.50$ . Now find the total cost of the order by adding the \$4.25 shipping fee:  $\$97.50 + \$4.25 = \$101.75$
7. **Answer choice (B) is correct.** Find the number of cucumbers Carlton bought by dividing the total money Carlton spent on cucumbers by the price of each cucumber:  $\$3.15 \div \$0.45 = 7$  cucumbers. Find the number of onions Carlton bought by dividing the total money Carlton spent on onions by the price of each onion:  $\$4.80 \div \$1.20 = 4$  onions. Find the difference between the number of cucumbers and onions Carlton bought:  $7 - 4 = 3$
8. **Answer choice (B) is correct.** Find the number of zucchinis Carlton bought by dividing the total money Carlton spent on zucchinis by the price of each zucchini:  $\$6.00 \div \$0.75 = 8$  zucchinis. Since Carlton purchased twice as many zucchinis as peppers, he purchased 4 peppers. Find the amount of money Carlton spent on pepper by multiplying the price of each pepper by 4:  $\$1.50 \cdot 4 = \$6.00$ . Finally, find the total money Carlton spent by adding the amounts he spent on each vegetable:  $\$3.15 + \$4.80 + \$6.00 + \$6.00 = \$19.95$
9. **Answer choice (C) is correct.** Find the monthly increase in the price of a gallon of gas in Charlestown by subtracting the price in January from the price in February:  $\$2.40 - \$2.15 = \$0.25$ .
10. **Answer choice (D) is correct.** The price of a gallon of gas in Sunnyvale is increasing by \$0.20 every month, so in May, the price will be \$3.90, and in June, the price will be \$4.10. Find the cost of buying 10 gallons of gas by multiplying the price of one gallon by 10:  $\$4.10 \cdot 10 = \$41.00$
11. **Answer choice (A) is correct.** 90 out of 120 women, or  $\frac{90}{120}$  of women, cook lunch. First simplify  $\frac{90}{120}$  to get  $\frac{3}{4}$ . Change this into a percent by dividing the numerator by the denominator and then moving the decimal point of the result two places to the right:  $\frac{3}{4} = 0.75 = 75\%$ . 32 out of 80 men, or  $\frac{32}{80}$  of men, cook lunch. First simplify  $\frac{32}{80}$  to get  $\frac{2}{5}$ . Change this into a percent by dividing the numerator by the denominator and then moving the decimal point of the result two places to the right:  $\frac{2}{5} = 0.4 = 40\%$ . Find the difference between these two percents:  $75\% - 40\% = 35\%$ .

12. **Answer choice (C) is correct.** There are 120 total women, and 30 of those women order lunch. Therefore, if a random woman is chosen, the probability that she orders her lunch is 30 out of 120 which simplifies to 1 out of 4.
13. **Answer choice (B) is correct.**  $\frac{5}{8}$  of adults voted, so we can estimate that 15 CAT votes represents  $\frac{5}{8}$  of the total CAT votes when all adults vote. Therefore, to find the predicted number of CAT votes when all adults vote, we need to answer the question, “15 is  $\frac{5}{8}$  of what number?” Set up and solve an equation based on this question, where  $x$  represents the total number of adults who are predicted to vote CAT:  $15 = \frac{5}{8}x \rightarrow x = 24$ .
14. **Answer choice (C) is correct.** First find the predicted number of DOG votes when all children vote.  $\frac{4}{5}$  of children voted, so we can estimate that 24 DOG votes represents  $\frac{4}{5}$  of the total DOG votes when all children vote. Therefore, to find the predicted number of DOG votes when all children vote, we need to answer the question, “24 is  $\frac{4}{5}$  of what number?” Set up and solve an equation based on this question, where  $c$  represents the total number of children who are predicted to vote DOG:  $24 = \frac{4}{5}c \rightarrow c = 30$ . Now find the predicted number of DOG votes when all adults vote.  $\frac{5}{8}$  of adults voted, so we can estimate that 35 DOG votes represents  $\frac{5}{8}$  of the total DOG votes when all adults vote. Therefore, to find the predicted number of DOG votes when all adults vote, we need to answer the question, “35 is  $\frac{5}{8}$  of what number?” Set up and solve an equation based on this question, where  $a$  represents the total number of adults who are predicted to vote DOG:  $35 = \frac{5}{8}a \rightarrow a = 56$ . Add the results to find the predicted total number of DOG votes:  $30 + 56 = 86$ .
15. **Answer choice (D) is correct.** Find the cost of renting a bike for 1 hour by adding the rental fee of \$9.75 to the fee for 1 hour, \$5.25:  $\$9.75 + \$5.25 = \$15.00$ . Now we can eliminate answer choices (A) and (C) because they don’t have a total cost of \$15.00 for 1 hour. We know that the price of rental increases by \$5.25 for each additional hour of rental, so the price to rent a bike for 2 hours is  $\$15.00 + \$5.25$  which equals \$20.25. Therefore, answer choice (D) is correct.

### **Charts and Graphs Practice Set 1**

1. **Answer choice (C) is correct.** Find the average by finding the total number of greeting cards sold over the six days and dividing the result by six:  $\frac{4 + 6 + 3 + 10 + 9 + 4}{6} = \frac{36}{6} = 6$
2. **Answer choice (A) is correct.** The sales on Monday, Tuesday, and Wednesday respectively are 4, 6, and 3. To find the median of these three days, arrange the numbers in order from least to greatest and find the middle number: 3, 4, 6  $\rightarrow$  the median is 4.
3. **Answer choice (B) is correct.** On a box-and-whisker plot, the vertical line inside the box represents the median of the data. Therefore, the median shoe size is 8.5.

4. **Answer choice (D) is correct.** A box-and-whisker plot shows the lowest value of the data set (represented by the leftmost line), the first quartile of the data (represented by the left side of the box), the median of the data (represented by the line inside the box), the third quartile (represented by the right side of the box), and the highest value of the data (represented by the rightmost line). A box-and-whisker plot does not show the mode of the data set, so the mode cannot be determined from the chart.
5. **Answer choice (B) is correct.** Between January and February, the difference in average temperature was  $20^\circ$ . Between May and June, the difference in average temperature was  $40^\circ$ . Between June and July, the difference in average temperature was  $30^\circ$ . Between August and September, the difference in average temperature was  $30^\circ$ . Therefore, the greatest difference in average temperature occurred between May and June.
6. **Answer choice (D) is correct.** April, May, and February both had an average temperature of  $40^\circ$ , and March and September both had an average temperature of  $30^\circ$ . Therefore, April and May were NOT the only two months that had the same average temperature.
7. **Answer choice (B) is correct.** The portion of the pie chart representing “oranges” is smaller than the portion of the pie chart representing “apples”, so fewer students chose oranges than apples. Therefore, we can eliminate answer choices (C) and (D). The portion of the pie chart representing “oranges” is more than half of the portion of the pie chart representing “apples”, so we can eliminate answer choice (A). We are left with answer choice (B) as the correct answer.
8. **Answer choice (B) is correct.** The portion of the pie chart representing “bananas” has a central angle of  $120^\circ$ , and the portion of the pie chart representing “strawberries” has a central angle of  $90^\circ$ . To answer the question, “The number of students who chose bananas as their favorite fruit is how many times the number of students who chose strawberries as their favorite fruit?” divide  $120^\circ$  by  $90^\circ$  to get  $\frac{4}{3}$ .
9. **Answer choice (A) is correct.** As age increases on the graph (as we move left to right), the grams of sugar eaten per day decreases (moves from the top of the graph towards the bottom). Therefore, based on the graph, as age increases, sugar consumption increases.
10. **Answer choice (B) is correct.** On this stem-and-leaf plot, the stem column represents the tens digit of the number, and the leaf column represents the ones digit. For example, the last row of our stem-and-leaf plot represents the numbers 44 and 48. To find the total number of students surveyed, count the number of leaves to get 20.
11. **Answer choice (B) is correct.** On this stem-and-leaf plot, the stem column represents the tens digit of the number, and the leaf column represents the ones digit. For example, the last row of our stem-and-leaf plot represents the numbers 44 and 48. The median of a set of data is the middle number when the numbers are lined up from least to greatest. A stem-and-leaf plot arranges the data in order from least to greatest, so we can easily find the middle number or numbers. Since we have an

even number of data points represented by the stem-and-leaf plot, we have two middle numbers, 26 and 28. Find the average of 26 and 28 to get the median:  $\frac{26 + 28}{2} = \frac{54}{2} = 27$

12. **Answer choice (C) is correct.** On this stem-and-leaf plot, the stem column represents the tens digit of the number, and the leaf column represents the ones digit. For example, the last row of our stem-and-leaf plot represents the numbers 44 and 48. From question 10, we found out that 20 students were surveyed. From the stem-and-leaf plot, we can see that 4 people volunteered for fewer than 18 hours. Therefore, 4 out of 20 or 1 out of 5 students volunteered for fewer than 18 hours.  $\frac{1}{5} = 20\%$ .
13. **Answer choice (B) is correct.** Add up the number of students represented by the right three bars:  $4 + 3 + 1 = 8$  students.
14. **Answer choice (D) is correct.** Since a histogram shows the ranges of data points, but doesn't show exact data points, we cannot determine the exact value of the average.
15. **Answer choice (B) is correct.** Since a histogram shows the ranges of data points, but doesn't show exact data points, we cannot determine the exact value of the median. However, we can find the range of values for the median. The median is the middle number of a data set when the numbers are in order from least to greatest. Therefore, the median of this data set falls between 9 minutes and 10.9 minutes, so 9.5 minutes could be the median.
16. **Answer choice (B) is correct.** Using the line of best fit, 4 hours of studying correlates to a 70 on the midterm because the line passes through the point (4, 70).
17. **Answer choice (B) is correct.** Based on the line of best fit, 9 hours of studying correlates to a score of 90. Since the score on the midterm increases as the number of hours of studying increases, we know that the expected score after studying for 10 hours will be greater than 90. Based on the line of best fit, the score increases by less than 5 points with each additional hour of studying. Therefore, the expected score for someone studying for 10 hours is between 90 and 95.
18. **Answer choice (B) is correct.** To find the fraction of students that are at least 10 years old, we need to know the total number of students represented by the chart. If you write all of the data points, you will get 6, 6, 7, 8, 8, 8, 8, 8 ... etc. Therefore, to find the total number of data points, add up the number of students represented by each bar:  $2 + 1 + 5 + 4 + 7 + 1 = 20$  students. There are 7 students that are 10 years old and 1 student that is 11 years old, so there are 8 students who are at least 10 years old. Therefore,  $\frac{8}{20}$  of the students are at least 10 years old, and  $\frac{8}{20}$  simplifies to  $\frac{2}{5}$ .
19. **Answer choice (D) is correct.** The mode of a data set is the number that appears the most. If you write all of the data points, you will get 6, 6, 7, 8, 8, 8, 8, 8 ... etc. Therefore, two students are 6 years old, one student is 7 years old, five students are 8 years old, four students are 9 years old, seven students are 10 years old, and one student is 11 years old. Therefore, the mode of the data is 10 years.



20. **Answer choice (C) is correct.** The average of a data set is equal to the sum of the numbers divided by the number of terms. If you write out all of the data points from the frequency chart, you will get two 6s, one 7, five 8s, four 9s, seven 10s, and one 11. Therefore, to find the sum of all of the numbers in the data set, multiply the height of each bar by the age it represents and find the sum of the results:  $2 \cdot 6 + 1 \cdot 7 + 5 \cdot 8 + 4 \cdot 9 + 7 \cdot 10 + 1 \cdot 11 = 12 + 7 + 40 + 36 + 70 + 11 = 176$ . We found in question 18 that there are 20 total students represented by the chart, so divide 176 by 20 to find the average:  $176 \div 20 = 8.8$  years.

## **Charts and Graphs Practice Set 2**

1. **Answer choice (C) is correct.** According to the graph, it rained for 8 days in March and 3 days in July. Find the difference by subtracting the values:  $8 - 3 = 5$ .
2. **Answer choice (B) is correct.** If we list out the data points from the graph, we get 9, 7, 8, 2, 4, 5, 3, 6, 4. The mode of a data set is the number that appears the most. The number 4 shows up twice, which is more than any other number in the data set.
3. **Answer choice (A) is correct.** A box-and-whisker plot shows the lowest value of the data set (represented by the leftmost line), the first quartile of the data (represented by the left side of the box), the median of the data (represented by the line inside the box), the third quartile (represented by the right side of the box), and the highest value of the data (represented by the rightmost line). The interquartile range of a data set is equal to the difference between the third and first quartile. The first quartile is 15 and the third quartile is 45, so the interquartile range is  $45 - 15$  which equals 30.
4. **Answer choice (D) is correct.** A box-and-whisker plot shows the lowest value of the data set (represented by the leftmost line), the first quartile of the data (represented by the left side of the box), the median of the data (represented by the line inside the box), the third quartile (represented by the right side of the box), and the highest value of the data (represented by the rightmost line). A box-and-whisker plot does not show the mean of the data set, so the mean cannot be determined from the chart.
5. **Answer choice (B) is correct.** We need to add up the bars representing stock prices of \$0-\$49, \$50-\$99, and \$100-\$149:  $5 + 3 + 1 = 9$  stocks.
6. **Answer choice (A) is correct.** There are 30 different stock prices, so the median is the average of the 15th and 16th data point. The first 15th data point falls in the bar representing \$150-\$199, and the 16th data point falls in the bar representing \$200-\$249. Since the 15th and 16th data points don't fall in the same bar, they cannot be the same value. Therefore, the average of the 15th and 16th data points will be a number between the 15th and 16th data point, which will not be equal to any of the 30 stock prices.
7. **Answer choice (C) is correct.** Since a histogram shows the ranges of data points, but doesn't show exact data points, we cannot determine the exact value of the range. However, we can find the range of values for the range. The range is equal to the difference between the largest and smallest value.

Therefore, the largest possible range is  $299 - 0$  which equals 299, and the smallest possible range is  $250 - 49$  which equals 201. 250 is the only answer choice that falls between 201 and 299.

8. **Answer choice (B) is correct.** Using the line of best fit, the total profit when there are 100 sales is \$500. Find the average profit per sale by dividing the total profit by the number of sales:  $\$500 \div 100 = \$5$ .
9. **Answer choice (B) is correct.** Using the line of best fit, the profit increases by \$50 for every 10 sales. The profit is \$900 for 180 sales, so the expected profit for 190 sales is \$950.
10. **Answer choice (C) is correct.** If you write all of the data points, you will get 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2 ... etc. First find the total number of data points by adding the heights of all six bars:  $6 + 7 + 6 + 2 + 3 + 1 = 25$ . The number of students who read no more than 2 books is equal to the sum of the number of students who read 1 book and the number of students who read 2 books:  $6 + 7 = 13$ . Therefore,  $13/25$  of students read no more than 2 books. Change this into a percent by dividing the numerator by the denominator and then moving the decimal point of the result two places to the right:  $13 \div 25 = 0.52 = 52\%$ .
11. **Answer choice (A) is correct.** If you write all of the data points, you will get 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2 ... etc. First find the total number of data points by adding the heights of all six bars:  $6 + 7 + 6 + 2 + 3 + 1 = 25$ . The median is the middle number in a data set when the numbers are lined up from least to greatest or greatest to least, so the median of this data set will be the 13th number, which is 2.
12. **Answer choice (D) is correct.** The original mode of the data set is 2 because the largest number of students read 2 books. If an additional student read 2 books, and one fewer student read 1 book, the mode will still be 2 books. The median is the middle number in a data set when the numbers are lined up from least to greatest or greatest to least, so the median of this data set will be the 13th number, which is 2. If an additional student read 2 books, and one fewer student read 1 book, the median will still be 2 books. The range of the data set is equal to the highest number minus the lower number. The highest number of books read is 6 and the lowest is 1, so the range is 5. If an additional student read 2 books, and one fewer student read 1 book, the range will still be 5. Therefore, the mode, median, and range stay the same.
13. **Answer choice (C) is correct.** Write out the data points represented by each bar: 8, 7, 9, 4, 5, 5. The median is the middle number in a data set when the numbers are lined up from least to greatest or greatest to least, so line the numbers up from least to greatest and find the middle number: 4, 5, 5, 7, 8, 9. Since there is an even number of data points, the median is the average of the two middle numbers. Find the average of 5 and 7 by adding them together and dividing the sum by 2:  $\frac{5+7}{2} = \frac{12}{2} = 6$ .
14. **Answer choice (D) is correct.** The interquartile range of a set of data is the difference between quartile 3 and quartile 1. Order the data points from least to greatest, and find quartile 1 by finding the median of the first half of the data: 4, 5, 5, 7, 8, 9  $\rightarrow$  quartile 1 is the median of 4, 5, 5 which is 5.

Order the data points from least to greatest, and find quartile 3 by finding the median of the second half of the data: 4, 5, 5, 7, 8, 9 → quartile 3 is the median of 7, 8, 9 which is 8. Find the difference between quartile 3 and quartile 1:  $8 - 5 = 3$ . Therefore, answer choice (D) is NOT true.

15. **Answer choice (C) is correct.** On this stem-and-leaf plot, the stem column represents the tens digit of the number, and the leaf column represents the ones digit. For example, the last row of our stem-and-leaf plot represents the number 30, 30, 30, 31, 32, and 33. The total number of data points is equal to the total number of leaves, which is 21, and there are 14 data points that are no more than 27. Therefore, the fraction of schools that have an average class size of no more than 27 students is  $\frac{14}{21}$  which simplifies to  $\frac{2}{3}$ .
16. **Answer choice (D) is correct.** On this stem-and-leaf plot, the stem column represents the tens digit of the number, and the leaf column represents the ones digit. For example, the last row of our stem-and-leaf plot represents the number 30, 30, 30, 31, 32, and 33. The mode of a data set is the number that shows up the most. 30 shows up three times, which is more than any other number in the data set, so 30 is the mode.
17. **Answer choice (B) is correct.** On this stem-and-leaf plot, the stem column represents the tens digit of the number, and the leaf column represents the ones digit. For example, the last row of our stem-and-leaf plot represents the number 30, 30, 30, 31, 32, and 33. The range of a data set is equal to the difference between the highest and lowest values. The highest value is 33 and the lowest value is 8, so the range is  $33 - 8$  which equals 25.
18. **Answer choice (C) is correct.** Because 50% of students chose Superhero, and 50% of students chose Sports or Decades, the number of students who chose Superhero must equal the number of students who chose Sports or Decades. Therefore, we can eliminate answer choice (A) and (B). The number of students who chose Sports is less than the number of students who chose Decades, since 20% is less than 30%, so we can eliminate answer choice (D). We are left with answer choice (C) as the correct answer.
19. **Answer choice (B) is correct.** 50% , or one half, of students chose Superhero as their preferred theme. Therefore, we can find the total number of students who were surveyed by doubling the number of students who chose Superhero:  $125 \cdot 2 = 250$  total students. 30% of the students chose Decades, so find the number of students who chose Decades by finding 30% of 250:  $30\% \text{ of } 250 = 0.3 \cdot 250 = 75$ .
20. **Answer choice (B) is correct.** The graph shows that as the temperature increases, the number of cups of lemonade sold also increases. It also shows the opposite of this: as the temperature decreases, the number of cups of lemonade sold also decreases. Therefore, we can say that as it gets colder (temperature decreases) fewer people purchase lemonade (the number of cups of lemonade decreases).

### **Quantitative Comparisons Practice Set 1**

1. **Answer choice (A) is correct.** A standard die has six sides labeled 1, 2, 3, 4, 5, and 6. Therefore, three of the sides are labeled with an odd number (1, 3, 5), and two sides are labeled with a number less than 3 (1, 2). Since there are more sides labeled with an odd number than there are sides labeled with a number less than 3, the probability that both dice land on an odd number is greater than the probability that both dice land on a number less than 3. Therefore, the quantity in Column A is greater than the quantity in Column B.
2. **Answer choice (D) is correct.** While we are given the median of Kris' quiz scores, we have no information that will help us find the mean, or the average, or his scores. Therefore, the relationship between the quantities in Column A and Column B cannot be determined with the given information.
3. **Answer choice (C) is correct.** There are two spaces containing a multiple of 3: 3 and 6. There are also two spaces containing a factor of 5: 1 and 5. Therefore, the probability of the spinner landing on a multiple of 3 is equal to the probability of the spinner landing on a factor of 5, so the quantities in both columns are equal.
4. **Answer choice (C) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Rearrange the equation to get  $sum = (average) \cdot (number\ of\ terms)$ . Find the quantity in Column A by plugin in 60 in for the average and 5 for the number of terms:  $sum = (60\ in) \cdot 5 \rightarrow sum = 300\ inches$ . Therefore, the quantity in Column A is equal to the quantity in Column B.
5. **Answer choice (A) is correct.** Since the average test score of the six girls was 82, we can say each girl scored an 82 on the test. Since the average test score of the four boys was 74, we can say that each boy scored a 74 on the test. The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Find the average test score of all ten children by finding the sum of the ten scores and dividing it by 10:  $average = \frac{82 \cdot 6 + 74 \cdot 4}{10} \rightarrow average = \frac{492 + 296}{10} \rightarrow average = \frac{788}{10} \rightarrow average = 78.8$ . Therefore, the quantity in Column A is greater than the quantity in Column B.
6. **Answer choice (B) is correct.** On this stem-and-leaf plot, the stem column represents the tens digit of the number, and the leaf column represents the ones digit. For example, the last row of our stem-and-leaf plot represents the number 30, 31, 32, and 39. The mode of a data set is the number that appears the most, so the mode of this data set is 17. The median of the data set is the middle number when the numbers are lined up from least to greatest or greatest to least, so the median of this data set is 22. Therefore, the median is greater than the mode, so the quantity in Column B is greater than the quantity in Column A.
7. **Answer choice (A) is correct.** Since there are twice as many black marbles as white marbles in the bag, the probability of choosing a black marble is twice the probability of choosing a white marble. Therefore, the probability of choose a white marble is half the probability of choosing a black marble,

so we can find the probability of choosing a white marble by finding  $\frac{1}{2}$  of  $\frac{1}{5}$ :  $\frac{1}{2}$  of  $\frac{1}{5} = \frac{1}{2} \cdot \frac{1}{5} = \frac{1}{10}$ . Since the bag is filled with only black, white and gray marbles, the sum of the probabilities of choosing each color marble must equal 1. Therefore, we can find the probability of choosing a gray marble by subtracting the probability of choosing a black marble and the probability of choosing a white marble from 1:  $1 - \frac{1}{5} - \frac{1}{10} = \frac{7}{10}$ . Since  $\frac{7}{10}$  is greater than  $\frac{3}{5}$ , the quantity in Column A is greater than the quantity in Column B.

8. **Answer choice (D) is correct.** Since a histogram shows the ranges of data points, but doesn't show exact data points, we cannot determine the exact value of the median. However, we can find the range of values for the median. The median is the middle number of a data set when the numbers are in order from least to greatest. Therefore, the median of this data set falls between 11 years and 15 years. Since 13 years falls within that range, we cannot determine if the quantity in Column A is greater than, equal to, or less than the quantity in Column B. Therefore, the relationship cannot be determined from the given information.
9. **Answer choice (B) is correct.** The problem does not tell us the numbers in the set, just that there are 20 numbers. Therefore, we can choose our own numbers. Let's choose the numbers 1 through 20: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20. The original median is 10.5 and the original range is 19. Now add 3 to each number to get 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23. The new median is 13.5 and the new range is 19. Therefore, the change in the median is 3 and the change in the range is 0, so the quantity in Column B is greater than the quantity in Column A.
10. **Answer choice (A) is correct.** To find the probability of a given event, divide the number of favorable outcomes by the number of total outcomes. Find the probability of Column A: there are 18 total balls, 6 of which are red, so the probability is  $\frac{6}{18}$  which simplifies to  $\frac{1}{3}$ . To find the probability of multiple events, multiply the probability of each event. Find the probability of Column B: we know the probability that the first ball is red is  $\frac{1}{3}$ . Once we remove one red ball, we now have 5 red balls, 4 blue balls, and 8 green balls, so the probability that the second ball is red is  $\frac{5}{17}$ . Multiply these probabilities to find the probability that both balls are red:  $\frac{1}{3} \cdot \frac{5}{17} = \frac{5}{51}$ . Since  $\frac{1}{3}$  is greater than  $\frac{5}{51}$ , the quantity in Column A is greater than the quantity in Column B.
11. **Answer choice (B) is correct.** The number of students who chose Spring or Fall represent half of the total students, so there are 240 students represented by the circle graph. There are  $360^\circ$  in a circle, so the portion of the circle graph representing winter takes up  $\frac{45^\circ}{360^\circ}$  or  $\frac{1}{8}$  of the circle. Therefore,  $\frac{1}{8}$  of the students chose winter as their favorite season, so we can find the number of students who chose winter by finding  $\frac{1}{8}$  of 240:  $\frac{1}{8}$  of 240 =  $\frac{1}{8} \cdot 240 = 30$  students. Therefore, the quantity in Column B is greater than the quantity in Column A.

12. **Answer choice (B) is correct.** If we were to write out the data points represented by the frequency chart, we would have 0, 0, 0, 1, 1, 1, 2, 2, 2, 2, 2, 3, 3, 3, 4, 5, 5. The mode of a data set is the number that appears the most. Since the most number of students have 2 siblings, 2 is the mode of the data. Therefore, the quantity in Column B is greater than the quantity in Column A.
13. **Answer choice (D) is correct.** A box-and-whisker plot shows the lowest value of the data set (represented by the leftmost line), the first quartile of the data (represented by the left side of the box), the median of the data (represented by the line inside the box), the third quartile (represented by the right side of the box), and the highest value of the data (represented by the rightmost line). A box-and-whisker plot does not show the mode of the data set, so the mode cannot be determined from the chart. Since the mode cannot be determined, we cannot determine the relationship between the quantity in Column A and the quantity in Column B.
14. **Answer choice (A) is correct.** The range of the data is equal to the highest value minus the lowest value. The highest value is 80 and the lowest value is  $-10$ , so subtract the values to find the range:  $80 - (-10) = 80 + 10 = 90$ . Since the range is higher than every single data point, the range is higher than the mean. The mean of a data set is always at most the highest value and at least the lowest value in the set. Therefore, the quantity in Column A is greater than the quantity in Column B.
15. **Answer choice (A) is correct.** Since the problem didn't tell us the five numbers in the set, only that they have an average of 20, we can choose our own numbers that have an average of 20. Let's choose 20, 20, 20, 20, 20 to make it easy. Now decrease each number by 1 to get 19, 19, 19, 19, 19. The new average is 19, which is greater than 15, so the quantity in Column A is greater than the quantity in Column B.
16. **Answer choice (B) is correct.** First find the quantity in Column A. To find the distance Fred has traveled, add up the distance between Cities A and B, Cities B and C, and Cities C and D:  $121 + 83 + 39 = 243$  miles. Next find the quantity in Column B. To find the distance Fred has left to travel, add up the distance between Cities D and F and Cities F and E:  $109 + 138 = 247$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
17. **Answer choice (A) is correct.** Since Jack puts the card back into the bag, the fact that he picked the card labeled A does not affect the probability that Amy chooses the card labeled A. To find the probability of a given event, divide the number of favorable outcomes by the number of total outcomes. There are 5 letters, 1 of which is labeled A, so there are 5 total outcomes and 1 favorable outcome. Therefore, the probability that Amy chooses the card labeled A is  $\frac{1}{5}$ , so the quantity in Column A is greater than the quantity in Column B.
18. **Answer choice (B) is correct.** To find the probability of a given event, divide the number of favorable outcomes by the number of total outcomes. Out of 60 total women, 42 go to the gym, so the probability in Column A is equal to  $\frac{42}{60}$ , which simplifies to  $\frac{7}{10}$ . Out of 50 total men, 36 go to the gym, so the probability in Column B is equal to  $\frac{36}{50}$ , which simplifies to  $\frac{18}{25}$ . To compare the

probabilities, change each fraction into an equivalent fraction with a denominator of 100:  $\frac{7}{10} = \frac{70}{100}$  and  $\frac{18}{25} = \frac{72}{100}$ . Therefore, the quantity in Column B is greater than the quantity in Column A.

19. **Answer choice (B) is correct.** There are four prime numbers between 0 and 10: 2, 3, 5, and 7. There are five composite numbers between 0 and 10: 4, 6, 8, 9, and 10. Since there are more composite numbers between 0 and 10 than there are prime numbers, the probability of choosing a composite number is greater than the probability of choosing a prime number. Therefore, the quantity in Column B is greater than the quantity in Column A.
20. **Answer choice (A) is correct.** First find the number of students who chose red as their favorite color by subtracting the number of students who chose blue, green, orange, and pink as their favorite color from the total number of students:  $120 - 35 - 15 - 10 - 20 = 40$ . Now we know 40 students chose red and 35 students chose blue. Because the number of students who chose red is greater than the number of students who chose blue, the central angle of the portion of the circle graph representing red is greater than the central angle of the portion of the circle graph representing blue, so the quantity in Column A is greater than the quantity in Column B.

## Quantitative Comparisons Practice Set 2

1. **Answer choice (D) is correct.** Because we don't know how many dogs and cats there are, we cannot determine the average weight of all the cats and dogs. If there are more dogs than cats, the average weight will be closer to 30 pounds than 10 pounds. If there are more cats than dogs, the average weight will be closer to 10 pounds than 30 pounds. If there are the same number of dogs and cats, the average weight will be 20 pounds. Therefore, the relationship between the two columns cannot be determined from the given information.
2. **Answer choice (C) is correct.** When you increase or decrease each number in a data set, the range does not change. This is because the range of a data set is equal to the highest value minus the lowest value, so if you increase or decrease the highest and lowest values by the same amount, the difference doesn't change. We can test this by choosing a random data set and decreasing each number by eight. Let's choose the following numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12. The range of this set is 11. Now increase each number by eight: 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20. The range of this set is still 11. Therefore, the quantity in Column A is equal to the quantity in Column B.
3. **Answer choice (A) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Rearrange the equation to get *number of terms* =  $\frac{sum}{average}$ . Use the equation and plug in 800 for the sum and 25 for the average and simplify to find the number of adults in the group:  $number\ of\ adults = \frac{800}{25} \rightarrow 32$  adults. Therefore, the quantity in Column A is greater than the quantity in Column B.

4. **Answer choice (A) is correct.** Since we cannot have a fraction of a ball, the number of balls in the basket must be a multiple of 12. The smallest multiple of 12 is 12, so the number of balls in the bucket is at least 12. Therefore, the quantity in Column A is greater than the quantity in Column B.
5. **Answer choice (B) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Plug in 90 for the average, 4 for the number of terms, each of Ava’s first three test scores for part of the sum, and solve for  $x$ , the lowest score Ava can get on her fourth test and still pass:  $90 = \frac{85 + 92 + 90 + x}{4} \rightarrow 90 = \frac{267 + x}{4} \rightarrow 360 = 267 + x \rightarrow x = 93$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
6. **Answer choice (B) is correct.** List out the numbers from 11 through 20: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20. There are four numbers less than 15: 11, 12, 13, 14. There are five numbers greater than 15: 16, 17, 18, 19, 20. Because there are more numbers greater than 15 than there are numbers less than 15, the probability of choosing a card with a number greater than 15 is greater than the probability of choosing a number less than 15. Therefore, the quantity in Column B is greater than the quantity in Column A.
7. **Answer choice (D) is correct.** The range of a data set is equal to the highest value minus the lowest value. While Cindy is 65 years old, we do not know if she is the oldest employee at her company. Since we don’t know the age of the oldest employee at Cindy’s company, we cannot determine the range. Therefore, we cannot determine the relationship between the two columns from the given information.
8. **Answer choice (B) is correct.** Since a histogram shows the ranges of data points, but doesn’t show exact data points, we cannot determine the exact value of the range. However, we can find the range of values for the range. The range is equal to the difference between the largest and smallest value. Therefore, the largest possible range is  $30 - 1$  which equals 29, and the smallest possible range is  $26 - 5$  which equals 21. Since 30 is greater than 29, 30 is greater than the range of the data, so the quantity in Column B is greater than the quantity in Column A.
9. **Answer choice (D) is correct.** The probability of choosing a purple chip is  $\frac{1}{4}$ , so  $\frac{1}{4}$  of the chips are purple. Find the number of purple chips by finding  $\frac{1}{4}$  of 240:  $\frac{1}{4}$  of 240 =  $\frac{1}{4} \cdot 240 = 60$  purple chips. The probability of choosing a green chip is  $\frac{2}{3}$ , so  $\frac{2}{3}$  of the chips are green. Find the number of green chips by finding  $\frac{2}{3}$  of 240:  $\frac{2}{3}$  of 240 =  $\frac{2}{3} \cdot 240 = 160$  green chips. Therefore, the total number of purple and green chips is  $60 + 160 = 220$ . Since there are 240 chips in the bag, there are 20 remaining chips ( $240 - 220 = 20$ ). Therefore, there can be anywhere between 1 and 20 other colors in the bag, so there can be anywhere between 3 and 22 total colors in the bag. Since 3 could be equal to the total number of colors in the bag or less than the total number of colors in the bag, we cannot determine the relationship between the two columns with the given information.



10. **Answer choice (C) is correct.** First find the probability of the event in Column A. Since the problem says, “If the coin lands tails up” we already know the coin lands tails up. Therefore, the coin landing tails up does not affect the probability of the die landing on 6. Since there are 6 sides on a standard die, 1 of which is labeled 6, the probability of the die landing on 6 is  $\frac{1}{6}$ . Now find the probability of the event in Column B. Since the problem says, “If the coin lands heads up” we already know the coin lands heads up. Therefore, the coin landing heads up does not affect the probability of the die landing on 3. Since there are 6 sides on a standard die, 1 of which is labeled 3, the probability of the die landing on 3 is  $\frac{1}{6}$ . Therefore, the quantities in each column are equal.
11. **Answer choice (A) is correct.** The average of a data set is equal to the sum of the numbers divided by the number of terms. Find the average number of cups Clara drank each day by first finding the sum of the cups of water Clara drank each day:  $8\frac{3}{4} + 10 + 7\frac{1}{4} + 12\frac{1}{2} + 11 = 49\frac{1}{2}$  or 49.5. Now divide this by the number of days:  $49.5 \div 5 = 9.9$ . Clara drank  $8\frac{3}{4}$  cups of water on Monday, so the quantity in Column A is greater than the quantity in Column B.
12. **Answer choice (A) is correct.** If you write the data points out from the graph, you will get 0, 0, 0, 1, 1, 1, 2, 2, 2, 2, 2, 3, 3, 3, 4, 5, 5. The range of a data set is equal to the difference between the highest and lowest numbers, so the range equals  $5 - 0$  which equals 5. Since the greatest number in the data set is 5, and all of the remaining numbers are less than 5, the mean of the data is less than 5. Therefore, the range of the data is greater than the mean of the data, so the quantity in Column A is greater than the quantity in Column B.
13. **Answer choice (A) is correct.** Using the line of best fit, the price of each water bottle when 600 bottles are purchased is \$6.75. To find the total cost of purchasing 600 water bottles, we need to multiply 600 by \$6.75. Since  $600 \cdot \$6.00 = \$3600$ , we know that  $600 \cdot \$6.75$  is greater than \$3600, so the quantity in Column A is greater than the quantity in Column B.
14. **Answer choice (B) is correct.** To find the probability of a given event, divide the number of favorable outcomes by the number of total outcomes. Find the total number of outfits Gerard can make with one shirt, one pair of pants, and one pair of sneakers by multiplying the number of shirts, shorts, and pairs of sneakers Gerard had:  $6 \cdot 4 \cdot 2 = 48$  total outfits. Therefore, there are 48 total outcomes. Since he only has one favorite shirt, one favorite pair of shorts, and one favorite pair of sneakers, there is only 1 way Gerard can choose his favorite shirt, shorts, and sneakers, so there is 1 favorable outcome. Therefore, the probability in Column A is equal to  $\frac{1}{48}$ , which is less than  $\frac{1}{12}$ , so the quantity in Column B is greater than the quantity in Column A.
15. **Answer choice (B) is correct.** The mode of a data set is the number that appears the most. Since 11 students is more than half of the 20 students, and 11 students have 2 siblings, 2 is the mode of the data. Since Cade has twin sisters and a brother, Cade has 3 siblings, so the quantity in Column B is greater than the quantity in Column A.
16. **Answer choice (C) is correct.** Since the problem does not tell us the five numbers, just that they are consecutive integers, we can choose our own numbers. Consecutive integers are one after the other,

so we can choose the numbers 1, 2, 3, 4, 5. The mean of a data set is equal to the sum of the numbers divided by the number of terms:  $mean = \frac{1+2+3+4+5}{5} \rightarrow mean = \frac{15}{5} \rightarrow mean = 3$ . The median of a data set is the middle number when the numbers are lined up from least to greatest or greatest to least. Since the numbers 1, 2, 3, 4, 5 are already in order from least to greatest, the median is 3. Therefore, the quantities in both columns are equal. Note: the mean and median of any set of consecutive integers are always equal.

17. **Answer choice (C) is correct.** The median of a data set is the middle number when the numbers are lined up from least to greatest or greatest to least. Since there is an even number of students, the median of the data will be the average of the two middle numbers. Since none of the numbers in the data set are equal to the median of 24, 50% of the data lies below the median and 50% of the data lies above the median. Therefore, the number of students who completed fewer than 24 hours of community service is equal to the number of students who completed more than 24 hours of community service, so the quantities in both columns are equal.
18. **Answer choice (B) is correct.** There are 36 possible ways you can roll two standard dice because each die has 6 sides and  $6 \cdot 6 = 36$ . To roll a sum of 11, you can roll the following combinations: 5 and 6, 6 and 5. To roll a sum of at least 11, you can roll the following combinations: 5 and 6, 6 and 5, 6 and 6. Since there are more ways to roll a sum of at least 11 than there are ways to roll a sum of 11, the probability that the sum is at least 11 is greater than the probability that the sum is 11, so the quantity in Column B is greater than the quantity in Column A.
19. **Answer choice (B) is correct.** The portion of the circle graph representing sports takes up  $\frac{3}{4}$  of the circle graph, so  $\frac{3}{4}$  of the students chose sports. Find the number of students surveyed who chose sports by finding  $\frac{3}{4}$  of 200:  $\frac{3}{4}$  of 200 =  $\frac{3}{4} \cdot 200 = 150$ . Grady only surveyed 20% of the students, and we want to use his data to estimate the remaining 80% of the students. Since 80% is four times 20%, we can multiply the number of students who chose sports by four to find the estimated number of remaining students who will chose sports:  $150 \cdot 4 = 600$  students. Therefore, the quantity in Column B is greater than the quantity in Column A.
20. **Answer choice (A) is correct.** Find the number of pages Valentina has left to write after Friday by subtracting the number of pages Valentina wrote on Monday through Friday from the total number of pages she needs to write:  $10 - 1.2 - 0.8 - 2 - 0.5 - 1.3 = 4.2$  pages. Find the total number of pages Valentina wrote Monday through Wednesday by adding the number of pages Valentina wrote on Monday, Tuesday, and Wednesday:  $1.2 + 0.8 + 2 = 4$  pages. Therefore, the quantity in Column A is greater than the quantity in Column B.

# Reading

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## **Question-Specific Passages**

### **Main Idea Passage 1**

1. The main purpose of this passage is to educate readers on how black cats are routinely overlooked for adoption. While the passage does mention that we are living in an image-conscious society, it does not criticize this fact, so answer choice (A) is incorrect. While the passage does say that people are more likely to adopt gray and white cats, it does not argue that people should not do this, so answer choice (B) is incorrect. While the passage does inform the readers about one baseless superstition people still believe, it is not the focus of the passage: it is mentioned in an effort to explain why people don't adopt as many black cats, so answer choice (C) is incorrect. The passage starts by providing a statistic about how often black cats are adopted compared to grey and white cats. It continues by providing reasons why people don't want to adopt black cats, and ends by saying that because black cats are less likely to be adopted, some pet adoption agencies are trying to help black cats. Based on this, we can see that the primary purpose of this passage is to educate readers that black cats are unfairly overlooked in adoption. **Therefore, answer choice (D) is correct.**
2. The last line in paragraph one states "Why are black cats less likely to be adopted?" The second paragraph answers this question and goes over the reasons that black cats are less likely to be adopted. The reasons given are that people are superstitious about black cats and that black cats don't photograph as well as white and gray cats. Therefore, the purpose of the second paragraph is to explain why people don't adopt black cats as frequently as other cats, **so answer choice (B) is correct.**

### **Main Idea Passage 2**

1. The author's main purpose in this passage is to educate and warn potential homebuyers about splurging and buying a house that is more expensive than they can afford. The author doesn't talk about any devious lending practices in the passage, so answer choice (A) is incorrect. While the author does briefly explain the preapproval process, this isn't the main focus or purpose of the passage, so answer choice (B) is incorrect. The author does not scold or criticize people who make bad financial decisions when buying a home, so answer choice (D) is incorrect. The author begins by introducing the process of getting preapproved for a home loan. She then says the buyer should consider staying well below the maximum loan amount because it's important to live below one's means to reduce stress and have the ability to deal with surprise expenses. Therefore, the author's main purpose is to prevent people from making bad financial decisions and warn homebuyers against pushing the limits of their potential loan amount, **so answer choice (C) is correct.**
2. The main idea of the passage is that while you may get approved for a larger loan than you anticipated, it is better to live within your means. The passage doesn't say that homebuyers should make sure that the lending institution gives them an accurate amount for your loan pre approval, so answer choice (A) is incorrect. The passage doesn't say that homeowners shouldn't try and find their dream home; it only says that they shouldn't buy a home they can't afford, so answer choice (B) is incorrect. While the passage does mention that the approval process involves many factors, this is

only a small piece of the passage and is not the main idea, so answer choice (C) is incorrect. The main idea of the passage is that although you may be able to get a loan for a high amount, you should consider a home that will allow you to take a smaller loan and provide you with more financial comfort in the future. **Therefore, answer choice (D) is correct.**

### **Fact Passage 1**

1. The first sentence in the passage states “Recent research by the Pew research Center has found that the youngest generation of adults, those aged 18-35, are actually the most likely to visit public libraries and boommobiles.” The author of this passage got her information from a study done by the Pew Research Center. **Therefore, answer choice (D) is correct.**
2. We are looking for the library feature that the text does NOT mention. A sentence from the second paragraph states “They offer study space, community engagement programs, meeting spaces for community groups, and often additional cutting-edge technologies like 3D printers.”, so answer choice (B) is incorrect. The next sentence in the paragraph states, “The King country library system in the Seattle area offers free ESL classes, free computer help, to which people can bring their own laptops, book clubs, and gaming events, which might be particularly appealing to teenagers.” Therefore, answer choices (C) and (D) are incorrect. The only library feature not mentioned in the text is free tax preparation help, **so answer choice (A) is correct.**
3. In reference to the fact that young adults go to the library more often than older adults, the first line in the second paragraph states, “This is particularly interesting because of the common perception that with so much content being digitized, libraries are a relic of the past, and the equally erroneous perception that younger adults are unlikely to see any value in something as ‘old fashioned’ as a library.” From that sentence we can see the reason it is interesting that young adults go to the library more often than older adults is because people think you adults don't value certain old fashioned things. **Therefore, answer choice (A) is correct.**

### **Fact Passage 2**

1. We are looking for the answer choice that is NOT a characteristic of a person with a fixed mindset. The first sentence of the second paragraph states, “An individual with a fixed mindset believes that our attributes and talents are in-born and essentially fixed and static.” Therefore, answer choice (D) is incorrect. Another sentence in the second paragraph states, “The danger for people with a fixed mindset is they may not see a need to apply themselves in school or other areas of life.” Therefore, answer choice (B) is incorrect. The last sentence of the second paragraph states, “They may also avoid challenges for fear that not successfully meeting a challenge would prove they lack a talent or attribute they value.” Therefore, answer choice (A) is incorrect. The only answer choice that is not mentioned as a characteristic of a person with a fixed mindset is a person with a fixed mindset receives too much praise. **Therefore, answer choice (C) is correct.**
2. The last paragraph in the passage talks about what educators believe is the better way to praise a child. The last sentence in the last paragraph states, “It is unlikely adoring elders will be able to resist

praising children in a variety of ways, but ideally, some of those ways should emphasize a child’s willingness to tackle the learning process.” **Therefore, answer choice (D) is correct.**

3. The first sentence in the last paragraph states, “Some educators therefore advise that adults focus their praise on the process of completing a task or working towards a goal, versus a quality of a person, such as intelligence.” The paragraph goes on to give examples of how you can praise a child to promote the growth mindset versus the fixed mindset, so educators are primarily focused on promoting the growth mindset. **Answer choice (B) is correct.**

### **Inference Passage 1**

1. The first two sentences in the passage state, “California’s housing crisis continues to escalate. Rents keep increasing, new construction is not keeping pace with demand, and in some communities, gentrification is pushing out lower income residents.” Right away we can eliminate answer choice (C) because if gentrification is pushing out lower income residents, it is not benefiting them. All of the examples listed are reasons why California’s housing crisis continues to escalate, so gentrification would not benefit the community overall, which means we can eliminate answer choice (D). The passage does not imply that gentrification benefits people who wish to build accessory dwelling units, so answer choice (B) is incorrect. We can infer that the reason gentrification pushes out lower income residents is because more middle-income or upper-income residents move in, so the only group that gentrification benefits is middle-income and upper-income residents. **Answer choice (A) is correct.**
2. Talking about accessory dwelling units, a sentence in the middle of the passage states, “This would appeal to many homeowners with enough land to build an additional unit because they can obtain a source of passive income or perhaps offer free or reduced rent to a family member.” The sentence is giving reason why ADU’s might appeal to some homeowners. One reason is that perhaps they could offer a free or rent reduced option to a family member. If the author thinks that is a reason ADU’s would appeal to many homeowners, then he/she would probably agree that people are more likely to offer free or reduced rent to family members. **Answer choice (D) is correct.**

### **Inference Passage 2**

1. The main purpose of the passage is to educate readers on the difference between and the pros and cons of rental caps and no rental caps on homes listed for sale. Because the passage is mostly educational, we can infer the target audience is made up of people that do not know a lot about the subject matter in the passage. Potential homebuyers who are not investors and have an average knowledge of real estate would probably not know all the ins and outs of rental caps and why they can be positive or negative. **Therefore, answer choice (B) is correct.**
2. A sentence in the second paragraph states, “When a listing agent does more than objectively state the existence or lack of rental caps, but actively boasts of one or the other, she is likely envisioning the type of buyer she expects to take an interest in the property.” Since the author tells us that real estate agents boast about whether a property has rental caps or doesn’t in order to appeal to a certain type of buyer, we can infer that the author believes that real estate agents think rental caps are a relevant

feature to note in property description because if they didn't, they wouldn't boast about them. **Therefore, answer choice (C) is correct.**

### **Vocabulary in Context Passage 1**

1. The word *foils* is used to describe the purpose Fortinbras and Laertes serve in the play *Tragedy of Hamlet, Prince of Denmark*. The final paragraph gives us the best clue to what their purpose is. The first two sentences in the final paragraph state, "Unlike Hamlet, Laertes is swift to seek vengeance. Unlike Hamlet, Fortinbras takes bold and effective action, marshaling thousands of troops to his purpose." These sentences are comparing Hamlet to Laertes and Fortinbras. Therefore, we can see that both Fortinbras' and Laertes' purpose was to give the audience characters who, in a similar situation, acted differently than Hamlet did. Therefore, they provided a contrast to Hamlet, **so answer choice (A) is correct.**
2. In the second paragraph the sentence containing the phrase *on the periphery* states, "Through most of the play he remains on the periphery, but at the end, he sweeps into the palace itself." This sentence is saying that for most of the play Fortinbras did something, but then he swept into the palace at the end, so *on the periphery* means something opposite of sweeping into the center of the battle. The opposite of the center of battle would be off to the side. **Therefore, answer choice (D) is correct.**

### **Vocabulary in Context Passage 2**

1. The first two sentences in the passage state, "Are your friends and co-workers *raving* about a new restaurant or a new coffee shop? Or maybe they've just been to a new comedy club and they found it cramped and overpriced." The second sentence starts with the word "or", implying that it is in contrast with the first sentence. Since the second sentence is saying that your friends and co-workers had a negative experience when they went out, the first sentence must be saying that they had a positive experience when they went out. This means that the word *raving* implies that your friends and co-workers are speaking positively about, or praising, their experience going out. **Therefore, answer choice (B) is correct.**
2. The last two sentences of paragraph one state "Word of mouth has always been a powerful means of generating interest, or apprehension, of business and products. But the internet has proved an even more powerful *medium* for disseminating reviews." The word *medium* in that sentence is referring to the internet and word of mouth as ways to spread information, or a means of communication. **Therefore, answer choice (C) is correct.**

### **Organization Passage 1**

1. The first paragraph in the passage introduces the reader to the concept of active reading, which is a more time-consuming type of reading that is required to understand more complex college-level texts. The passage then goes on to outline all the steps someone must take when actively reading, from the first stage to the final stage, so the best way to describe the organization of the passage is,, a process is described in chronological order. **Answer choice (A) is correct.**

2. We know the passage is organized as a process that is described in chronological order. During those descriptions the author analyzes each step of the process in detail and includes examples of how to perform each step, so the main organizational pattern of this passage could be described as process analysis. **Answer choice (B) is correct.**

### **Organization Passage 2**

1. In the first paragraph, the author talks about how we live in a culture of constant innovation. The author goes on to talk about how even traditional books must now compete with e-readers. The author then compares and contrasts books and e-readers. **Therefore, answer choice (A) is correct.**
2. Continuing with the organizational pattern of the first paragraph, the passage goes on to compare features and functions of books and e-readers. The passage also compares other aspects of using books compared to using e-readers such as going to a bookstore versus downloading a book from the internet. Overall the primary pattern of development of this essay is compare and contrast. **Therefore, answer choice (B) is correct.**

### **Tone Passage 1**

1. A sentence in the second paragraph states, “Advertisers, political campaigns, and promoters of all kinds shamelessly deploy the bandwagon fallacy because they understand its strong appeal.” The fact that the author describes the use of the bandwagon fallacy by these different entities as shameless tells us that he/she does not support this practice. The author is being critical of people who use the bandwagon fallacy to influence others. **Therefore, answer choice (C) is correct.**

### **Tone Passage 2**

1. **The correct answer is choice (B).** When trying to detect sarcasm through text, try and look for words or ideas that are overly exaggerated or hyperbolic. For example, in the sentence in answer choice (B), the author says that failing to offer items that are clearly stated on the menu would compromise the customer’s enjoyment of the meal *so thoroughly* that they must be consoled with free food. If the items are clearly stated on the menu, we can assume that most people would have seen them. Therefore, not offering them really shouldn’t affect a customer’s enjoyment of the meal much, if at all. This exaggeration of what would happen in the situation hints at the fact that the author is being sarcastic in this sentence.
  2. **The correct answer is choice (B) lurid**, which means an overly bright or vivid color in an unappealing way. Describing the color of the buttons with a negative word such as lurid tells us that the author was trying to paint a picture of an unpleasant color that most people would not choose to wear. The other answer choices are not negative. “Free” is positive, and “oversized” and “proclaiming” are neutral.
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## **Full-Length Passages**

### **Reading Passage 1**

1. The passage provides information about the discovery of the Maillard reaction, the reactions between sugar molecules and protein molecules that occur during the Maillard reaction, and the different flavor profiles produced by the Maillard reaction. Therefore, the passage is primarily concerned with information the reader about the Maillard reaction, **so answer choice (B) is correct.** The passage does not discuss the best cooking techniques, so choice (A) is incorrect. While the passage mentions differences between the Maillard reaction and caramelization, this is not the main focus of the passage, so answer choice (C) is incorrect. While the passage mentions Louis Camille Maillard as the discoverer of the Maillard reaction, it does not provide any history about him or his life, so answer choice (D) is incorrect.
2. In lines 40 through 42, the passage states, “When thinking about caramelization, it’s helpful to distinguish it from the Maillard reaction.” The passage then goes on to describe how caramelization is different from the Maillard reaction because caramelization involves the breakdown of sugars while the Maillard reaction involves a reaction between sugar molecules and protein molecules. Therefore, we can assume the word “distinguish” means “differentiate” which means recognizing the differences between things. **Answer choice (D) is correct.**
3. In lines 6 through 7, the author states, “French scientist Louis Camille Maillard was working on replicating biological protein synthesis.” The author then explains that over the course of Louis Camille Maillard’s research, he discovered an explanation for why foods brown. The author then refers to the cause of this browning, the reaction between sugar molecules and protein molecules, as the Maillard reaction. Therefore, we know that Louis Camille Maillard discovered the Maillard reaction, **so answer choice (C) is correct.**
4. In lines 31 through 343 states, “While each food that undergoes the Maillard reaction has a different profile of flavor molecules, they all produce the characteristic flavors that people know and love ...” This sentence is saying that while each food has a different group or collection of profile flavors, they all produce similar flavors after going through the Maillard reaction. The words “group” or “collection” are closest to the word “set”, **so answer choice (B) is correct.**
5. In lines 13 and 14, the passage states that the Maillard reaction occurs between temperatures of 280 to 330 degrees Fahrenheit. In lines, 38 through 40, the passage states that caramelization occurs between temperatures of 330 to 450 degrees Fahrenheit. Since Caramelization occurs at higher temperatures than the Maillard reaction, but the passage did not state that Caramelization burns foods, we can assume that Carmelization occurs between the Maillard reaction and burning. **Answer choice (A) is correct.**
6. In the last paragraph, the author states, “Caramelization involves the breakdown of sugar molecules (as opposed to the reaction of sugar molecules and protein molecules). In lines 13 and 14, the author states that sugars and proteins react with one another during the Maillard reaction. The author never

states that the Maillard reaction involves the breakdown of sugar molecules. Therefore, unlike the Maillard reaction, caramelization involves the breakdown of sugar molecules, so **answer choice (C) is correct**.

## **Reading Passage 2**

1. The passage starts by introducing the Basque game of jai alai. It then goes on to describe the setup and rules of the game, and ends by discussing the popularity of the game in the US, Spain, and Latin America. Therefore, the main purpose of the passage is to provide an overview of jai alai, which is a Basque game, so **answer choice (C) is correct**. The passage does not talk about how the rules of jai alai have evolved, or changed, so answer choice (A) is incorrect. The passage does not discuss the reasons that jai alai, a niche sport, is popular, so answer choice (B) is incorrect. The passage briefly compares jai alai to other American sports such as baseball, football, basketball, hockey and soccer by saying that jai alai is lesser-known, however, this is only briefly mentioned and is not the main point of the passage, so answer choice (D) is incorrect.
2. Lines 59 to 60 state, “There is one caveat, though. The catching and throwing motion must happen as one, fluid activity.” The caveat is that the catching and throwing motion must happen as one, fluid activity, which is a requirement according to the rules of the game, so **answer choice (D) is correct**.
3. In lines 20 through 21, the passage states that players throw a ball called a “pelota,” so **answer choice (C) is correct**.
4. The last paragraph states that the popularity of jai alai in the US hit its peak in the 1980s, and now there are only about half of a dozen conchas in the US. It also states that there are many conchas, or courts, in Spain in Latin America. From this, we can infer that the sport is more popular in Latin America than the US because Latin America still has many courts for people to play on. **Answer choice (A) is correct**.
5. The first and fourth paragraphs both compare jai alai to popular US sports. The first paragraph states that jai alai is not as common as other American sports, and the fourth paragraph compares the size of a jai alai court to the size of a football field and a basketball court, and it compares the shape of a jai alai court to the courts of traditional American sports. Therefore, the primary purpose of the two paragraphs is to compare jai alai to more traditional American sports that the reader is probably familiar with, so **answer choice (D) is correct**. The paragraphs do not give reasons why jai alai is less popular than other American sports, so answer choice (A) is incorrect. The paragraphs are not trying to convince the reader to do anything, so answer choice (B) is incorrect. The paragraphs do not talk about any other niche sports, so answer choice (C) is incorrect.
6. The passage begins by introducing the sport of jai alai in paragraphs 1 and 2. In paragraphs 3, 4, and 5 the author describes the court and game setup. Finally, in paragraphs 6 through 8, the author describes the rules and required uniforms of jai alai. **Therefore, answer choice (A) is correct**.

### Reading Passage 3

1. The passage tells the story of a young woman who joined an electrical apprenticeship. It explains what led to her choosing the apprenticeship, the requirements of the apprenticeship, and the process of leaving for the apprenticeship. Therefore, the passage is primarily concerned with the experience of entering an apprenticeship program, **so answer choice (D) is correct.** The passage did not talk about how the narrator struggled between choosing college versus a trade school, so answer choice (A) is incorrect. While the passage discusses some benefits of the apprenticeship, it does not discuss benefits of a career as an electrician, so answer choice (B) is incorrect. Aside from implying that college is expensive and that students in college don't make money, the passage does not talk about the pros and cons of going to college, so answer choice (D) is incorrect.
2. In lines 38 through 39, the passage states, "The hours seemed like they could be arduous - sometimes 50 in a week." Working 50 hours in a week is considered working a lot, and when you work a lot, it is tiring and demanding. Therefore, we can assume that arduous means tiring and demanding which is the same as taxing, **so answer choice (B) is correct.**
3. The author starts the passage by saying, "I had never moved away from home." She then mentions that while he had gone to summer camp and across the country to see her aunt, those situations were different than moving away from home (which she would need to do for her apprenticeship). Therefore, the author mentions going to summer camp and visiting her aunt in the first paragraph to compare previously leaving home to leaving for her apprenticeship, **so answer choice (B) is correct.**
4. In lines 9 through 10, the passage states, "but my parents just couldn't stomach spending so much money when I didn't have a clue about what I wanted to do." From this, we can infer that the narrator's parents didn't want to spend money on college since the narrator did not know what she wanted to study. Therefore, we can assume that the parents would be open to paying for college if the narrator knew what she wanted to study, **so answer choice (A) is correct.**
5. In lines 55 through 60, the passage states, "I was going to forgo warm, humid summers in central Texas and exchange them for what some describe as "mild" winters in Denver, Colorado: a city where single-digit temperatures are not unusual." The narrator mentions that single-digit temperatures are not unusual to point out that Denver winters get very cold. Based on this, we can assume the narrator put the word "mild" in quotation marks to emphasize that she believes Denver winters are colder, or harsher, than people have described, **so answer choice (A) is correct.**
6. In lines 18 through 22 the passage states, "I had always played with wires and batteries when I was younger, so I decided to go to an open house to learn more about becoming an electrical apprentice." Therefore, answer choice (A) is incorrect. In lines 5 through 11, the passage states that the narrator did not know what she wanted to study in college, and lines 12 through 13 go on to say that the narrator's dad suggested she join an apprenticeship program. Therefore, answer choices (B) and (C) are incorrect. **Therefore, answer choice (D) is correct.**

### Reading Passage 4

1. In lines 56 through 58, the passage states, “The idea to raise the ship out of the water ignored the bigger problem: locating the ship.” Later in that paragraph, the passage discusses how Robert Ballard formed a company to try and locate the *Titanic*, but was unsuccessful. He eventually agreed to work for the navy if he could use their advanced technology to find the *Titanic*, and with this technology, the *Titanic* was eventually found. Therefore, we can assume that one of the obstacles in finding the *Titanic* initially was lack of technology, **so answer choice (A) is correct.**
2. In the last paragraph, the passage states that in 1977 Ballard created a company with the intent of finding the *Titanic*. He then went to work for the Navy in 1985. Therefore, Ballard had previously attempted to locate the *Titanic* before working for the US Navy, **so answer choice (C) is correct.**
3. The passage discusses many failed attempts at finding the *titanic*: lines 37-38 states, “Interested parties began discussing the best ways to salvage the wreck.” The passage then goes on to discuss how various people tried but ultimately failed to find the ship. Since people searched for the *Titanic*, we can assume that people viewed the possibility of raising the *Titanic* as possible. However, since there were many failed attempts, we can assume that people viewed the possibility of raising the *Titanic* as challenging. **Therefore, answer choice (D) is correct.**
4. The fifth paragraph discusses various ideas people had to raise the *Titanic*. Therefore, the main purpose of the paragraph is to give context about various ideas to raise the ship, **so answer choice (C) is correct.**
5. The second paragraph states that the sinking caught the world by surprise because modern inventions at the time “had helped to deliver confidence to the *Titanic's* investors.” It then goes on to state that the ship’s builders were also confident that the way the ship was built would keep it afloat. Therefore, we can assume that previous inventions assured people that the ship would not sink, **so answer choice (D) is correct.**
6. Lines 44 through 46 state, “Over the next forty years, many entertaining and ultimately fruitless ideas were put forward to raise the ship.” Since the ship was not found or raised during these attempts, we know that the attempts were not successful. Therefore, fruitless most nearly means unsuccessful, **so answer choice (A) is correct.**

### Reading Passage 5

1. The passage discusses how timekeeping pieces have evolved over the years. It begins by discussing how Egyptians used the position of the sun to tell time over 3000 years ago, then discusses how clocks began to incorporate pendulums in the 1600s, goes on to explain how clocks have evolved over the next two centuries, and ends by providing information about present-day clocks. Therefore, the passage is primarily concerned with giving a chronological (in order of time) history of timekeeping pieces, **so answer choice (C) is correct.** While the passage discusses various methods of telling time, it is not focused on comparing those methods, so answer choice (A) is incorrect. The

passage does not provide details about how various watches work, so answer choice (B) is incorrect. While the first paragraph discusses how various cultures view time, this is not discussed anywhere else in the passage, so answer choice (D) is incorrect.

2. The second paragraph discusses how the Egyptians used the sun to tell time, and then states that “the method can still be used today by a curious backcountry traveler - all they need to do is learn how to use a sundial.” Therefore, we can assume that a sundial is similar to the methods used by Egyptians, so answer choice (D) is incorrect. In lines 14 through 15 the passage states, “Egyptians realized that the position of the sun could inform the time,” so answer choice (A) is incorrect. In lines 19 through 20 the passage states, “This method still works perfectly well today, unless it’s cloudy,” which is implying that in order for a sundial to work, there needs to be sun, so it would not be accurate at night. Therefore, answer choice (B) is incorrect. **Therefore, answer choice (C) is correct.** While the passage states that backcountry travelers can use a sundial, it does not indicate that this method of telling time is popular among backcountry travelers.
3. Lines 24 through 26 state, “clocks had started to incorporate pendulums - large swinging arms.” Lines 28 through 29 state, “The pendulum swings in a predictable fashion known as “periodic motion.” Based on these lines, we can infer that periodic motion is a repeated swinging motion. Since a rocking chair rocks, or swings, back and forth repeatedly, it has periodic motion. **Answer choice (B) is correct.**
4. Lines 24 through 26 state, “Fast forward to the 1600s and clocks had started to incorporate pendulums - large swinging arms.” In this context, incorporate means to have or use: this sentence is saying that clocks had started to have or use pendulums. “Utilize” means use, **so answer choice (D) is correct.**
5. Lines 53 through 62 discuss electric watches. Lines 56 through 57 state, “These watches operate on a very interesting principle: vibration,” **so answer choice (C) is correct.**
6. Lines 44 through 45 state, “This new style of watch was very accurate - they typically only “lost” 15 minutes per day.” Based on this sentence, we know that “losing time” indicates how accurate a clock is. Therefore, the word “lost” implies that over the course of the day, the clock was 15 minutes off and was not fully accurate. This means that time was not actually lost, but the clock displayed the wrong time, **so answer choice (B) is correct.**

## **Reading Passage 6**

1. Looking at lines 1 through 5, the word “but” tells us that the first part of the sentence, “The question may seem inane at first glance,” should contrast the second part of the sentence, “but answering it can tell us a lot about the biological classification system . . .” Therefore, since the second part of the sentence is telling us that the question “What are humans?” is important to scientists, the first part must mean that it seems unimportant, so *inane*, means unimportant or pointless. **Answer choice (D) is correct.**

2. Lines 31 through 35 states, “The third taxonomic level, phylum, is where it starts to get complicated. Depending on the exact methodology used by scientists, there are anywhere from 50 to 60 different phyla!” Therefore, the exact number of phyla is not agreed upon by all scientists since they use different methodologies, **so answer choice (D) is correct.**
3. The passage discusses the current methodology of dividing life on earth into different groups (the Linnaean system). It provides details about the different levels of classification of life on earth. Therefore, **answer choice (B) is correct.** The passage does not discuss various answers to the question “What are humans?”, so answer choice (A) is incorrect. While the passage discusses different classes and orders of animals, this is only part of the passage, so it is not the main idea: answer choice (C) is incorrect. While the passage mentions that Carl Linnaeus created the Linnaean system, it does not discuss how he created it, so answer choice (D) is incorrect.
4. Lines 62 through 63 state, “Some of these families *encompass* groups of primates that sound familiar, “and then goes on the list a few of the primates found in, or included in, the different families. Therefore, we can assume that “encompass” means “included,” **so answer choice (A) is correct.**
5. The passage discusses all of the levels of classification in order (domain, kingdom, phylum, classes, orders, families, genus, species), so we know that there are eight levels of classification. **Therefore, answer choice (C) is correct.**
6. The passage states that the phylum *Arthropoda* includes almost all insects, so we can assume spiders are part of *Arthropoda*, not *Chordata*, **so answer choice (C) is correct.**

### **Reading Passage 7**

1. The author talks about the size of Monaco, stating that it is among the smallest countries in the world and also mentions where it is located and the size of its population. We are informed about the history of the country and the different nations that have claimed ‘ownership’ of the land on which the small country sits. There is also information on how to visit, and the fact that Monaco has made visitation easy for those who have it on their bucket list as a country to visit while in Europe. These are all interesting facts about the country, so the author’s purpose in writing this passage is to inform the reader about the interesting aspects of Monaco. **Answer choice (D) is correct.** Lines 48 through 49 state that many people already have Monaco on their bucket list of countries to visit while in Europe. This means people are already willing to visit, so the passage doesn’t need to persuade them. In addition, visiting Monaco is only mentioned in the last paragraph, and the passage does not request people to visit anywhere in the passage. This means choice (A) is incorrect. Although the sizes of different countries are mentioned, this is not the main purpose of writing this passage. The sizes are only mentioned in the first paragraph, while the rest of the passage talks about Monaco, so choice (B) is incorrect. The history of Monaco is discussed in lines 14 through 23, but only as one among several other interesting aspects of the country such as its size, location, and population. It is not the main purpose of writing the article, so answer choice (C) is wrong.

2. The author discusses interesting aspects of Monaco. For example, Lines 14 through 15 state, "The history of Monaco is as interesting as it is complicated." In lines 41 to 42, the author says "Interestingly, Monégasques make up a minority of the population in their own country." The author also mentions that 30% of the residents are millionaires, which is an interesting fact about Monaco. Therefore, the author seems interested or intrigued by Monaco, **so answer choice (C) is correct.**
3. In lines 53 through 57, the author talks about the two reasons that make visiting Monaco easy. "First, it is very easy to enter Monaco once an individual has visited another EU country. Second, Monaco has also converted over to the standard European currency, the Euro." Its currency being the Euro is mentioned as one of the reasons visiting Monaco is easy, **so answer choice (C) is correct.** Although the fact that Monaco is not part of the EU is mentioned, it is not given as one of the reasons visiting the country is easy. Answer choice (A) is therefore incorrect. Choice (B) is incorrect because although the passage does say Monaco is probably the richest country on planet Earth, this is not given as the reason it's easy to visit. Choice (D) is incorrect because, although Monaco is a small country, its size is not listed as one of the two reasons why the country is easy to visit.
4. In lines 33 through 35, the passage says the entire population of Monaco "is only about 38,000 people (about as many people that live in one square mile in New York City)". New York is a city and yet its population is much larger than that of Monaco, an independent nation. Therefore, we can say New York is included to show how small Monaco's population is, **so answer choice (A) is correct.**
5. In lines 32 to 36, the author informs the reader that Monaco is probably the richest country in the world. Further, 30 percent of the country's 38,000 residents are millionaires, a fact that can be attributed to Monaco's status as a tax haven. So, the reason why most people in Monaco are millionaires is that Monaco has low tax rates. The phrase 'attributed to' is used to mean 'because of'. **Therefore, answer choice (B) is correct.**
6. In the first paragraph, the passage talks about the five largest countries in the world and how together they cover about 55 million kilometers. Lines 6 through 7 then describe the size of Monaco. It is one of the smallest countries in the world and has a total area of about 2 kilometers. By comparing Monaco to the big countries, the author can show just how tiny the country is. The reader can compare millions of square kilometers to just 2 kilometers. **So the correct answer is choice (D):** the purpose of the paragraph is to contextualize the size of Monaco.

### **Reading Passage 8**

1. The passage is about Alice Paul, who was a leader in the women's suffrage movement. It explains that she had to deal with many challenges while trying to fight for women's rights: she would be met with resistance when she went door to door asking people to support her cause, she received criticism from NAWSA, and her office had been ransacked. Therefore, the main idea of the passage is that sometimes, fighting for what is right isn't always easy, **so answer choice (C) is correct.** Answer choice (A) is incorrect because while Alice does say that they are going to break their friend out of jail, that was just one line at the end of the passage and is not the main idea of the passage. Answer

choice (B) is incorrect because nowhere in the passage does it say that suffragists were a diverse group of activists. Answer choice (D) is incorrect because while the author might believe that persistence can get you through the toughest situations, the passage focuses more on the challenges faced by Alice and other activists.

2. Throughout the passage we read about Alice Paul facing challenges including knocking on strangers' doors every day, not knowing what kind of person will answer the door or whether they will support her cause, to her office being ransacked by the police and having to break her friend out of jail. Alice Paul faced all these challenges despite the difficulty, and she faced them with bravery and courage. Alice could best be described as courageous, **so answer choice (B) is correct.**
3. This passage is about a strong woman, Alice Paul, who faced many challenges in her fight for what she believed in. Alice Paul had many setbacks and roadblocks during her fight, but she kept fighting and stayed courageous. The tone of this passage reflects Alice's toughness and could best be described as determined. **Therefore, answer choice (A) is correct.**
4. Lines 15-17 state, "Every day, Alice found herself standing face-to-face with an increasingly arduous task --- could she go on?" The word "arduous" is describing the task Alice faced on a daily basis. Everyday Alice had to ask herself if she could continue, which implies that what she was doing must have been very challenging or difficult. Therefore, the word "arduous" means difficult, **so answer choice (D) is correct.**
5. The third paragraph starts by saying, "Alice never knew what to expect when she wound up at the front door of another homeowner." The paragraph continues by presenting various scenarios that Alice has experienced when knocking on people's doors: a husband who dismisses Alice, a housewife that doesn't care about women's right to vote, or a potential ally willing to help the cause. The paragraph ends by saying that before every house, Alice takes a deep breath and allows herself a moment of peace. From this, we can conclude that the paragraph is showing that Alice typically thinks about the possible scenarios that can happen when knocking on someone's door and that she feels apprehensive when knocking on a new door, which is why she takes a deep breath to calm herself down. Therefore, the purpose of the paragraph is to show Alice's thoughts and feelings about going door to door asking people to join her cause, **so answer choice (B) is correct.**
6. In the second paragraph, we learn that Alice's organization, the National Women's Party, struggled to recruit people to their cause due to societal and political pressure. From the middle to the end of the passage, we learn about how the police ransacked the National Women's Party's office and came to arrest one of its employees. After learning this, the passage tells us that Alice thought to herself and wondered what laws they had broken besides making a frustratingly male society uncomfortable. Alice's organization clearly faced pressure and were punished by society and the law for fighting for what they believed in. **Therefore, answer choice (D) is correct.**



## Reading Passage 9

1. Nia felt that she had done everything she needed to do to win the election as explained in lines 1 through 3. In lines 3 and 4, she says she would hopefully win the election, meaning she was feeling hopeful about the elections' outcome. In lines 15-16, she saunters down the stairs and finds her brother rushing to catch the bus, and jokes with him in a "sing-song" voice. He's not in the mood for jokes, but the fact that she jokes with him shows she is in a good mood. She also wears a big smile when she gets to school and is beaming at everyone as explained in lines 37 through 40. We can therefore conclude she is feeling hopeful and cheery, **so answer choice (A) is correct.**
2. When Nia gets to school, she notices everyone is looking back at her. She thinks people are staring at her because they care about the election as explained in lines 39 through 40. In lines 61 and 62, she later realizes people had stared at her because she has a big stain on her blouse, which she tries to cover. She also blames her brother Damian, in lines 65 and 66, and says it's his fault she has a stain on the election day clothes she had carefully selected the previous night to look professional. She wins the election and is no longer mad at her brother, meaning she had been mad at him and felt the stain would hurt her chances of being elected. Ironically, she is elected despite having a stain on her blouse, **so answer choice (A) is correct.**
3. In line 26, Nia's mom asks her, "What's the matter, Nia?", and Nia is scared by the question. The word inquiry here is used to mean question because the mom is asking a question. **Therefore the correct answer is choice (A).**
4. Lines 18 through 19 state, "I gathered the equipment for my routine breakfast: a bowl and spoon." Lines 23 through 24 state, "Where is my cereal?" after Nia opens the cupboard and cannot find her routine breakfast: cereal. Finally, lines 31 through 35 state, "I didn't want to expend the energy telling my mother about my cereal routine ... Although I love my routine, the oats that my mom made for me that morning were truly delicious." From these lines, we can see that Nia routinely, or frequently, eats cereal for breakfast, **so answer choice (C) is correct.**
5. In lines 10 through 13, Nia says she thinks "dressing professionally is one of the most important keys to getting elected" because "if you dress seriously, people will take you seriously." Therefore, she takes the time to select a professional outfit, only for the blouse to end up with a big stain. She thinks this will harm her chances of being elected and blames her brother for it and is mad at him. When she is elected, she is not mad at him anymore because she won after all. That's why she says she shouldn't be mad at Damien after all in lines 77 through 78. **Answer choice (C) is correct.**
6. Lines 58 to 62 describe how Nia comes to know about the stain on her blouse after Ms. Jansen points out she has a large stain on her blouse. She looks at her blouse and sees the stain. She immediately realizes why everyone had been staring at her earlier, a realization that makes her voice quiver as she thanks the teacher for informing her. The quiver comes from realizing that her outfit, which she had intended to be perfect and professional, is not. The quiver is because she is embarrassed by the stain, **so answer choice (B) is correct.**

## Reading Passage 10

1. The passage provides us with information about the Triple Crown racing event, such as the fact that it's made up of three different events, when and where the three events originated, and the format of all three races. We also get information about which animals are allowed to compete in the races, in addition to the exact number of people who have managed to compete in the race. In lines 23 through 30, we are informed that "The notion of the Triple Crown emerged significantly after each of the individual races began to be contested. The first runnings of each race were before 1900: the Derby, 1875; the Preakness, 1873; and the Belmont, 1867. The earliest usage of the term "Triple Crown" is attributed to various racing journalists sometime between 1925 and 1930." We can therefore say one of the primary purposes of the passage is to inform us about the origin of the Triple Crown races, **so answer choice (B) is correct**. Answer choice (A) is incorrect because the passage is not about the history of horseracing in general: it is about the three specific events mentioned. Choice (C) is incorrect because even though the passage says there was discussion of the fairness of the Triple Crown as mentioned in lines 59 to 61, the author then says in lines 67 through 68 that this assumption was proven false in 2015 and 2018. Answer choice (D) is incorrect because although there have been 13 winners, only one name is given, that of Sir Barton. The rest remain unnamed and there is no further information about them.
2. Lines 37 through 40 talk about the difference between the Triple Crown races and other major horse races in other countries. "Unlike major horse racing in other countries, where the races are contested on grass, each of the Triple Crown races takes place on a dirt track." The major difference is in the terrain, **so answer choice (D) is correct**. Although the passage mentions the length of the individual events, it does not mention this as a difference with other major horse races, so choice (A) is incorrect. The passage does not mention the races being open to both male and female horses as a difference with other major horse races, so answer choice (B) is incorrect. Although the passage does state the age requirement is any horse under four years, this is not mentioned as a major difference with other horse races, so choice (C) is incorrect.
3. In paragraph two, the author informs us that the Kentucky Derby is one of the most well-known horse-racing events in the world. Lines 9 through 14 state that most people don't know that the Kentucky Derby is one among three of the most storied achievements in American Sports: The Triple Crown of Thoroughbred Horse Racing. If the Kentucky Derby is well-known, but it's only part of an even bigger achievement, then we can assume the bigger achievement must be much more famous than the Kentucky Derby, **so answer choice (B) is correct**.
4. According to the passage in lines 28 to 30, "The earliest usage of the term "Triple Crown" is attributed to various racing journalists sometime between 1925 and 1930." The passage also informs us in lines 50 through 51 that Sir Barton won all three races in 1919, which means he won even before the term 'Triple Crown' started being used. At this time the Triple Crown had not been created, and he was an unofficial winner. **Therefore, answer choice (A) is correct**.

5. The first paragraph starts by saying that the announcing is almost as iconic as the event. This already makes the reader start to get excited about the announcing (by the race caller). The commentary, written in italics, has all its sentences ending in exclamation marks, and there is a sense of urgency that makes the reader want to know what happens to Justify. Therefore, the tone is spirited, **so answer choice (B) is correct.**
  
6. Lines 59 to 61 talk about how there have been discussions about the fairness of the Triple Crown. The rest of the paragraph explains why there have been doubts about fairness, but the last line in this paragraph puts an end to the debate. In lines 67 through 68, the author states that the assumption was seemingly proven false in 2015 and 2018, meaning the assumption that horses that had already competed would be more tired than those that had not competed was proven wrong because there were winners who won and proved it could be done. **Therefore, answer choice (C) is correct.**

### **Reading Passage 11**

1. The passage goes through different steps and methods that can be used and things to watch out for while adopting and training a hamster. The author begins the passage by providing tips on how to choose a hamster to adopt, and then explains ways to train a hamster: make sure the hamster knows your voice, use sunflower seeds to incentivize the hamster, and don't overfeed your hamster. Therefore, the primary purpose of the passage is to recommend ways of training a hamster, **so answer choice (B) is correct.** Answer choice (A) is incorrect because while the passage gives techniques and recommendations on how to train a hamster, it does not compare different methods of training. Answer choice (C) is incorrect because while the passage mentions that when selecting a hamster, choosing a friendly one will make training easier, this is only a minor detail in the passage. It also does not say that all hamsters are friendly. Answer choice (D) is incorrect because the passage does not try to encourage everyone to buy a pet hamster. In fact, the passage warns that they are not like cats and dogs and how it takes a certain degree of patience to reap the rewards of hamster ownership, so the author probably believes that hamsters are not the best pet for everyone.
  
2. The passage starts off by introducing the idea that hamsters can be trained and be great pets. The paragraphs are set up as step-by-step instructions from how to pick the best hamster all the way to specific training techniques. The best way to describe the organization of the passage is a step-by-step overview of selecting and training hamsters. **Therefore, answer choice (A) is correct.**
  
3. The first line of the passages states, "Hamsters may not be the most conventional pets, but that doesn't mean they can't be one of the best pets." Later in the first paragraph, the passage states, "...but hamsters aren't like cats or dogs ..." From these two lines, we can assume that Hamsters are not common pets like cats or dogs, so "conventional" most nearly means common. **Therefore, answer choice (A) is correct.**
  
4. Lines 8 through 10 state, "With hamsters, there takes a certain degree of patience from the pet owner before you start reaping the full benefits of hamster ownership." Therefore, answer choice (A) is incorrect. Lines 21 through 23 state, "The more curious and willing a hamster is to touch you, the

easier it will be to train.” Therefore, answer choice (B) is incorrect. The fourth paragraph discusses how using food, such as sunflower seeds, is important for incentivizing hamsters to perform tricks. Therefore, answer choice (C) is incorrect. The last line of the fourth paragraph states, “... hamsters are entirely different from dogs or cats and can’t be held to the same standards.” Therefore, the author says you should NOT treat a hamster like a dog, **so answer choice (D) is correct.**

5. Lines 34 through 37 state, “When you want to teach your hamster to jump, sit, or stand, sunflower seeds are the best reward incentivizing them to continue performing the trick.” This sentence is saying that using food as a reward is a good way to encourage your hamster to perform tricks. Therefore, incentivizing most nearly means encouraging, **so answer choice (C) is correct.**
6. The phrase in lines 45-47, “always keep in mind that hamsters are entirely different from dogs or cats, and can’t be held to the same standards,” is trying to remind pet owners that all pets are different and some may require different care than others. The phrase is not a warning, so answer choices (A) and (D) are incorrect. The phrase is also not encouraging anything, so answer choice (C) is incorrect. The phrase is just a gentle reminder that all pets are different and may require different care, **so answer choice (B) is correct.**

## **Reading Passage 12**

1. The author begins the passage by saying that he has never seen or heard from his biological parents. He continues by explaining that he is sitting in Applebee’s waiting to meet his parents for the first time. Throughout the rest of the passage, the author explains his thoughts and feelings about meeting his parents for the first time. He is excited but nervous, and begins thinking about what his parents were like: What do they do for a living? Why did they leave me? Would they be pretty? Are they poor or rich? The author continues thinking about his parents and why they may have left them until the end of the passage when his parents open the door to the restaurant. Therefore, the author’s main purpose is to recount how he felt and what thoughts he had while he was waiting to meet his parents for the first time, **so answer choice (B) is correct.** Answer choice (A) is incorrect because while the author does mention a couple things about growing up without parents, that is a small portion of the passage and not the main purpose. Answer choice (C) is incorrect because the passage ends with the author’s parents walking in the door and smiling and we don’t actually learn about how the interaction went. Answer choice (D) is incorrect because while the author does go over some possible reasons his parents may have abandoned him, this is mentioned as part of the author’s overall feelings and thoughts about his parents, so it is not the main focus of the passage.
2. Lines 37-30 state “I look at my clothes and cringe---a pale and ragged hand-me-down suit the foster agent had whipped up for me the day before.” The word “ragged” is describing the author’s suit which he said made him cringe and was a hand-me-down. If clothing is hand-me-down, we know it is not new and might be a bit worn out. If clothing makes you cringe, that would probably mean that it was not very nice or possibly embarrassing. Using the fact that his suit made him cringe and it being a hand-me-down, we can infer that the word “ragged” means old and worn. **Therefore, answer choice (B) is correct.**

3. Lines 41-43 occur while the author is waiting to meet his parents for the first time. We can infer from all the thoughts he was having and the fact that he is meeting his parents for the first time that the author was most likely nervous. There is no reason to believe the author likes the taste of blood, so answer choice (B) is incorrect. We also can't know if the author got this habit from his parents because both he and we don't know who his parents are, so answer choice (C) is incorrect. The author gives us no reason to believe he is angry during this time, so answer choice (D) is incorrect. The only logical reason that the author would be biting his lip would be out of nervousness, and the fact that the line described the wound as familiar means he has done this before. **Therefore, answer choice (A) is correct.**
4. We are looking for the statement which is NOT true. Clearly the author is resilient, as growing up without parents and moving around from foster home to foster home is a tough thing for anyone to experience, so answer choice (A) is incorrect. Throughout the passage, the author goes over many different scenarios for how his parents will be and why they may have left him. He questions if they will be poor or travelers which shows that he is prepared for any of these situations, so answer choice (C) is incorrect. Lines 45-46 state "But there is one thing I do know for sure: I'm not going to be mad at them." This shows that the author has a positive outlook, so answer choice (D) is incorrect. The only statement that can not be proven true based on the passage is that the author wants upper-class parents. **Therefore, answer choice (B) is correct.**
5. The passage is focused on the time leading up to the author meeting his parents for the first time. His thoughts are racing and emotions are high, and he's thinking about all the possible ways the event could unfold. Doing anything for the first time can be nerve wracking, especially something as big as meeting your parents after growing up without them. This is reinforced by lines 41-44 where the author says he was biting his lip, which was out of nervousness. Overall the tone of this passage can be described as nervous. **Therefore, answer choice (A) is correct.**
6. In the fourth paragraph, the author thinks of possible reasons why his parents left him: maybe they were poor, maybe they were travelers moving from town to town, or maybe they weren't very smart. Therefore, in the fourth paragraph, the author is trying to rationalize or justify why his parents may have left him, **so answer choice (B) is correct.**

### **Reading Passage 13**

1. The fifth paragraph starts by saying that Maneul tried practicing dancing by himself in his room without music. However, he felt awkward, so he decided to try with music. Although the music helped, he still didn't know what to do with his body. The sixth paragraph explains that Manuel tried watching videos to learn how to dance, but it felt too repetitive. The seventh paragraph discusses how Manuel practiced for the next few months and learned what music he likes to dance to. By the end of the few months, his dancing had improved. Therefore, the purpose of these three paragraphs is to describe the various methods Manuel used to practice dancing and become a better dancer, **so answer choice (B) is correct.**

2. In lines 25 through 29, Manuel is surprised that his sister wants him to dance at her wedding, and Manuel’s sister responds by saying she wants everyone to be lively and that everyone in the wedding party will be dancing. Lines 29 through 31 state, “Apparently, his internal scowl had leaked out and his sister commented, “Don’t be such a baby; it’s 30 seconds of your life.” From his sister’s response, we know that Manuel must’ve been making a face that showed he did not want to dance at his sister’s wedding, so “internal scowl” means a face showing dislike. Saying the scowl “leaked out” means that his sister saw the scowl and realized that Manuel was opposed to dancing at her wedding. Therefore, the phrase “his internal scowl had leaked out” means that Manuel was attempting to hide his dislike but his sister could see it on his face, **so answer choice (A) is correct.**
3. Lines 13 through 14 state, “‘I like where I’m at right now, thank you,’ was his common retort.” What Manuel said was not offensive, so answer choice (C) is incorrect. Answer choice (D), indication, means a sign or demonstration of something, which does not make sense in this context, so answer choice (D) is incorrect. Manuel was not making an excuse or giving a reason why he could not dance, so answer choice (B) is incorrect. The word “retort” means a response or counter, which is closest in meaning to “rebuttal”, **so answer choice (A) is correct.**
4. Lines 57 through 61 state, “‘What song would you like?’ Manuel stared blankly. ‘I get to choose?’ He seemed amazed. ‘Of course; it’s your dance!’ Manuel smiled, knowing that his 30 seconds of fame were going to go smoothly.” From these lines, we can see that Manuel smiled because he gets to choose his own music to dance to, which helped him relax. **Therefore, answer choice (D) is the correct answer.**
5. The first paragraph says Manuel was not much of a dancer, but his mom, dad, and sister were all dancers. Lines 3 through 6 then state, “Maybe the gene skipped over him or something, but he seemingly didn’t have an on-beat bone in his body.” This line is referring to the fact that everyone else in Manuel’s family can dance but him, **so answer choice (C) is correct.**
6. The first line of the passage says, “Manuel was never much of a dancer.” In the second paragraph, the passage explains that Manuel wouldn’t dance at parties. Later in the passage, when Manuel’s sister says that she wants him to dance at her wedding, Manuel was surprised and did not want to dance. He later begins practicing and feels awkward, even when he watches videos of other people dancing. From this, we can assume that Manuel felt worried or apprehensive when he began learning how to dance because he didn’t think he was a good dancer, **so answer choice (B) is correct.**

### **Reading Passage 14**

1. The passage starts by informing the reader about Lindsey’s early days and how she learned to ski before the age of two. It goes on to detail how she spent her childhood training in different places and how she began her professional career at the age of 16. She went on to win many competitions and medals including a silver medal at the Junior World Championship, the world championships three years in a row, and a gold medal at the Vancouver Games. We can therefore conclude that the main purpose of the passage is to discuss Lindsey Vonn’s career and accomplishments, **so answer choice (B) is correct.** Choice (A) is incorrect because the passage is not limited to Lindsey’s Olympic career:

it mentions other competitions in addition to the Olympics. Choice (C) is incorrect because the passage does not mention other female skiers or compare Lindsey Vonn to other female skiers. Answer choice (D) is incorrect because the passage does not talk about Vonn’s junior racing career: it only discusses her professional racing career.

2. In lines 5 through 6, the author says that Lindsey’s grandfather taught her how to ski by the age of two. Lines 36 through 39 describe how Lindsey shocked the skiing world by clocking the 6th fastest slalom time and finishing the event just under 3 seconds away from the medals. The author puts (out of 31 competitors) in brackets to show how impressive Lindsey’s performance was. In the last paragraph, the author says that Lindsay remains the most decorated female athlete in American skiing history. All these show the author’s tone towards Lindsey is admiring, **so the correct answer is answer choice (D).**
3. Answer choice (A) is mentioned as an accomplishment in lines 60 through 65, which state that Lindsey finally won gold in the Vancouver games. Choice (B) is listed as an accomplishment in lines 66 through 67, which state that Vonn was ranked number one for both Slalom and downhill before the 2014 Sochi games, which she never competed in due to an injury. Choice (C) is an accomplishment mentioned in lines 56 to 58, which state that Lindsey won the world championships three years in row, from 2008 to 2010. **The correct answer is choice (D)** because Lindsey did not earn a silver medal in the 2006 Olympics. That year, she crashed in the snow at 50 miles per hour and had to be evacuated by a helicopter hours later. She returned to compete, but without success.
4. All the information provided in the passage paints Lindsey as a woman who is determined to win. Even after she gets into an accident, she returns to compete. Her achievements are also listed and they are all impressive, such as winning the world championships three years in a row and being the first American woman to have won a downhill gold. We can therefore conclude that when the author says in lines 72 that Lindsey remains the most decorated female athlete in American skiing history, the word “decorated” here means accomplished. **Therefore, answer choice (C) is correct.**
5. The passage says in the fifth paragraph that in the 2006 Olympics in Sicario, Italy, Lindsey crashed and had to be evacuated. She returned to continue with the competition, but without success. The last paragraph talks about another accident just before yet another Olympics, the 2014 Sochi Games. Lindsey did not compete that year. We can therefore conclude the reason she has only won three Olympic medals is that the injuries either made her perform poorly, or not at all. **Therefore, answer choice (B) is correct.**
6. Lines 69 through 72 state that after she suffered an injury before the 2014 Olympics that made her miss those games, Lindsey returned to compete in the 2018 Olympics, eventually amassing two more gold medals. The use of the words “two more” shows she already had earned other medals, and from the passage we know it is the gold medal she had won in 2010 at the Vancouver games. We can conclude that the word “amassing” as used here means earning, **so answer choice (C) is correct.**

## Reading Passage 15

1. The passage begins by informing us about the Interstate Highway System, which still remains the largest public works project in American history. It explains when and why the system was created, saying it was created in 1956 by President Eisenhower to “establish a system of roads that have unified standards for construction and signage.” The passage continues by providing information about the construction of the Interstate Highway System, saying it took much longer than expected to construct, it was expensive to construct, and today, one of the interstates is still not completed today. The passage finishes by describing various aspects of the Interstate Highway System including how it is numbered and benefits and drawbacks of the highway system. Therefore, the main purpose of the passage is to describe the inception and construction of the Interstate Highway System, which was one of the largest projects in American history, **so answer choice (B) is correct**. Answer choice (A) is incorrect because the passage is not about any particular highways; it’s about the interstate system in general. Answer choice (C) is incorrect because while the passage mentions that the Interstate Highway System took longer than expected to construct, it does not provide reasons why. Answer choice (D) is incorrect because the negative effects of the highways system are only discussed in one paragraph, so this is not the main focus of the passage.
2. Lines 10 through 12 say, “This system connects major metropolitan areas within the United States, including Alaska, Hawaii, and Puerto Rico.” This is a very large area so we can conclude that the system is extensive because it covers all these areas. The third paragraph says the construction of the system took 35 years to complete instead of 10 years. We can assume this is because of its size, **so the answer choice (B) is correct**.
3. Lines 43 through 45 say, “The interstate system was designed for other uses than to provide more direct routes for public traffic.” The passage then lists these other uses as the mobility of troops between army airports and army air bases, and the evacuation of people during natural disasters. Therefore, one lesser-known advantage of the system is that it provides an efficient route for military vehicles, **so answer choice (C) is correct**.
4. Lines 30 through 32 say, “Despite two of the original interstates not being complete, the government proclaimed completion of the system in 1992.” The word “despite” is used to link two contrasting thoughts, so the second part of the sentence should contrast the first part. The first part of the sentence says that two of the original highways were not complete. The second part should say something that you would not expect given the first part of the sentence: if the highway was not complete, you would not expect the government to announce that it was complete. Therefore, “proclaimed” most nearly means “announced”, **so answer choice (A) is correct**.
5. Lines 22 through 24 say, “These funds would be used over a 10-year span to construct 41,000 miles of highway.” Lines 27 through 29 say, “The project took much longer than initially planned with construction ending up taking 35 years”. From this information, we can see the system took 35 years instead of 10 years to complete. Since 35 years is roughly three times 10 years, the actual construction time was about three times the expected construction time. **Therefore, answer choice (A) is correct**.



6. The second-to-last paragraph discusses the negative effects of the interstate system. These include the decline of cities and towns located too far from the system, displacing minority neighborhoods in cities where the interstates were constructed, and adding to existing racial segregation by creating physical barriers between neighborhoods. We can conclude that the purpose of this paragraph is to discuss how the Interstate Highway System has negative, or detrimental, effects on some American citizens, **so answer choice (D) is correct.**

### **Reading Passage 16**

1. The passage talks about the Stanley Cup, the oldest trophy in North American professional sports, which is also the championship trophy for the National Hockey League. It discusses the origins of the trophy, explaining that the trophy was commissioned by Lord Stanley of Preston in 1892 as an award to the nation’s best amateur hockey club. It then explains that the cup has undergone many changes since, such as changing from its original height to three feet tall, having the names of some participants engraved on bands added below the original cup, and having a barrel added to it. Many traditions have also formed around the award, such as the winning team drinking champagne out of the cup. Therefore, the theme of the passage centers around the origins of the oldest trophy in North American professional sports, **so answer choice (B) is correct.** Answer choice (A) is incorrect because the passage does not discuss the championship game of the NHL season, it only discusses the trophy won at this championship. Answer choice (C) is incorrect because why the cup was commissioned is one of the many details mentioned in the passage, not the main focus. Answer choice (D) is incorrect because while the passage mentions the engraving on the Stanley Cup, it does not go into detail about the history of these engravings.
2. The fifth paragraph talks about the traditions that have formed since the cup was first awarded. These include the winning players drinking champagne out of the Stanley Cup, handing the trophy to the winning captain on the ice after the final game, and allowing each coach and each player from the winning team to have the cup for a day in the off-season. Therefore, the purpose of this paragraph is to discuss the creation of many traditions involving the Stanley Cup, **so answer choice (C) is correct.**
3. The fifth paragraph discusses the traditions that have formed since the Stanley Cup was commissioned. Lines 37 through 39 say, “The oldest of these traditions was that the winning team would drink champagne out of the cup, which persists today.” This means the champagne tradition was the first to be formed, and the winning team still drinks out of the cup today. The word persists is used to mean the tradition continues to be followed by players even today, **so answer choice (C) is correct.**
4. The first paragraph of the passage explains how important the Stanley Cup is to the NHL: it is the oldest trophy in North American professional sports, and it has been the NHL championship trophy since 1926. Lines 54 through 56 say, “As ice hockey’s top prize for the past century, the Stanley Cup has garnered legendary status within the sporting world.” The fifth paragraph explains there’s a tradition where each player and coach in the winning team gets to spend a day with the cup in the off-season. Lines 47 through 49 say, “The NHL has an official cup handler accompany the team member as they can spend their time however they want to.” We can assume that because the Stanley

Cup is such an important part of the NHL, the purpose of the NHL official cup handler is to make sure the cup is safe. **Therefore, answer choice (D) is correct.**

5. The second paragraph says the cup was first awarded by Lord Staley of Preston, who was the Governor General of Canada. Lines 17 through 18 say the cup he “donated the cup to award the nation’s best amateur hockey club.” We can conclude the award was initially created to award Canada’s best hockey clubs, **so answer choice (D) is correct.**
6. Lines 54 through 56 say, “As ice hockey’s top prize for the past century, the Stanley Cup has garnered legendary status within the sporting world.” The passage also says the cup’s traditions and history have added to its legendary status. Therefore, we can assume that these traditions and history, in addition to it being hockey’s top prize, have led to the cup gaining legendary status. Therefore, the word “garnered” means “gained”, **so answer choice (A) is correct.**

### **Reading Passage 17**

1. The passage provides information about President Harrison’s career in the Military and in government. It discusses how Harrison started his career in the military in 1791, rose through the ranks, and retired from the military in 1798. After that, he joined the government and served in various senior capacities such as the Northwest Territory congressional delegate, the Governor of the Indiana Territory, senator, presidential elector and ambassador to Colombia. He also served again in the military in 1812 as brigadier general. All this experience eventually helped propel him to the presidency. Therefore, the main purpose of the passage is to inform the reader about the life and career of President Harrison, **so answer choice (B) is correct.** Choice (A) is incorrect because the passage does not say whether or not President Harrison would have done a good job had he served longer. Choice (C) is incorrect because the cause of his death is not the primary focus of the passage, and the impact of his death is not mentioned anywhere in the passage. Choice (D) is incorrect because although his accomplishments in the military are mentioned, they are not the main purpose of the passage: the passage also focuses on his political achievements.
2. Lines 52 through 54 say, “It was this collection of military and government experience that propelled Harrison to the presidency”. This means his career in the military was one of the reasons he won the presidential election, **so answer choice (C) is correct.**
3. Lines 7 through 10 say that when President Harrison started to develop cold-like symptoms, the doctors of the day incorrectly thought the wet and cold weather had caused his illness. They used unsubstantiated and snake-oil techniques to treat him, such as bloodletting and giving him a mixture of petroleum and snakeroot. Lines 15 through 18 say modern doctors believe that his doctor’s treatment probably exacerbated Harrison’s condition. Since Harrison died from his illness, we can assume that these treatments did not help Harrison get better. Therefore, modern doctors probably believed that Harrison’s doctor’s treatments made his condition worse, **so answer choice (D) is correct.**
4. Lines 11 through 12 say that the doctors used unsubstantiated, snake-oil techniques to treat the president, which made his illness worse and finally led to his death. The techniques were not substantiated, meaning they were not backed up by scientific evidence or based on verified medicine, **so answer choice (C) is correct.**
5. Lines 8 through 10 say the doctors incorrectly thought the cold and wet weather had caused the

president’s illness. The use of the word “incorrectly” shows the weather was not the reason President Harrison was sick. We can therefore infer that his illness was caused by something other than the weather, **so answer choice (A) is correct.**

6. Throughout the passage, the author discusses the life of William Harrison, including his military and political careers. It then introduces Benjamin at the end, in lines 57 to 60, saying that while William Harrison served for just 31 days, his grandson, Benjamin Harrison, served a full term of 1461 days. Therefore, we can assume that if the passage were to continue, it would now talk about Benjamin Harrison and his presidential career, **so answer choice (C) is correct.**

### **Reading Passage 18**

1. The passage starts by telling us that, unlike other people who remember their birthdays or family vacations, the narrator remembers the first days of school. This is a characteristic of the narrator. The following paragraphs all give examples of what happened to the narrator on her first days of school on different levels of learning, such as kindergarten, 6th grade, and high school. We can therefore conclude that the organization of the passage is a characteristic of the narrator is stated and then explained through anecdotes (personal stories), **so answer choice (B) is correct.**
2. The third paragraph says the kindergarten attended by the narrator was connected to the middle school. The two did not share hallways, but there were doors. On the narrator’s first day in kindergarten, a janitor had left one of these doors open, and the narrator, being an inquisitive five-year-old kid, decided to walk through that door. We can assume the narrator was a curious kid who was interested in knowing what lay on the other side of the open door, **so the correct answer is choice (C).**
3. Lines 27 to 33 say the first day of 6th grade was uneventful, mostly because she was not there. She fell sick on the day before the first day of school. In comparison, her do-over in 7th grade was much more fun. Her first day in 7th grade was her real first day in middle school because she missed the first day of school in 6th grade, **so answer choice (A) is correct.**
4. The last two lines of the passage state, “Today was, in fact, just like any other day. It would be the first day of school that I would remember forever.” From this, we can infer that the narrator’s first day of senior year was just like any other first day of school because she had remembered all of her previous first days of school. **Therefore, answer choice (D) is correct.**
5. In the second paragraph, the narrator says her first day of kindergarten is a little hazy. This is because she doesn’t remember some of the details about getting on the bus for the first time or what she had for lunch. We can therefore conclude the word hazy is used to mean her memory of that day is a little unclear because she does not remember some details. **Therefore, answer choice (A) is correct.**
6. Answer choice (A) is true because in lines 10 through 12, the narrator says she remembers being lost in kindergarten and the police being called. Answer choice (C) is true because in lines 43 through 45, the narrator says she already had her license before the school year even started. Answer choice (D) is true because in lines 38 through 41 the narrator says sitting through an entire day soaking wet really

changed her mind about whether or not it was “cool” to use an umbrella. Answer choice (B) is not true. The 4th paragraph says the narrator had appendicitis in 6th grade, not in high school, **so answer choice (B) is correct.**

### **Reading Passage 19**

1. Answer choice (B) can be inferred from the passage because in lines 11 through 12, Toshi’s mom says “Our family has been growin’ corn on this land for centuries”. A century is 100 years, but she says centuries, so that means for hundreds of years. Answer choice (C) is supported in lines 4 through 5 when the passage says that due to her family’s superstition, Toshi hadn’t seen her corn in a whole week. Choice (D) can be inferred from the passage. Lines 6 through 9 say that show corn is harvested as close to the presentation date as possible so that it can stay as fresh and healthy as possible during the presentation process. **Answer choice (A) is correct** because it claims that Toshi wanted to harvest the corn early because she was so nervous, but this claim is not supported anywhere in the first two paragraphs.
2. In the fifth paragraph, Toshi tells her family that the only reason she was in second place was that Lauren had dyed her corn yellow. She says it was not possible for Lauren’s corn to look that immaculate, meaning the ears of corn only looked so perfect because Lauren had dyed them; that was not their natural color. The word immaculate is used to mean perfect, **so answer choice (D) is correct.**
3. In the last paragraph, Toshi harvests the biggest ears of corn she can find on five different stalks and puts the corn into a grocery bag. She then looks at her family and smirks, “This doesn’t look like second-place corn.” The use of the word “smirked” shows that she is confident that her corn will not be in second place again. She is confident that this time she will win the competition, **so answer choice (D) is correct.**
4. The second-to-last paragraph says that as Toshi approached the corn, her deepest fears were relieved because nothing catastrophic had happened to it in the preceding week. The first paragraph says Toshi had not seen her corn in a whole week, and when the passage says her fears were relieved, it shows she had been fearing that something bad had happened to her corn in the week she had not seen it. The word “disastrous” is the only word in the answer choices that is negative, **so answer choice (A) is correct.**
5. Paragraphs 3 through 6 say there are generally three primary criteria that corn is judged upon. The first is maturity: the judges check the plumpness and color of the kernels. The second is the condition of the corn: the rows of kernels should be straight and uniform. The third is uniformity among several of the different ears of corn. **Answer choice (C) is correct** because it does not meet the conditions of the second criterion that says all the kernels need to be straight and uniform.
6. In the first paragraph, Toshi is anxiously tapping her foot and nervously fidgeting in the kitchen. In the 8th paragraph, she finally gets to see her corn and nothing catastrophic has happened to it, so her fears are relieved. In the last paragraph, she gets nine good corn ears and confidently tells her family

that the corn is good enough to win the competition. We can conclude that her demeanor shifts from anxious to confident, **so answer choice (B) is correct.**

## **Reading Passage 20**

1. The passage provides information about coffee, starting with where it is grown and how long it takes for a coffee tree to mature and produce usable seeds. It goes on to detail how coffee fruits are harvested and dried to get the actual beans. The beans are then sorted and shipped to various destinations, where they are further sorted into smaller quantities and sold to roasters. After roasting, the coffee is ready for grinding and drinking. We can conclude that the main function of the passage is to detail the journey of a coffee bean from tree to cup, **so answer choice (D) is correct.** Answer choice (A) is incorrect because regions are only mentioned in one paragraph and not the whole passage. Answer choice (B) is incorrect because the complexity of growing coffee is not mentioned anywhere in the passage. Answer choice (C) is incorrect because the passage does not discuss various reasons why someone may want to buy coffee.
2. Lines 31 to 37 say that after the initial sorting according to characteristics such as size, weight and color, coffee beans are then packaged in large quantities such as 50 or 100 pounds. The second-to-last paragraph says that once the beans arrive in their destination country, they are further sorted into smaller quantities (20 or 40 pounds). The last paragraph says the coffee beans make their way into coffee shops and individuals' homes in much, much smaller quantities: about a pound. It's therefore implied that the amounts of coffee get smaller and smaller in each distribution step, **so answer choice (A) is correct.**
3. The passage starts by informing the reader about the ideal places coffee is grown, then details the journey of a coffee bean from the time the tree is planted, to the time coffee is dried, sorted and shipped, roasted, and finally ground and brewed. We can therefore conclude that the passage is organized around the journey of a coffee bean, **so answer choice (B) is correct.**
4. The third paragraph says coffee is harvested by hand for two reasons, one of which is that the technology to harvest coffee cherries with machines has been grossly underdeveloped. We can conclude that if the technology was advanced, there would be no need to harvest coffee by hand. We can therefore assume that grossly underdeveloped means the technology is extremely underdeveloped, **so answer choice (B) is correct.**
5. Lines 23 through 24 say coffee is harvested by hand. The reason for this is that one, the technology to harvest coffee cherries is grossly underdeveloped, and two, the money to purchase this equipment can be hard to come by in traditional coffee-growing regions of the world. From this, we can conclude that one reason coffee beans are not harvested by machines is that the machinery is too expensive, **so answer choice (C) is correct.**
6. After detailing all the other steps involved in the journey of a coffee bean from tree to cup, the passage now focuses on the final step in the last paragraph. It says that at this point, coffee beans are ready to be ground and brewed. The passage then lists the many different ways to brew coffee such as

drip, pour-over, mocha pot, and espresso. We can conclude that the purpose of the last paragraph is to present the various ways to brew coffee, which is the final step in creating coffee, **so answer choice (B) is correct.**

### **Reading Passage 21**

1. The second paragraph says that for much of her career through the 90s, Harris served in various district attorneys' offices. Lines 21 through 24 say she decided to run for the head of the office she had previously worked for, so we can assume she was probably already well-known in the office as she had spent most of her career there, which helped her win handily. From these sentences, we can assume "handily" is positive, so answer choices (C) and (D) are incorrect. From here, we need to know that handily means without difficulty, or easily, **so answer choice (B) is correct.**
2. Lines 27 to 29 say that Harris ran two successful campaigns and served as the attorney general for California for two terms, from 2010 to 2017. **The correct answer is choice (A).**
3. The first paragraph says the United States of America congress was formed in 1789. The first woman elected to Congress was Jeannette Rankin of Montana who was elected in 1917. It took another 100 years for a woman to finally occupy one of the upper two spots in the American Government: the Vice Presidency. We can conclude that this paragraph explains why a female vice president is a great achievement because it took more than two centuries after the congress was formed for a woman to get to that position **so answer choice (C) is correct.**
4. The passage details Harris's rise from her days working in various district attorney's offices, to the position of the district attorney of the City of San Francisco, and then to the attorney general for the State of California. She then served in the US senate and finally earned the position of Vice President. We can conclude that the author believes she has consistently worked her way up the political ladder to the office of Vice Presidency, **so answer choice (C) is correct.**
5. Lines 30 through 34 say that in 2015, then long-standing Senator Barbara Boxer of California announced she would not run for reelection in 2016. Harris announced her candidacy for the US Senate and was immediately viewed as a front runner. She went on to win with over 61% of the vote. This answers the question of whose seat Harris ran for in the 2016 Senate race, **so answer choice (C) is correct.**
6. Lines 38 through 40 say that murmurs of a possible 2020 Presidential run by Harris began in June of 2018 when she was quoted as "not ruling out" a possible run. This means there was a possibility that she would run, but she was not yet certain. This possibility later became a certainty when she officially announced her candidacy on January 21st, 2019. The word "murmurs" is used to mean there were rumors, which resulted from her saying she was not ruling out a possible run. Therefore, "murmurs" means "rumors", **so answer choice (A) is correct.**

## Reading Passage 22

1. The author's main purpose for writing this passage is to describe a trip to Disneyland and all the things that go along with that. The author discusses how she and her husband hit some traffic on their way to Disneyland, which made them late for their breakfast reservation. She then describes the various places they went and how they eventually made it to one of her favorite rides: Buzz Lightyear Astro Blasters. Unfortunately, the line for the ride was too long, so the author and her husband ended up walking around Disneyland experiencing the “uplifting atmosphere of child-like joy.” Therefore, the author describes her day at Disneyland, including the positives and negatives of the day, so the author’s main purpose is to describe her trip to Disneyland and all the ups and downs that go along with that. **Therefore, answer choice (B) is correct.** Answer choice (A) is incorrect because while the author does highlight some things that could be considered difficult about going to Disneyland, she does not complain. Answer choice (C) is incorrect because while it seems like the author enjoys going to Disneyland, she doesn’t try to persuade people to visit. Answer choice (D) is incorrect because the author does not discuss how to plan ahead or why it’s important to plan ahead when taking a trip to Disneyland.
2. Lines 15-17 state “The morning air was still cool so I pulled on my cardigan and then reached in my purse for the requisite Disney accessory, my Minnie Mouse ears.” The word “requisite” is describing the type of accessory that the author considers Minnie Mouse ears to be. She does not feel they are ridiculous or else she probably wouldn’t choose to wear them, so answer choice (A) is incorrect. She might feel they are expected, but the passage does not give us any indication that that is the case, so answer choice (C) is incorrect. Understated means subtle, and wearing Minni Mouse ears is not subtle, so choice (D) is incorrect. Requisite means necessary and Minnie mouse ears could be considered a necessary accessory while you are at Disneyland. **Therefore, answer choice (B) is correct.**
3. Throughout the passage the author describes her day at Disneyland, from getting breakfast at the Rainforest Cafe to walking around in the park. Although the day doesn’t go perfectly, the author does not imply that she is upset at any time and pretty much goes with the flow. An example of this is when the line for the ride she wants to go on is too long: she doesn’t get upset, and instead chooses to just walk around the main street and look at some shops. Overall the author’s mood throughout the passage can best be described as relaxed and content, **so answer choice (C) is correct.**
4. Lines 72-77 state “We walked around a little more, looking in an occasional shop, but the temperature was steadily creeping upward as a stream of sweat under my Minnie Mouse headband began to creep down. We decided to call it a day and began heading back down Main Street.” Based on those two sentences we can assume that the author ended her trip due to hot weather, **so answer choice (D) is correct.**
5. Lines 68-72 state “We decided to forgo standing in line, but fortunately, you don’t have to wait in line to stroll through the park and experience the beautiful, uplifting atmosphere of child-like joy.” The word “ulifting” is clearly indicating something positive in this sentence. If we break the word down we see it is made up of the words up and lifting so we can assume that it has something to do with

increasing or lifting something up such as lifting your mood. Based on those two factors, the best way to describe the author’s meaning with the word uplifting is adding to one’s overall positivity.

**Therefore, answer choice (A) is correct.**

6. At the beginning of the passage, the author and her husband are driving to Disneyland. Throughout the passage, the author describes what she and her husband did at Disneyland, including eating breakfast at the Rainforest Cafe, walking to one of her favorite rides and realizing the line was too long, and eventually deciding to walk around the park and enjoy the uplifting atmosphere. The passage ends with the author explaining why they ended up leaving the park: it was getting too hot outside. Therefore, the author describes her trip to Disneyland from beginning to end, **so answer choice (B) is correct.**

### **Reading Passage 23**

1. The passage starts by telling the story of how Isaac Newton was sitting under an apple tree when an apple fell and hit him on the head. This was an “ah-ha” moment for him, and from this, he created Newton’s laws of physics that act as a starting point for many physics problems. The passage then lists these laws in different paragraphs and explains each law with an example. Therefore the main purpose of the passage is to explain Newton’s laws with examples, **so answer choice (A) is correct.** Answer choice (B) is incorrect because the passage does not tell us much about Isaac Newton as a person, such as his childhood, his other accomplishments, etc, so the passage is not a biography of Isaac Newton. Answer choice (C) is incorrect because the passage mainly talks about Newton’s Laws and doesn’t discuss *all* of his contributions to physics. Answer choice (D) is incorrect because only one paragraph discusses how the laws were discovered, so this is not the main purpose of the passage.
2. Newton’s first law in simple terms says that objects will not randomly start moving or stop moving unless there is a force acting on them. Lines 27 to 29 say that this was the idea that led to the discovery of gravity. We can therefore say Newton’s laws played a role in the discovery of gravity, **so answer choice (D) is correct.**
3. Lines 17 through 20 say Newton’s laws start to be less accurate when the scale becomes extremely small - like when working with atoms and molecules. So the laws are less relevant when applied to atoms and molecules. **Therefore, answer choice (C) is correct.**
4. In the first paragraph, the passage is telling a story and starts by saying “As the story goes”. In line 5, the author then says “allegedly” to show this is a story as told by someone else, but there is no proof. We can therefore conclude the word allegedly most likely means supposedly, **so answer choice (A) is correct.**
5. When explaining what the second law is about, the passage says in lines 38 to 44 that if a person were to push someone on a swing with as much force as they could muster, that person would certainly swing forward. If that person were to apply the same force to a much heavier object, such as a car, then the heavier object would not respond in the same way. This means when the same force used on



a light object is applied to a heavier object, it will have a different effect on the heavier object.

Answer choice (A) illustrates this law because a child is able to use force to move a lighter bowling ball, but when the child attempts to move a heavier bowling ball, the force he/she applied is unable to move the ball. **Therefore, answer choice (A) is correct.**

6. The first paragraph asks the rhetorical question, “Do you believe that an apple falling was the basis for all of modern physics?”. It then relates the story of how Isaac Newton got the ah-ha moment that became the basis of modern physics. The rhetorical question is used to make the reader feel the author is addressing them personally, which makes the tone conversational. **Therefore, answer choice (B) is correct.**

### **Reading Passage 24**

1. The passage informs us that the building blocks of all living organisms are the DNA inside cells, and then says that biologists have collected and analyzed the DNA of many species across the planet and put this information in several online databases. In lines 25 through 29, the passage states, “There are several databases online where biologists can work together by adding the DNA from different individuals of each species. We call this process “DNA barcoding.” The remainder of the passage discusses DNA barcoding, which is a useful tool used by biologists, **so answer choice (B) is correct.** Answer choice (A) is incorrect because the significance of barcodes is only mentioned in two paragraphs, so it’s not the main focus of the passage. Answer choice (C) is incorrect because the passage does not make any comparison between eDNA and DNA. Answer choice (D) is incorrect because an example of how eDNA is collected is only discussed in the last paragraph. so this is not the main focus of the passage.
2. Lines 41 to 43 say biologists can gather what is called “environmental DNA” or “eDNA”. Lines 46 to 48 say that eDNA is basically the cells of plants or animals that are left behind even when that individual is no longer there. Therefore, we can conclude eDNA is a type of DNA collected from environmental samples, **so answer choice (C) is correct.**
3. The first paragraph asks what the building blocks of all living organisms are and goes on to say human skin, a dog’s fur, and the scale of a fish are all made up of tiny cells. Lines 6 through 9 say that each cell contains microscopic instructions for creating even more cells. These instructions are coded within myriad strands of DNA. Myriad means having a large number of something, so this is closest in meaning to many. **Therefore, answer choice (D) is correct.**
4. In the third paragraph, the passage says that clerks scan your items and the machine reads the pattern on the barcode to identify the food items. DNA barcoding works in a similar way – when a biologist enters the DNA of a butterfly they can’t identify, the online barcodes can identify the butterfly for them. Therefore, the barcode analogy is used to help the reader understand the usefulness or utility of eDNA, **so answer choice (B) is correct.**
5. The third paragraph says biologists work together by adding DNA data from different individuals of each species. With enough samples from one species, biologists begin to zero in on a specific code

that identifies that species. The phrase “zero in” (line 30) is used to mean that the scientists start to recognize a specific code they can use to identify that particular species. The phrase most nearly means identify, **so answer choice (D) is correct.**

6. The last paragraph provides an example of how eDNA is used: a cup of water is scooped from a lake, and inside that cup are trace amounts of eDNA from things such as fish scales, crayfish feces, dead insects, etc. This is useful for biologists if they want to see if an endangered species of fish is in a specific lake, they can take multiple samples of the water and look for eDNA from that species. In the same way, if biologists want to know if a specific species of fish native to California also lives in a lake in Michigan, they can take multiple samples of water from the lake in Michigan and look for eDNA from that species, so eDNA would be useful in this scenario. **Therefore, answer choice (A) is correct.**

### **Reading Passage 25**

1. The passage states that the magic of baking comes down to simple chemistry and explains that the chemistry involved in baking is when leavening agents release carbon dioxide gas which causes the rise in the bake. The passage lists three major leavening agents: baking powder, baking soda, and yeast. The passage states that the way these three leavening agents work is slightly different, and the rest of the passage explains these differences. Therefore, the primary purpose of the passage is to describe the differences between the three leavening agents, **so answer choice (C) is correct.** Answer choice (A) is incorrect because the passage does not teach the reader how to bake. Answer choice (B) is incorrect because the passage does not mention anything about the history of leavening agents. Answer choice (D) is incorrect because how yeast is used to make bread rise is one of the many details mentioned in the passage and is not the main focus of the passage. Also, yeast is not the only leavening agent mentioned.
2. Lines 7 to 11 say that no matter what you are baking, you need something that will cause the dough or batter to create pockets of air as it is heated. These ingredients are called leavening agents, and there are three primary choices to use when baking. Paragraphs 3 and 4 give more information about baking soda and baking powder respectively. The next agent is yeast, and line 42 says, “The third rising agent, yeast,...” we can therefore assume that leavening agents and rising agents are synonymous, **so answer choice (C) is correct.**
3. Lines 12 through 15 state that each leavening agent “ultimately creates the carbon dioxide (CO<sub>2</sub>) gas which causes the rise in the bake.” The third paragraph explains that for baking soda to release this gas, it needs to be mixed with a weak acid such as buttermilk, vinegar or lemon juice. Line 31 mentions that weak acids have a low pH. Therefore, baking soda is mixed with liquids such as lemon juice or vinegar because they have a low pH and react with the baking soda to create CO<sub>2</sub> which causes the dough rise. **Therefore, answer choice (B) is correct.**
4. The second paragraph starts by saying that no matter what you are baking, you need something that will cause the dough or batter to create pockets of air as it is heated. It then says these ingredients are called leavening agents and the main ones are baking soda, baking powder, and yeast. The paragraph

then states that they all work by releasing carbon dioxide gas which causes the rise in the bake, but they all work slightly differently. The rest of the passage discusses these differences, so we can conclude the second paragraph introduces the ingredients discussed later in the passage. **Therefore, answer choice (A) is correct.**

5. Lines 20 through 22 say that baking soda is also known as sodium bicarbonate and is basic (has a high pH). Lines 29 through 31 say that baking powder is a combination of baking soda and some variation of a powdered weak acid (low pH). Based on this information, we can assume that items with a high pH are basic and those with a low pH are acidic: the lower the pH the more acidic and the higher the pH the more basic. Therefore, since black coffee has the highest pH out of all of the answer choices, it is the most basic and therefore the least acidic liquid. **Therefore, answer choice (D) is correct.**
6. Lines 49 through 51 say that bread recipes often include two different rising stages that allow the yeast to eat sugars and multiply. Unlike yeast, baking powder and baking soda do not need to go through two stages to create rise in a bake, so we can assume that compared to these two, yeast takes longer to leaven dough. **Therefore, answer choice (B) is correct.**

### **Reading Passage 26**

1. The last two lines of the first paragraph state, “However, public libraries offer an array of relevant resources. They deserve continued public funding and the care and use of their communities.” The remainder of the passage discusses the benefits of libraries: they allow anyone to access information for free, they are important centers of community engagement, and they offer people access to media and equipment. Therefore, the primary purpose of the passage is to educate readers on the various benefits of libraries, **so answer choice (A) is correct.** Answer choice (B) is incorrect because while the passage does encourage people to visit libraries, it is not specifically encouraging people to borrow more books from the library. Answer choice (C) is incorrect because the passage does not discuss any negative aspects of libraries. Answer choice (D) is incorrect because while the passage mentions that some people believe libraries are obsolete or outdated, the passage does not discuss why people believe this.
2. In the first paragraph, the author discusses how people tend to view progress as linear and how we think we are always improving and developing better technologies. The author feels that because of this, we often undervalue things that we feel are obsolete or out of date. Lines 9-10 state, “One institution that is often regarded as obsolete, or at best quaint, is the public library.” The author then goes on to show why he/she feels that not only are libraries not obsolete, but they are essential resources for the community. Based on that, we can assume that the author would most likely agree that people often underestimate the importance of libraries. **Therefore, answer choice (C) is correct.**
3. The passage starts out by telling the reader that many people feel libraries are obsolete in today's society. The author then goes on to explain why this is not true and defends the value that he/she feels libraries still have. The author supports this stance with examples of the features and benefits that many libraries have today and why he/she feels they are so important. The best way to describe the

organization of this passage would be that an institution (the library) is defended and then explored in more detail. **Therefore, answer choice (C) is correct.**

4. Lines 55-56 state “Far from being obsolete, libraries are vital community and informational centers.” From that sentence, we can infer that obsolete means the opposite or something close to the opposite of vital. Vital means necessary or essential, so the opposite would be unnecessary or no longer needed. Outdated is the closest in meaning to unnecessary, **so answer choice (B) is correct.**
5. Lines 34-35 state, “Libraries also provide access to forms of media and equipment not everyone has.” Therefore, answer choice (A) is incorrect. Lines 44 through 46 state, “Libraries are also important centers of community engagement. They host book clubs, meetings, and community events.” Therefore, answer choice (B) is incorrect. Lines 31 through 33 state, “This provides valuable aid in researching issues and policies, completing schoolwork, and even just learning about the world.” Therefore, answer choice (C) is incorrect. While the passage mentioned that libraries offer citizens classes, in line 49, the passage does NOT state that libraries can grant people citizenship, **so answer choice (D) is correct.**
6. The last line of the passage states “You’ll find more than you imagined.” The sentence is referring to what the reader will find if he/she explores his/her local library. The author believes that if you explore your local library, you will discover more resources and benefits than you probably would have thought. The last line serves as a reminder to the reader to not underestimate the richness of local libraries, **so answer choice (B) is correct.**

### **Reading Passage 27**

1. According to lines 45 to 48, figuring out the prime factors of very large numbers may take a computer hundreds of years to figure out. A large number serves as the public key and its prime factors serve as the private key, and this creates a code that is difficult to break on a practical timeline. We can assume since the large numbers take computers hundreds of years, practical most nearly means reasonably short, **therefore answer choice (C) is correct.**
2. The passage discusses modern cryptography and how it uses long numbers to make it difficult to break the code. The last paragraph gives an example of how modern cryptography is used in a real-world situation, which is in almost every secure transaction on the internet. We can therefore conclude the purpose of the last paragraph is to provide a real-world example of a concept discussed earlier in the passage, **so answer choice (D) is correct.**
3. The third paragraph says that symmetric key encryption requires that both parties know the key required for decryption, meaning that only requires one key for decryption. The fourth paragraph states that symmetric key encryption uses two keys: one to encrypt the text and one to decrypt it as stated in lines 31 and 32. Asymmetric encryption therefore differs from symmetric encryption because it uses more keys, **so answer choice (C) is correct.**

4. The third paragraph introduces the two types of modern cryptography, symmetric encryption and asymmetric encryption. Paragraphs 3, 4, and 5 explain how they work. The last paragraph shows how they are applied in secure transactions on the internet, and explains that public key encryption is part of almost every secure transaction on the internet. The passage concludes by stating, “the vast majority of modern security relies on the difficulty of a mathematical problem!” From this, we can conclude that cryptography is important for modern-day security, **so answer choice (B) is correct.**
5. Lines 19 to 21 say that like all early forms of encryption, the Caesar cipher was not very secure. Then lines 24 to 27 say symmetric encryption requires that both parties know the key required for decryption, but uses more advanced techniques for encryption than the Romans. This means that modern-day encryption forms are more secure than the early forms, **so answer choice (A) is correct.**
6. According to the second paragraph, “the Romans used a scheme called the “Caesar cipher” for military communications.” Each letter in the original message was shifted down the alphabet by a fixed number. Looking at the choices, only the last answer follows this rule by shifting A, B and C three spots higher to make D, E, and F, **so answer choice (D) is correct.**

### **Reading Passage 28**

1. The passage informs us about how polo is played and gives us a brief history of its origin in the Parthian empire and its spread to different parts of the world. It then details the different derivative games that have emerged from the original, including the slower version adopted in Europe, canoe polo, auto polo, and bike polo. From this, we can conclude that the main purpose of the passage is to detail the different varieties of polo, **so answer choice (B) is correct.** Answer choice (A) is incorrect because the history of horse polo is only mentioned briefly and is not the main focus of the passage. Answer choice (C) is incorrect because the passage does not give any rationale or reason for the spread of polo. Answer choice (D) is incorrect because the rules of bike polo are only mentioned in the last two paragraphs, so this is not the main focus of the passage.
2. Lines 17 to 19 say, “It was here that British colonists first encountered the game, catalyzing polo’s eventual spread into Europe.” The place the colonists encountered polo is the Indian State of Manipur. We can assume the British later introduced the game back home in Britain, and from there it spread to other parts of Europe. Therefore, the word “catalyzing” most nearly means starting, **so answer choice (A) is correct.**
3. Lines 32 through 34 say that bike polo was invented in Ireland in the late 19th century and quickly spread to the rest of Europe and the United States. We can conclude that it emerged from Europe because Ireland is in Europe and then spread to the US, **so answer choice (C) is correct.**
4. According to lines 27 through 28, polo had a stint at the Olympics in the early 20th century. The word “stint” means a period of time, so this means that polo was one of the games played in the Olympics in the early 20th century, but only for a period of time. We can therefore assume the game is no longer played in the Olympics, **so answer choice (C) is correct.**

5. The last paragraph details how hardcourt bike polo is played and then talks about how this form of bike polo is rapidly gaining popularity across the world, with active clubs in over 30 countries and 300 cities. We can conclude the purpose of the last paragraph is to detail how bike polo is gaining in popularity, **so answer choice (D) is correct.**
6. The passage gives us a brief history about where polo originated and how it spread to other parts of the world. It then informs us about the different forms of the game and details how some of the games are played such as the bike polo played on grassy courts and that played on hard-surface courts. It ends by talking about how the latter is gaining popularity across the world. The passage provides facts throughout and also gives detailed information about the topic. The tone is informative and thorough, **so answer choice (C) is correct.**

### **Reading Passage 29**

1. The passage begins by telling the story of how on the day before Valentine’s Day, residents in Bristol, United Kingdom woke up to find a mural on the side of a building. The artist who created this mural was Banksy: an anonymous street artist. The rest of the passage provides information about Banksy, including when he started creating street art, the tools he uses to create his art, and the issues his art centers around. Therefore, the primary focus of the passage is the artwork of the street artist known as Banksy, **so answer choice (B) is correct.** Answer choice (A) is incorrect because the passage does not just propose one theory on who Banksy might be but rather gives a couple different theories on his identity. Answer choice (C) is incorrect because while the passage does discuss Banksy’s famous series, *Girl with Balloon*, it is only mentioned in one paragraph, so it is not the main focus of the passage. Answer choice (D) is incorrect because while the passage does discuss street art in the UK, it does not do this in a general way: it only discusses Banksy’s street art and does not talk about other artists or the history of street art in the UK.
2. Answer choice (A) is incorrect because erased means removed or deleted and it doesn’t make sense to say mural *removed* a you girl firing a slingshot. Answer choice (B) is incorrect because mocked means teased or made fun of and nothing in the context of the surrounding sentences implies that the mural was making fun of anything. **Answer choice (C) is correct** because showed means displayed or pictured, and the word “depicted” refers to what the mural showed. Answer choice (D) is incorrect because fabricated means created or made and a mural could not actually *create* a young girl.
3. Lines 19-21 state “Banksy’s messages often center around topics such as anti-war, anti-violence, and anti-capitalism.” In reference to one of Banksy’s most famous series *Girl With a Balloon*, lines 38-41 state, “These works have continued to appear in response to various world events like the Syrian refugee crisis and various UK elections.” Based on these two lines, we can assume that the purpose of Banksy’s art is to raise awareness about important issues like the Syrian refugee crisis or anti-capitalism, **so answer choice (C) is correct.**
4. The third paragraph in the passage talks about how Banksy started using stencils to make his street art. Referring to this, lines 28-32 state, “He credits this change to the fact that stenciling is much faster than free-hand drawing, which is vital when illegally drawing art throughout the city.” From

this, we can infer that the stencils helped Banksy create his art more quickly and efficiently, which made it less likely that he would get caught for creating illegal street art. **Therefore, answer choice (A) is correct.**

5. The author’s tone towards Banksy is positive: in line 10 he refers to Banksy’s arts as “fabulous,” and in the last line of the passage, the author says that it is “likely that Banksy will continue to stun the UK and the world with his thought-provoking art.” The only answer choice that is positive is choice (A), **so answer choice (A) is correct.**
6. The last paragraph never says that the two identities it discusses as possibly being Banksy are his only possible identities, so answer choice (A) is incorrect. The last paragraph starts out by saying it is unknown if Banksy’s real identity will ever be revealed, so answer choice (B) is incorrect. The last paragraph doesn’t actually say whether or not the author knows Banksy’s identity, only that the author doesn’t know if it will ever be revealed, so answer choice (C) is incorrect. The last paragraph provides different opinions on who Banksy is: some people believe his name is Robin Gunningham, and others believe his is Robert Del Naja. Therefore, the main function of the last paragraph is to show that many people have different opinions about Banksy’s identity, **so answer choice (D) is correct. correct answer.**

### **Reading Passage 30**

1. The fourth paragraph says that the 3D model of DNA was a huge leap in biological research at the time, so its construction won the most prestigious award in science, the Nobel Prize in Physiology or Medicine in 1962. We can assume the award was won because the model helped advance biological research in a big way, and therefore won the highest award possible for such an achievement. Therefore, the word prestigious as used in line 34 most nearly means distinguished, **so answer choice (C) is correct.**
2. Lines 4 through 6 say that the instructions for all of the tasks the body performs are written in a biological code that is carried around by each and every cell. Lines 13 to 15 say that DNA is the molecule that is used to write your biological code - the instructions for nearly everything that your body does. We can conclude that DNA is important because it’s the code that tells the body’s cells what to do, **so answer choice (B) is correct.**
3. In the second-to-last paragraph, the author says it’s not against the rules for Nobel prizes to be awarded to people who are no longer alive and then poses a question: “So why was Dr. Franklin not recognized for her historic contribution to science?” The rest of the passage is an attempt to answer this question and gives reasons such as because she was a female scientist and because the prize had already been awarded. Therefore, the function of the last two paragraphs is to explore possible reasons why Franklin wasn’t recognized for her achievements, **so answer choice (A) is correct.**
4. The fourth paragraph says that even though Rosalind Franklin’s 2D photograph was the missing puzzle piece to discovering the 3D model of DNA, she was not awarded the Nobel Prize. Lines 23 and 24 say that unfortunately, Rosalind’s fame was not recognized until after she died. The use of the word “unfortunately” shows that the author thinks Rosalind deserved more recognition for her work, **so answer choice (C) is correct.**

5. The author introduces Rosalind using her full title - a scientist and professor named Dr. Rosalind Franklin in lines 9 through 10. The author introduces her work, then says she was not recognized for it although it was a big achievement. The author then wonders why she was not recognized after death, even though it's not against the rules to recognize people after their death. The author then concludes by saying at least her pioneering work is now taught in schools across the United States so that we may always remember the woman who discovered the instructions for life. We can conclude that the author admires her work and wants her to be given the recognition she deserves. Therefore, the tone is that of admiration, **so answer choice (D) is correct.**
6. The third paragraph says that Rosalind identified the twisted double-helix shape of DNA and took a photograph of it in 2D. Other scientists took this photo and developed it into a 3D model which won a Nobel Prize. We can assume that the scientists might not have made the model without her 2D photo. The last paragraph says that her pioneering work is now taught in schools. Since she was the first person to identify the structure of DNA we can conclude the word pioneering means groundbreaking or innovative, **so answer choice (A) is correct.**

### **Reading Passage 31**

1. In the first paragraph, Sofia tries to get out of the camping trip by saying the forecast predicted there was a 50% chance of rain that weekend. Emma dismisses her and says they can't reschedule because they'll have a tent to keep the rain out. In the second paragraph, as they approach the car, Sofia tries again by saying the clouds indicated there would be rain. When they get to the camping site, the sky still looks ominous, so they set up their tent as quickly as they can. They manage to cook, eat and start roasting marshmallows, but that plan is ruined because finally, it does rain – just like Sofia had predicted. The two even get rained on a bit before they can get into their tent, and it's clear Sofia was frustrated with Emma for dismissing her warnings. We can conclude the main theme of the passage is about predicting the rain, **so answer choice (C) is correct.** The passage says Sofia or Emma go camping once or twice a year together, so answer choice (A) is incorrect. Answer choice (B) is incorrect because the only obstacle mentioned is being rained on, so there were not multiple obstacles to overcome. Answer choice (D) is incorrect because while the passage does mention that Sofia cooks outdoors, this is only part of the passage and not the main focus.
2. Lines 14 through 16 say that as Sofia and Emma make their way to the campsite, the traffic is like molasses. Lines 16 through 18 say, "We passed the time by listening to the radio and talking about the food that we were going to make in camp." We can assume that if Sofia and Emma need to pass time, it's because traffic is moving slowly, so they listen to the radio and talk to keep themselves busy and entertained. **Therefore, answer choice (D) is correct.**
3. In lines 6 through 8, Emma says, "I'm only usually able to drag her out on a camping trip once or twice a year, so I wasn't about to give up this opportunity." This means Emma has succeeded in convincing Sofia to go camping, but Sofia is now getting second thoughts and attempting to get out of the trip. It also implies that Emma goes camping often and would like Sofia to go with her more often, but Sofia is against the idea and only agrees to these trips once or twice a year. We can therefore infer that Sofia camps less often than Emma, **so answer choice (B) is correct.**



4. The third paragraph says as Sofia and Emma are stuck in traffic and talking about the food they are going to make in camp, Sofia finally says something positive about this camping trip. She says, “I am very excited to roast marshmallows. You can’t really do that in Manhattan.” Therefore, Sofia is looking forward to roasting marshmallows on this trip, **so answer choice (D) is correct.**
5. Sofia points out to Emma that the forecast says there is a 50% chance of rain during their trip, but Emma brushes it off. She mentions it again as they walk to the car, but Emma does not listen to the warning. When it finally rains, Emma says in lines 54 through 56, “I looked at Sofia and I didn’t have to ask her what she was thinking: *I told you so.*” The phrase “I didn’t have to ask” means Emma already knows Sofia is frustrated because she had predicted the rain and tried to warn Emma, but Emma didn’t listen. **Therefore, answer choice (C) is correct.**
6. In the second paragraph, Sofia desperately says, “Emma, look at those clouds!”. Based on their earlier conversation about the forecast saying there would be rain, we can assume this statement means it looks like it could rain at any moment. The third paragraph says as the two pull into the campsite, the sky still looks ominous. We can conclude the word “ominous” means that the sky looks threatening or forbidding, as if it could rain at any moment. **Therefore, answer choice (A) is correct.**

### **Reading Passage 32**

1. The passage states that one of the most haunting theories of universal generation or destruction is that of the black hole. It then says that black holes are the edge of the detectable universe and that if anything that has mass comes near the edge of a black hole, it is sucked in and trapped for eternity. A photograph showing a black hole surrounded by a bright orange and yellow halo exists to prove these claims. The passage gives details about how these holes are formed and states that they can continue to grow in size until they eventually grow big enough to absorb all the mass in the universe. We can conclude that the main purpose of this passage is to detail the main aspects of black holes, **so answer choice (D) is correct.** Answer choice (A) is incorrect because while the passage mentions in the first paragraph that there are various theories about how the universe could be destroyed, only one way is discussed throughout the passage: black holes. Answer choice (B) is incorrect because the passage does not discuss the history of black holes; it only discusses how black holes are formed. Answer choice (C) is incorrect because the passage does not mention methods used to study space.
2. Lines 24 through 27 say that the Event Horizon Telescope took the first photograph of a supermassive black hole in a region of space called “Messier 87.” Messier 87 is therefore a specific place in space, **so answer choice (D) is correct.**
3. Lines 12 through 16 state, “...scientists believe they cannot measure anything past a black hole because it is a region of space where gravity is strong enough that not a single particle, not even wavelengths of light, can ever escape.” Therefore, black holes are probably hard to study because they trap everything that comes near them, including light, **so answer choice (D) is correct.**
4. According to lines 47 through 48, the more mass a black hole absorbs, the larger it will become. Lines 49 through 52 state, “If we assume this growth is limitless, then, in theory, the black hole could

eventually become big enough to eventually absorb all the mass in the universe.” The word “limitless” is used to mean that the growth can continue without end, meaning the hole can continue to grow until it’s large enough to absorb the entire universe. Therefore, the word limitless most nearly means infinite, **so answer choice (A) is correct.**

5. The last paragraph states, “As the black hole absorbs things that cross its event horizon, it concentrates gravity further and begins to expand.” It then explains that if we assume the growth of a black hole is limitless, the black hole could grow so large that it would absorb all of the mass in the universe and destroy it. Therefore, the purpose of this paragraph is to explain how black holes could destroy the universe, **so answer choice (B) is correct.**
6. Lines 31 through 33 state, “Black holes form when giant stars reach the end of their life cycle, or run out of fuel, and collapse.” This means black holes form when these stars die, **so answer choice (A) is correct.**

### **Reading passage 33**

1. The passage discusses the origins of snowboarding, informing us that the first person to come up with the idea of a snowboard did so by chance: he was trying to make it easier for his daughters to ski down a hill in their backyard. The passage then explains that this idea was later improved by adding bindings to the board to add the rider’s feet. It goes on to say that by 1983, snowboarding was a big game and the first World Championships were held. It went international and even made its Olympic debut at the Nagano Games in Japan. By the time the 2022 Winter Olympics took place in Beijing, China, the game had expanded to include 11 separate events. Therefore, the passage is informing us about how snowboarding started and changed over time, so the main purpose of the passage is to inform the reader about the origin and evolution of snowboarding. **Therefore, answer choice (C) is correct.** Answer choice (A) is incorrect because the fact that snowboards originated from snurfers is one of the many details in the passage, not the main focus. Answer choice (B) is incorrect because while it’s true that Sherman Poppen created snowboards, this is not the main focus of the passage: it’s just one of many details. Answer choice (D) is incorrect because while the passage mentions some of the snowboarding events in the Olympics, it does not explain what the events are.
2. Lines 46 through 48 state that snowboarding had expanded to include 11 separate events in the 2022 Winter Olympics in Beijing, China. Lines 51 through 52 say that these events have produced household names for the American team. We can assume the phrase “these events” refers to the 11 separate events that took place in the 2022 Winter Olympics. The paragraph lists two of these household names: Shaun White and Chloe Kim. We can therefore conclude that these two athletes competed in the 2022 Winter Olympics, **so the correct answer is choice (C).**
3. According to lines 21 through 24, Vermont native Jake Burton’s revelation was to add bindings to the board to secure the rider’s feet. This improved stability and allowed riders to conquer much larger slopes. The board, therefore (A) allowed riders to secure their feet to the board, (B) made it easier for riders to balance themselves because it improved stability, and (C) riders were able to snowboard on a larger variety of slopes. The first three choices are all reasons why Jake Burton’s snowboard was

successful, so they are all incorrect. The fourth choice says the board allowed riders to snowboard on difficult terrain, but this information is not given in the passage, **so answer choice (D) is correct.**

4. The second-to-last paragraph states that the Nagano Games Olympics in Japan featured two snowboarding events: the now-popular halfpipe event as well as the giant slalom. This event was analogous to the skiing event whereby racers must pass between a series of gates as they move downhill. Analogous means comparable or similar (think of an analogy), **so answer choice (B) is correct.**
5. Lines 8 through 12 say that Sherman Poppen was trying to make it easier for his two daughters to ski down a hill in their backyard, so he attached the skis together and had his daughters stand on the pair of skis, together, sideways. We can conclude that the initial idea that gave rise to snowboards was an idea to make it easier for Sherman’s children to ski, **so answer choice (D) is correct.**
6. In lines 32 through 36, the passage says, “Various competitions in the United States eventually gave way to international competitions in Austria, New Zealand, and Switzerland. These competitions cemented snowboarding as an international sport...” This means the game was now permanently an international sport and would never again be just a game played in the United States. Therefore, the word cemented most nearly means solidified, **so the correct answer is choice (B).**

#### **Reading passage 34**

1. The passage talks about one of the lesser-known icons of the American West legends, Ed Pulaski. It says that he joined the US Forest Service in 1910 after he had held other jobs such as blacksmithing and ranching, and then discusses his contribution to firefighting. The passage states that he cemented his place in history by fighting fires in Northern Idaho in the Summer of 1910 when he was in charge of 45 firefighters. The crew was forced by incoming flames to take refuge in an abandoned mine: Ed used his leadership skills and knowledge of the area to lead his crew members into the mine for safety. Due to his great leadership, 39 out of the 45 men survived the fire. He later used his experience as a blacksmith to design a tool, the Pulaski, which is used by firefighters to date. Therefore, the author’s purpose in writing this passage was to highlight Ed Pulaski’s contribution to firefighting, **so answer choice (B) is correct.** Answer choice (A) is incorrect because the author does not say that Ed Pulaski deserves more recognition. Answer choice (C) is incorrect because although the Great Fire of 1910 is mentioned in the passage, it is mentioned to highlight Ed Pulaski’s heroic act, so it is not the main focus of the passage. Answer choice (D) is incorrect because the Pulaski tool is only one of Pulaski’s contributions mentioned in the passage, but the passage focuses on all of Pulaski’s contributions.
2. The last paragraph summarizes Ed Pulaski’s contributions to firefighting. It says that the rescue of his fellow firefighters as well as the development of the Pulaski tool ensured that his legacy within the firefighting community is eternal. This paragraph honors his memory and his contributions, so we can say the tone is commemorative. **Therefore, answer choice (C) is correct.**
3. Lines 23 through 26 say, “Using his knowledge of the area and the leadership skills he had developed over the years, Ed led all but one of his crew members into the mine.: Therefore, Ed’s previous

knowledge of the area and his knowledge in leadership helped him control the situation, **so answer choice (C) is correct.**

4. In lines 32 through 34, the passage states that Ed rarely discussed the fire of 1910 and was determined to improve the safety of firefighters. This determination made him design the Pulaski, an ax and hoe that enabled firefighters to chop and dig using the same tool. We can conclude he was passionate about the welfare of firefighters, **so answer choice (C) is correct.**
5. Lines 32 through 34 say this about Ed Pulaski, “A humble hero, Ed rarely discussed the fire of 1910 and was determined to improve the safety of firefighters.” This means he was humble about his heroic acts, so he is modest. He was also determined to improve the safety of firefighters, and this determination made him design the Pulaski tool. We can conclude he is determined and modest, **so answer choice (A) is correct.**
6. In lines 8 through 11, the passage says, “Being forty years old and with little formal education, Ed was not the conventional hire for the Forest Service during that time period.” From this statement, we can assume the typical hire during that period was younger than Ed and had more formal education than Ed did. Therefore, the word conventional most nearly means typical, **so answer choice (D) is correct.**

### **Reading Passage 35**

1. The passage discusses how the amount of peanut butter consumed by Americans is so much that it can cover the floor of the Grand Canyon. It then outlines how Peanut butter has evolved over the years, starting with the version made by the Aztecs and Incas. It goes on to discuss different people that came up with variations of peanut butter over the years, but it was John Harvey Kellogg in the 1910s who made the spread mainstream. It finishes by discussing how Joseph Rosefield patented the process of partial hydrogenation for peanut butter production in 1921. Therefore, the main purpose of the passage is to detail part of peanut butter’s history, **so answer choice (B) is correct.** Answer choice (A) is incorrect because while the passage does explain that modern peanut butter goes through a process called hydrogenation, the passage does not provide any other information about how modern peanut butter is made. Answer choice (C) is incorrect because the origins of peanut butter being traced to the Aztecs and Incas is one of many details mentioned in the passage, so it is not the main focus. Answer choice (D) is incorrect because while the passage discusses that various people are responsible for the invention of peanut butter, it does not discuss different theories or ideas about how peanut butter originated.
2. The first paragraph says Americans consume a lot of peanut butter, about 700 million tons, which would be enough to cover the floor of the Grand Canyon. This information makes it clear just how much peanut butter is consumed by individuals in the United States, so the purpose of the first paragraph is to help the reader understand how much peanut butter the average person eats. **Therefore, answer choice (B) is correct.**

3. Lines 18 through 20 state, “The invention of modern peanut butter has been attributed to several people throughout the late 1800s and early 1900s.” The paragraph then lists the various people who have created different versions of peanut butter since the 1800s. Therefore, it is unclear who the exact inventor of modern peanut butter is and how it originated, **so answer choice (B) is correct.**
4. In paragraphs two and three, the passage mentions people who are thought to have come up with different varieties of peanut butter. These include the Aztecs and Incas, George Washington Carver, Rose Davis, Marcellus Gilmore, George A. Bayle, John Harvey Kellogg, and Joseph Rosefield. When the passage says there are a multitude of people to thank for modern peanut butter in line 53, these are some of the people it is referring to. Since there are many people to thank for modern peanut butter, we can assume “multitude of” most nearly means “large group of”, **so answer choice (D) is correct.**
5. The passage describes that the origins of peanut butter can be traced to the Aztecs and Incas. Since the 1800s, many more varieties have been made by many different people, including one made from roasted peanuts, one with cheese, and one apparently made from boiled peanuts. It wasn’t until 1920 that modern peanut butter was introduced to the American mainstream, and after that, peanut butter was further modified to be able to last a long time on a shelf. Finally, the last line of the passage states, “. . . it took hundreds of years and dozens of versions to become a perfect product.” From this, it’s clear that the journey from the first peanut butter to the modern version consumed today has been long and difficult, but it was worth it because peanut butter is so popular. **Therefore, answer choice (A) is correct.**
6. Lines 20 to 23 say, “Rose Davis made a peanut spread in the 1840s after her son had returned from Cuba and witnessed people eating the spread on bread.” This statement answers the question, What was Rose Davis’s inspiration to make peanut butter? She was inspired to make peanut butter after her son told her he had seen people eating spread on bread in Cuba, **so answer choice (B) is correct.**

### **Reading Passage 36**

1. The passage informs us that noodles have been around for thousands of years and fed billions. The passage then explains that there has been much debate about the origin of noodles and whether they originated from China, Europe, or the Middle East. However, the passage says that an archaeological find in 2005 at Lajia archaeological site put an end to this debate because noodles dating back to 2000 BCE were discovered there. The passage continues by discussing the origins of noodles, explaining that it took several centuries for noodles to be found in civilizations outside of China, and tracing the spread of noodles throughout the world. Therefore, the main purpose of the passage is to trace the origin of noodles, **so answer choice (D) is correct.** Answer choice (A) is incorrect because the passage does not have a controversial viewpoint: it merely states facts about noodles in chronological order. Answer choice (B) is incorrect because the passage does not focus on any practice. Answer choice (C) is incorrect because there is no decision mentioned which would then need to be questioned.
2. Lines 16 through 19 say, “This find in 2005 was groundbreaking as there was much debate about the noodles coming from China, Europe, or the Middle East.” This statement means that noodles have been around for 4000 years. Lines 19 through 21 say, “The oldest written evidence of noodles was

from a book dating back to the Eastern Han dynasty in China (25-220 CE)” We can conclude that before the 2005 find, noodles were thought to date back to the Eastern Han dynasty, but the find proved they have been around for a longer time. Therefore, the passage supports the statement that the history of noodles has evolved, or changed, over time due to new findings, **so answer choice (A) is correct.**

3. In lines 3 through 5, the passage says noodles are “made from some form of unleavened dough that is stretched, extruded, shaped, and cooked in boiling water”. The word “unleavened” means dough made without a rising or leavening agent, so the dough has not risen. This type of dough makes sense to use for pasta, because unlike bread, pasta does not rise. **Therefore, answer choice (C) is correct.**
4. The third paragraph says the first evidence of noodles in Europe was described by a Greek physician in the second century CE. From here, noodles spread to present-day Israel and reached Japan in the ninth century CE. This implies that from Israel, noodles next made their way to Japan, **so answer choice (C) is correct.**
5. Lines 47 through 50 state, “Whether flat, stuffed, curly, skinny, or fat, noodles come in all shapes and sizes. They can be made from rice, corn, potatoes, or various grains.” This means noodles are versatile, which has led them to be a common food in over 30 cuisines worldwide. Therefore, noodles are varied but common, **so answer choice (B) is correct.**
6. The fourth paragraph talks about a popular legend that says Marco Polo brought back pasta to Italy from his travels to China. Lines 41 through 44 say the legend “has been proven false and has been attributed to an advertisement by a Canadian spaghetti company from the 1920s or 1930s.” The passage is saying that while there was a legend that Marco Polo brought pasta to Italy, the legend has been traced to or was created by an advertisement by a Canadian spaghetti company. Therefore, “attributed” most nearly means traced, **so answer choice (B) is correct.**

### **Reading Passage 37**

1. The passage begins by introducing skyscrapers, explaining the origins of the word “skyscraper” and discussing the evolution of the height of skyscrapers. The passage then discusses the restrictions initially placed on skyscrapers, saying they were restricted to around 500 feet until the 1890s. The passage continues by explaining how skyscrapers have evolved over the years: they began being made out of steel, and eventually, they were constructed using a framed tube system. The passage ends by summarizing how skyscrapers have changed over the years: they’ve grown from 500 feet to over 2,700 feet. Therefore, the main purpose of the passage is to detail the evolution of skyscrapers, **so answer choice (D) is correct.** Answer choice (A) is incorrect because the author of the passage does not provide an opinion on how tall skyscrapers will be in the future. Answer choice (B) is incorrect because while the passage does explain that the use of steel and the framed tube system have made skyscrapers stronger, this is not the main focus of the passage; this is used to help explain how skyscrapers have changed over time. Answer choice (C) is incorrect because the passage only discusses Fazlur Rhaman Khan’s framed tube system and does not discuss other architect’s skyscraper designs.

2. Lines 17 through 20 state, “Steel is much more malleable and easier to work with than cast iron, so it could be formed into any shape needed within the frame.” Therefore, “malleable” means able to be formed into any shape. This is closest in meaning to “workable”, **so answer choice (B) is correct.**
  
3. Lines 32 through 35 state, “This system [the framed tube system] uses columns on the exterior of the main building that are closely connected to form a vertical tube, creating a strong, rigid frame.” Lines 38 through 41 state, “All buildings over 40 stories tall that were built after the 1960s have implemented either the original framed tube system or a variation that was developed later.” Finally, the last paragraph states that skyscrapers have grown from 500 feet to over 2,700 feet. Since all buildings over 40 stories use some variation of the framed tube system, which uses columns on the exterior or outside of the skyscraper to make the frame stronger, we can conclude that columns placed on the outside of buildings is the main reason skyscrapers can stand more than 2,700 feet tall. **Therefore, answer choice (C) is correct.**
  
4. Lines 35 through 37 state, “The framed tube requires fewer interior columns, which allows more floor space throughout the building.” Therefore, one of the benefits of Khan’s tube design is that it allows more usable space inside of buildings, **so answer choice (B) is correct.**
  
5. The fourth paragraph begins by stating, “All buildings over 40 stories tall that were built after the 1960s have implemented either the original framed tube system or a variation that was developed later.” It then discusses how the tallest building in the world uses the tube design. Therefore, the purpose of the paragraph is to give an example of the impact of Khan’s tube design, **so answer choice (A) is correct.**
  
6. Lines 24 through 29 state, “Over time, skyscrapers continued growing and more support was needed, limiting the amount of usable floor space available in the higher stories. As buildings approached 40 stories tall, the skeleton method became obsolete.” Therefore, the skeleton design became obsolete, or outdated, because it did not provide enough usable interior space. The Khan tube design used fewer interior columns than the skeleton design, and instead used exterior columns, so we can assume the skeleton design became outdated because it used too many interior columns. **Therefore, answer choice (D) is correct.**

### **Reading Passage 38**

1. In paragraph 1, the passage states that Mabel hates reading the rules book because it’s boring. In the fifth paragraph, she recalls how when she went for the first practice drive with an instructor, the car behind her made a loud honk. She then realizes she made a mistake when she remembers a rule from her book: *A flashing red light indicates that the driver shall treat the intersection as if it was a four-way stop. Proceed with caution based on typical four-way stop regulations.* The final paragraph states, “Thinking of it, the same kind of thing had happened often when she was driving.” The paragraph continues by stating some of the rules that Mabel has accidentally broken while driving. The paragraph ends by stating, “The more Mabel thought about it, the more she was ok reading the rules book. *What harm could it cause?*”. We can conclude the reason why Mabel finally thinks she

needs to read the book is because she realizes she has been breaking them without knowing, **so answer choice (C) is correct.**

2. Line 5 says, “The drab text seemed endless” which is referring to the text of the rulebook. Then lines 6 through 8 say, “She knew these laws were ‘important,’ but that didn’t mean they were what she wanted to spend her afternoon studying.” This means she would rather spend her afternoon doing something more fun and interesting than reading the drab text, so we can assume the word drab means boring or dull. **Therefore, answer choice (D) is correct.**
3. Lines 34 through 37 say, “The information that wasn’t common sense was too... technical. She didn’t understand how anyone could understand it.” This supports answer choice (A), which says parts of the book are hard to understand. Lines 32 through 34 say, “Some of the information contained in those pages was useful, but so much of it was just common sense.” This supports answer choice (B), which says many rules in the book are just common sense. Line 5 says, “The drab text seemed endless.” This supports answer choice (D) which says the book was long (endless) and boring (drab). Answer choice (C) says the rules were not useful while she was driving, but this is not an aspect of the book Mabel dislikes. The last two paragraphs show that the rules from the book have been useful while Mabel is driving, and the more she thinks about it, the more she is okay reading the book. **Therefore, answer choice (C) is correct.**
4. In the second paragraph, Mabel recall’s the first time her mom asked her to occupy the driver’s seat because she wanted to teach Mabel how to drive. In the third paragraph, Mabel says it’s a weird feeling being only two feet from the seat she has occupied hundreds of times. She says this because she is sitting in the driver’s seat for the first time, so the place “you’ve been hundreds of times” is referring to the passenger’s seat. We can conclude that she has been in the passenger’s seat many times but not in the driver’s seat, **so answer choice (D) is correct.**
5. The first paragraph shows Mabel dislikes the book. She says she hates reading the book because the text is drab and endless, and she would rather be doing something else than studying the rules. Therefore, in the beginning of the passage, Mabel is frustrated or irked by the rules book. The last line of the passage states, “The more Mabel thought about it, the more she was okay reading the rule book. *What harm could it cause?*” This shows that in the end, Mabel is more accepting of reading the rule book. We can conclude that her attitude towards the book changes from irked to accepting, **so answer choice (C) is correct.**
6. The story is about Mabel, a girl who is struggling with reading a driving rules book because it’s long and boring. Throughout the story, new rules are stated in italics, and between the rules, the passage continues to tell us about Mabel’s driving experience including her first time driving her mom’s car, her first practice drive with an instructor, and the rules she has broken without knowing. Therefore, we can conclude the organization of the passage can be described as specific rules intertwined within a story, **so answer choice (B) is correct.**



### Reading Passage 39

1. The passage begins by introducing *The Elevation of the Cross*, which is one of the most famous triptychs in history. The passage continues by providing information about the painting, including when it was completed, who painted it, and what it is composed of. The rest of the passage analyzes the meaning of the painting by describing what scenes are depicted in each panel of the painting and exploring the meaning of each scene. Therefore, the primary purpose of the passage is to analyze *The Elevation of the Cross*, **so answer choice (D) is correct.** Answer choice (A) is incorrect because while the passage does mention the famous artist who created *The Elevation of the Cross*, the passage focused more on the artwork itself. Answer choice (B) is incorrect because while the passage does focus on *The Elevation of the Cross*, the author does not critique the work. Answer choice (C) is incorrect because while *The Elevation of the Cross* depicts a biblical story, the story itself is not the focus of the passage.
2. According to the passage, *The Elevation of the Cross* is a massive piece of art, measuring fifteen-feet tall and twenty-one-feet wide, and it is housed in an equally impressive cathedral in Antwerp. Lines 23-24 state “The triptych itself is perhaps the magnum opus of Rubens’ career.” The term magnum opus is used to describe the greatest achievement of an artist or writer, so we know that this work is considered to be artist Peter Paul Rubens’ best work. Based on this, *The Elevation of the Cross* can best be described as a powerful example of a famous 17th century artist’s work. **Therefore, answer choice (C) is correct.**
3. Lines 7-11 state “As a traditional triptych, the work is composed of three separate wooden panels--a square central panel, and two rectangular outer panels which fold over the central panel and reveal another image behind it.” **Therefore, answer choice (C) is correct.**
4. The entire passage is dedicated to analyzing a single piece of art, *The Elevation of the Cross*, created by Peter Paul Rubens, so we can assume that *The Elevation of the Cross* is considered very important. We can infer then that calling it perhaps the magnum opus of Rubens’ career is another way of saying it is perhaps his most important work. **Therefore, answer choice (D) is correct.**
5. According to the passage, the left panel depicts St. John the Evangelist and the Virgin Mary at the top of the panel, and below them on the same panel is a line of women and children with frightened and horrified expressions. All the characters on the left panel are looking right where we presume they are looking at the suffering body of Christ. The center panel depicts Christ’s cross being raised to its upright position. The right panel depicts Roman soldiers preparing the two thieves who are to be crucified beside Christ. Lines 63-68 state “Every piece of the right panel seems to diagonally lean away from the central image, to the opposite angle of the left panel, creating a sense that both sides are pointed to the crucified Christ in the center of the triptych.” It’s as if the outer panels are pointing and drawing your eyes to the center panel. Based on this, we can infer that the rectangular panels on either side of the center panel of *The Elevation of the Cross* serve to provide narrative context to the central panel’s image. **Therefore, answer choice (A) is correct.**

6. We can assume the author does not believe that *The Elevation of the Cross* will always be the most famous triptych because he/she cannot know all the triptychs that will ever be created in the future, so answer choice (A) is incorrect. While the author does believe that *The Elevation of the Cross* is perhaps Rubens' most important work, nowhere does the passage imply that he would not be famous without it, so answer choice (B) is incorrect. Similarly, while the author does believe that *Elevation of the Cross* is the most famous triptych, the passage does not imply that triptychs in general would not be famous if it didn't exist, so answer choice (C) is incorrect. Based on the passage, the author would most likely agree that Rubens' attention to detail and talent can be seen in *The Elevation of the Cross*. **Therefore, answer choice (D) is correct.**

### **Reading Passage 40**

1. The passage starts by informing us about the periodic table and then tells us about 17 elements found on this table called rare-earth metals. The passage says they are silvery-white in color and can be easily ground up into soft powders to be used as an ingredient for making materials. The passage explains that they are mined in India, South Africa, and China, and that these elements are not a renewable resource, yet more technological advancements make their demand greater and greater. The passage asks what we will do when we run out of these elements that cannot be substituted for anything else. Based on this, we can conclude the main purpose of the passage is to inform the reader about the importance of rare-earth metals, **so answer choice (B) is correct.** The passage only briefly mentions other elements on the periodic table, so answer choice (A) is incorrect. Answer choice (C) is incorrect because warning the reader about an upcoming problem is not the main focus of the passage. The problem is not upcoming and is a present-day problem as stated in lines 50 through 52. Answer choice (D) is incorrect because the physical properties of rare earth metals are only mentioned in paragraph two, so this is not the main focus of this passage.
2. The fourth paragraph says, "Rapid technological advancements, like cell phones, have increased the need to mine rare earth metals. However, they are a finite resource... Most of the land where rare earth metals are mined is owned by companies in one country: China. As we continue to utilize these rare-earth metal stocks, corporations can charge more money for access to the metals as well as the products they are used to make." In short, rare earth metals are a finite resource controlled by one country, which means corporations can make it harder to access rare earth metals. From this, we can conclude the problem the author is referring to is the many obstacles faced when trying to obtain rare earth metals, **so answer choice (D) is correct.**
3. The fourth paragraph says, "Rapid technological advancements, like cell phones, have increased the need to mine rare earth metals. However, they are a finite resource: there is a fixed amount on the planet, and once they are gone, there is no way to produce more." Based on these lines, we can conclude that finite means fixed or limited, **so answer choice (D) is correct.**
4. Lines 30 through 32 state that rapid technological advancements, like cell phones, have increased the need to mine rare earth metals. This leads to the decline in the supply of rare-earth metals, so the speed at which new technology is being produced is one factor contributing to the decline of rare earth metals. **Therefore, answer choice (B) is correct.**

5. The first paragraph starts by saying, “Every material you touch is made up of one or many elements found in nature.” It then explains that these elements are categorized by scientists based on many different properties. The second paragraph says these elements are compared against one another using a chart called the periodic table, and there are 17 elements found on this chart called rare earth metals, which are discussed in the rest of the passage. Therefore, the main purpose of the first paragraph is to provide relevant scientific background about the periodic table and elements so the reader has a better understanding of the main topic of the passage: rare earth metals. **Therefore, answer choice (D) is correct.**
6. The last paragraph asks two important questions: What do we do when we run out of an ingredient that cannot be replaced by anything else? Will we be able to find a solution to our supply shortage before it is too late? These questions create a sense of worry about the future of the industries that rely on rare-earth metals. The tone in this paragraph is worried or apprehensive, **so answer choice (A) is correct.**

### **Reading Passage 41**

1. Lines 7 through 9 state, “What no one tells you about buying a car is that the worst part is whatever causes you to need a new car in the first place.” Even the time, money, and effort spent in looking for a new car is “better than finding out your old car is bunk.” These statements mean that the author thinks buying a new car is a better experience than finding out that the old one you had is damaged beyond repair. We can therefore conclude the author would agree that losing your car is worse than looking for a new one, **so answer choice (B) is correct.**
2. Line 58 mentions an agent, and from that, we know Ajay is talking to this car dealership agent in the first paragraph. In the first paragraph, Ajay gets up and turns to leave, and the agent asks him not to leave and tells him they can talk. Ajay knows the car has been on the lot for a while, so the agent is desperate to sell it. Ajay says, “Works every time,” because he knew that if he started to walk out of the dealership, he would pressure the agent into negotiating the price of the car. **Therefore, answer choice (D) is correct.**
3. In the fourth paragraph, Ajay’s insurance agent tells him that his case is an insurance no-brainer and that he should have his check within a week and then he can start shopping for a new car. In lines 24 to 26, the agent says, “And during the intervening week... We could look into getting you a rental.” He then tells Ajay that using a bike would be best, and in the fifth paragraph, Ajay decides to use the bike to get around. We can assume that the intervening week is the week between Ajay losing his car and the week he’ll get money to buy a new one. Therefore, the word intervening most nearly means in-between, **so answer choice (C) is correct.**
4. In the second-to-last paragraph, the car agent says he can’t take \$2000 off the price of the car. Ajay asks the agent how long the car has been on the lot, and the agent “hesitated, almost as if he was willing the question to evaporate.” The agent then answers by saying it’s been a while: he is purposely avoiding giving an exact timeframe. The agent knows that by giving a timeframe, he would make it

easy for Ajay to negotiate a lower price for the car because the car has probably been on the lot for a long time. We can conclude the author included this line to show that the agent doesn't want to answer the question as it would help Ajay's argument, **so answer choice (B) is correct.**

5. Lines 47 through 51 state, "He had finally picked it out: a 2015 Subaru Forester. Yellow. Everyone else seemed to hate it: that's why it was still on the lot. Ajay didn't even know they made vehicles in such revolting colors." From this, we can conclude that the car was still at the car lot because it had a revolting or ugly color, **so answer choice (C) is correct.**
6. The eighth paragraph says the car Ajay finally picks is yellow, and the reason the car is still at the car lot is that everyone else seems to hate that color. In lines 49 through 51, Ajay says he "didn't even know they made vehicles in such revolting colors." We can assume the word revolting means the color is so unappealing that no one else wants to buy the car. Therefore, the word revolting most nearly means disgusting, **so answer choice (A) is correct.**

### **Reading Passage 42**

1. The passage is about a 42-year-old woman who wants to try skiing for the first time. It starts by describing the woman's experience at the ski shop, getting to the ski lift, and eventually getting on the lift to go up the mountain. Throughout her experience, the woman seems unsure of herself. She is hesitant to tell the ski rental shop clerk that she has never skied before, she is unsure how to get from the ski rental shop to the mountain, and she even loses her balance and falls over as she is putting on her skis. In lines 46 through 52, the passage explains that the woman starts to panic as she approaches the top of the hill: "I hadn't been watching other people get off of the lift; I didn't know what to do! I think the women sense my panic." Therefore, the main purpose of the passage is to show how nervous the woman is about her first experience skiing, **answer choice (D) is correct.** Answer choice (A) is incorrect because the woman was not mortified during her experience; she did fall once, but the passage does not indicate that she was incredibly embarrassed. Answer choice (B) is incorrect because the passage does not explain what happens once the woman starts skiing down the hill: it ends with her about to ski down the mountain. Answer choice (C) is incorrect because the woman was mainly nervous throughout the passage, not thrilled.
2. In the first paragraph, when the narrator is asked how many times she has skied, she hesitantly says it's her first time. In the second paragraph, she is again unsure what to do when she has to get from the ski shop to the mountain, which was not part of any of the videos she had previously watched. Wearing the skis proves quite hard, and she says she makes quite a scene trying to wear them. In the fourth paragraph, she has to again figure out how to get on the lift. Once that is done, getting off the lift presents another challenge and she begins to panic. Once she manages to finally be on top of the hill, she finds it too steep and is scared. We can say the narrator is afraid and worried throughout the passage, mostly because she has never skied before. Therefore, her attitude towards skiing is apprehensive, **so answer choice (C) is correct.**

3. In lines 39 to 41, one of the women riding the lift with the narrator says, “the snow is so much better today, I’m glad we got a few inches last night.” This means the ski has recently received snow, **so the answer choice (C) is correct.**
4. In lines 2 to 3, the narrator says, “At 42 years old, I was apparently quite the sight in the ski rental shop.” The first question she is asked is how many times she has been skiing. When she answers that it’s her first time, the response she gets is, “Huh, well, okay.” This response shows disbelief: the person asking cannot believe that at her age, the narrator has never skied before. We can conclude the statement in lines 2 and 3 means the narrator was older than the other people in the ski shop, **so answer choice (B) is correct.**
5. In the second paragraph, after the narrator gets out of the ski rental shop, she is confused about what to do next, so she walks in the general direction of the mountains. She eventually sees other skiers coming down the hill and congregating at a lift. In the fourth paragraph, the narrator says she, “tried to pay attention to what everyone else was doing. *Wait for the people in front of you to sit down. “Walk” forwards. Wait for the chair to hit your butt. Sit down.*” We can therefore assume these people she saw were gathering around the lift waiting for a turn to get on the lift. Therefore, the word congregation most nearly means group or gathering, **so answer choice (D) is the correct answer.**
6. In the last paragraph, the narrator says she was scared of the steep hill and would have started on the bunny hill but it was populated by toddlers. When she sees the two ladies from the lift gesturing toward her, she smiles and decides there is no day like today. We can assume the two women are gesturing toward her to start skiing, and because of this, she finally decides to give it a try. The last two lines of the passage tell us that the ladies are encouraging the narrator to ski down the hill, **so answer choice (D) is correct.**

### **Reading Passage 43**

1. The passage is narrated by Taylor who is chaperoning her friend’s daughter’s birthday party at a rock climbing gym. Taylor does not want to climb the wall because she is scared of heights, but Maria, the birthday girl, insists that Taylor climbs. Taylor ends up facing her fear of climbing the wall and actually becomes relaxed while climbing the wall. Therefore, a main theme of the passage is facing your fears, **so answer choice (D) is correct.** Answer choice (A) is incorrect because Taylor ultimately says yes to climbing the wall, not no. Answer choice (B) is incorrect because while Taylor overcame a fear, she did not face any adversity or misfortune. Answer choice (C) is incorrect because Taylor did not quit: she faced her fear, and even though she slipped, she did not intentionally quit climbing the wall.
2. In lines 33 through 39, Maria, Lizzy’s daughter, says, “Taylor, you haven’t climbed yet!” She goes on to say that it’s her birthday, so she wanted Taylor to climb the wall. Taylor sighs in resignation and realizes she will have to climb the wall because Maria wants her to. Therefore, Taylor decided to climb the wall because Lizzy’s daughter wanted her to, **so answer choice (C) is correct.**

3. In the third paragraph, the employee at the climbing gym turns to Taylor and says, “What shoe size for you?” Taylor looks around for a child without shoes, and says, “Oh! You mean me?” Clearly, Taylor is surprised that the employee is asking her for her shoe size. Line 27 says Taylor then “stared, incredulously, at the employee.” Therefore, Taylor stared with a sense of surprise or in disbelief, **so answer choice (A) is correct.**
4. The last two paragraphs describe Taylor’s experience climbing the wall. Lines 50 through 51 state, “As I climbed higher, I actually started to relax.” In the last paragraph, Taylor looks down and begins to panic. This panic causes her foot to slip and she is dangling from the wall. Therefore, after feeling relaxed, Taylor looks down and panics, which causes her foot to slip. **Therefore, answer choice (B) is correct.**
5. In the fifth paragraph, Maria says it’s her birthday, so she wants Taylor to climb the wall. Lines 37 through 39 then say, “I sighed in resignation: I knew I would have to climb now.” Therefore, Taylor sighed in resignation, which means that she realized she will have to climb the wall because it is Maria’s birthday. Therefore, Taylor signed in resignation because she caved to the pressure to climb, **so answer choice (D) is correct.**
6. Lines 4 through 6 state, “The tiny section that the rock-climbing gym had cordoned off for us gave a sense of privacy . . .” Therefore, “cordoned off” must mean something that would provide privacy. The words “decorated”, “purchased”, and “personalize” do not imply giving privacy, so they are incorrect. “Sectioned off” means creating a private section for the group, so this is closest in meaning to “cordoned off”. **Therefore, answer choice (B) is correct.**

#### **Reading Passage 44**

1. The narrator of the passage starts by saying that ants have always fascinated him. He explains that his interest began with his grandfather, who would spend hours every month trying to get rid of the ants on his driveway. The narrator’s love for ants grew when he went to college and took a course called “animal diversity”, and he eventually landed a research position with a professor who helped him gain a real-world perspective on what it would be like to research ants as a full-time job. In the last paragraph, The passage ends by explaining how the narrator was speaking to a panel of interviewers about why he decided to apply to grad school. Therefore, the passage centers around a prospective student who is answering an interview question, **so answer choice (D) is correct.** Answer choices (A) and (B) are incorrect because the narrator is not a teacher or a professor. Answer choice (C) is incorrect because the narrator is not reflecting to himself: he is explaining to a panel of interviewers how he became interested in ants and why he wants to attend grad school.
2. Lines 1 through 3 state, “Ants have always fascinated me. They exist on every continent but Antarctica, and they play pivotal roles in our ecosystem.” Because ants fascinate the narrator, we can assume that “pivotal” has a positive connotation. Answer choices (A) is the only positive word, so “pivotal” most nearly means “important.” **Therefore, answer choice (A) is correct.** You could also look at lines 24 through 25 which state, “But they shape (in some cases physically) the world around

them.” This means that ants play an important role in our ecosystem because they influence and shape other things around them.

3. Lines 33 through 35 state, “‘You must know, it’s a rather gross job at times,’ she told me on the very first day. I remember smiling through my naivety.” The word “naivety” means inexperience. Therefore, the narrator was smiling even though he didn’t have experience working at a job like this, which means he wasn’t fully prepared for how gross it would be. Therefore, Anish smiled and nodded, even though he did not fully understand what the position would entail, **so answer choice (D) is correct.**
4. Lines 16 through 17 state, “My passion for small insects grew when I arrived at college. One of the first courses I took was called ‘Animal Diversity.’” Therefore, the class “Animal Diversity” helped foster Anish’s love of insects, **so answer choice (B) is correct.**
5. In lines 36 through 38, the interviewer asks Anish, “Was it during your time with Blackwood that you decided you wanted to go to grade school?” In lines 40 through 43, Anish replies by saying, “I suppose so. She really helped to give me the real-world perspective on what it would be like to research these creatures full time.” Therefore, Anish’s research position with Dr. Blackwood helped influence his decision to apply to grad school, **so answer choice (A) is correct.**
6. The first line of the passage states, “Ants have always fascinated me.” The narrator of the passage, Anish, then explains why ants fascinate him and how his love for ants has grown over the years. Therefore, Anish’s tone towards ants can best be described as awed, **so answer choice (B) is correct.**

### **Reading Passage 45**

1. The first paragraph of the passage introduces mountain biking and then states, “The sport involves riding specifically designed bikes off-road and has evolved from riding modified, casual bicycles down hiking trails, to riding high-tech mountain bikes that were designed for a specific type of trail.” The remainder of the passage discusses how mountain bikes have evolved, including how Early mountain bikers in Northern California started adding a gearing system to mountain bikes, Joe Breeze created the first bike specifically designed for mountain riding, high tech lightweight frames were designed in the 1980s, and the variety of modern mountain bikes that have been created. The passage concludes by saying, “Mountain biking has evolved from an underground sport in the 1970s into the mainstream sport that it is today.” Therefore, the main theme of the passage revolves around the changes and modifications to mountain bikes, **so answer choice (B) is correct.** While the passage does mention that mountain bikes have evolved to have more suspension in the front and rear (lines 40 to 41), this is only briefly mentioned in the passage. Furthermore, the passage does not include details about how suspensions have evolved or developed, so answer choice (A) is incorrect. While the passage does discuss why mountain bikes have evolved (allowing people to ride on different terrains and conditions), this is only part of the larger theme of the passage, which is the evolution of mountain bikes: this includes why they evolved, who helped them evolve, and how they evolved. Therefore, answer choice (C) is incorrect. While the passage mentions people who have been influential in developing mountain bikes, this is only part of the larger theme of the passage, which is

the evolution of mountain bikes: this includes why they evolved, who helped them evolve, and how they evolved. Therefore, answer choice (D) is incorrect.

2. Lines 49 through 52 state, “Cross-country riding involves a large variety of terrain that incorporates climbing and descending and requires a lighter and nimbler bike” Lines 54 through 57 state, “Downhill bikes have the biggest suspension and tires out of all mountain bikes because they are only used for descending.” From this, we can conclude that downhill bikes have a larger suspension than cross-country bikes, and cross-country bikes are lighter. **Therefore, answer choice (B) is correct.**
3. Lines 64 through 67 state, “As mountain bikers continue to push the limits of what bikes can handle, mountain bikes will continue to evolve.” Therefore, the author would most likely agree that mountain bikes will continue to evolve and improve, **so answer choice (A) is correct.**
4. The third paragraph discusses how Joe Breeze designed a bike specifically for mountain riding. It then says in lines 21 through 24, “This bicycle was used as a framework for future designs as road biking companies began to manufacture mountain bikes using high-tech lightweight frames in the early 1980s.” Lines 30 through 32 state, “These bikes were much lighter and allowed riders to explore longer and rougher trails.” Therefore, Joe Breeze’s bike design helped develop high-tech lightweight frames that allow riders to explore a larger variety of trails, **so answer choice (C) is correct.**
5. Lines 44 through 46 state, “The larger tires roll over obstacles more easily but are not quite as agile as the smaller sizes.” Therefore, the benefit of larger tires is the ability to roll over larger objects, **so answer choice (D) is correct.**
6. Lines 36 through 39 state, “Mountain biking remained a relatively niche sport until the 1990s when bikes could be found in standard bike shops in a variety of styles.” Therefore, before the 1990s, mountain bikes could not be found in standard bike shops, which means they were probably only found in specific or specialized bike shops. Therefore, the word “niche” most nearly means specialized, **so answer choice (D) is correct.**



# Practice Tests

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## **Practice Test 1**

### **Verbal Reasoning**

1. **Answer choice (C) is correct.** The word **consent** means permission to do something. For example, before you attend a field trip, the school needs to get your parent’s **consent**. This is closest in meaning to **permission**.
2. **Answer choice (B) is correct.** The word **momentary** means something that lasts for a very short time. For example, a flash of lightning or a shooting star are both **momentary** because they pass through the sky for only a few seconds or less. This is closest in meaning to **passing**.
3. **Answer choice (C) is correct.** The word **perspective** means an attitude towards or a view of something. If you believe that playing sports helps children learn teamwork, commitment, and perseverance, then from your **perspective**, playing sports is beneficial to children. This is closest in meaning to **outlook**.
4. **Answer choice (C) is correct.** The word **aggravate** means to make worse or to annoy. For example, it might **aggravate** you if your sister always chews with her mouth open. This is closest in meaning to **irritate**.
5. **Answer choice (D) is correct.** The word **intensify** means to intensify, increase, or make something better. For example, if you want to **enhance** your chances of getting into college, you may provide additional references and write additional essays. This is closest in meaning to **improve**.
6. **Answer choice (A) is correct.** The word **moral** means concerned with principles of right and wrong. For example, if a **moral** person sees someone drop a \$20 bill, they will return the money to its owner instead of keeping it for themselves. This is closest in meaning to **upright**.
7. **Answer choice (A) is correct.** An **aspiration** is a dream or desire to do something. For example, you may have an **aspiration** of becoming an astronaut because you enjoy learning about space and planets. This is closest in meaning to **ambition**.
8. **Answer choice (B) is correct.** The word **fathom** means to understand something. For example, if you received As on all of your tests, quizzes, and homework in a class, but ended up receiving a B in the class, you would not be able to **fathom** why your grade was not an A. This is closest in meaning to **comprehend**.
9. **Answer choice (D) is correct.** The word **tenacious** means tending to keep a firm hold of something or not easily giving up. For example, a runner who becomes injured during a race but doesn’t let it stop her from crossing the finish line is **tenacious**. This is closest in meaning to **determined**.
10. **Answer choice (D) is correct.** The word **devious** means using underhanded or dishonest methods to achieve your goal. For example, a teenager who convinces his parents he is too sick to go to school by

putting a thermometer in hot water but then hangs out with his friends is **devious**. This is closest in meaning to **deceitful**.

11. **Answer choice (B) is correct.** A **disposition** is a person’s character or nature. For example, a person who is happy and upbeat can be described as having a cheery **disposition**. This is closest in meaning to **temperament**.
12. **Answer choice (A) is correct.** The word **coerce** means to persuade using force or threats. For example, blackmailing someone is a way to **coerce** them into doing something. This is closest in meaning to **pressure**.
13. **Answer choice (C) is correct.** A **demeanor** is someone’s outward behavior or attitude. For example, if a student at your school rarely talks to anyone and sits by himself at lunch, he has a quiet **demeanor**. This is closest in meaning to **behavior**.
14. **Answer choice (B) is correct.** The word **snarky** means critical or mocking in a sarcastic way. For example, if you say to someone, “You look good ... for someone your age,” in a sarcastic tone, that is a **snarky** comment. This is closest in meaning to **mocking**.
15. **Answer choice (A) is correct.** The word **poised** means being self-assured, calm, and collected. For example, people who are good at public speaking are able to stay **poised** in front of thousands of people. This is closest in meaning to **composed**.
16. **Answer choice (D) is correct.** The word **unfounded** means not supported by facts. For example, if someone starts a rumor about you that is a complete lie, and there is no evidence to support the rumor, the rumor is **unfounded**. This is closest in meaning to **unsupported**.
17. **Answer choice (A) is correct.** The word **lope** means to run or move with a long bounding stride. For example, if a horse runs across a field, you could say the horse **lopes** across the field. This is closest in meaning to **stride**.
18. **Answer choice (C) is correct.** The word **pertinent** means applicable or appropriate to a certain matter. For example, if you are applying for a job as a teacher, they may ask you for any **pertinent** previous work experience such as working as a tutor or working in any other jobs involving children. This is closest in meaning to **relevant**.
19. **Answer choice (C) is correct.** The word **aversion** means a strong dislike of something. For example, if you really hate eating broccoli, you have an **aversion** to broccoli.
20. **Answer choice (B) is correct.** The word **evade** means to escape or avoid, especially by cleverness or trickery. For example, if your friend asks you a question that you don’t want to answer, you could **evade** the question by asking them a question in return or changing the topic.

21. **Answer choice (D) is correct.** The sentence says that industrial pollution damages the earth and negatively affects wildlife, so we know the word in the blank should be negative. “Enhancing” is positive and “regulating” is neutral, so answer choices (A) and (B) are incorrect. While “ignoring” is negative, it would not make sense to say pollution ignores natural habitats, so answer choice (C) is incorrect. “Disrupting,” which means interrupting by causing a disturbance or problem, is negative and fits in the blank: if pollution disrupts or causes problems in the natural habitats of certain animals, then it is negatively affecting wildlife.
22. **Answer choice (B) is correct.** The sentence says that Tim rarely understood the material being taught in math class. Therefore, the first part of the sentence should say something that would result in Tim rarely understanding the material being taught. “Disregarding” means ignoring, so it fits best in the blank: if Tim’s teacher suggests he come in for extra help, we can assume he is having trouble with the material being taught. If he then disregards or ignores these suggestions, he is not getting the help he needs, so he will not understand the material.
23. **Answer choice (D) is correct.** The sentence says Neil surprised his teachers when he easily complied, or listened to, his requests. Therefore, since his teachers were surprised by his behavior, we can assume Neil’s parents described him as the opposite of willingly listening to authority. The word “willful” means determined to do what you want regardless of the consequences, which is the opposite of willingly listening to authority, so “willful” fits best in the blank.
24. **Answer choice (C) is correct.** The sentence says that the sponges being described will likely scratch glass. Therefore, the word in the blank should be a word that describes something that scratches surfaces. “Abrasive” is used to describe materials that can remove things from surfaces by scrubbing or grinding, which can damage or scratch the surface. Therefore, “abrasive” fits best in the blank.
25. **Answer choice (B) is correct.** The sentence says that the food critic received terrible service, undercooked food, and unprofessional responses. Therefore, the critic had a negative experience at the restaurant, so we know the word in the blank must be negative. “Reverent” means respectful, which is positive, so answer choice (A) is incorrect. “Impartial” means unbiased or uninvolved, which is positive or neutral, so answer choice (D) is incorrect. “Hysterical” can mean overly emotional or very funny, so it can be negative or positive. “Scathing” means extremely critical, which is negative. It would make more sense that the critic would write a very critical review than an overly emotional review of the restaurant after his experience since his experience was very negative, so “scathing” fits best in the blank.
26. **Answer choice (A) is correct.** The word “by” tells us that the word in the blank should be the result of the school counselor listening to Rachel’s story and asking her questions about how she felt. Since it is helpful to ask someone questions about their feelings and listen to them, we know the word in the blank should be positive. “Mimicked” means to imitate someone, especially in order to entertain or ridicule, so “mimicked” is neutral or negative. Therefore, answer choice (B) is incorrect. “Belittled” means to put someone down or make them feel badly, which is negative, so answer choice (C) is incorrect. “Praised” means to express approval or admiration, which is positive. “Validate” means to support or acknowledge, which is also positive. While the school counselor listened to Rachel and

asked questions, we do not know if she expressed approval or admiration of Rache’s feelings, so “praised” does not fit best in the blank. The school counselor did make Rachel feel supported and acknowledged by listening to her, so “validated” fits best in the blank.

27. **Answer choice (A) is correct.** The sentence says Katrina was frustrated and left wondering whether or not the main character ever got caught for his crimes, so we can assume the word in the blank has to describe a movie ending that leaves the viewer wondering or asking questions. “Ambiguous” means open to more than one interpretation, so “ambiguous” fits best in the blank.
28. **Answer choice (A) is correct.** The sentence says Roger often yells profanities out of his window and honks at other drivers, which are actions taken by a driver who is angry or aggressive. Therefore, the word in the blank must mean something similar to angry or aggressive. “Belligerent” means hostile and aggressive, so “belligerent” fits best in the blank.
29. **Answer choice (C) is correct.** The sentence says women fought for decades to change the voting laws in the United States. The word “finally” tells us that the end of the sentence should say that the fight was successful, meaning women were granted the right to vote. Therefore, the last part of the sentence should say, “the constitution was finally changed to allow women to vote,” so the word in the blank should mean change. “Amended” means changed, so amended fits best in the blank. You can also use process of elimination for this question. The constitution was created long before women had the right to vote, so answer choice (A) is incorrect. “Repealed” means canceled or nullified. The constitution was not canceled to allow women to vote, so answer choice (B) is incorrect. “Exempted” means excused or free from obligation. If the constitution was free from the obligation to allow women to vote, women would not be able to vote, so answer choice (D) is incorrect.
30. **Answer choice (B) is correct.** The sentence says the scientists had certain opinions about how the experiment would turn out even though they had never completed a similar experiment. Therefore, the word in the blank must describe opinions that one forms beforehand that are not based on prior experience. “Preconceived” describes an opinion formed beforehand that is not based on adequate evidence or knowledge, so “preconceived” fits best in the blank.
31. **Answer choice (D) is correct.** The phrase “due to” tells us that the second part of the sentence is a result of the first part. The first part of the sentence says Dr. Whittake has made significant contributions to the field of radiology, so the word in the blank must be used to describe someone who has made significant contributions to a field. “Distinguished” means successful, respected, or well-known, so “distinguished” fits best in the blank: if you’ve made great contributions to a field of study, you would likely be well-known, successful, and respected in that field. You can also use process of elimination for this question. Since Dr. Whittaker made significant contributions to the field of radiology, we know the word in the blank should be positive. “Pretentious” means showy or pompous, and “contentious” means controversial, which are both negative, so answer choices (B) and (C) are incorrect. While “personable” means likable or agreeable, which is positive, but just because someone makes contributions to a field does not mean they are likable or agreeable.

32. **Answer choice (A) is correct.** The first part of the sentence says Eleanor Roosevelt was committed to fighting for equal rights, so we know the word in the blank should be positive. “Spurning” means rejecting or refusing, which is negative, so answer choice (A) is incorrect. “Analyzing” means examining or inspecting, which is neutral, so answer choice (C) is incorrect. “Undermining” means lessening the effectiveness of something, which is negative, so answer choice (D) is incorrect. “Advocating” means recommending or supporting, which is positive, so “advocating” fits best in the blank.
33. **Answer choice (D) is correct.** The word “unlike” tells us that the word describing the word in the blank should describe a dessert that is the opposite of bland. “Delectable” means delicious or flavorful, so “delectable” fits best in the blank.
34. **Answer choice (B) is correct.** If you’re feeling overwhelmed, taking a break and practicing breathing should help calm you down or help you feel less overwhelmed. Therefore, the word in the blank should be positive. “Intensify” means to make more intense or severe, which would be negative in this context, so answer choice (A) is incorrect. “Suppress” to conceal or push away, which is negative in this context, so answer choice (D) is incorrect. “Legitimize” means to validate, and “alleviate” means to reduce or ease, which are both positive. It makes more sense that breathing and taking a break would ease or reduce feelings of being overwhelmed than validate feelings of being overwhelmed, so “alleviate” fits best in the blank.
35. **Answer choice (A) is correct.** The sentence says Tara enjoys learning from other people and brainstorming as a group, so the word in the blank must describe a type of work that involves working with other people. “Collaborative” is used to describe an effort in which people work together, so “collaborative” fits best in the blank.
36. **Answer choice (D) is correct.** The sentence says Mika did not like her small middle school, so she was excited to go to a high school that was diverse. Therefore, we can assume her middle school was not diverse, so the word in the blank should mean something similar to not diverse. “Homogeneous” means of the same kind or consisting of parts of the same kind, so “homogeneous” fits best in the blank.
37. **Answer choice (A) is correct.** The sentence says Mojay was worshiped by most of his fan base, so we know the word in the blank should be positive. “Detested” means hated, and “haughty” means arrogant, so answer choices (B) and (D) are incorrect. “Humble” means modest and “revered” means admired or respected, which are both positive. While Mojay may be modest, there is no indication in the sentence that he is, so “humble” does not fit best in the blank. Therefore, answer choice (C) is incorrect. Since Mojay is worshiped, or loved, by most of his fan base, it makes sense to say he is one of the most admired or respected players in all of college soccer. Therefore, “revered” fits best in the blank.
38. **Answer choice (C) is correct.** The sentence says his ----- remarks made it clear he showed no remorse and he did not care about the people he hurt. Therefore, the word in the blank must be an adjective describing someone who does not show remorse or doesn’t care about hurting people.

“Callous” means showing or having an insensitive and cruel disregard for others, so “callous” fits best in the blank.

39. **Answer choice (D) is correct.** The word “after” tells us that the word in the blank should describe an attitude that is the result of Sam being betrayed by multiple friends. The sentence also says Sam had a hard time trusting people, so we know the word in the blank should be related to not trusting people. “Cynical” means distrustful of sincerity or other people’s motives, so “cynical” fits best in the blank.
40. **Answer choice (B) is correct.** The word “after” tells us that the first part of the sentence is a result of the second part. The second part of the sentence says explosions were heard throughout the town. If everyone in the town heard explosions, they were probably concerned and scared, so it would make sense that a lot of people would call the police station. Therefore, the word in the blank should indicate that the police station was receiving a lot of calls. “Inundated” means overwhelmed or flooded, so “inundated” fits best in the blank.

### Quantitative Reasoning

1. **Answer choice (D) is correct.** There are 5 spaces between each consecutive integer, so each space  $\frac{1}{5}$  units long. Therefore, point A is located at  $-1\frac{4}{5}$ , and point B is located at  $2\frac{2}{5}$ . Find the difference by subtracting  $-1\frac{4}{5}$  from  $2\frac{2}{5}$ :  $2\frac{2}{5} - (-1\frac{4}{5}) = 2\frac{2}{5} + 1\frac{4}{5} = 4\frac{1}{5}$ .
2. **Answer choice (B) is correct.**  $\sqrt{196} < \sqrt{200} < \sqrt{225}$ . The square root of 196 is 14 because  $14^2 = 196$ , and the square root of 225 is 15 because  $15^2 = 225$ , so  $14 < \sqrt{200} < 15$ .
3. **Answer choice (C) is correct.** Consecutive integers are integers that are integers that follow each other in numerical order without any gaps. Therefore, if the middle of seven consecutive integers is 10, the seven consecutive integers are 7, 8, 9, 10, 11, 12, 13. The mean of a set of data is equal to the sum of the numbers divided by the number of terms:  $\frac{7+8+9+10+11+12+13}{7} = \frac{70}{7} = 10$ .
4. **Answer choice (A) is correct.** Let  $c$  represent the amount of money Clayton has. Since Kinsey has five times as much money as Clayton, the amount of money Kinsey has can be represented by  $5c$ . Set the sum of Clayton’s and Kinsey’s money equal to \$60 and solve for  $c$ :  $c + 5c = \$60 \rightarrow 6c = \$60 \rightarrow c = \$10$ .
5. **Answer choice (B) is correct.** Each dimension of the larger cube is 4 small cubes in length. Therefore, the total number of small cubes used to make the larger cube equals  $4 \cdot 4 \cdot 4$  which equals 64 cubes. Since the volume of each small cube is  $0.75 \text{ cm}^3$ , find the volume of the larger cube by multiplying 64 by  $0.75 \text{ cm}^3$  to get  $48 \text{ cm}^3$ .
6. **Answer choice (D) is correct.** Adding a negative number is the same as subtracting the positive version of the number, so answer choice (A) equals  $68 - 93$  which equals  $-25$ . Subtracting a negative number is the same as adding the positive version of the number, so answer choice (B) equals  $-93 + 68$  which equals  $-25$ , and answer choice (C) equals  $-68 + 93$  which equals 25. When subtracting a

number from a negative number, add the positive versions of the two numbers and then make the result negative. Therefore, answer choice (D) equals  $-(68 + 93)$  which equals  $-161$ . Therefore, answer choice (D) has the smallest value.

7. **Answer choice (B) is correct.** To find the probability of multiple events, multiply the probability of each event. There are 5 total numbers between 1 and 5 inclusive, 2 of which are even, so the probability of choosing an even number is  $\frac{2}{5}$ . Multiply  $\frac{2}{5}$  by itself twice because we want to the probability of Thomas choosing two even numbers:  $\frac{2}{5} \cdot \frac{2}{5} = \frac{4}{25}$ .
8. **Answer choice (A) is correct.** Since Mrs. Mathews creates the greatest number of identical gift bags possible, to find the number of gift bags she creates, we need to find the greatest common factor of 72, 48, and 36. 12 is the greatest common factor of 72, 48, and 36 because it is the greatest number that all three numbers are divisible by. Find the number of erasers in each bag by dividing 48 erasers by 12 gift bags to get 4 erasers in each bag.
9. **Answer choice (C) is correct.** If you plug each value of  $x$  into  $y = -2x - 6$ , you will get the corresponding  $y$  values from the table. Plug in  $x = -8$ :  $y = -2(-8) - 6 \rightarrow y = 10$ . Plug in  $x = -6$ :  $y = -2(-6) - 6 \rightarrow y = 6$ . Plug in  $x = -4$ :  $y = -2(-4) - 6 \rightarrow y = 2$ . Plug in  $x = -2$ :  $y = -2(-2) - 6 \rightarrow y = -2$ . Therefore, the rule for the table is  $y = -2x - 6$ .
10. **Answer choice (C) is correct.** First find the diameter of the model by setting up and solve the following proportion, where  $d$  represents the diameter of the model:  $\frac{d}{18 \text{ ft}} = \frac{7 \text{ in}}{21 \text{ ft}} \rightarrow \frac{d}{18 \text{ ft}} = \frac{1 \text{ in}}{3 \text{ ft}} \rightarrow 3d = 18 \rightarrow d = 6 \text{ in}$ . Therefore, the radius of the model is 3 in. To find the number of square inches of foam board needed for the two circular faces of the model, we need to find the area of each circular face. The area of a circle can be found using the equation  $A = \pi r^2$ . Plug in 3 inches for  $r$  and simplify to find the area of each circular face:  $A = \pi(3)^2 \rightarrow A = 9\pi \text{ in}^2$ . Since there are two circular faces, multiply the area by two to get  $18\pi \text{ in}^2$ .
11. **Answer choice (D) is correct.** Since Kedar is three years older than Rosy, Rosy is three years younger than Kedar. Therefore, five years ago, Rosy was  $k - 3$  years old. Find Rosy's age today by adding five years to her age five years ago:  $k - 3 + 5 = k + 2$ .
12. **Answer choice (D) is correct.** Since the price decreased by 60%, the new price is 40% of the original price. Therefore, we want to answer the question, "\$120 is 40% of what number?" where "what number" represents the original price of the stock. Set up and solve an equation that represents the question "\$120 is 40% of what number?":  $120 = 0.4x \rightarrow x = \$300$ .
13. **Answer choice (C) is correct.** If the probability of choosing a girl from the group is 2 out of 5, then 2 out of 5 or  $\frac{2}{5}$  of the children in the group are girls. Therefore, the remaining children are boys, so  $\frac{3}{5}$  of the children are boys. Find the number of boys by finding  $\frac{3}{5}$  of 40:  $\frac{3}{5}$  of 40 =  $\frac{3}{5} \cdot 40 = 24$  boys.
14. **Answer choice (D) is correct.** To find the surface area of a shape from a net, find the area of each face of the figure and add up the areas. The top, middle, bottom, and leftmost rectangles each measure



4 units by 10 units, so the area of each rectangle equals  $4 \cdot 10 = 40$  units<sup>2</sup>. The leftmost rectangle and the second rectangle from the right both measure 4 units by 4 units, so the area of each rectangle is  $4 \cdot 4 = 16$  units<sup>2</sup>. Add up the area of all six rectangles to find the surface area:  $40 + 40 + 40 + 40 + 16 + 16 = 192$  units<sup>2</sup>.

15. **Answer choice (A) is correct.** Set up and solve the following proportion:  $\frac{DF}{12} = \frac{2/3x}{x} \rightarrow \frac{DF}{12} = \frac{2/3}{1} \rightarrow DF = 12 \cdot \frac{2}{3} \rightarrow DF = 8$  ft.
16. **Answer choice (D) is correct.** As the number of questions answered correctly goes up by one, the number of points increases by 1 more than the previous increase: 1 to 2 is an increase of 1, 2 to 4 is an increase of 2, 4 to 7 is an increase of 3, and 7 to 11 is an increase of 4. Therefore, 6 correct questions will be awarded  $11 + 5 = 16$  points, 7 correct questions will be awarded  $16 + 6 = 22$  points, 8 correct questions will be awarded  $22 + 7 = 29$  points, 9 correct questions will be awarded  $29 + 8 = 37$  points, and 10 correct questions will be awarded  $37 + 9 = 46$  points.
17. **Answer choice (B) is correct.** Using the line of best fit, the total cost of renting a cabin for 4 days is \$750. Find the daily cost by dividing the total cost by 4 days:  $\$750 \div 4 = \$187.50$ .
18. **Answer choice (A) is correct.** The median of a data set is the middle number when the numbers are in numerical order. Since there are 40 data points, the median will be between the 20th and 21st term. The frequency chart shows us how many children play 0, 1, 2, 3, 4, and 5 sports. If we wrote the data out, we would get four 0s, eight 1s, ten 2s, twelve 3s, two 4s, and four 5s, so the 20th and 21st terms are both 2. Therefore, the median is 2.
19. **Answer choice (C) is correct.** There are  $360^\circ$  in a circle. The portion representing April has a central angle of  $90^\circ$ , the portion of the graph representing June has a central angle of  $180^\circ$ , and the portion of the graph representing March and May both have a central angle of  $45^\circ$ . Therefore, the number of people who chose March is the same as the number of people who chose May, so 25 people chose May. Since  $180^\circ$  is four times  $45^\circ$ , the number of people who chose June is four times the number of people who chose March, so  $25 \cdot 4 = 100$  people chose June. Therefore, the number of people who chose June or May equals  $100 + 25 = 125$  people.
20. **Answer choice (B) is correct.** The area of a square is equal to the side length squared, so the area of the square equals  $x^2$ . Since the triangle and square share a side, and since the triangle is a right isosceles triangle, each leg of the isosceles right triangle measures  $x$  mm. The formula for the area of a triangle is  $A = \frac{1}{2}bh$ , where  $b$  represents the base of the triangle and  $h$  represents the height. Plug in  $x$  for  $b$  and  $h$  in the equation, and simplify to find the area of the triangle:  $A = \frac{1}{2}x \cdot x = \frac{1}{2}x^2 = 0.5x^2$ . Find the total area of the figure by adding the area of the square and the area of the triangle:  $x^2 + 0.5x^2 = 1.5x^2$ .
21. **Answer choice (C) is correct.** Find the value of Column A by writing the numbers in standard form and multiplying:  $400,000 \cdot 9,000,000,000 = 3,600,000,000,000,000$ . Find the value of Column B by writing the numbers in standard form and multiplying:  $600 \cdot 6,000,000,000,000 = 3,600,000,000,000,000$ . Therefore, the quantities in both columns are equal. A short cut for this

problem is to realize that  $4 \cdot 9$  and  $6 \cdot 6$  both equal 36, and  $10^5 \cdot 10^9$  and  $10^2 \cdot 10^{12}$  both equal  $10^{14}$ , so the two quantities are equal.

22. **Answer choice (B) is correct.** When you roll two number cubes, there are six ways you can roll each cube: you can roll a 1, 2, 3, 4, 5 or 6 on each cube. Therefore, there are 36 total ways you can roll both cubes because  $6 \cdot 6 = 36$ . While you could write out all of the possible products for the two cubes, that would take a long time, so we are going to use a shortcut. The product of two odd numbers is odd, the product of two even numbers is even, and the product of an odd and even number is even. Since there is an equal number of even and odd numbers on each number cube, the probability of rolling an even product is greater than the probability of rolling an odd product because there are more ways to roll an even product (even  $\cdot$  even or even  $\cdot$  odd) than there are to roll an odd product (odd  $\cdot$  odd). Therefore, the quantity in Column B is greater than the quantity in Column A.
23. **Answer choice (A) is correct.** When adding a positive number is added to a positive number, the result is greater than both numbers. Therefore, the quantity in Column A is greater than  $x$ . When multiplying a positive number by a number less than 1, the result is less than the number. Therefore, the quantity in Column B is less than  $x$ . Therefore, the quantity in Column A is greater than the quantity in Column B.
24. **Answer choice (B) is correct.** The original price of the laptop is \$800, so find the price on Friday by increasing \$800 by 25%:  $\$800 + 25\% \text{ of } \$800 = \$800 + 0.25 \cdot \$800 = \$800 + \$200 = \$1,000$ . Now find the percent decrease from the price of \$1,000 on Friday to the price of \$800 on Saturday by first finding the decrease in price:  $\$1,000 - \$800 = \$200$ . Now we need to answer the question, the decrease in price (\$200) is what percent of the price on Friday (\$1,000) by setting up and solving the following equation:  $\$200 = \$1000x \rightarrow x = 0.2$ . Change 0.2 into a percent to get 20% for Column A. Therefore, the quantity in Column B is greater than the quantity in Column A.
25. **Answer choice (A) is correct.** Find the quantity in Column A by simplifying the exponents and then finding the difference between the two terms:  $8^2 - 3^2 = 64 - 9 = 55$ . Find the quantity in Column B by finding the difference between 8 and 3 and then raising the result to the 2nd power:  $(8 - 3)^2 = 5^2 = 25$ . Therefore, the quantity in Column A is greater than the quantity in Column B.
26. **Answer choice (B) is correct.** Find the quantity in Column A by multiplying the given equation by 3 on both sides:  $3(x - 4) = 3y \rightarrow 3x - 12 = 3y$ . Therefore, the quantity in Column A is  $3x - 12$ . Since both columns have  $3x$ , but Column B is subtracting a smaller number from  $3x$  than Column A, the quantity in Column B is greater than the quantity in Column A.
27. **Answer choice (C) is correct.** Garret runs at a speed of 6mph, and Charlie runs at a speed of 5mph, so Garret runs 1mph faster than Charlie. This means every hour, Garret runs 1 more mile than Charlie runs. Therefore, if Charlie is 1 mile ahead of Garret, it will take Garret 1 hour to catch up to Charlie, so the quantities in both columns are equal.
28. **Answer choice (A) is correct.** The problem tells us that the average of five numbers is 10. The average of a set of numbers equals the sum of the numbers divided by the number of terms: *average* =

$\frac{\text{sum}}{\text{number of terms}}$ . Therefore, we can find the sum of the five numbers by plugging in 10 for the average and 5 for the number of terms and solving for the sum:  $10 = \frac{\text{sum}}{5} \rightarrow \text{sum} = 50$ . Now we know the sum of the first five numbers is 10, and we are adding another number to the set to get an average of 12. Let the number added to the set equal  $x$ , and set up and solve the following equation using the average equation above:  $12 = \frac{50+x}{6} \rightarrow 72 = 50 + x \rightarrow x = 22$ . Therefore the quantity in Column A is greater than the quantity in Column B.

29. **Answer choice (D) is correct.** Because histograms do not show exact data points, we cannot determine the mean or mode. Therefore, the relationship between the two quantities cannot be determined from the information given.
30. **Answer choice (A) is correct.** There are three odd numbers (1, 3, 5) and two numbers that are no less than 4 (4, 5). Since there are more odd numbers than numbers no less than four, the probability of choosing an odd card is greater than the probability of choosing a number no less than 4, so the quantity in Column A is greater than the quantity in Column B.
31. **Answer choice (B) is correct.** Find the quantity in Column A by using the equation for the area of a circle,  $A = \pi r^2$ . Plug in  $36\pi$  for the area and solve for the radius:  $36\pi = \pi r^2 \rightarrow 36 = r^2 \rightarrow r = 6$ . Find the quantity in Column B by using either equation for the circumference of a circle,  $C = 2\pi r$  or  $C = \pi d$ . The second equation is easier to use for this problem since we are solving for the diameter, so plug in  $12\pi$  for the circumference and solve for the diameter:  $12\pi = \pi d \rightarrow d = 12$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
32. **Answer choice (A) is correct.** For this problem, we can use the quantity in Column B to determine the relationship between Column A and Column B. Let's assume the value of Hank's nickels is the value of Column B, \$0.50. One nickel is worth \$0.05, so find the number of nickels Hank has by dividing \$0.50 by \$0.05 to get 10 nickels. The problem says Hank has twice as many nickels as he does dimes, so if he has 10 nickels, he has 5 dimes. One dime is worth \$0.10, so find the value of Hank's dimes by multiplying \$0.10 by 5 to get \$0.50. Finally find the total value of Hank's dimes and nickels by adding \$0.50 and \$0.50 to get \$1.00. Since the problem says Hank has \$1.20 in total, but using the quantity in Column B we only got a total of \$1.00, we know there has to be more nickels, so the quantity in Column A is greater than the quantity in Column B. We could have also set up and solved the following equation, where  $d$  represents the number of dimes Hank has:  $0.10d + 0.05(2d) = 1.20 \rightarrow 0.10d + 0.10d = \$1.20 \rightarrow 0.20d = 1.20 \rightarrow d = 6$ . Since Hank has 6 dimes, he has 12 nickels, and the value of 12 nickels is  $12 \cdot \$0.05 = \$0.60$ .
33. **Answer choice (D) is correct.** While we know that point C is the midpoint of AB, we do not know where point D is placed. It could be placed between A and C, which would mean the distance between points A and D is less than the distance between points A and C. It could also be placed between points C and B, which would mean the distance between points A and D is greater than the distance between points A and C. Therefore, the relationship between the two quantities cannot be determined from the information given.

34. **Answer choice (B) is correct.** Since the triangles are similar, their corresponding sides are proportional. Since YZ is half of BC, XZ is half of AZ and XY is half of AB. Therefore, XZ has a length of 7 inches, and AB has a length of 6 inches, so the quantity in Column B is greater than the quantity in Column A.
35. **Answer choice (C) is correct.** First the quantity in Column A. The area of a rectangle is equal to the length times the width:  $6 \text{ m} \cdot 14 \text{ m} = 84 \text{ m}^2$ . Find the quantity in Column B. The formula for the area of a triangle is  $A = \frac{1}{2}bh$ , so plug in 12 meters for  $h$  and 14 meters for  $b$  and simplify to find the area:  $A = \frac{1}{2}(12 \text{ m})(14 \text{ m}) \rightarrow A = 84 \text{ m}^2$ . Therefore, the quantities in both columns are equal.
36. **Answer choice (C) is correct.** Find the quantity in Column A:  $60\% \text{ of } 0.4 = 0.6 \cdot 0.4 = 0.24$ . Find the quantity in Column B:  $80\% \text{ of } 0.3 = 0.8 \cdot 0.3 = 0.24$ . Therefore, the quantities in both columns are equal.
37. **Answer choice (A) is correct.** There are 10 green marbles and 14 marbles that are NOT green (6 red + 8 blue = 14 non-green marbles). Since there are more marbles that are NOT green than there are green marbles, the probability of choosing two marbles that are NOT green is greater than the probability of choosing two marbles that are green. Therefore, the quantity in Column A is greater than the quantity in Column B.

## Reading Comprehension

1. The passage talks about the origin of the term ‘Dark Ages’, who came up with the term, and around which time in history. It also talks about why modern scholars no longer use it and goes on to explain in detail that the term is misleading because, as stated in lines 45 through 46, “civilizations were flourishing in other parts of the world”. We can therefore conclude that the main idea of the passage is to elaborate upon the topic of the “Dark Ages”, **so choice (D) is the correct answer.** While the fall of the Roman Empire is mentioned, the reasons for its fall are not given, so choice (A) is incorrect. Some activities that took place between 500 and 1000 AD are mentioned, but other periods before and after that period are mentioned too. For example, in lines 4 through 10, “The period that followed the fall of the Roman Empire, from the 6th to 15th centuries, was known for much of history as the “Dark Ages”. The Mongol invasions of the 13th and 14th centuries are mentioned in lines 64 to 65. Therefore choice (B) is incorrect. Choice (C) is incorrect because while the passage states in lines 46 through 48, “The Mayan civilization was one of the most advanced peoples in the world during this period,” this was only a small part of the passage, not the main focus.
2. Choice (A) is incorrect because the passage says in lines 38 through 40 “Algebra and the quadratic equation were invented in Asia during this period.” In lines 48 through 50, the passage says “Their civilization was at its height for roughly 600 years in the middle of the Dark Ages.” The civilization is the Mayan civilization so Choice (B) is incorrect. The Justinian Plague is not one of the reasons the “Dark Ages” are now considered lighter than modern scholars had first thought. It is given as one of the mass casualty events that took place during this period as stated in lines 56 through 60. **This makes choice (C) the correct answer.** Answer (D) is incorrect because in lines 26 through 38, the

passage states, “Emperor Justinian actually expanded the territory of the East Roman Empire, taking back North Africa and large parts of Italy.”

3. In the last paragraph, the author says that although war and famine were common during the ‘Dark Ages’ there were still many technological advancements all over the world. In lines 19 through 20 the passage clearly states most modern scholars don’t use the term anymore and says the term “ is misleading for two general reasons.” The two reasons given are that there was quite a lot of activity going on in Western Europe and civilizations were flourishing in the rest of Europe. We can conclude the author thinks the term the “Dark Ages” is outdated and misleading, **so choice (A) is correct.**
4. Lines 10 and 11 pose the question “Where exactly does the term “Dark Ages” come from?” The author then spends the following paragraphs explaining where the term comes from and why the term is misleading. There is also an explanation of why the term might have been used, which is the catastrophic events that took place during the period. The last paragraph explains that regardless of its inception, the “Dark Ages” were anything but. Meaning, regardless of the origin of the term, the period was not as dark as scholars had initially thought it to be. We can therefore say the word inception means origin, **so choice (A) is correct.**
5. In line 19, the author says modern scholars have all but stopped using the term entirely and then goes ahead to say the term ‘Dark Ages’ is misleading. The author gives two reasons why it’s misleading but also explains why it might have been used, and that is because of the many unfortunate events that took place in the world at the time. The phrase “all but stopped” here is used to mean modern scholars hardly ever use the term because it is misleading since a lot of positive things were happening during the time, even though there were a lot of misfortunes. **Therefore, answer choice (C) is correct.**
6. The second to last paragraph starts by saying, “One reason for the phrase “Dark Ages” may be attributed to the mass casualty events that took place during this period.” It then lists these events that took place both in Europe and elsewhere in the world. This paragraph is used to show where the term “Dark Ages” came from, **so answer choice (D) is correct.**
7. The passage informs the reader about the different adaptations that make an owl an owl. These adaptations help the owl hunt for food. For example, owls have a huge round face that has a round pattern of feathers; the feathers act like a satellite dish that directs the slightest sound to the owl’s ears. Another example is that owl’s ears are asymmetrical to help pinpoint the exact origin of a sound. Owls also have eyes highly attuned to night vision because they hunt at night, and their flight is near silent so their prey doesn’t hear them coming. We can therefore conclude the main purpose of the passage is to detail some of the adaptations that owls have evolved, **so answer choice (B) is correct.** Choice (A) is incorrect because the passage is not about why owls are evolved; it is about which adaptations they have evolved. Choice (C) is not correct because the passage is not about just the appearances, but how the appearances are useful as adaptations. Choice (D) is also incorrect because although hunting at night is mentioned, that is not the primary focus of the passage.

8. According to the passage, owls have many more rods than cones in their eyes to help them see the slightest contrasts of light while hunting at night, as mentioned in lines 26 through 28. **Therefore answer choice (B) is correct.**
9. Line 23 says the eyes of owls are highly attuned to night vision. Lines 26 through 28 go on to explain that owls have many more rods than cones so that they can detect the slightest contrasts of light while hunting at night, meaning that these characteristics of their eyes help them see better at night. We can therefore conclude “attuned” is used to mean the eyes of owls are highly adapted to night vision because of the increased rods, **so the correct answer is choice (D).**
10. Paragraph 5 provides information about owls’ flight, which is described as near-silent. The flight is silent entirely thanks to their feathers, which are soft and velvety. This softness helps to cushion the air as it passes over their wings, resulting in the quiet nature of an owl’s flight. In summary, the soft feathers minimize friction, making the flight quieter, **so the correct answer is choice (B).**
11. Owls are described as having quiet flight, and they rely on their ears to listen to the slightest noises of mice moving in the underbrush. We can conclude that they are mostly quiet and stealthy animals. They also hunt at night when most people are asleep, so it’s not easy to see them. However, in the last paragraph, the passage details two ways owls can be seen. One, by going out and listening at night when they are most vocal, especially during the spring and summer. Two, looking for owl pellets during the day. The main purpose of this paragraph is to provide the reader with ways to spot owls, or give an actionable item for the reader, **so answer choice (D) is correct.**
12. Lines 44 through 45 say that the stealthy nature of owl flight helps make sure that their prey does not hear them coming. Before that, the passage says the other advantage of the quiet nature of their flight is that it does not mask the sound of their prey moving below them. So after hearing the prey and pinpointing the prey’s exact location, the owls need to move quietly and sneakily towards the prey so the prey does not hear them coming and run. Therefore, the word stealthy here means sneaky, **so answer choice (C) is correct.**
13. The passage begins by listing popular games most people think of when they think of the Winter Olympics. It then mentions in lines 8 through 9, “One exciting sport likely wasn’t on many people’s radars until recently: curling.” Saying the sport likely wasn’t on many people’s radar means this game was not as well known as the sports listed in lines 3 through 7 until recently, which implies that in recent years more people have heard about curling. **Therefore, the correct answer is (A)**
14. Lines 23 and 24 say curling is typically played by a team of four. Line 24 goes on to detail that the team is comprised of a skip (captain) and three sweepers. We can conclude that the word “comprised” is used to mean the team is made up of a skip and three sweepers, **so the correct answer is choice (A).**
15. Paragraph 4 says that after the stone is pushed down the ice, the other three players are allowed to sweep the ice in front of the stone. According to lines 37 to 39, “This makes the ice every-so-slightly smoother, which causes the stone to go farther.” Making the ice smoother reduces friction between the ice and the stone, making the stone go farther. **Therefore the correct answer is choice (B).**

16. Lines 46 through 48 state that points are only awarded to the team that has their stone the closest to the center. The second-to-last paragraph then gives an example of how the points would be awarded in a specific situation, so the point of this paragraph is to give an example of how curling is scored. **Therefore, the correct answer is choice (B).**
17. In the third paragraph, the author says that one can think of curling as a mixture between bocce ball, shuffleboard, chess, and hockey. Lines 54 through 57 also say that curling is not just about trying to slide each stone as close as possible, it's about setting up moves for several turns in the future, similar to chess. So the author thinks the strategy of chess (setting up moves for several turns in the future) can be applied to curling. **Therefore the correct answer is (D).**
18. Lines 42 through 43 say the scoring method of curling makes it a very exciting game to watch. There are no different amounts of points awarded for how close a specific game piece is to the middle. Instead points are awarded to the team that has their stone closest to the center. It's possible for a team to have 5 stones in the center and another team to have just one in the center. If the team that has one stone has their stone closest to the center, they win that round. Therefore, one stone can determine the winner of each round, **so the correct answer is choice (A).**
19. The passage starts out with the grandma telling Conor that it takes six ingredients to work your way into someone's heart. Conor then details how the grandma uses the six ingredients to make biscuits, including steps in making them. The grandma includes some tips and opinions about life during the process of making biscuits; for example, "people are always rushing nowadays", and "Rushing and biscuit makin' don't go together." The two started making biscuits together when Conor was young, and they've bonded while making the biscuits over the years. At the end of the passage, Conor remembers his grandma by making biscuits using this same recipe during her funeral, showing that Conor and his grandma had a very special relationship. The primary purpose of the passage is to discuss the importance of a specific recipe to a relationship, **so answer choice (B) is correct.** Choice (A) is incorrect because it excludes the recipe. Choice (C) is incorrect because the purpose of the passage is not to instruct the reader on how to make biscuits. The instructions are not the main focus of the story; the author simply seeks to inform the reader about the process Conor's grandma followed while making biscuits. Choice (D) is incorrect because the passage only talks about one specific activity, biscuit making, not different activities that Conor did with his grandma.
20. In lines 15 through 19, Conor fetches the butter from the fridge after letting it cool for 15 to 20 minutes, then unwraps it as his nana combines the flour, baking powder, sugar and salt. The grandma asks for the butter after it's been unwrapped. In lines 23 through 24, the passage says, "This is the point in biscuit creation that tips the scale from science to art." The passage then goes on to detail how the butter is added to the flour mixture. Therefore, we can conclude the point that tips the scale from science to art is the careful process of adding the butter to the dough, **so answer choice (B) is correct.**
21. In lines 46 to 49, the narrator says. "First, you have to squish the dough out to about an inch thick, but under no circumstance should you ever use a rolling pin." "Under no circumstance should you ever use a rolling pin" is a warning to the reader to never use a rolling pin, **so answer choice (C) is correct.**
22. The passage is written by Conor, who is telling stories about him and his grandma making biscuits together. At the end of the passage, Conor makes biscuits for his grandma's funeral as a way to remember her and the memories they shared making biscuits together. Therefore, Conor is fondly reminiscing on the past, so the tone of the passage is nostalgic. **Therefore, answer choice (A) is**

**correct.**

23. The second-to-last paragraph talks about how Conor’s grandma said, “I know the recipes call for 475 and 12 and a half minutes, but that’s too complicated. 10 minutes on 500 and they’ll be golden brown.” The author then says he suspects his grandma had a penchant for slightly overcooked biscuits. This means that although she always said the biscuits would be golden brown, she would let them cook a little more because she preferred slightly overcooked biscuits over what the recipe called for, so penchant means preference. **Therefore, answer choice (B) is correct.**
24. In the last paragraph, Conor is still thinking about his grandma when his Mom calls out to him and tells him they have five minutes before they have to leave. Conor pulls out the biscuits from the oven and places them on a serving platter, thinking that although biscuits are not a common food during funerals, his Nana would have been happy about him choosing to make the biscuits. Therefore, the passage ends with Conor making biscuits during his grandma’s funeral, **so answer choice (C) is correct.**
25. The passage talks about a massive lake found in southern California called the Salton Sea. It explains that the sea was formed after a flood broke a poorly constructed irrigation scheme in the Salton sink. After the irrigation canals were repaired, the lake didn’t evaporate as expected, and soon became a tourist destination in the California desert. However, it soon became too salty for marine life, and the tourist destination that once thrived became a ghost town destination. Based on this, we can conclude that the main purpose of the passage is to provide a brief overview of the Salton Sea, **so answer choice (A) is correct.** Answer choice (B) is incorrect because the reason why the Salton sea was a tourist destination is only one of the many details provided in the passage. Answer choice (C) is incorrect because although the Salton Sea is a ghost lake, there are other details about how it came about and thrived that this choice leaves out. Answer choice (D) is incorrect because the passage does not mention anything about returning the Sea to its original glory.
26. Paragraphs 2 and 3 say that in 1905, the American West experienced heavy rains which channeled into the Colorado River and resulted in a flood. The flood broke the poorly constructed irrigation system, and for two years the Colorado River poured into the Salton Basin where there was no exit. By the time the canals were repaired and the River continued its normal course, a brand new lake had already formed in the Salton Basin. Therefore, the lake was formed as a result of human error as stated in lines 7 through 9, and the error was the poorly constructed irrigation system in the Salton Sink. **Therefore, answer choice (D) is correct.**
27. The passage lists events in chronological order (in order of time), from the time farmers constructed an irrigation scheme, to when the Colorado River flooded and broke the irrigation scheme, to when the waters flowed in the Salton Basin without an exit and formed the Salton Sea. It details how the sea became a tourist destination, how the sea became too salty to support marine life and slowly died, and its current state – a ghost town destination. We can conclude that the passage is organized in chronological order, **so answer choice (C) is correct.**
28. The fourth paragraph says, “To everyone’s surprise, the Salton Sea did not disappear in the years that followed.” This is after the Colorado River continued after its normal course. Many assumed that because the only input into the lake was rainfall and runoff, the lake would rapidly evaporate. Instead,



the lake persisted and became an oasis in the California desert. From this, we can assume some people thought the Sea would disappear shortly after 1905, **so answer choice (C) is correct.**

29. Lines 35 through 40 say that by the 1950s, enough of the salts in the ground had dissolved into the lake to make it about as salty as the ocean. This led people to stock the lake with marine fish that could be caught by tourists. We can conclude that new populations of marine fish started to exist where none existed before, so there was a spike in the population of marine fish for a period of time. **Therefore, answer choice (B) is correct.**
30. Lines 34 through 35 say that the lake persisted and became an oasis in the California desert. In the preceding lines, the passage talks about how people were surprised when the Sea did not dry up because they had assumed it would evaporate and disappear shortly after the Colorado River resumed its normal course. Instead, it stuck around and continues to exist to date. Therefore, “persisted” most nearly means stuck around, **so answer choice (A) is correct.**
31. The passage starts by informing us about the colossal scale of the Great Barrier Reef, which is so large that it can be seen from space. It goes on to provide information about the reef, including that it is made up of 3000 individual coral reefs and is a combined effort between algae and corals. It explains the symbiotic relationship between the algae and corals and how this relationship is endangered by climate change, which leads to coral bleaching and a decline in the health of the Great Barrier Reef. It concludes by saying that unless we can stop the effects of climate change, we will continue to lose parts of the Great Barrier Reef. Therefore, the main theme of the passage centers around the health of the Great Barrier Reef, **so answer choice (C) is correct.** Answer choice (A) is incorrect because the passage does not mention different methods to stop the bleaching of corals. Answer choice (B) is incorrect because the different species that live in the reef are only briefly mentioned in the last paragraph, so this is not the main theme of the passage. Answer choice (D) is incorrect because while the symbiotic relationship between algae and corals is explained in the passage, the purpose of mentioning it is to explain how climate change is detrimental to this relationship, which leads to coral bleaching and a decline in the health of the Great Barrier Reef.
32. Lines 6 through 7 state, “This reef is the largest single structure constructed by living creatures ...” This shows us that the Great Barrier Reef was constructed by creatures not by humans. Lines 49 through 51 state, “The Great Barrier Reef is an incredible source of biodiversity, and it is entirely dependent on the coral.” Therefore, we can assume that the Great Barrier Reef was constructed by corals, **so answer choice (A) is correct.**
33. The second paragraph says that corals and algae have a symbiotic relationship. Lines 15 through 17 describe a symbiotic relationship as a relationship where “both organisms benefit from living together.” Therefore, for a relationship to be symbiotic, both organisms must be benefiting from the relationship. In answer choice (D), both the whale and the small fish benefit from each other: the whale gets bugs cleaned off of its skin, and the small fish gets food. **Therefore, answer choice (D) is correct.**

34. Lines 9 through 11 state, “The Great Barrier Reef is a conglomeration of almost 3000 individual reefs loathed off the northeast coast of Australia.” From the first paragraph, we already know that the reef is so huge that it can be seen from space, so we can assume that the reason the reef is so large is because it is made up of a combination of individual reefs. Therefore, the word conglomeration most nearly means combination or assortment, **so answer choice (D) is correct.**
35. Lines 40 through 48 discuss coral bleaching and its impact. Lines 46 through 48 state, “The coral is also much more susceptible to disease and provides little habitat to the surrounding marine life.” This means that coral bleaching causes coral to be more susceptible to disease, which results in the coral providing less habitat to the surrounding marine life. Therefore, coral bleaching disrupts the habitat and life of other marine organisms, **so answer choice (C) is correct.**
36. Lines 36 through 39 state, “As the oceans become warmer and more acidic, corals become more stressed. This leads to the coral expelling the algae from their tissues. Lines 41 through 42 say, “Once the algae leave, all that’s left is the white of the coral skeleton.” From this, we can assume that when coral expels algae, the algae leaves the coral. Therefore, the algae is eliminated from the coral’s tissues, so expelling most nearly means eliminating. **Answer choice (B) is correct.**

### **Mathematics Achievement**

- Answer choice (A) is correct.** When subtracting large numbers, stack the numbers on top of each other and line up the digits. Then subtract straight down, borrowing when necessary. To see a step-by-step solution of this problem, follow this link and type in the problem: [how to subtract large numbers](#)
- Answer choice (D) is correct.** The factors of 39 are 1, 3, 13, 39. The factors of 45 are 1, 3, 5, 9, 15, 45. The factors of 54 are 1, 2, 3, 6, 9, 18, 27, 54. 61 is a prime number, so its only factors are 1 and itself.
- Answer choice (D) is correct.** Plug  $-3$  in for  $x$  in the given equation and solve for  $y$ :  $5(-3) = -9y \rightarrow -15 = -9y \rightarrow y = \frac{15}{9} \rightarrow y = \frac{5}{3}$ .
- Answer choice (B) is correct.** The price of the ticket after a 25% increase was \$600. Therefore, \$600 is 125% of the price of the ticket on Monday. Find the price of the ticket on Monday by setting up and solving an equation that represents the question, “\$600 is 125% of what number?”:  $600 = 1.25x \rightarrow x = 480$ . Therefore, the price of the ticket on Monday was \$480.
- Answer choice (B) is correct.** Set up and solve the following proportion, where  $c$  represents the cost of purchasing 5 Honeycrisp apples:  $\frac{24}{20} = \frac{c}{5} \rightarrow \frac{6}{5} = \frac{c}{5} \rightarrow 30 = 5c \rightarrow c = \$6.00$ .
- Answer choice (D) is correct.** Two events are said to be complementary when one event occurs if and only if the other does not. The probabilities of two complementary events add up to 1. Since there

are cards numbered 1, 2, 3, 4 and 5, the probability of choosing an odd number is  $\frac{3}{5}$  and the probability of choosing an even number is  $\frac{2}{5}$ . Since  $\frac{3}{5} + \frac{2}{5} = 1$ , the two events are complementary.

7. **Answer choice (A) is correct.** As the number of hours,  $h$ , increases by 1, the number of pages Toby has left to write,  $P$ , decreases by 0.75. Therefore, every Toby writes 0.75 pages every hour. You can verify this by plugging in different values of  $h$  and solving for  $P$ . For example, plug in 0 for  $h$  and  $P$  equals 25. Plug in 1 for  $h$  and  $P$  equals 24.25. Plug in 2 for  $h$  and  $P$  equals 23.50. This shows that every hour, Toby writes 0.75 pages.
8. **Answer choice (A) is correct.** To find the slope, change the equation into  $y = mx + b$  form where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept:  $5x + 2y = 8 \rightarrow 2y = -5x + 8 \rightarrow y = -\frac{5}{2}x + 4$ . Therefore, the slope of the line is  $-\frac{5}{2}$ .
9. **Answer choice (A) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. To write 0.00068 in scientific notation, change it into a decimal that is between 1 and 10: 0.00068 becomes 6.8. To get from 6.8 to 0.00068, we need to move the decimal point 4 times to the left. Therefore, we can write 0.00068 as  $6.8 \times 10^{-4}$ .
10. **Answer choice (C) is correct.** Plug 6 inches in for  $s$  and 8 inches in for  $h$  in the given equation and simplify to find the volume:  $V = \frac{1}{3}(6 \text{ in})^2(8 \text{ in}) \rightarrow V = \frac{1}{3}(36 \text{ in}^2)(8 \text{ in}) \rightarrow V = 96 \text{ in}^3$
11. **Answer choice (C) is correct.** Since the square root of  $x = 4$ , then  $x = 16$  because  $4^2 = 16$ .
12. **Answer choice (D) is correct.** The perimeter of a square can be found by adding up all four sides. Since all sides of a square are congruent, the perimeter can also be found by multiplying the side length by 4. Therefore, we can find the side length of the square by dividing the perimeter of 36 inches by 4 to get a side length of 9 inches. Find the area of the square by squaring the side length:  $(9 \text{ in})^2 = 81 \text{ in}^2$
13. **Answer choice (C) is correct.** On this stem-and-leaf plot, the stem column represents the tens digit of the number, and the leaf column represents the ones digit. For example, the last row of our stem-and-leaf plot represents 91%, 96%, and 99%. The median of a set of data is the middle number when the numbers are lined up from least to greatest. A stem-and-leaf plot arranges the data in order from least to greatest, so we can easily find the middle number. Since there are 17 numbers, the middle number will be the 9th number which is 84%.
14. **Answer choice (D) is correct.** We know the number of people who chose breakfast and the number of people who chose dinner are equal, so answer choice (B) is incorrect. 40% is not two times 30%, so the number of people who chose lunch is not twice the number of people who chose breakfast. Therefore, answer choice (A) is incorrect. The ratio of 40% to 30% is 40:30 which simplifies to 4:3, so we can check answer choices (C) and (D) by finding the ratio of lunch to breakfast in each answer

choice. For answer choice (C), the ratio of lunch to breakfast is 16:9 which cannot be simplified. Therefore, answer choice (C) is incorrect. For answer choice (D), the ratio of lunch to breakfast is 12:9 which simplifies to 4:3, so answer choice (D) is correct.

15. **Answer choice (B) is correct.** Simplify the expression using PEMDAS. Perform the operation in the parentheses first to get  $\frac{20(120)}{3}$ . Next you can divide 20 by 3, divide 120 by 3, or multiply 20 and 120. It's easiest to divide 120 by 3 first to get  $20 \cdot 40$ . Finally, multiply 20 by 40 to get 800.
16. **Answer choice (C) is correct.** Jim spends  $d$  dollars on lunch on Monday, Tuesday, and Wednesday, so after this, he has  $j - d - d - d$  dollars left which simplifies to  $j - 3d$  dollars. His mom gives him 15 dollars, so after this, he has  $j - 3d + 15$ .
17. **Answer choice (A) is correct.** Since the rectangles are similar, their corresponding sides are proportional. Set up and solve the following proportion to find the length of EH:  $\frac{9}{27} = \frac{7}{EH} \rightarrow 9EH = 27 \cdot 7$ . To solve the problem more quickly do not multiply 27 and 7. Instead, divide both sides by 9 first:  $EH = \frac{27 \cdot 7}{9}$ . Now divide 27 by 9 and then multiply the result by 7:  $EH = 3 \cdot 7 = 21$  ft.
18. **Answer choice (C) is correct.** An equilateral triangle is a triangle with three equal sides and three equal angles. The sum of the angles in any triangle is  $180^\circ$ , so the measure of each angle in an equilateral triangle is  $60^\circ$ . An obtuse triangle is a triangle with one obtuse angle (an angle that has a measure greater than  $90^\circ$ ). Therefore, an equilateral triangle can never be obtuse because every angle in an equilateral triangle is  $60^\circ$  which is not obtuse.
19. **Answer choice (B) is correct.** The percent of students at the high school that are girls who play sports is equal to 80% of  $\frac{4}{10}$ , so we need to find 80% of  $\frac{4}{10}$ :  $80\% \text{ of } \frac{4}{10} = 0.8 \cdot \frac{4}{10} = 0.8 \cdot 0.4 = 0.32 = 32\%$ .
20. **Answer choice (B) is correct.** Using the point located at (2, 7.5) we know that Lydia walked 7.5 miles in 2 hours. Find her speed in miles per hour by dividing 7.5 miles by 2 hours to get a speed of 3.75 mph.
21. **Answer choice (D) is correct.** First get rid of the 5 in the denominator by multiplying both sides of the equation by 5 to get  $2x = 5(10y - 20)$ . Distribute the 5 on the right side of the equation to get  $2x = 50y - 100$ . Finally, add 100 to both sides of the equation to get  $2x + 100 = 50y$ .
22. **Answer choice (C) is correct.** The mode of a data set is the number that appears the most. The frequency chart shows us how many students have 1, 2, 3, 4, 5 or 6 classes. If we wrote the data out, we would get one 1, four 2s, three 3s, five 4s, three 5s, and two 6s. Therefore, the number that appears the most is 4, so the mode of the data is 4.
23. **Answer choice (C) is correct.** Since the data set has an even number of numbers, the median will be the average of the middle two numbers. Since no two numbers are the same, the middle two numbers

cannot both be 18: they must be two different numbers that have an average of 18. Therefore, none of the numbers are 18.

24. **Answer choice (C) is correct.** To find the probability of a given event, divide the number of favorable outcomes by the number of total outcomes. There are 20 black or red cards (5 black + 15 red = 20 black or red), so there are 20 favorable outcomes. There are a total of 30 cards (5 black + 10 white + 15 red = 30 total cards), so there are 30 total outcomes. Therefore, the probability of choosing a black or red card is  $\frac{20}{30}$  or 20 out of 30. This simplifies to 2 out of 3.
25. **Answer choice (D) is correct.** The formula for the area of a triangle is  $A = \frac{1}{2}bh$ . Plug in 72 cm for  $A$  and 9 cm for  $b$  and solve for  $h$ :  $72 = \frac{1}{2}(9)h \rightarrow 8 = \frac{1}{2}h \rightarrow h = 16$  cm.
26. **Answer choice (D) is correct.** To find the least common multiple (LCM) of a set of numbers, write out the first 6 multiples of each number and see if there are any common multiples. Multiple of 15: 15, 30, 45, 60, 75, 90. Multiples of 6: 6, 12, 24, 36, 48, 60. Multiples of 12: 12, 24, 36, 48, 60, 72. The smallest multiple 15, 6, and 12 have in common is 60, so 60 is the LCM of 15, 6, and 12.
27. **Answer choice (A) is correct.** Solve the equation by first cross multiplying, and then isolating  $p$ :  
$$\frac{p-2}{p} = \frac{4}{3} \rightarrow 3p - 6 = 4p \rightarrow -6 = p.$$
28. **Answer choice (B) is correct.** Brendan's speed is kilometers per hour, and the distance is in meters. Therefore, we need to change the distance into kilometers: to change 6000 meters into kilometers, divide by 1000 to get 6 km. Now find the number of hours it takes Brendan to ride 6 km by using the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Plug in 6 km for  $d$  and 30 km/hr for  $r$  and solve for  $t$ :  $6 = 30t \rightarrow t = 0.2$  hours. Finally, change 0.2 hours into minutes by multiplying by 60 because there are 60 minutes in an hour:  $0.2 \cdot 60 = 12$  minutes.
29. **Answer choice (C) is correct.** The circle is cut into 8 equal slices, so find the area of each slice by dividing the total area by 8:  $24 \text{ cm}^2 \div 8 = 3 \text{ cm}^2$ . There are three shaded slices, so find the shaded area by multiplying the area of each slice by 3:  $3 \text{ cm}^2 \cdot 3 = 9 \text{ cm}^2$ .
30. **Answer choice (B) is correct.** The sum of the angles in any triangle is  $180^\circ$ , so set the sum of the three angles equal to  $180^\circ$  and solve for  $x$ :  $2x^\circ + x^\circ + 90^\circ = 180^\circ \rightarrow 3x^\circ + 90^\circ = 180^\circ \rightarrow 3x^\circ = 90^\circ \rightarrow x = 30$ .
31. **Answer choice (B) is correct.** First get  $2a$  and  $2b$  on the same side of the equation:  $2a - 4 = 2b + 6 \rightarrow 2a = 2b + 10 \rightarrow 2a - 2b = 10$ . Now divide both sides of the equation by 2 to get  $a - b = 5$ .
32. **Answer choice (A) is correct.** When a point is reflected across the  $x$ -axis, the  $x$ -coordinate of the point stays the same and the sign of the  $y$ -coordinate changes. Point B has coordinates (1, 3), so when it is reflected across the  $x$ -axis it becomes (1, -3).

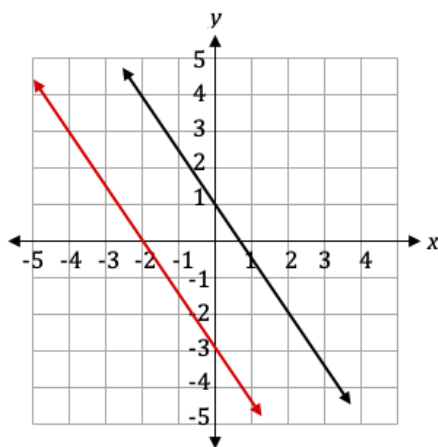
33. **Answer choice (C) is correct.** Round 62,870 up to 63,000 and round 89 up to 90. Divide 63,000 by 90 to get 700. Multiply 700 by 20 to get 14,000.
34. **Answer choice (B) is correct.** To find a percent of a number, change the percent into a fraction or decimal and then multiply:  $0.1\%$  of  $600 = 0.001 \cdot 600 = 0.6$
35. **Answer choice (D) is correct.** After Sam buys 5 highlighters, she has 5 *more* highlighters. Therefore, she has  $x + 5$  highlighters. If she gives half of her highlighters to her best friend, then she has half of her highlighters remaining. Therefore, she has  $\frac{1}{2}(x + 5)$  highlighters remaining, so  $y = \frac{1}{2}(x + 5)$ .
36. **Answer choice (C) is correct.** To change a mixed number into a percent, first change the mixed number into a decimal. Start by dividing the numerator of the fraction part by the denominator of the fraction part:  $1 \div 4 = 0.25$ . Add this to the whole number part:  $1 + 0.25 = 1.25$ . Now change the decimal into a percent by moving the decimal point two places to the right:  $1.25 = 125\%$ .
37. **Answer choice (C) is correct.** We can rewrite the given expression as  $\frac{3}{4} \div \left(\frac{4}{5} - \frac{1}{2}\right)$ , so perform the subtraction first:  $\frac{4}{5} - \frac{1}{2} = \frac{8}{10} - \frac{5}{10} = \frac{3}{10}$ . Now we have  $\frac{3}{4} \div \frac{3}{10}$ . Divide the fractions by multiplying the first fraction by the reciprocal of the second fraction,:  $\frac{3}{4} \div \frac{3}{10} = \frac{3}{4} \cdot \frac{10}{3} = \frac{30}{12} = \frac{5}{2} = 2\frac{1}{2}$
38. **Answer choice (A) is correct.** We want to find the number of square feet of glass Veronica needs to purchase, so we need to change 6 feet 3 inches into feet. There are 12 inches in 1 foot, so change 3 inches into feet by dividing 3 by 12:  $3 \div 12 = 0.25$ . Therefore, 6 feet 3 inches equals 6.25 feet. Find the number of square feet of glass Veronica needs by finding the area of the triangle using the formula  $A = \frac{1}{2}bh$ :  $A = \frac{1}{2}(6.25 \text{ ft})(4 \text{ ft}) = 12.5 \text{ ft}^2$ .
39. **Answer choice (A) is correct.** From the first element to the second element, two dots were added on the right. From the second element to the third element, three dots were added on the top. From the third element to the fourth element, three dots were added on the right. From the fourth element to the fifth element, four dots were added on the top. Therefore, the pattern alternates between added dots on the top and right of the rectangle. The number of dots added is equal to the number of dots in each row of the previous figure if we are adding dots to the top or the number of dots in each column of the previous figure if we are adding dots to the right. Therefore, to get from the fifth to the sixth element, add four dots on the right to get the figure in answer choice (A).
40. **Answer choice (C) is correct.** The surface area of any 3D figure is equal to the sum of the area of each face. The right and left areas are each  $5 \text{ cm} \cdot 5 \text{ cm} = 25 \text{ cm}^2$ , and the top, bottom, front, and back area are each  $5 \text{ cm} \cdot x \text{ cm} = 5x \text{ cm}^2$ . Therefore, the total surface area equals  $25 + 25 + 5x + 5x + 5x + 5x = 50 + 20x \text{ cm}^2$ . Set this equal to  $450 \text{ cm}^2$  and solve for  $x$ :  $50 + 20x = 450 \rightarrow 20x = 400 \rightarrow x = 20$ .
41. **Answer choice (B) is correct.** Find the number of cups Allison pours into small glasses by multiplying 2 cups by 6 to get 12 cups. Find the number of cups Allison pours into large glasses by multiplying 3 cups by 4 to get 12 cups. Add the results to get that Allison poured a total of 24 cups.

There are 16 cups in a gallon, so find the total number of cups of juice in the carton by multiplying 16 by 2.5 to get 40 cups. Find the number of cups Allison has remaining after pouring 24 cups into the small and large glasses by subtracting 24 from 40 to get 16 cups remaining. Finally, find the number of small glasses Allison can pour by dividing 16 remaining cups by 2 cups in each small glass:  $16 \div 2 = 8$  small glasses.

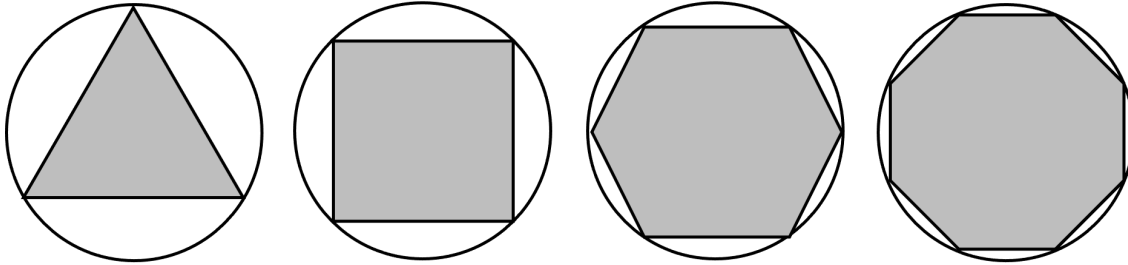
42. **Answer choice (A) is correct.** To find the probability of multiple events, multiply the probability of each event. There are 6 total chips, 2 of which are green, so the probability of Rohan choosing a green chip is  $\frac{2}{6} = \frac{1}{3}$ . There are 6 total marbles, 1 of which is green, so the probability of Rohan choosing a gold marble is  $\frac{1}{6}$ . Find the probability of Rohan choosing a green chip and a gold marble by multiplying the two probabilities:  $\frac{1}{3} \cdot \frac{1}{6} = \frac{1}{18}$

43. **Answer choice (C) is correct.** First we need to find the estimated number of hours it will take Victoria to create enough signs to sell at the craft fair. To do this, we need to multiply the number of days that the fair will run by the estimated number of signs Victoria sells per day, and then multiply the result by the number of hours it takes her to create each sign. The craft fair runs for 5 days, and Victoria expects to sell 10 to 20 signs per day, so we will estimate that she sells 15 signs per day because 15 is the middle of 10 and 20. It takes Victoria 6 to 10 hours to create each sign, so we will estimate that it takes her 8 hours to create each sign because 8 is the middle of 6 and 10. Multiply the three values:  $5 \cdot 15 \cdot 8 = 600$  hours. Now that we've estimated it will take Victoria 600 hours to create each sign, we can find the estimated number of weeks by dividing the 600 hours by the 40 hours per week that Victoria works:  $600 \div 40 = 15$  weeks.

44. **Answer choice (A) is correct.** First find the slope of line  $p$ . Line  $p$  passes through the points  $(2, -2)$  and  $(0, 1)$ , so find the slope using the equation  $slope = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point:  $slope = \frac{-2 - 1}{2 - 0} = -\frac{3}{2}$ . Since we are looking for the equation of a line that is parallel to line  $p$ , we need to find an equation with the same slope as line  $p$  because parallel lines have the same slope. Therefore, we can eliminate answer choices (C) and (D). The easiest way to find the answer to this problem is to draw the line on the given graph. To do that, plot the point  $(-4, 3)$  and use the slope to find more points. Your line should look like the red line below: the  $y$ -intercept of the line is  $-3$ , which means the equation of the line is  $y = -\frac{3}{2}x - 3$ .



45. **Answer choice (D) is correct.** If you look at the diagrams below, you can see that a regular octagon will be the largest shape Brooks can cut out of a circle because an octagon has the greatest number of sides out of the shapes listed.



46. **Answer choice (B) is correct.** The first row of the table tells us it costs \$18.75 to pay the admission fee and ride 2 rides. We know the admission fee is \$15.25, so we can find the cost of each ride by subtracting the admission fee from the total cost and dividing the result by 2:  $(\$18.75 - \$15.25) \div 2 = \$3.50 \div 2 = \$1.75$ . Now we can find the total cost of riding 8 rides by multiplying the price of each ride by 8 and adding the admission fee:  $\$1.75 \cdot 8 + \$15.25 = \$14.00 + \$15.25 = \$29.25$ .
47. **Answer choice (C) is correct.** Since two of Phil's shirts are dirty, he has 4 clean shirts. Since one pair of pants is dirty, he has 4 clean pairs of pants. All of his pairs of shoes are clean, so he has 3 clean pairs of shoes. Find the total number of outfits he can make by multiplying the number of clean shirts, the number of clean pairs of pants, and the number of clean pairs of shoes Phil has:  $4 \cdot 4 \cdot 3 = 48$ .

## **Practice Test 2**

### **Verbal Reasoning**

1. **Answer choice (A) is correct.** A **motive** is a reason for doing something. For example, your **motive** for getting good grades may be to get into a good college. This is closest in meaning to **reason**.
2. **Answer choice (B) is correct.** The word **bizarre** means very strange or unusual. For example, it would be **bizarre** if your teacher showed up to class wearing a clown suit and a purple wig. This is closest in meaning to **peculiar**.
3. **Answer choice (D) is correct.** The word **remorseful** means feeling sorry. For example, you may feel **remorseful** if you are playing soccer in the house and accidentally break your mother's favorite vase. This is closest in meaning to **regretful**.
4. **Answer choice (C) is correct.** The word **deliberate** means intentionally or well-thought out. For example, if you stick out your foot while your friend is walking by so that he trips, you **deliberately** tripped him. This is closest in meaning to **conscious**.



5. **Answer choice (C) is correct.** The word **sophisticated** means having worldly knowledge and experience. For example, someone who has traveled the world learning about different cultures, food, and people is **sophisticated**. This is closest in meaning to **worldly**.
6. **Answer choice (C) is correct.** The word **privileged** means blessed with certain advantages. For example, before 1920, men were more **privileged** than women when it came to voting because men were able to vote in elections but women were not. This is closest in meaning to **advantaged**.
7. **Answer choice (B) is correct.** The word **arbitrary** means based on random choice, rather than any reason or system. If I ask you to pick any **arbitrary** number between 1 and 10, you can pick any random number between 1 and 10 without any reasoning behind your decision. This is closest in meaning to **random**.
8. **Answer choice (D) is correct.** The word **daunting** means seeming difficult to deal with in anticipation or discouraging through fear. For example, writing a 20-page research paper in one week is a **daunting** task. This is closest in meaning to **intimidating**.
9. **Answer choice (B) is correct.** The word **mock** means to tease, make fun of, or mimic in a mean way. For example, if your friend hurt her foot and walks with a limp, you would be **mocking** her if you also pretended to have a limp and laughed at her. This is closest in meaning to **ridicule**.
10. **Answer choice (A) is correct.** The word **amend** means to make changes or modify. For example, the constitution was **amended** in the 1900s to allow women the right to vote. This is closest in meaning to **revise**.
11. **Answer choice (A) is correct.** The word **notorious** means famous or well-known, typically for something bad. For example, the Joker is **notorious** for being Batman’s evil villain. This is closest in meaning to **infamous**.
12. **Answer choice (A) is correct.** The word **persevere** means to continue something even in the face of difficulty. For example, a runner who hurts their leg during a race may **persevere** and finish the race, despite being injured.. This is closest in meaning to **persist**.
13. **Answer choice (B) is correct.** The word **impartial** means being unbiased or treating people fairly and equally. For example, judges in the United States are supposed to be **impartial** when sentencing people and are supposed to base their decisions on the law rather than their own opinions. This is closest in meaning to **fair**.
14. **Answer choice (A) is correct.** An **affiliation** is an official connection to something. For example, if you are a member of your local church, you have an **affiliation** to the church. This is closest in meaning to **association**.

15. **Answer choice (D) is correct.** A **connotation** is the feeling or idea a word invokes in addition to its literal meaning. For example, the word punishment has a negative **connotation** because you are typically punished when you do something wrong. This is closest in meaning to **implication**.
16. **Answer choice (C) is correct.** The word **avid** means showing a strong interest in or enthusiasm for something. For example, if you read for an hour every night because you really enjoy reading, you are an **avid** reader. This is closest in meaning to **eager**.
17. **Answer choice (D) is correct.** The word **defame** means to damage someone’s reputation. For example, a politician may try to **defame** his opponent by releasing private information about her personal life that will negatively impact her campaign. This is closest in meaning to **slander**.
18. **Answer choice (C) is correct.** The word **candor** means honesty, openness, or frankness. For example, if you openly tell your friends about your struggles with mental health, you are speaking with **candor**. This is closest in meaning to **honesty**.
19. **Answer choice (C) is correct.** The word **heedful** means being careful. For example, if you are driving in the rain or snow, you have to be especially **heedful**. This is closest in meaning to **cautious**.
20. **Answer choice (D) is correct.** The word **miserly** means stingy and not generous. For example, if your friend has \$500 and he refuses to lend you \$1 to ride the bus, he is being **miserly**. This is closest in meaning to **greedy**.
21. **Answer choice (D) is correct.** The word “though” tells us that the second part of the sentence should be the opposite of the first part or unexpected based on the first part. The first part of the sentence says the music was blaring, which means the music was very loud. Therefore, it would be unexpected if the upstairs neighbors could not hear the music or if they heard quiet music, so the word in the blank should mean something similar to quiet. “Muffled” means not loud or muted, so “muffled” fits best in the blank.
22. **Answer choice (A) is correct.** The sentence said Justin attempted to justify his actions instead of apologizing, so the word in the blank should describe someone who makes excuses for their actions and doesn’t say sorry. “Defensive” describes someone who is quick to defend themselves and justify their actions when presented with criticism, so “defensive” fits best in the blank.
23. **Answer choice (D) is correct.** The word “but” tells us that the first part of the sentence should be the opposite of the second part. The second part of the sentence says the students were unable to come to an agreement, so the first part should say something similar to, “The school counselor attempted to resolve the dispute between the two students.” The word “mediate” means to intervene during a disagreement in order to bring about an agreement or compromise, so “mediate” fits best in the blank.
24. **Answer choice (B) is correct.** The word in the blank should describe someone who is adaptable and able to use whatever tools are available to complete a job. “Resourceful” means having the ability to

find quick and clever ways to overcome difficulties and having the ability to use your resources to solve problems, so “resourceful” fits best in the blank.

25. **Answer choice (A) is correct.** The sentence says Tanya no longer needed to wear gloves and a scarf every time she left the house, which means when she first moved to Alaska, she needed to wear a scarf and gloves every time she left the house. Therefore, we can assume that over time, Tanya’s body adapted or adjusted to the cold, so the word in the blank should mean something similar to adapted or adjusted. “Acclimated” means to become accustomed to a new climate or situation, so “acclimated” fits best in the blank.
26. **Answer choice (C) is correct.** The sentence says there have only been three sightings of the white-footed deer this year in Michigan. Therefore, the white-footed deer is not seen very often, so the word in the blank must be used to describe something that is not seen very often. “Elusive” means difficult to find, catch, or achieve, so “elusive” fits best in the blank.
27. **Answer choice (B) is correct.** The word “though” tells us that the second part of the sentence should be the opposite of the first. The first part of the sentence says the employees of the municipal waste department are often overlooked, which means people often don’t consider the employees important. Therefore, the second part of the sentence should say that the employees are an important part of the community. The word “essential” also tells us that the word in the blank should mean something similar to essential or important. “Indispensable” means absolutely necessary, so “indispensable” fits best in the blank.
28. **Answer choice (A) is correct.** The sentence says Marie Curie was the first woman to win the Nobel Prize and the only woman to have won it twice. Winning the Nobel Prize is a very impressive accomplishment, and being the first woman to win a Nobel Prize is an even more impressive accomplishment. Therefore, the word in the blank should be positive. “Infamous” means famous for something bad and “ruthless” means showing no compassion, which are both negative, so answer choices (B) and (C) are incorrect. “Renowned” means famous or distinguished, and “congenial” means pleasant or likable. While Marie Curie may have been pleasant and likable, winning the Nobel Prize twice does not necessarily mean you are pleasant and likable, so answer choice (D) is incorrect. Winning the Nobel Prize twice does make you famous and distinguished, so “renowned” fits best in the blank.
29. **Answer choice (B) is correct.** The word “surprised” tells us that the narrators were not expecting constant rain. Therefore, the word in the blank should be the opposite of constant. “Intermittent” means scattered or not continuous, so “intermittent” fits best in the blank.
30. **Answer choice (C) is correct.** The sentence says that the woman experienced trauma in her past, but she was determined to not let that trauma stop her from achieving her dreams. Therefore, we can assume the word in the blank is similar to trauma. “Adversity” means difficulties or misfortune, so “adversity” fits best in the blank.

31. **Answer choice (A) is correct.** The word “luckily” tells us that the word in the blank should be positive. “Exhaust” means to drain or wear out, which is negative, so answer choice (B) is incorrect. “Alter” means to change, which is neutral, so answer choice (C) is incorrect. “Replenish” means to refill, and “embellish” means to decorate, which are both positive. While decorating an appetizer tray is positive, guests would not typically complain that a tray of appetizers is not decorated. However, guests would complain if a tray of appetizers was empty or not refilled, so “replenish” fits best in the blank.
32. **Answer choice (B) is correct.** The word “although” tells us that the second part of the sentence should be the opposite of the first. The first part of the sentence says the necklace Rachel received cost little to know money. Therefore, it would not make sense to put the word “monetary” into the blank because “monetary” means having to do with money. Therefore, answer choice (A) is incorrect. The end of the sentence says the necklace was passed down from Rachel’s grandmother, so we can assume the necklace had some positive value to Rachel since it was previously her grandmother’s necklace. “Frivolous” means not having any serious value, which is negative, so answer choice (D) is incorrect. “Practical” means useful, and “sentimental” means related to feelings of nostalgia or something that has personal and emotional value. It would make more sense to say Rachel appreciated that the necklace had personal and emotional value since it was passed down from her grandmother than it would to say Rachel appreciated the usefulness of the necklace, so “sentimental” fits best in the blank.
33. **Answer choice (D) is correct.** The sentence says Hank made sure to attend every baseball game and debate competition, even if he had to leave work. Therefore, Hank was supportive of his children and committed to showing up for his children even if it was inconvenient to him, so the word in the blank should mean something similar to committed and supportive. “Devoted” means very loving, loyal, and committed, so “devoted” fits best in the blank.
34. **Answer choice (D) is correct.** The phrase “even though” tells us that the second part of the sentence should be the opposite of the first part. The first part of the sentence says Vanessa’s team was down by 20 points in the third quarter, which means her team was losing. The opposite of losing is winning, so the second part of the sentence should say that Vanessa was confident that if her teammates communicated and stayed focused, they would win the championship game. “Prevail” means win or be victorious, so “prevail” fits best in the blank.
35. **Answer choice (B) is correct.** The word “while” tells us that the second part of the sentence should be the opposite of the first part or unexpected based on the first part. The first part of the sentence says Yasmin’s boss thought her ideas would be beneficial. Therefore, the opposite of that is something similar to her boss thinking the ideas may not actually work or be practical. The end of the sentence also says that the boss needs to confirm if the ideas are ----- given the current financial situation of the company, so we can assume that he needs to check if the company can afford to implement her ideas. “Feasible” means possible or easily done. It would make sense that Yasmin’s boss would need to check if her ideas would be able to easily be implemented, especially if the company is having financial trouble, so “feasible” fits best in the blank.

36. **Answer choice (D) is correct.** The sentence says the human brain is able to continuously adapt to changes, so the word in the blank should be similar to adaptable or changeable. “Malleable” means able to be shaped or changed, so “malleable” fits best in the blank.
37. **Answer choice (B) is correct.** The sentence says Emma’s classmates were shocked when she chose to perform a song and dance in front of the entire show. Performing a song and dance in front of your entire school is a brave action usually taken by someone who is confident and outgoing. Therefore, since Emma’s classmates were shocked by her behavior, the word in the blank should be the opposite of confident and outgoing. “Bashful” means shy and reluctant to draw attention to oneself, so “bashful” fits best in the blank.
38. **Answer choice (A) is correct.** The sentence says Louis was nervous, which caused him to ----- while answering the final few questions. The sentence also says this led to Louis being rejected from the position. Therefore, we know the word in the blank must be negative. “Persevere” means never give up and “enunciate” means speak clearly, which are both positive, so answer choices (B) and (C) are incorrect. “Contemplate” means to think deeply, which is neutral or positive in this situation, so answer choice (D) is incorrect. “Falter” means to hesitate or stumble or move in a way that shows lack of confidence, which is negative, so “falter” fits best in the blank.
39. **Answer choice (D) is correct.** The sentence says after receiving the phone call, Maria called the police and drove to her parents house because she didn’t feel safe in her home. Therefore, we know the word in the blank should be negative. “Gratifying” means giving pleasure or satisfaction, which is positive, so answer choice (A) is incorrect. “Absurd” means very unreasonable or ridiculous, “depressing” means saddening, and “sinister” means menacing or threatening. All three of these are negative, however, Maria was clearly scared for her safety, so we need to choose the word that would describe a phone call that would scare someone. A ridiculous or saddening phone call would not scare someone, so answer choices (B) and (C) are incorrect. A menacing or threatening phone call would scare someone, so “sinister” fits best in the blank.
40. **Answer choice (C) is correct.** The sentence says the students at the university were polled about their issues and complaints about their school, so we know the word in the blank should mean something similar to issues or complaints. “Grievances” means complaints, so “grievances” fits best in the blank.

### **Quantitative Reasoning**

1. **Answer choice (B) is correct.** On Tuesday, Fido ate 1.05 pounds of food, and on Saturday, Fido ate 0.60 pounds of food. Find the difference by subtraction:  $1.05 - 0.60 = 0.45$  pounds.
2. **Answer choice (C) is correct.** The problem tells us that the mean of eight numbers is  $-2$ . The mean or average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number\ of\ terms}$ . Therefore, we can find the sum of the eight numbers by plugging in  $-2$  for the average and 8 for the number of terms and solving for the sum:  $-2 = \frac{sum}{8} \rightarrow sum = -16$ . We want

to add a number to the set and create a set of nine numbers with an average that is 4 more than the original average. Since the original average is  $-2$ , we want the new set to have an average of  $2$ . Let the number added to the set equal  $x$ , and set up and solve the following equation using  $2$  as the average and  $-16$  as the sum of the first eight numbers:  $2 = \frac{-16+x}{9} \rightarrow 18 = -16 + x \rightarrow x = 34$ .

- Answer choice (D) is correct.** Replaced  $x$  with  $-3$  on both sides of the given equation and simplify to find the value of  $((-3))$ :  $((-3)) = (-3)^2 - 12 \rightarrow ((-3)) = 9 - 12 \rightarrow ((-3)) = -3$ .
- Answer choice (D) is correct.** The probability of choosing a gray block is  $0.25$ , which equals  $\frac{1}{4}$ . Add the probability of choosing a gray block and the probability of choosing a black block:  $\frac{1}{4} + \frac{3}{5} = \frac{5}{20} + \frac{12}{20} = \frac{17}{20}$ . The probability of choosing each color of block present in the bag must add to  $1$ . Therefore, we know there are more than two blocks since the sum of the probability of choosing a gray block and the probability of choosing a black block is less than  $1$ , so answer choice (A) is incorrect. Now we need to think about the possible number of colors present in the bag. We could have three additional colored blocks that each have a probability of being chosen of  $\frac{1}{20}$ , so we could have  $5$  colors present. Therefore, answer choices (B) and (C) are incorrect. Therefore, answer choice (D) is correct.
- Answer choice (D) is correct.** The polyhedron shown has one square face and four triangular faces. The only answer choice with this combination of faces is answer choice (D).
- Answer choice (B) is correct.** While you could solve for  $x$  in the given equation, and then plug the value you get for  $x$  into the second equation, it is faster to use a different method. Divide both sides of the given equation by  $3$ , and you will be left with  $3x - 2$  on the left side of the equation:  $\frac{9x-6}{3} = \frac{18}{3} \rightarrow 3x - 2 = 6$ .
- Answer choice (A) is correct.** The possible values of  $a$  are  $-4, -3, -2$ , and the possible values of  $b$  are  $-1, 0, 1, 2$ . The product  $ab$  can equal  $-3$  if  $a = -3$  and  $b = 1$ , so answer choice (B) is incorrect. The product  $ab$  can equal  $2$  if  $a = -2$  and  $b = -1$ , so answer choice (C) is incorrect. The product  $ab$  can equal  $0$  if  $a = -4, -3$ , or  $-2$  and  $b = 0$ , so answer choice (D) is incorrect. The product  $ab$  cannot equal  $-5$  because the only integers that have a product of  $-5$  are  $-1 \cdot 5$  and  $-5 \cdot 1$ , and neither  $a$  nor  $b$  can equal  $5$  or  $-5$ .
- Answer choice (D) is correct.** Since Theresa has  $T$  twenty dollar bills, and she has twice as many five dollar bills as she does twenty dollar bills, she has  $2T$  five dollar bills. The value of her twenty dollar bills is  $20T$  and the value of her five dollar bills  $5(2T)$  which equals  $10T$ . Now we can write an equation that represents the statement, “the value of Theresa’s twenty dollar bills is \$60 more than the value of her five dollar bills” by setting the value of Theresa’s twenty dollar bills equal to \$60 plus than the value of her five dollar bills:  $20T = 10T + 60$ . Finally, isolate  $10T$  by adding  $60$  to both sides of the equation to get  $10T = 20T + 60$ .

9. **Answer choice (C) is correct.** Since Marissa can run twice as fast as Julie can walk, Marissa can walk twice as far as Julie can in the same amount of time. Therefore, if Marissa can run 6 miles in 48 minutes, Julie can walk half as far, 3 miles, in 48 minutes.
10. **Answer choice (B) is correct.** Since Deandra gave  $\frac{3}{8}$  of her cards to her friends, she has  $\frac{5}{8}$  of her cards remaining. Therefore, 15 represents  $\frac{5}{8}$  of the total cards Deandra created. Set up and solve an equation that represents the question, “15 is  $\frac{5}{8}$  of what number?”, where  $x$  represents the total number of cards Deandra created:  $15 = \frac{5}{8} \cdot x \rightarrow x = 24$ .
11. **Answer choice (C) is correct.** The area of each 3 mm by 3 mm square can be found by squaring the side length:  $(3 \text{ mm})^2 = 9 \text{ mm}^2$ . There are 10 mm in 1 cm, so change 9 cm into mm by multiplying by 10 to get that the larger square measures 90 mm by 90 mm. The area of the larger square can be found squaring the side length:  $(90 \text{ mm})^2 = 8100 \text{ mm}^2$ . Find the number of small squares that can fit inside of the large square by dividing the area of the large square by the area of the smaller square:  $8100 \text{ mm}^2 \div 9 \text{ mm}^2 = 900$ .
12. **Answer choice (B) is correct.** Find the electrician’s hourly rate after the 15% discount by reducing his original hourly rate of \$80 by 15%:  $\$80 - 15\% \text{ of } \$80 = \$80 - 0.15 \cdot \$80 = \$80 - \$12 = \$68$ . Now use the first row of the table to find the electrician’s service fee. The first row shows the total cost of hiring the electrician for 2 hours, so multiply the discounted hourly rate by 2 and subtract that from the total cost to find the electrician’s service fee:  $\$171 - \$68 \cdot 2 = \$171 - \$136 = \$35$ .
13. **Answer choice (A) is correct.** We are looking for the figure with a shaded area of  $(64 + 4\pi)\text{ft}^2$ . The side length of each square is 8 ft, so the  $64 \text{ ft}^2$  comes from the area of the square because  $(8 \text{ ft})(8 \text{ ft}) = 64 \text{ ft}^2$ . Since we are adding 4 to the area of the square, we can eliminate answer choices (C) and (D) because they would require us to subtract the white area from the area of the square. The radius of each circle is 4 ft, so using the equation for the area of a circle, the area of a full circle with a radius of 4 ft is  $16\pi$ . Since we are only adding  $4\pi$  to 64, the area we are adding is one-fourth of the area of the entire circle ( $4\pi$  is one fourth of  $16\pi$ ). Therefore, answer choice (A) is correct because it shows a square added to a quarter circle.
14. **Answer choice (D) is correct.** The number of cubes in each layer is equal to the number that represents the position of the layer squared: layer 1 has  $1^2 = 1$  cubes, layer 2 has  $2^2 = 4$  cubes, layer 3 has  $3^2 = 9$  cubes, and layer 4 has  $4^2 = 16$  cubes. Therefore, layer 5 will have  $5^2 = 25$  cubes, and layer 6 will have  $6^2 = 36$  cubes. Find the total number of cubes by adding the number of cubes in each layer:  $1 + 4 + 9 + 16 + 25 + 36 = 91$ .
15. **Answer choice (C) is correct.** Since 3 prizes cost 20 tickets, 6 prizes will cost 40 tickets because  $3 \cdot 2 = 6$  and  $20 \cdot 2 = 40$ . Since you win 4 tickets per game, you would need to win 10 games to get 40 tickets because  $40 \div 4 = 10$ . Since 5 games cost \$12, 10 games cost \$24 because  $5 \cdot 2 = 10$  and  $\$12 \cdot 2 = \$24$ . Therefore, you would need to spend \$24 to buy 6 prizes.
16. **Answer choice (C) is correct.** Since the problem did not tell us the side lengths of the two cubes, we can choose side lengths that fit the given requirements. Let’s say the side length of the small cube

- equals 1. The side length of the large cube is three times the side length of the small cube, so the side length of the large cube is 3. Find the surface area of the small cube using the given equation:  $SA = 6(1)^2 = 6 \cdot 1 = 6$ . Find the surface area of the large cube using the given equation:  $SA = 6(3)^2 = 6 \cdot 9 = 54$ . Therefore, the ratio of the surface area of the small cube to the surface area of the large cube is 6:54 which simplifies to 1:9.
17. **Answer choice (B) is correct.** Find the dimensions of the similar rectangle by multiplying the dimensions of the given rectangle by the scale factor:  $24 \text{ ft} \cdot \frac{3}{8} = 9 \text{ ft}$ , and  $16 \text{ ft} \cdot \frac{3}{8} = 6 \text{ ft}$ . Find the area of the similar rectangle by multiplying the dimension:  $9 \text{ ft} \cdot 6 \text{ ft} = 54 \text{ ft}^2$ .
18. **Answer choice (A) is correct.** In February, Will deposits twice as much as he did in January. Will deposited \$100 in January, so he deposited  $\$100 \cdot 2$  dollars in February. In March, he deposits twice as much as he did in February, so he deposits  $\$100 \cdot 2 \cdot 2$  which equals  $\$100 \cdot 2^2$ . In April, he deposits twice as much as he did in March, so he deposits  $\$100 \cdot 2^2 \cdot 2$  which equals  $\$100 \cdot 2^3$ . Add the four amounts to get  $\$100 + \$100 \cdot 2 + \$100 \cdot 2^2 + \$100 \cdot 2^3$ .
19. **Answer choice (B) is correct.** Vivian sold three times as many cupcakes as Ashley, so find the number of cupcakes Ashley sold by dividing the number of cupcakes Vivian sold by 3:  $18 \div 3 = 6$  cupcakes. Add the number of cupcakes Ashley and Vivian each sold:  $18 + 6 = 24$  cupcakes.
20. **Answer choice (B) is correct.** On day 0, Nicole meditates for 10 minutes. On day 2, she meditates for 11.5 minutes. On day 5, she meditates for 13 minutes. Therefore, every 2 days she increases her session time by 1.5 minutes, so every day, she increases her time by half of that:  $1.5 \text{ minutes} \div 2 = 0.75 \text{ minutes}$  which is equal to  $\frac{3}{4}$  minutes.
21. **Answer choice (A) is correct.** Find the quantity in Column A by using PEMDAS:  $7 - 4(9^2 \div 9) = 7 - 4(81 \div 9) = 7 - 4(9) = 7 - 36 = -29$ . Find the quantity in Column B using PEMDAS:  $8 - 5(3^3 \div 3) = 8 - 5(27 \div 3) = 8 - 5(9) = 8 - 45 = -37$ . Therefore, the quantity in Column A is greater than the quantity in Column B.
22. **Answer choice (B) is correct.** The equation in Column A is written in  $y = mx + b$  form where  $m$  represents the slope, so the slope of the line in Column A is  $-3$ . Find the slope between the points in Column B using the equation  $slope = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point:  $slope = \frac{10 - 4}{-8 - (-5)} = \frac{6}{-3} = -2$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
23. **Answer choice (B) is correct.** Since  $a$  and  $b$  are both negative, the sum  $a + b$  will always be negative and will be more negative, or less than, than both  $a$  and  $b$ . Since  $a$  and  $b$  are both negative, the difference  $a - b$  will always be greater than  $a$  because when we subtract a negative number, we add the positive version of the number. Therefore, since Column A is less than  $a$  and Column B is greater than  $a$ , Column B is greater than Column A.



24. **Answer choice (A) is correct.** Since the Sharks won 75% of their games and did not tie any games, they lost 25% of their game. Since 75% is three times 25%, the Sharks won three times as many games as they lost, so they won 30 games. Therefore, they played a total of 40 games because  $10 \text{ games lost} + 30 \text{ games won} = 40 \text{ total games}$ , so the quantity in Column A is greater than the quantity in Column B.
25. **Answer choice (D) is correct.** Since we do not know the relationship between the median and mean of the original set, we cannot determine the relationship between the median and mean of the new set. Therefore, the relationship between the two quantities cannot be determined from the given information.
26. **Answer choice (D) is correct.** While we know there are 12 yellow marbles, and we are given the ratio of yellow to green marbles, we are not given the ratio of yellow to orange marbles or the total number of marbles in the bag, so we cannot determine the number of orange marbles. Therefore, the relationship between the two quantities cannot be determined from the given information.
27. **Answer choice (A) is correct.** Find the quantity in Column A by first subtracting the terms in the numerator and dividing the result by the denominator:  $(0.9 - \frac{4}{5}) \div 0.5 = (0.9 - 0.8) \div 0.5 = 0.1 \div 0.5 = 0.2$ . Find the quantity in Column B by first subtracting the terms in the numerator and dividing the result by the denominator:  $(\frac{1}{2} - 0.4) \div 0.75 = (0.5 - 0.4) \div 0.75 = 0.1 \div 0.75 = 0.1\bar{3}$ . Therefore, the quantity in Column A is greater than the quantity in Column B. There is a shortcut for this problem. Once you find that both numerators equal 0.1, you can tell that Column A is greater than Column B: Column A is  $0.1 \div 0.5$ , and Column B is  $0.1 \div 0.75$ . Dividing 0.1 by 0.5 will result in a greater answer than dividing 0.1 by 0.75 because 0.5 is smaller than 0.75.
28. **Answer choice (C) is correct.** In Column A, we are only looking for the probability that Brent chooses an even number. The fact that Julie chose a number less than 3 does not affect the probability since she put the card back in the deck. The same rule applies to Column B. The fact that Julie chose a number greater than 3 does not affect the probability of Brent choosing an odd number. Since there are an equal number of even and odd numbers between 1 and 10, the probability that Brent chooses an even number is equal to the probability that Brent chooses an odd number. Therefore, the quantities in both columns are equal.
29. **Answer choice (B) is correct.** Find the quantity in Column A by plugging 2 in for  $n$  in the given equation and simplifying to find the value of  $m$ :  $m = 6 - 4(2) \rightarrow m = 6 - 8 \rightarrow m = -2$ . Find the quantity in Column B by plugging 10 in for  $m$  in the given equation and solving for  $n$ :  $10 = 6 - 4n \rightarrow 4 = -4n \rightarrow n = -1$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
30. **Answer choice (C) is correct.** The width of path A is 5 blocks and the height is 7 blocks, so the total distance of Path A is  $5 + 5 + 7 + 7 = 24$  blocks. We do not need to convert blocks to miles to compare the two paths, so we will leave the distance as 24 blocks because it saves time. If you add up the lengths of each piece of Path B, you will get  $(7 + 2 + 2 + 3 + 4 + 3 + 1 + 2)$  blocks which equals 24 blocks. Therefore, the distance of Path A and Path B are equal, so the quantities in both columns are equal.

31. **Answer choice (A) is correct.** Since we want to find the smallest number of packs of pencils Mrs. White purchased, we want to purchase as many large packs of pencils as possible. Mrs. White could have purchased 6 packs of 20 pencils, which equals 120 total pencils. She could have purchased 1 pack of 12 pencils, which brings her total pencils to 132. The remaining 4 pencils would come from purchasing 1 pack of 4 pencils. Therefore, she bought a total of  $6 + 1 + 1 = 8$  packs, so the quantity in Column A is greater than the quantity in Column B.
32. **Answer choice (C) is correct.** There are a total of 9 red and green marbles ( $4 \text{ red} + 5 \text{ green} = 9 \text{ total}$ ), and there are a total of 9 black and blue markers ( $3 \text{ black} + 6 \text{ blue} = 9 \text{ total}$ ). Therefore, since the total number of red and green marbles equals the total number of black and blue marbles, the probability of choosing two red or green markers is equal to the probability of choosing two black or blue markers, so the quantities in both columns are equal.
33. **Answer choice (B) is correct.** The area of a square is equal to the side length squared, so the original side length of the square is 10 cm because  $(10 \text{ cm})^2 = 100 \text{ cm}^2$ . Cut the side length in half to get a side length of 5 cm. Therefore, the area of the new square is  $(5 \text{ cm})^2$  which equals  $25 \text{ cm}^2$ , so the quantity in Column B is greater than the quantity in Column A.
34. **Answer choice (C) is correct.** The measure of each interior angle in any regular octagon is always the same, regardless of the dimensions of the octagon. Also, the measures of corresponding angles of similar figures are always equal. Therefore, the quantities in both columns are equal.
35. **Answer choice (B) is correct.** Since 0.9 is greater than 0.16, the square root of 0.9 is greater than 0.16. Therefore, the quantity in Column B is greater than the quantity in Column A.
36. **Answer choice (B) is correct.** The 6th grade students have collected 42 cans, which is 60% of their goal. Find the total number of cans the 6th graders need to collect by setting up an equation to answer the question, “42 is 60% of what number?”:  $42 = 0.6x \rightarrow x = 70$ . Therefore, the 6th graders are expected to collect 70 cans, and they have collected 42, so they need to collect 28 more cans to reach their goal. The 7th grade students have collected 90 cans, which is 75% of their goal. Find the total number of cans the 7th graders need to collect by setting up an equation to answer the question, “90 is 75% of what number?”:  $90 = 0.75x \rightarrow x = 120$ . Therefore, the 7th graders are expected to collect 120 cans, and they have collected 90, so they need to collect 30 more cans to reach their goal. Therefore, the quantity in Column B is greater than the quantity in Column A.
37. **Answer choice (A) is correct.** The area of the shaded region is equal to the area of the outer square minus the area of the inner square. Find the area of the outer square by squaring 10 m to get  $100 \text{ m}^2$ . Therefore, the area of the inner square is  $36 \text{ m}^2$  because  $100 \text{ m}^2 - 36 \text{ m}^2 = 64 \text{ m}^2$ . Since the area of the inner square is  $36 \text{ m}^2$ , the side length is 6 m because  $(6 \text{ m})^2 = 36 \text{ m}^2$ . Now we know the side length of the outer square is 10 m and the side length of the inner cube is 6 m. Since there is a border on both sides of the inner cube, we know that  $b + 6 + b = 10$ , where  $b$  represents the width of the border. Solve this equation to find the width of the border:  $b + 6 + b = 10 \rightarrow 2b + 6 = 10 \rightarrow 2b = 4 \rightarrow b = 2$

m. Therefore, the width of the border is 2 meters, so the quantity in Column A is greater than the quantity in Column B.

## **Reading Comprehension**

1. The passage provides information about how birds have evolved to fill almost every habitat imaginable. Different bird species can occupy the same habitat, but because the species are all slightly different, they don't compete for food, water and other resources. In lines 15 and 16, the passage explains this phenomenon is known as "resource partitioning." The whole passage revolves around providing more information about resource partitioning in birds in various habitats, **so answer choice (D) is correct.** Resources partitioning is mentioned, but in this passage, it is mentioned specifically for birds and not animals in general, so answer choice (A) is incorrect. Answer choice (B) is incorrect because although both bodies of water and forests are mentioned as habitats in the passage, there is no mention of which habitat is easier to find food in. Choice (C) is incorrect because although it's true that birds have adapted to live in different habitats, that is not the main focus of the passage. The passage mostly discusses how the bird species found in different habitats share the resources in the habitat without competition because of the differences in their adaptations. For example lines 20 and 21 say, "Each species is specialized for finding a different type of food in the forest."
2. The first line of the passage states that we see birds everywhere. Lines 4 and 5 say that this is partly because birds are conspicuous because they are bright, loud, and they can fly. This means it's hard for us to not notice them, and it's hard for them to hide from us. They stand out because of the three characteristics: bright, loud, and can fly. The word conspicuous is used to mean that birds are easily visible, **so choice (D) is the correct answer.**
3. The first sentence of the passage states that we see birds everywhere. In the second paragraph, the passage states, "There can be a myriad (variety) of different bird species all using the same habitat. The key is that they have all evolved to be slightly different, so they won't have to compete with one another for food, water, or other resources." Therefore, the passage implies that we see birds everywhere because they have evolved to be slightly different, allowing them to not have to compete for resources. This phenomenon is known as resource partitioning, so the passage implies that resource partitioning has contributed to why we see so many birds, **so answer choice (A) is correct.**
4. Lines 9 through 13 inform the reader that there can be a myriad of bird species in a single habitat, but they don't compete for resources because they have evolved to be slightly different. The word "myriad" here is used to mean that there are many birds in the same habitat or a large variety, **so choice (B) is correct.** It cannot mean a small quantity because the passage has previously talked about how there are many bird species wherever you go, so choice (A) is incorrect. Choice (C) is incorrect because the passage does not say anything about dangerous birds, and choice (D) is incorrect because the passage does not say whether or not the birds found in different habitats are friendly.
5. In the second paragraph, the passage defines resource partitioning as a phenomenon where animals living the same habitat have evolved to be slightly different so they won't have to compete for

resources such as food and water. Answer choice (A) is incorrect because the two lions do not live in the same habitat. Answer choice (C) and (D) are incorrect because the animals are competing for food. **Answer choice (B) is correct** because the lizards live in the same habitat but do not compete for food because they each find food in different parts of their habitat.

6. The second paragraph introduces a process called resource partitioning. In the following paragraphs, examples of this process are discussed. For example, in the second paragraph, an example of resource partitioning among birds in the forests is given. In the final paragraph, an example of resource partitioning among birds in bodies of water is given. Therefore, a process is introduced and examples are used to explain the process, **so answer choice (A) is correct**. Answer choice (B) is incorrect because the passage does not talk about any specific animal. Answer choice (C) is incorrect because the passage is not about a particular behavior: it is about a process called resource partitioning as mentioned in lines 15 and 16. Answer choice (D) is incorrect because extinction is not mentioned anywhere in the passage.
7. Lines 29 through 32 state, “This genus is exclusively made up of different pepper plants. Capsaicin most likely evolved as a defense mechanism against mammalian herbivores.” The passage then goes on to say that capsaicin deters mammals from eating the pepper plants and their seeds. We can therefore conclude that the word herbivores means mammals that eat plants, **so the correct answer is choice (C)**.
8. The third paragraph talks about the wide variety of spicy foods one can find in a grocery store including jalapenos, chiles, curry powder, paprika, red pepper flakes, hot sauces, etc. It then informs us that what these foods have in common is the molecule capsaicin, which is responsible for the level of spice in all these foods. The next two paragraphs give more information about what capsaicin is and its role in pepper plants. We can therefore conclude that the purpose of the third paragraph is to give context about what type of spice the author is referring to, **so answer choice (D) is correct**.
9. Lines 20 through 24 say that TRPV1 is a receptor in the mouth that can be activated by heat, causing you to feel a localized burning sensation. Therefore, it is the receptor in humans’ mouths that senses heat, **so answer choice (C) is correct**.
10. The fifth paragraph explains that capsaicin evolved as a defense mechanism to deter mammalian herbivores from eating the spicy pepper plants and their spicier seeds. This is because the mammals would eat and fully digest the seeds, therefore destroying them before they could be dispersed. The highest levels of capsaicin are within the seeds so that the seeds are protected from mammals, allowing plants to spread their seeds. **Therefore, answer choice (A) is correct**.
11. Lines 22 through 24 say TRPV1 is the “receptor that can be activated by heat, causing you to feel a localized burning sensation.” Lines 24 through 27 say the receptor can also be activated by the molecule capsaicin found in spicy food. So the receptor is activated by either spicy foods or hot foods or drinks, such as a cup of hot tea. **Therefore, choice (D) is correct**.

12. The passage says in lines 52 through 54 that it wasn't until the 1500s that the Spanish brought these fiery plants back to Europe. The fiery plants mentioned here are plants in the genus *Capsicum*. The 1500s are also known as the 16th century, so the fiery plants were brought to Europe in the 16th century. **Therefore answer choice (C) is correct.**
13. The passage provides information about the Galveston Hurricane (a natural disaster) which happened in 1900, which is the 20th century. The passage discusses the way the US Weather Bureau handled the storm, the damage caused by the storm, and even includes a report on the storm. Therefore, the primary purpose of the passage is to detail a natural disaster from the 20th century, **so answer choice (B) is correct.** Choice (A) is incorrect because while it's true that US weather officials ignored warning signs from Cuba, this detail is only part of the passage and not the main focus. Choice (C) is incorrect because what would have been done to prevent the disaster is only mentioned in the last paragraph, so it's not the main focus of the passage. Choice (D) is incorrect because the passage only mentions one specific hurricane and not many hurricanes.
14. The first paragraph states that the Galveston hurricane is the deadliest natural disaster to date in United States history. The last paragraph states that the Galveston hurricane killed an estimated 8,000 people. Since the Galveston hurricane is the most deadly natural disaster in US history since 1900, and Hurricane Katrina hit the US in 2005, we can assume that Hurricane Katrina was less deadly than the Galveston Hurricane. Therefore, we can assume that fewer than 10,000 people died in Hurricane Katrina, **so answer choice (C) is correct.**
15. The third paragraph says that on the morning of the storm the Galveston locals were unalarmed about the possibility of a major storm. This is because the Weather Bureau had not indicated any strong storm was imminent. This later changed when Galveston made landfall around 8 PM. Based on these lines, we can assume that the word imminent means approaching: the Weather Bureau had not indicated any strong storm was approaching, so the Galveson locals were not worried. **Therefore, answer choice (D) is correct.**
16. According to the third paragraph, the locals were not warned about an imminent storm, so even the increased wave activity seemed less sinister under partly cloudy skies. If they had been warned about the storm, they would have been worried about the increased wave activity and taken it as a warning that the hurricane was almost making landfall. The fact that the skies were partly sunny deceived them into thinking that this was just another ordinary day and that they did not have to worry about a hurricane. We can therefore assume the phrase "seemed less sinister under partly cloudy skies." means the partly sunny weather gave the people of Galveston a false sense of security about the hurricane, **so answer choice (B) is correct.**
17. The second paragraph talks about how, due to tension as a result of the Spanish-American War only two years earlier, the US Weather Bureau director Willis Moore implemented a policy to block telegraph reports from Cuban meteorologists. Because of this, when the Cuban officials said Galveston would make landfall on the Gulf Coast of Texas, this information was ignored. From this, we can conclude the tension between the US and Cuba resulting from the war played a role in why

the US Weather Bureau did not look into Cuban data about the hurricane, **so answer choice (C) is correct.**

18. The fourth paragraph starts out by saying, “One report of the damage is particularly vivid”. The vivid report is then written in italics and in quotes to show it is a first-hand account of the storm as reported by someone who actually saw the damage caused by the Galveston Hurricane. **Therefore, answer choice (D) is correct.**
19. The passage tells the story of two siblings, Josie and Jackson, who decide to play kickball in the house because the weather outside is not great for playing kickball. They set ground rules, one of which is to use the left foot so they don’t kick the ball hard, and they also agree not to kick the ball into the living room because there are too many things in there that could break. The game gets interesting, and they forget the rules. Josie uses her right foot to kick the ball and the ball goes straight towards the television and breaks the screen. We can conclude that the main purpose of the passage is to tell the story of two siblings who make a mistake while playing kickball, **so answer choice (D) is correct.** Answer choice (A) is incorrect because no lesson is mentioned in the passage. The passage just tells a story but does not end with saying there’s a lesson, and no punishment is mentioned either. Answer choice (B) is incorrect because we are not told about the father’s reaction. Answer choice (C) is incorrect because the story does not focus on the relationship between Josie and Jackson; it focuses on their kickball game and how it led to a mistake.
20. Lines 6 through 7 say that the thought of not playing kickball had occurred to Josie. However, the weather outside was not conducive to spending any time out there, as stated in lines 8 through 9. This means the weather was not suitable for playing kickball, so they decided to play inside. We can assume the word conducive means appropriate, **so answer choice (B) is correct.**
21. Lines 26 through 27 say, “Josie, finally controlling the ball, congratulated her brother, “nice kick!””. This means Josie is happy that her brother is playing well. Lines 28 through 29 say, “ At some point in time, they also stopped keeping score.” This means Josie and Jackson are focused on enjoying the game and not on who has more points. We can infer that Josie and Jackson don’t care who wins, **so answer choice (A) is correct.**
22. Paragraph 6, 7 and 8 describe how the siblings decide to play with their dominant feet, and Josie gives the ball a good kick with her right foot. The ball crashes the television: the same one her dad watches every single night as detailed in paragraph 1. Jackson tells her that the dad would be so mad at her, and a few minutes later they hear him at the door. At this point, Josie thinks, “*I would rather be taking a test in school right now.*” This means she would rather be taking a test, which is usually a scary experience for most students, than face her dad and explain that she broke his television. We can conclude from that statement that she is not looking forward to her dad coming home, **so answer choice (C) is correct.**
23. In the second-to-last paragraph, when Josie breaks the television, Jackson tells her that their dad would be so mad about her mistake. Josie insists that since they were both playing, it might as well be Jackson who broke the television. But Jackson retorts, “But it wasn’t”. He is replying to her claim that

it could be him who broke the television, so we can assume the word, “retorted” means replied.

**Therefore, answer choice (A) is correct.**

24. Lines 51 through 53 state, “What their dad said next caused Josie and Jackson to stare at each other in disbelief.” They are staring at each other in disbelief because their dad tells them he has bought another TV. Having a new TV means that they won’t be in trouble for breaking the old one. They had thought their dad would be mad at them for breaking his TV, but since he has bought a new one, their problem is already solved, **so answer choice (C) is correct.**
25. The passage informs us that the ocean is one example of carbon sinks and that 90% of the carbon dioxide found on the planet is found in the ocean. It then details how carbon enters and leaves the ocean through three mechanisms called pumps. The rest of the passage discusses these three pumps and their effect on the ocean. We can therefore conclude that the primary purpose of the passage is to detail the different mechanisms that move carbon dioxide in and out of the ocean, **so answer choice (C) is correct.** Answer choice (A) is incorrect because the passage does not discuss why ocean health is important to humans. It does briefly mention climate change, but it mainly focuses on the health of the entire ocean and the organisms that call it home (lines 59 through 61). Answer choice (B) is incorrect because although climate change is mentioned in line 51, it is only briefly mentioned and is not the main focus of the passage. Answer choice (D) is incorrect because while the passage does mention that “90% of the carbon dioxide found on the planet is stored in the ocean,” (lines 8 through 9), the remainder of the passage is about the three pumps that help carbon enter and exit the ocean, not about the fact that the ocean stores most of the earth’s carbon dioxide.
26. Lines 49 through 51 state, “While the ocean does provide a buffer against the effects of climate change, it cannot continue to absorb carbon forever.” Lines 48 and 49 say that the ocean has absorbed up to 40% of human-caused carbon emissions in the past. This means that the ocean provides a buffer against the effects of climate change because it absorbs human-caused carbon emissions. We can therefore conclude that carbon emissions contribute to climate change, **so answer choice (D) is correct.**
27. Lines 57 through 61 say that when too much dissolved carbon is present in seawater, the ocean becomes more acidic. This has a negative effect on the health of the entire ocean and the organisms that call it home, so answer choice (B) has been mentioned. Answer choice (C) has been mentioned in lines 49 through 52 where the passage says the ocean can’t continue to absorb carbon forever. Answer choice (D) is mentioned in lines 54 through 55 that say, “As the carbon content of water increases, its chemical properties change”. **Therefore, answer choice (A) is correct.** In lines 57 through 59, the passage states that when too much dissolved carbon is present in seawater, the ocean becomes more acidic. This answer says the ocean becomes *less* acidic, which contradicts what was said in the passage.
28. The fifth paragraph explains the mechanism called the biological pump. It involves phytoplanktons, which are tiny creatures that live on the surface of the ocean and use the sun as a source of energy. In the process of converting sunlight into food, they absorb carbon dioxide. It’s therefore true that phytoplankton play a role in regulating the carbon dioxide balance in the Earth’s atmosphere because phytoplankton absorb carbon dioxide, **so answer choice (A) is correct.**

29. Lines 54 through 57 say that as the carbon content of water increases, its chemical properties change and it becomes unable to absorb as much carbon. We can conclude the ocean is able to absorb less carbon over time because its chemistry changes as it absorbs carbon, **so answer choice (B) is correct.**
30. Lines 31 through 32 state, “The carbonate pump works against the effect of the solubility pump. **Therefore, answer choice (A) is correct.**
31. The passage starts by introducing the town of Leavenworth and explains that in the 1920s, the economy of Leavenworth began to decline. By the 1960s, city leaders decided to reinvent the town. With the help of the residents of Leavenworth, the town was transformed into a Bavarian village that attracts swarms of tourists each year. Based on this, we can conclude the central aim of the text is to celebrate a community-based renovation of a struggling U.S. town, **so answer choice (B) is correct.** Answer choice (A) is incorrect because the passage only looks at one city: Leavenworth. It does not talk about various ways that struggling towns can reinvent themselves; it only discusses how Leavenworth reinvented itself. Answer choice (C) is incorrect because while the passage does mention that Leavenworth had traditional Bavarian celebrations, it does not examine how these traditions are expressed all over the country. Answer choice (D) is incorrect because while the passage does mention that another Washington town has emulated Leavenworth in creating their own themed town, the passage does not aim to create a blueprint or provide steps for them to follow.
32. The passage focuses on the town of Leavenworth and how they reinvented themselves by modeling their town after a Bavarian village. While they were a struggling town and improved their economy by imitating a European town, this does not mean that any struggling U.S. town can just imitate a European city and find success, so answer choice (B) is incorrect. The passage talks about how some of the German festivals that Leavenworth holds each year are very popular but it does not tell us enough about German festivals' success in the U.S. as a whole for us to know if they are highly successful elsewhere, so answer choice (C) is incorrect. While the passage does say that another struggling town in Washington modeled their reinvention on Leavenworth's success, that does not mean that Leavenworth's model is the correct model for every struggling town, so answer choice (D) is incorrect. The only thing we know for sure from the passage is that Leavenworth used a focused and community-wide effort to transform their town and find economic success. **Therefore, answer choice (A) is correct.**
33. Lines 33-37 state, “It is a small city with a thriving tourism-oriented economy. Visitors are *enthralled* by the quaint Old World charm of a European city so easily accessible right in America.” Because tourism is thriving and visitors are *enthralled* by the charm of the city, we can determine that the word “enthralled” is positive. The only answer choices that are positive are “humored” and “captivated”. It would not make sense that people would be humored, or find it funny, that Leavenworth was charming, so answer choice (B) is incorrect. “Captivating” means charming or attractive, which makes sense in the sentence because visitors would be charmed or attracted to the charm of Leavenworth. **Therefore, answer choice (D) is correct.**
34. The passage starts off by introducing the reader to the idea of reinvention. It talks about the town of Leavenworth and how it was once a prosperous railroad town but it fell on hard times when the railroad was rerouted to a different town (the city's decline). The passage goes on to explain and



celebrate the decision of Leavenworth to reinvent itself as a classic Bavarian village. This ultimately led to the revitalization of the town’s economy (the city’s success). Overall the organization of the passage can best be described as the exploration of a city’s journey from its decline to its success.

**Therefore, answer choice (C) is the correct answer.**

35. The third paragraph discusses how city leaders of Leavenworth decided to reinvent the town in the 1960s. Lines 26 through 28 state, “They were inspired in part by their proximity to the Cascade Mountains, which put them in mind of the famous Alps.” Lines 30 through 31 state, “They were also inspired by the town of Solvang, California.” Therefore, the purpose of the third paragraph is to discuss the inspiration behind the transformation of Leavenworth, **so answer choice (D) is correct.**
36. Lines 26-28 state “They were inspired in part by their proximity to the Cascade Mountains, which put them in mind of the famous Alps.” Mountains are geographical features, **so answer choice (A) is correct.**

### **Mathematics Achievement**

1. **Answer choice (D) is correct.** Prime factorization means finding which prime numbers multiply together to make the original number. To find the prime factorization of 80, make a factor tree for 80 and continue breaking up the factors into more branches until you are left with all prime numbers. If you do this, you get that 80 equals  $2 \cdot 2 \cdot 2 \cdot 2 \cdot 5$  which equals  $2^4 \cdot 5$ . To see a step-by-step solution of this problem, follow this link, type in the number, and choose “Find prime factorization and factor tree”: [prime factorization calculator](#)
2. **Answer choice (B) is correct.** To multiply mixed numbers, first change each mixed number into an improper fraction:  $6\frac{3}{4} \cdot 1\frac{1}{12} = \frac{27}{4} \cdot \frac{14}{3}$ . Now multiply the fractions by multiplying the numerators and multiplying the denominators, cross reducing when possible:  $\frac{27}{4} \cdot \frac{14}{3} = \frac{9}{2} \cdot \frac{7}{1} = \frac{63}{2} = 31\frac{1}{2}$
3. **Answer choice (D) is correct.** Since we choose two cards randomly at the same time, we cannot choose the same card twice. The only way to get a sum of 10 is to choose the card labeled 5 twice, so it is not possible that the sum of the two cards is 10.
4. **Answer choice (A) is correct.** Since we only want to display integers, we can only display the whole numbers that are no more than 5 and no less than 1. The whole numbers no more than 5 and no less than 1 are 1, 2, 3, 4, 5. The graph in answer choice (A) displays the numbers 1, 2, 3, 4, 5.
5. **Answer choice (D) is correct.** Because the  $y$  – axis represents the gas price in dollars, and the  $x$  – axis represents the time in weeks, the slope of each line represents the change in the price of gas per week, which is the same as saying the weekly increase in gas price. Therefore, we need to order the lines in order of greatest, or steepest, slope to least, or least steep. City B has the greatest slope, then City C, then City A, and then City D.

6. **Answer choice (B) is correct.** A basketball is a little under a foot. 20 mm is very small (the thickness of a credit card is about 1 mm), so it could not represent the diameter of a basketball. 20 meters is the length of 20 meter sticks, which are each around 3 feet. Therefore, 20 meters is too large for the diameter of a basketball. 20 km is similar to 20 miles, which is way too large for the diameter of a basketball. Therefore, 20 cm is the best answer.
7. **Answer choice (A) is correct.** To divide decimals, move the decimal point of the divisor (2nd number) all the way to the right. We move the decimal point in 0.8 to the right one time to get 8. Now, do the same thing to the dividend (1st number). We move the decimal point in 0.0964 to the right one time to get 0.964. Now divide 0.964 by 8 using long division and you get 0.1205. To see a step by step solution of this problem, follow this link and type in the problem: [how to solve operations with decimals](#)
8. **Answer choice (B) is correct.** To solve this problem, we need to find the LCM of 15 and 20. The LCM of 15 and 20 is 60 because it is the smallest number that 15 and 20 both go into evenly. Therefore, every 60 minutes, or every 1 hour, both trains leave the station. Since both trains left the station at 8:15 am, they will both leave the station together at 9:15 am.
9. **Answer choice (A) is correct.** To find the probability of multiple events, multiply the probability of each event. There are 6 total balls and 1 gold ball in the first bin, so the probability that Devin chooses a gold ball from the first bin is  $\frac{1}{6}$ . There are 8 total balls and 1 gold ball in the second bin, so the probability that Devin chooses a gold ball from the second bin is  $\frac{1}{8}$ . There are 10 total balls and 1 gold ball in the third bin, so the probability that Devin chooses a gold ball from the third bin is  $\frac{1}{10}$ . Find the probability of Devin choosing three gold balls and winning the game by multiplying the three probabilities:  $\frac{1}{6} \cdot \frac{1}{8} \cdot \frac{1}{10} = \frac{1}{480}$ .
10. **Answer choice (B) is correct.** To find the slope between two points, use the equation  $slope = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point. Plug the slope and the given points into the formula and solve for  $x$ :  $2 = \frac{2-6}{x-8} \rightarrow 2 = \frac{-4}{x-8} \rightarrow 2(x-8) = -4 \rightarrow x-8 = -2 \rightarrow x = 6$ .
11. **Answer choice (A) is correct.** While you could multiply out each product and then combine the terms together, this will take too long, so we will use a shortcut. First rearrange the terms to get  $(310)(13) - (310)(3) + (290)(6) + (290)(4)$ . Notice that the first two terms are multiplied by 310, and the last two terms are multiplied by 290, so we can rewrite the problem as  $310(13 - 3) + 290(6 + 4)$ . Simplify to get  $310(10) + 290(10)$ , and multiply each term to get  $3,100 + 2,900$ . Finally, add the two terms to get 6,000.
12. **Answer choice (B) is correct.** Plug 3 in for  $r$  and 9 in for  $h$  into the given volume equation and simplify to find the volume of the cone:  $V = \frac{1}{3}\pi \cdot (3)^2 \cdot (9) \rightarrow V = \frac{1}{3}\pi \cdot (9) \cdot (9) \rightarrow V = 27\pi \text{ m}^2$ .

13. **Answer choice (D) is correct.** A number is written in scientific notation when a number between 1 and 10 is multiplied by a power of 10. The power, or exponent, tells us how many times to move the decimal point: positive means move to the right and negative means move to the left. To write 243,000 in scientific notation, change it into a decimal that is between 1 and 10: 243,000 becomes 2.43. To get from 2.43 to 243,000, we need to move the decimal point 5 times to the right. Therefore, we can write 243,000 as  $2.43 \times 10^5$ .
14. **Answer choice (D) is correct.** The formula for the volume of a cube is  $V = s^3$ , where  $s$  is the side length of the cube. Find the side length of the cube by plugging  $125 \text{ m}^3$  in for the volume in the equation and solving for  $s$ :  $125 \text{ m}^3 = s^3 \rightarrow s = 5 \text{ m}$ . The formula for the surface area of a cube is  $SA = 6s^2$ , where  $s$  is the side length of the cube. Plug in 5 m for  $s$  to find the surface area:  $SA = 6(5 \text{ m})^2 \rightarrow SA = 6(25 \text{ m}^2) \rightarrow SA = 150 \text{ m}^2$ .
15. **Answer choice (C) is correct.** A parallelogram is a four sided shape with two pairs of opposite sides that are both congruent and parallel. A rectangle is a specific type of parallelogram that has four right angles.
16. **Answer choice (B) is correct.** Choose a number for  $a$  that is a multiple of four. Let's say  $a = 4$ . Plug 4 in for  $a$  in each answer choice and cross out choices that are multiples of 4. Answer choice (A):  $4 + 4 = 8$ , which is a multiple of 4, so we can cross out answer choice (A). Answer choice (B):  $4 - 2 = 2$  which is NOT a multiple of 4, so we keep answer choice (B). Answer choice (C):  $2(4) = 8$ , which is a multiple of 4, so we can cross out answer choice (C). Answer choice (D):  $4^2 = 16$ , which is a multiple of 4, so we can cross out answer choice (D). Therefore, answer choice (B) is correct.
17. **Answer choice (C) is correct.** When setting up proportions, we either need the same quantities in the numerators of both fractions and the same quantities in the denominators of both fractions, or we need the same quantities in the same fraction. This means we can put the heights of Ashley and the building in the numerators of both fractions and lengths of shadows in the denominators of both fractions:  $\frac{15}{4} = \frac{5}{s}$ . We could've also written the proportion in these three ways:  $\frac{4}{15} = \frac{s}{5}$ ,  $\frac{15}{5} = \frac{4}{s}$ ,  $\frac{5}{15} = \frac{s}{4}$ .
18. **Answer choice (A) is correct.** On this stem-and-leaf plot, the stem column represents the ones digit of the number, and the leaf column represents the tenths digit. For example, the last row of our stem-and-leaf plot represents the number 4.5. The range of a set of data equals the difference between the highest and lowest number. The highest number is 4.5 and the lowest number is 0.9, so the range is  $4.5 - 0.9$  which equals 3.6.
19. **Answer choice (B) is correct.** Find the price of the TV after the 20% discount by subtracting 20% of \$500 from \$500:  $\$500 - 20\% \text{ of } \$500 = \$500 - 0.2 \cdot \$500 = \$500 - \$100 = \$400$ . Find the price of the TV after sales tax by adding 10% of \$400 to \$400:  $\$400 + 10\% \text{ of } \$400 = \$400 + \$40 = \$440$ .

20. **Answer choice (D) is correct.** Find the total fraction of his money that Wyatt spent on rent and groceries by adding  $\frac{1}{2}$  and  $\frac{1}{4}$ :  $\frac{1}{2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4} = \frac{3}{4}$ . Therefore, Wyatt spent  $\frac{3}{4}$  of his money, so he has  $\frac{1}{4}$  left. Now we need to answer the question, “\$3000 is  $\frac{1}{4}$  of what number?” to find how much money Wyatt received from his paycheck. Set up and solve the following equation, where  $x$  represents how much money Wyatt received from his paycheck:  $\$3000 = \frac{1}{4}x \rightarrow x = \$12,000$ .
21. **Answer choice (B) is correct.** Use PEMDAS to find the value of the expression. Start with the exponent:  $(\sqrt{8})^2 - 2(5 - 3) = 8 - 2(5 - 3)$ . Next perform the subtraction inside the parentheses:  $8 - 2(5 - 3) = 8 - 2(2)$ . Finally, perform the multiplication and then the subtraction:  $8 - 2(2) = 8 - 4 = 4$ .
22. **Answer choice (A) is correct.** Cathay worked 10 more hours than Ben, and Ben worked  $b$  hours. Write an expression for how long Cathy worked by adding 10 to  $b$  to get  $b + 10$ . Jessie worked twice as long as Cathy, so write an expression for how long Jessie worked by multiplying  $b + 10$  by 2 and simplifying:  $2(b + 10) = 2b + 20$ . Therefore, we know the time Jessie worked,  $j$ , equals  $2b + 20$ , so  $j = 2b + 20$ .
23. **Answer choice (A) is correct.** First find the value of  $4x$  in terms of  $y$  by dividing both sides of the equation by 3 to get  $4x = 2y$ . Now find the value of  $4x + 3$  in terms of  $y$  by adding 3 to both sides of the equation to get  $4x + 3 = 2y + 3$ .
24. **Answer choice (C) is correct.** Let  $s$  represent the number of ounces of liquid a small mug can hold. Since a large mug can hold 8 more ounces than a small mug, a large mug can hold  $s + 8$  ounces. Together, a small and large mug can hold 32 ounces, so set the sum of the number of ounces a small mug can hold and the number of ounces a large cup can hold equal to 32 and solve:  $s + s + 8 = 32 \rightarrow 2s + 8 = 32 \rightarrow 2s = 24 \rightarrow s = 12$  ounces. Therefore, a small mug can hold 12 ounces, and a large mug can hold 8 more ounces, so a large mug can hold 20 ounces of liquid.
25. **Answer choice (D) is correct.** Using the graph, the number of sales on Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday respectively is 2, 7, 3, 1, 5, 9. The mean of a data set equals the sum of the numbers divided by the number of terms:  $\frac{2+7+3+1+5+9}{6} = \frac{27}{6} = 4.5$  hours.
26. **Answer choice (C) is correct.** Find the number of dimes in the jar by setting up and solving the following proportion, where  $d$  represents the number of dimes:  $\frac{3}{5} = \frac{15}{d} \rightarrow 3d = 75 \rightarrow d = 25$ . The value of one dime is \$0.10, so find the value of the 25 dimes by multiplying \$0.10 by 25:  $\$0.10 \cdot 25 = \$2.50$ .
27. **Answer choice (A) is correct.** Round 489 up to 500, and round 812 down to 800. Now we have  $\frac{500 \cdot 800}{5,000}$ . Multiply the numbers in the numerator and then divide the result by the denominator:  $\frac{500 \cdot 800}{5,000} = \frac{400,000}{5,000} = 80$ .

28. **Answer choice (C) is correct.** The area of the shaded region is equal to the area of the square minus the area of the circle. To find the area of the square, we first need to find the side length. The perimeter of a square is equal to 4 times the side length. Therefore, to find the side length of the square, divide the perimeter of 32 cm by 4 to get a side length of 8 cm. The area of a square is equal to the side length squared, so the area of the square equals  $(8 \text{ cm})^2 = 64 \text{ cm}^2$ . To find the area of a circle we need the radius. The diameter of the circle is equal to the side length of the square, and the radius of a circle is equal to half of the side length. Therefore, the diameter of the circle is 8 cm, so the radius of the circle is 4 cm. The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Plug in 4 cm for  $r$  to find the area of the circle:  $A = \pi(4 \text{ cm})^2 \rightarrow 16\pi \text{ cm}^2$ . Therefore, the shaded area equal  $64 - 16\pi \text{ cm}^2$ .
29. **Answer choice (C) is correct.** We need to find which value in the table is greater than  $\frac{2}{9}$ . Convert  $\frac{2}{9}$  into a decimal by dividing the numerator by the denominator:  $\frac{2}{9} = 2 \div 9 = 0.\overline{2}$ . Since 0.23 is greater than  $0.\overline{2}$ , Patty has not completed more of the paper than Maddie has.
30. **Answer choice (B) is correct.** Plug in 4 for  $b$  and  $-6$  for  $c$  and solve for  $a$ :  $2a = 3(4) - (-6) \rightarrow 2a = 12 + 6 \rightarrow 2a = 18 \rightarrow a = 9$ .
31. **Answer choice (C) is correct.** We need to find the number of square feet of wallpaper Natalie needs to cover both walls, so we need to find the area of each wall in square feet. First, change 8 feet 3 inches into feet by converting 3 inches into feet. There are 12 inches in a foot, so to change 3 inches into feet, divide 3 by 12 to get 0.25 feet. Therefore, 8 feet 3 inches equals 8.25 feet. Now find the area of each wall by multiplying the dimensions:  $12 \text{ feet} \cdot 8.25 \text{ feet} = 99 \text{ square feet}$  for each wall. Since there are two walls, 99 square feet by 2 to get a total of 198 square feet.
32. **Answer choice (B) is correct.** The probability of choosing a dark or milk chocolate is 1 out of 2, or  $\frac{1}{2}$ . Therefore,  $\frac{1}{2}$  of the chocolates are dark or milk chocolates, so we can find the total number of dark and milk chocolates by finding  $\frac{1}{2}$  of 20:  $\frac{1}{2}$  of 20 =  $\frac{1}{2} \cdot 20 = 10$ . There are 6 dark chocolates, so find the number of milk chocolates by subtracting 6 from 10:  $10 - 6 = 4$  milk chocolates.
33. **Answer choice (B) is correct.** Divide both sides of the equation by 9:  $6m = 9(n - 2) \rightarrow \frac{6}{9}m = n - 2$ . Simplify  $\frac{6}{9}$  and add 2 to both sides:  $\frac{6}{9}m = n - 2 \rightarrow \frac{2}{3}m = n - 2 \rightarrow \frac{2}{3}m + 2 = n$ .
34. **Answer choice (A) is correct.** A dilation changes the size of the figure, so answer choice (B) is incorrect. A translation and reflection do not change the orientation of the figure, so answer choices (C) and (D) are incorrect. Therefore, we are left with answer choice (A) rotation. A rotation is a circular movement of an object or figure around a center point. Triangle  $ABC$  was rotated  $90^\circ$  counterclockwise around the origin to produce the image  $A'B'C'$ .

35. **Answer choice (D) is correct.** In order for a trapezoid to be isosceles, the two non parallel sides must be congruent and base angles must be congruent. Therefore, if the measures of angles D and C are equal, the trapezoid is isosceles.
36. **Answer choice (C) is correct.** Trisha drove 25 miles in 30 minutes, so if she drives at the same speed, she will drive 50 miles in 60 minutes. There are 60 minutes in 1 hour, so Trisha drives 50 miles per hour. 1:30 PM is 3.5 hours past 10:00 AM, so we can find the distance Trisha drove by multiplying her speed 50 miles per hour by 3.5 hours:  $50 \text{ mph} \cdot 3.5 \text{ hours} = 175 \text{ miles}$ . We want to know how far away Trisha is from her daughter's college, so subtract the number of miles she drove from the total miles she needs to drive to get to the college:  $450 \text{ miles} - 175 \text{ miles} = 225 \text{ miles}$ .
37. **Answer choice (A) is correct.** To find the amount of water initially in the tub, plug in 0 for  $m$  and simplify to find  $g$ :  $g = 40 - 5(0) \rightarrow g = 40 - 0 \rightarrow g = 40$  gallons. Therefore, the 40 represents that the tub was initially filled with 40 gallons of water.
38. **Answer choice (D) is correct.** A rectangle is a four-sided shape with two pairs of opposite sides that are congruent and parallel and four right angles. If you plot the points (1, 3) and (-2, -4), you will form a rectangle with a width of 3 grid units and a length of 7 grid units.
39. **Answer choice (D) is correct.** Since there are 25% fewer girls than boys, the number of girls is equal to  $b - 25\%$  of  $b$ . Simplify this expression:  $b - 25\% \text{ of } b = b - 0.25b = 0.75b$ . Therefore, the total number of students is equal to the sum of the boys and girls:  $s = b + 0.75b \rightarrow s = 1.75b$ .
40. **Answer choice (A) is correct.** Change  $\%$  into a percent by first changing it into a decimal by dividing the numerator by the denominator:  $\% = 2 \div 5 = 0.4$ . Now change 0.4 into a percent by moving the decimal point two places to the right to get 40%. Find the total number of toys Kendall gave away by adding 25% and 40% to get 65%. Finally, find the percent of her toys Kendall has left by subtracting 65% from 100% to get 35%.
41. **Answer choice (A) is correct.** To find the ratio of the length of a side of triangle DEF to the corresponding side of triangle LMN, we can find the ratio of DE:LM, DF:LM, or EF:MN. Let's find the ratio of DF:LM:  $DF:LM = 12x:18x = 12:18 = 2:3$  which can also be written as 2 to 3.
42. **Answer choice (C) is correct.** Based on the scatter plot, we can estimate it takes between 10 and 12 minutes to complete 4 laps, and between 15 and 16 minutes to complete 6 laps. Therefore, we can estimate that it takes more than 12 minutes but fewer than 15 minutes to complete 5 laps. Answer choice (C) is the only answer choice greater than 12 and less than 15.
43. **Answer choice (B) is correct.** Out of 50 women, 15 do not own a dog, so  $\frac{15}{50}$  of the women do not own a dog. Find the percent of women that do not own a dog by changing  $\frac{15}{50}$  into a percent. The easiest way to change  $\frac{15}{50}$  into a percent is to multiply the numerator and denominator by 2 to get

$\frac{30}{100}$ . Now that our fraction has a denominator of 100, the percent is equal to the numerator, so 30% of women do not own a dog.

44. **Answer choice (B) is correct.** Answer choice (B) has only 2 routes from X to Z without retracting steps: X to W to Z, and X to Y to W to Z. Answer choices (A), (C), and (D) each have more than 2 routes from X to Z without retracing your steps.
45. **Answer choice (A) is correct.** The volume of a rectangular prism is equal to length • width • height. Use the center rectangle that is surrounded by dotted lines to find the length and width: the length is 7 cm<sup>2</sup>, and the width is 6 cm<sup>2</sup>. When the box is folded, the height will equal the width of the four rectangles connected to the center rectangle, so the height is 3 cm<sup>2</sup>. Multiply the dimensions to find the volume: 7 cm<sup>2</sup> • 6 cm<sup>2</sup> • 3 cm<sup>2</sup> = 126 cm<sup>2</sup>
46. **Answer choice (D) is correct.** The *y*-intercept of a line is where the line crosses the *y*-axis, so the *y*-intercept of the line is 8. Each equation in the answer choice is written in the form  $y = mx + b$ , where  $m$  is the slope and  $b$  is the *y*-intercept. Therefore, the  $b$  in the equation will be 8, so we can eliminate answer choices (A) and (B). Now we need to find the slope using the equation  $slope = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$ . Since the line crosses the *x*-axis at 4, it crosses through the point (4, 0). Since the line crosses the *y*-axis at 8, it crosses through the point (0, 8). Find the slope between (4, 0) and (8, 0):  $slope = \frac{8 - 0}{0 - 4} = \frac{8}{-4} = -2$ . Therefore, the equation of the line is  $y = -2x + 8$ .
47. **Answer choice (B) is correct.** David charges a flat fee of \$60, which means for 0 hours costs \$60. Therefore, we can eliminate answer choices (C) and (D) because they do not pass through the point (0, 60). David charges \$30 per hour, so for 1 hour, he charges the flat fee of \$60 plus \$30 which equals \$90. Answer choice (A) does not pass through the point (1, 90), so answer choice (A) is incorrect. Answer choice (B) increases by \$30 every hour and starts at \$60, so answer choice (B) is correct.

### **Practice Test 3**

#### **Verbal Reasoning**

1. **Answer choice (A) is correct.** The word **oblivious** means not aware or not concerned about what is happening around you. For example, if you walk across the middle of the street without looking to see if cars are coming, you are being **oblivious**. This is closest in meaning to **unaware**.
2. **Answer choice (C) is correct.** The word **devastated** means severely shocked, sad, or overwhelmed. For example, many people are **devastated** when their dog passes away. This is closest in meaning to **shattered**.

3. **Answer choice (C) is correct.** The word **procrastinate** means to delay or postpone an action. For example, if you don't start writing your English paper until the day before it is due, even though it was assigned two weeks ago, you **procrastinated**. This is closest in meaning to **delay**.
4. **Answer choice (D) is correct.** The word **portray** means to depict or describe something in a certain way. For example, if you draw a picture of your mom with a smile on her face and a giant heart on her chest, you are **portraying** her as happy and loving. This is closest in meaning to **represent**.
5. **Answer choice (A) is correct.** The word **abrupt** means sudden and unexpected. For example, an **abrupt** change in weather could be if it is sunny one minute, and pouring rain the next. This is closest in meaning to **sudden**.
6. **Answer choice (C) is correct.** The word **controversial** means likely causing disagreement. For example, many political topics such as immigration, gun control, and taxes are **controversial** because people have strong and differing opinions. This is closest in meaning to **arguable**.
7. **Answer choice (A) is correct.** The word **ample** means enough or more than enough. For example, if you and your friend were each asked to collect 10 canned goods for a food kitchen, and you collect 10 cans and your friend collects 15 cans, you have both collected an **ample** number of cans. This is closest in meaning to **adequate**.
8. **Answer choice (B) is correct.** The word **impending** means about to happen. For example, a gray cloud in the sky usually means rain is **impending**. This is closest in meaning to **approaching**.
9. **Answer choice (D) is correct.** The word **condone** means to accept or allow. For example, many teachers do not **condone** students using their phones during class. This is closest in meaning to **approve**.
10. **Answer choice (B) is correct.** The word **apprehensive** means anxious or worried. For example, many people are **apprehensive** before giving a presentation in front of a large audience. This is closest in meaning to **uneasy**.
11. **Answer choice (D) is correct.** The word **supplement** means to add an extra element or amount. For example, your parents may want you to **supplement** your school work with additional after school classes and practice. This is closest in meaning to **augment**.
12. **Answer choice (C) is correct.** The word **lure** means to entice or attract someone or something to do something, especially by offering a reward. For example, you may **lure** your dog into his crate by placing a treat inside of the crate. This is closest in meaning to **tempt**.
13. **Answer choice (D) is correct.** The word **allotted** means allocated or assigned. For example, when you are taking a standardized test, you have **allotted** time to complete each section of the test. This is closest in meaning to **assigned**.



14. **Answer choice (A) is correct.** The word **incompetent** means showing no skill or incapable. For example, if you hire an **incompetent** mechanic to fix your car, they may end up making things worse by trying to fix your car because they don't know what they are doing. This is closest in meaning to **inept**.
15. **Answer choice (B) is correct.** The word **benign** means kind and harmless. For example, while some people are scared of dogs, many dogs are **benign** and do not hurt humans. This is closest in meaning to **gentle**.
16. **Answer choice (B) is correct.** The word **abdicate** means to resign or step down. For example, if a king **abdicates** his position, he may pass the throne to his oldest son. This is closest in meaning to **retire**.
17. **Answer choice (D) is correct.** The word **copious** means large in number or quantity. For example, if you drink **copious** amounts of soda, you will probably have a stomach ache and headache from all of the sugar. This is closest in meaning to **plentiful**.
18. **Answer choice (C) is correct.** The word **accentuate** means to make it more noticeable. For example, sometimes when people with green eyes wear a green shirt, the shirt **accentuates** their eyes and makes them appear greener. This is closest in meaning to **highlight**.
19. **Answer choice (A) is correct.** The word **repeal** means to reverse or cancel a law. For example, if your town has a law that children cannot eat candy, you would probably want your local government to **repeal** this law. This is closest in meaning to **revoke**.
20. **Answer choice (C) is correct.** The word **blunder** means a mistake. For example, if your teammate accidentally scores on his own goal, that is a **blunder**. This is closest in meaning to error.
21. **Answer choice (B) is correct.** The sentence says Carmen was worried, so the word in the blank has to mean something similar to worried. "Confident" means assured or composed, which is the opposite of worried, so answer choice (A) is incorrect. "Discontented" means dissatisfied, which is not similar to worried, so answer choice (C) is incorrect. "Unethical" means not morally correct, which is not similar to worried, so answer choice (D) is incorrect. "Hesitant" means uncertain or doubtful which is similar to worried or can be the result of feeling worried, so "hesitant" makes the most sense.
22. **Answer choice (B) is correct.** The sentence says the evacuation is not mandatory, so we know the word in the blank cannot be "requiring" since that would mean it is mandatory. Therefore, answer choice (A) is incorrect. "Dissuading" means persuading someone to not do something. If there is a hurricane, the National Weather Service would not try to convince people to not leave their homes, so answer choice (D) is incorrect. We are down to "enticing" and "advising". "Enticing" means to tempt or attract, and "advising" means to suggest or recommend. Since we do not know if the National Weather Service is providing an incentive for people to leave their homes or giving people something that would attract them to leave their homes, answer choice (C) is incorrect. It would make sense that

if there is a hurricane, the National Weather Service would recommend people leave their homes, so “advising” fits best in the blank.

23. **Answer choice (B) is correct.** The sentence says that Mrs. Putnam assigns her students frequent quizzes so they are encouraged to consistently study what they are learning. Therefore, Mrs. Putnam is trying to help her students better understand and remember the material, so the word in the blank should mean something similar to remember or understand. “Retain” means to keep in one’s memory, so “retain” fits best in the sentence.
24. **Answer choice (D) is correct.** Since Kevin’s trading card is one of the rarest in the world, it would make sense that he wants to keep it in very good or near perfect condition since it is very valuable. Therefore, the word in the blank should mean something similar to very good or near perfect. “Pristine” means in its original condition or spotless, so “pristine” fits best in the blank.
25. **Answer choice (D) is correct.** For this question, use process of elimination. The company treats its employees very poorly and is one of the worst companies to work for in the state. Therefore, the word in the blank should be negative. “Commended” means praised, and “courageous” means brave, which are both positive words, so answer choices (A) and (C) are incorrect. “Tormented” means tortured, and “notorious” means famous or known for something bad, which are both negative words. There is no indication that the company is tortured for treating its employees poorly, so answer choice (B) is incorrect. Since the company is known as being one of the worst companies to work for in the state, they are known for something bad, so “notorious” fits best in the blank.
26. **Answer choice (A) is correct.** The word “so” tells us that the second part of the sentence is a result of the first part. The first part of the sentence says Preston had made false claims about other students in the past. Since Preston has previously made false claims, we can assume that his teacher would not find his story believable. Therefore, the word in the blank should mean something similar to believable. “Credible” means believable or convincing, so “credible” fits best in the blank.
27. **Answer choice (C) is correct.** The narrator has been self-employed since he/she was sixteen years old, which means the concept of working with coworkers and having a boss is something that the narrator has probably never experienced. Therefore, the narrator is unfamiliar with having a boss or coworkers, so the word in the blank should mean something similar to unfamiliar. “Foreign” means strange or unfamiliar, so “foreign” fits best in the blank.
28. **Answer choice (A) is correct.** The word “but” tells us that the second part of the sentence should be the opposite of the first. The second part says many people think yoga emerged over 5,000 years ago in India and has since spread to hundreds of countries. Therefore, the first part of the sentence should say something similar to, “There is a lot of speculation around the exact emergence of yoga,” so the word in the blank should be similar in meaning to emergence or beginning. “Origin” means the beginning or start of something, so “origin” fits best in the blank.
29. **Answer choice (A) is correct.** We know Sophia worked twelve-hour shifts at the hospital and was grateful to relax. Therefore, we can assume Sophia was tired because working twelve hours is tiring,

and if Sophia is tired, she would be grateful to relax. “Fatigued” means tired or exhausted, so “fatigued” fits best in the blank.

30. **Answer choice (C) is correct.** We know that the corrupt actions of the city’s officials resulted in something happening to the people’s confidence in the local government. The word “corrupt” means dishonest. If the city’s officials were dishonest, it would make sense that people’s confidence in the local government has decreased. Therefore, the word in the blank should mean something similar to decreased. “Undermined” means to lessen the effectiveness of something, to weaken, or to reduce, so “undermine” fits best in the blank.
31. **Answer choice (B) is correct.** Since camels can survive without water, can withstand the heat of desert sand, and don’t sweat often, we can assume camels can survive in dry and hot climates. Therefore, the word in the blank should describe a climate that is dry and/or hot. “Arid” means dry and is often used to describe the climate in a desert, so “arid” fits best in the blank.
32. **Answer choice (D) is correct.** Since Ralph is irritated by his sister constantly trying to ----- fights, we know the word in the blank is negative. “Pacify” means appease or calm, and “mediate” means to intervene in a dispute and try to come to an agreement, which are both positive, so answer choices (A) and (C) are incorrect. “Fabricate” means to invent or concoct, usually in a deceitful way, so “fabricate” can be negative. However, fabricating a fight would mean making one up or lying about one, and there is no indication that Ralph’s sister lied about fights. “Instigate” means to provoke or urge someone to do something that is usually bad. Since the end of the sentence says that Ralph’s sister would mock him and call him names, we can assume that she was doing this to anger Ralph and cause or provoke a fight. Therefore, “instigate” fits best in the blank.
33. **Answer choice (C) is correct.** Since Angela enjoys listening to a variety of music genres, she would be described as having a varied or diverse taste in music. Therefore, the word in the blank should mean varied or diverse. “Eclectic” means wide-ranging or diversified, so “eclectic” fits best in the blank.
34. **Answer choice (A) is correct.** Since Ted was forced to step down from his position as CEO, we can assume he was forced to give up control of the company. Therefore, the word in the blank should mean something similar to give up. “Relinquish” means to give away, so “relinquish” fits best in the blank.
35. **Answer choice (D) is correct.** Since Eagles can clearly detect objects about eight times as far as humans can, we can say eagles have stronger vision than humans or better visual strength or ability. Therefore, the word in the blank should mean something similar to strength or ability. “Acuity” means sharpness, and “visual acuity” means sharpness of vision or the ability to see things well, so “acuity” fits best in the blank.
36. **Answer choice (B) is correct.** The words “while” and “surprisingly” tell us that the word in the blank should be the opposite of how parrots are portrayed in movies and television. Since parrots are often portrayed as greedy and treasure-seeking, the word in the blank should mean the opposite of greedy.

“Altruistic” means selfless or compassionate, which is the opposite of greedy, so “altruistic” fits best in the blank.

37. **Answer choice (D) is correct.** For this question, use process of elimination. “Negligibly” means in a way that is too small to be of importance. Since automobile racing can cause serious injuries and even death, it would not make sense to say it is dangerous in a way that is of little importance, so answer choice (A) is incorrect. “Extrinsically” means external or outward. It would not make sense to say automobile racing is externally dangerous, so answer choice (B) is incorrect. “Unexpectedly” means surprisingly. Since automobile racing involves cars speeding down a narrow track, it is not surprising that it is a dangerous sport, so answer choice (C) is incorrect. “Inherently” means naturally or fundamentally dangerous. Given the nature of automobile racing, which includes dozens of cars speeding down a narrow track, it is a dangerous sport. Therefore, “inherently” fits best in the blank.
38. **Answer choice (B) is correct.** The word “also” tells us that crabs use their claws and teeth in their stomach for a similar reason. Since crabs use teeth in their stomach to growl and ward, or scare, off predators, we can assume they use their claws to scare predators too. Therefore, the word in the blank should mean something similar to scare. “Intimidate” means to alarm or scare, so “intimidate” fits best in the blank.
39. **Answer choice (C) is correct.** For this question, use process of elimination. “Enlists” can mean join or can mean obtain. Either way, “enlist” does not fit in the sentence. It would not make sense to say the mantis shrimp joins the world’s fastest punch, nor would it make sense to say the mantis shrimp obtains the world’s fastest punch, so answer choice (A) is incorrect. “Spurns” means rejects. The mantis shrimp strikes at incredibly fast speeds, so it would not make sense to say the mantis shrimp rejects the world’s fastest punch. Therefore, answer choice (B) is incorrect. “Endures” means suffer or survive. It would not make sense to say the mantis shrimp suffers or survives the world’s fastest punch, since the mantis shrimp is producing the punch, so answer choice (D) is incorrect. “Boasts” means possesses, which fits best in the sentence: the mantis shrimp is the subject of the sentence, and the sentence says the mantis shrimp strikes at speeds of 75 feet per second and produces an underwater shockwave that stuns and kills predators, so it makes sense to say the mantis shrimp possesses the world’s fastest punch.
40. **Answer choice (A) is correct.** The phrase “even though” tells us that the second part of the sentence should be the opposite of the first. The first part of the sentence says all of the evidence placed Martin at the scene of the crime, which would make Martin seem guilty. Therefore, the second part of the sentence should say the opposite: Martin maintained his statement or belief that he was innocent. Therefore, the word in the blank should mean something similar to statement or belief. “Assertion” means a statement of opinion, so “assertion” fits best in the blank.

### **Quantitative Reasoning**

1. **Answer choice (A) is correct.** The median of a set of numbers is the middle number when the numbers are lined up from least to greatest or greatest to least. The histogram represents the scores of 14 players, so it represents 14 data points. Because we have an even number of data points, the

median will be the average of the two middle data points, 7 and 8. The histogram shows that the 7th data point is located in the range 20 to 29, and the 8th data point is located in the range 30 to 39. Therefore, the 7th and 8th data points must be different values because they are not located in the same range of scores, so the average of the 7th and 8th data points will lie between these scores. Based on this, we can tell that the median will not be one of the individual scores in the data set.

- Answer choice (B) is correct.** The pattern repeats every five terms: heart, smiley, moon, cloud, cross, heart, smiley, moon, cloud, cross etc. Therefore, the 5th, 10th, 15th, 20th, and 25th terms are all the same because they are all multiples of 5. Since the 5th and 10th terms are both a cross, the 25th term will be a cross.
- Answer choice (A) is correct.** To find the value of  $6a$  in terms of  $b$ , multiply both sides of the equation by 2 and simplify:  $2(3a) = 2(b + 1) \rightarrow 6a = 2b + 2$ .
- Answer choice (D) is correct.** It is helpful to remember that 50% of a number is half of the number. Find the number of bees in 2011 by increasing the number of bees in 2010 by 50%:  $2000 + 50\%$  of  $2000 = 2000 + 1000 = 3000$ . Find the number of bees in 2012 by increasing the number of bees in 2011 by 50%:  $3000 + 50\%$  of  $3000 = 3000 + 1500 = 4500$ . Find the number of bees in 2013 by increasing the number of bees in 2012 by 50%:  $4500 + 50\%$  of  $4500 = 4500 + 2250 = 6750$ .
- Answer choice (C) is correct.** First find the radius of the circle by finding the distance between the center,  $(1, 2)$ , and the given point that lies on the circle,  $(4, 2)$ . Since the  $y$ -coordinates of both points are the same, the distance between the two points is the difference between the  $x$ -coordinates:  $4 - 1 = 3$  grid units. Therefore, the radius of the circle is 3 grid units. The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle. Plug in 3 for  $r$  and simplify to find the area:  $A = \pi(3)^2 \rightarrow A = 9\pi$  grid units<sup>2</sup>.
- Answer choice (D) is correct.** If a number is divided by a number greater than 1, the result is less than the original number, so answer choices (A) and (B) are both less  $\frac{a}{b}$ . If a number is multiplied by a number greater than 1, the result is greater than the original number, so answer choices (C) and (D) are both greater than  $\frac{a}{b}$ . Therefore, we can cross out answer choices (A) and (B). The larger the number something is multiplied by, the larger the result. Since  $\frac{5}{4}$  is greater than  $\frac{9}{8}$ , answer choice (D) is greater than answer choice (C).
- Answer choice (B) is correct.** The larger, incomplete cube is 4 small cubes long, 4 small cubes wide, and 4 small cubes high, so there should be a total of  $4 \cdot 4 \cdot 4 = 64$  small cubes. On the bottom row of the larger cube, we have 16 small cubes. On the next row, we have 14 small cubes. On the next row, we have 12 small cubes, and on the top row, we have 7 small cubes. Therefore, altogether we have  $16 + 14 + 12 + 7 = 49$  small cubes. Find the number of cubes needed to complete the larger cube by subtracting 49 from 64 to get 15.
- Answer choice (B) is correct.**  $2^n \cdot 3^m$  represents the prime factorization of 144, so to find the values of  $n$  and  $m$ , we need to find the prime factorization of 144. Prime factorization means finding which

prime numbers multiply together to make the original number. To find the prime factorization of 144, make a factor tree for 144 and continue breaking up the factors into more branches until you are left with all prime numbers. If you do this, you get that 144 equals  $2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$  which equals  $2^4 \cdot 3^2$ . Therefore,  $n = 4$  and  $m = 2$ , so  $n + m = 4 + 2 = 6$ . To see a step-by-step solution of the prime factorization, follow this link, type in the number, and choose “Find prime factorization and factor tree”: [prime factorization calculator](#)

9. **Answer choice (C) is correct.** An acute angle has a measure less than  $90^\circ$ , and the sum of the angles in a triangle is  $180^\circ$ . Therefore,  $A + B + C = 180^\circ$ . If angle A measures  $90^\circ$ , then  $B + C = 90^\circ$ . Since angle A is less than  $90^\circ$ ,  $B + C$  must be greater than  $90^\circ$ . This eliminates answer choices (A) and (B). Since the sum of the angles in a triangle is  $180^\circ$ ,  $B + C$  cannot equal 180 because then angle A would measure  $0^\circ$ . Therefore, the only answer choice that could be the sum of angles B and C is  $100^\circ$ .
10. **Answer choice (A) is correct.** The amount of money Tim has is one-third the amount of money Allen has, so the amount of money Allen has is three times the amount of money Tim has. Therefore, since Tim has  $t$  dollars, Allen has  $3t$  dollars. If Allen gives Tim \$20, Allen loses \$20, so subtract \$20 from the amount of money Allen has to get  $3t - 20$ .
11. **Answer choice (C) is correct.** In probability, the word *or* means *add*. To find the probability of landing on a pink *or* blue space, add the probability of landing on a blue space and the probability of landing on a pink space:  $\frac{1}{5} + \frac{1}{4} = \frac{4}{20} + \frac{5}{20} = \frac{9}{20}$  which can be written as 9 out of 20.
12. **Answer choice (A) is correct.** The difference between two points on a number line is equal to the distance between them, which can be found by subtracting the smaller number from the larger number. Because points A and D are the farthest apart, the difference between D – A has the greatest value.
13. **Answer choice (A) is correct.** First convert 100 grams into kilograms. There are 1,000 grams in 1 kilogram, so divide 100 grams by 1,000 to convert it to kilograms:  $100 \div 1000 = 0.1$  kg. Since there are two 100-gram, or 0.1-kilogram, weights on the left side of the scale, the left side of the scale has 0.2 kilograms of weight on it not including the wooden blocks. Set up and solve an equation that balances the scale, using  $w$  to represent the weight of each wooden block:  $0.2 \text{ kg} + 4w = 1 \text{ kg} \rightarrow 4w = 0.8 \text{ kg} \rightarrow w = 0.2 \text{ kg}$ .
14. **Answer choice (D) is correct.** The average of a set of numbers equals the sum of the numbers divided by the number of terms:  $average = \frac{sum}{number \text{ of terms}}$ . Find the sum of the temperatures from Monday through Thursday by plugging in  $60^\circ$  for the average and 4 for the number of terms:  $60^\circ = \frac{sum}{4} \rightarrow sum = 240^\circ$ . Now set up and solve an equation for the average temperature from Monday through Friday. Use  $x$  to represent the temperature on Friday, 5 for the number of terms, and  $55^\circ$  for the average:  $55^\circ = \frac{240^\circ + x}{5} \rightarrow 275^\circ = 240^\circ + x \rightarrow x = 35^\circ$ .

15. **Answer choice (D) is correct.** Find the number of green marbles by finding 50% of 20. 50% of a number is half of a number, so 50% of 20 = 10 green marbles. Find the number of red marbles by finding one and a half times the number of blue marbles. One and a half equals 1.5, so multiply the number of blue marbles by 1.5 to find the number of red marbles:  $20 \cdot 1.5 = 30$  red marbles. To find the probability of a given event, divide the number of favorable outcomes by the number of total outcomes. Since we want the probability of choosing a red marble, and there are 30 red marbles, there are 30 favorable outcomes. There are 60 total marbles (20 blue + 10 green + 30 red = 60 total), so there are 60 total outcomes. Therefore, the probability of choosing a red marble is  $\frac{30}{60} = \frac{1}{2}$ , which can be written as 1 out of 2.
16. **Answer choice (B) is correct.** We know 60 out of 160 people chose crime as their favorite genre. Write this as a simplified fraction:  $\frac{60}{160} = \frac{3}{8}$ . The portions of the pie chart representing fantasy and crime make up half of the pie chart, so  $\frac{1}{2}$  of the people chose fantasy or crime. Find the portion of people who chose fantasy by subtracting the portion of people who chose crime from  $\frac{1}{2}$ :  $\frac{1}{2} - \frac{3}{8} = \frac{4}{8} - \frac{3}{8} = \frac{1}{8}$ . Therefore, the portion of the chart representing fantasy makes up  $\frac{1}{8}$  of the chart. Find the central angle of the portion representing fantasy by finding  $\frac{1}{8}$  of  $360^\circ$  because there are  $360^\circ$  in a circle:  $\frac{1}{8}$  of  $360^\circ = \frac{1}{8} \cdot 360^\circ = 45^\circ$ .
17. **Answer choice (D) is correct.** Since girls make up  $\frac{3}{8}$  of the class, then boys make up  $\frac{5}{8}$  of the class. Therefore, to answer the question, “the number of boys in the class is how many times the number of girls?” we can answer the question, “ $\frac{5}{8}$  is how many times  $\frac{3}{8}$ ?” To do this, set up and solve the following equation, where  $x$  represents the answer to the question:  $\frac{5}{8} = x \cdot \frac{3}{8} \rightarrow x = \frac{5}{3}$ .
18. **Answer choice (D) is correct.** When setting up proportions, we either need the same quantities in the numerators of both fractions and the same quantities in the denominators of both fractions, or we need the same quantities in the same fraction. This means we can put the tablespoons of oil in one fraction and the tablespoons in water in the other fraction. We need to make sure that 4 tablespoons of oil and 8 tablespoons of water are both in the numerator or both in the denominator of the fractions. Therefore, we can set up the proportion  $\frac{4}{3} = \frac{8}{w}$ . We could’ve also written the proportion in these three ways:  $\frac{3}{4} = \frac{w}{8}$ ,  $\frac{4}{8} = \frac{3}{w}$ ,  $\frac{8}{4} = \frac{w}{3}$ .
19. **Answer choice (C) is correct.** The entire square measures 8 by 8, so there are a total of 64 small squares that make up the large square ( $8 \cdot 8 = 64$ ). Find the area of each small square by dividing the total area by 64:  $128 \text{ cm}^2 \div 64 = 2 \text{ cm}^2$ . There are 12 shaded squares, so find the area of the shaded region by multiplying the area of each small square by 12:  $2 \text{ cm}^2 \cdot 12 = 24 \text{ cm}^2$ .
20. **Answer choice (B) is correct.** We are looking for a graph where the  $y$  value decreases as the  $x$  value increases, so we are looking for a graph with a negative slope. Therefore, we can eliminate answer

choices (C) and (D) because their slopes are positive. Since we are looking for which graph shows the  $y$  value decreasing at the *greatest* rate as the  $x$  value increases, we are looking for the *steepest* negative slope, so answer choice (B) is correct.

21. **Answer choice (A) is correct.** Rearrange the terms in Column A to get  $5 \cdot 7 \cdot 6 \cdot 8$ . Multiply 5 by 7 and 6 by 8 to get that  $5 \cdot 7 \cdot 6 \cdot 8 = 35 \cdot 48$ . Now we are comparing  $35 \cdot 48$  and  $35 \cdot 45$ . Since 48 is greater than 45, Column A is greater than Column B.
22. **Answer choice (C) is correct.** A trapezoid and parallelogram are both quadrilaterals (four-sided shapes). The sum of the interior angles in any quadrilateral is  $360^\circ$ , so the quantities in both columns are equal.
23. **Answer choice (B) is correct.** Find the quantity in Column A by first added 25 and 144, and then taking the square root of the result:  $\sqrt{25 + 144} = \sqrt{169} = 13$ . Find the quantity in Column A by evaluating each individual square root, and then finding the sum:  $\sqrt{25} + \sqrt{144} = 5 + 12 = 17$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
24. **Answer choice (D) is correct.** Because we have three unknown variables and only two equations, we cannot find the value of  $x$ ,  $y$ , or  $z$ . You can also choose numbers for  $x$ ,  $y$ , and  $z$  that fit both equations to show that the relationship between  $x$  and  $z$  cannot be determined. For example,  $x$  could equal 20,  $y$  could equals 5, and  $z$  could equal 15. However,  $x$  could also equal 5,  $y$  could equal 20, and  $z$  could equal 30. Therefore, the relationship between the two quantities cannot be determined from the information given.
25. **Answer choice (A) is correct.** There are 5 ways to spin a sum of 6: 1 and 5, 5 and 1, 2 and 4, 4 and 2, 3 and 3. There are 4 ways to spin a sum of 5: 1 and 4, 4 and 1, 2 and 3, 3 and 2. Therefore, the probability that the sum of the spins is 6 is greater than the probability that the sum of the spins is 5, so the quantity in Column A is greater than the quantity in Column B.
26. **Answer choice (B) is correct.** Every hour, Allie drives 60 miles and Nicole drives 40 miles. Therefore, every hour, Allie and Nicole drive a total of 100 miles. After 1 hour, they've driven 100 miles, after 2 hours they've driven 200 miles, and after 3 hours they've driven 300 miles. Since they live 240 miles apart, it will take them between 2 and 3 hours to meet, so the quantity in Column B is greater than the quantity in Column A.
27. **Answer choice (A) is correct.** Simplify the expression in Column A by distributing  $-6$ :  $-6(a - b) = -6a + 6b$ . Now we are comparing  $-6a + 6b$  and  $-6a - 6b$ . Since  $b$  is positive, adding  $6b$  will increase the value of  $-6a$ , while subtracting  $6b$  will decrease the value of  $-6a$ , so the quantity in Column A is greater than the quantity in Column B.
28. **Answer choice (A) is correct.** Since  $k$  is greater than 1, any value of  $k$  will make  $\frac{1}{k}$  have a value between 0 and 1. Raising a value between 0 and 1 to a positive power decreases the value. The higher



- the power, the smaller the value. For example,  $\left(\frac{1}{2}\right)^2 = \frac{1}{4}$  and  $\left(\frac{1}{2}\right)^3 = \frac{1}{8}$ . Therefore, for all values of  $k$  greater than 1, the quantity in Column A is greater than the quantity in Column B.
29. **Answer choice (A) is correct.** The formula for the surface area of a cube is  $SA = 6s^2$ , where  $s$  is the side length of the cube. Use this to find the quantity in Column A:  $SA = 6(4 \text{ in})^2 = 6(16 \text{ in}^2) = 96 \text{ in}^2$ . The formula for the volume of a cube is  $V = s^3$ , where  $s$  is the side length of the cube. Use this to find the quantity in Column B:  $V = (4 \text{ in})^3 = 64 \text{ in}^3$ . Therefore, the quantity in Column A is greater than the quantity in Column B.
30. **Answer choice (D) is correct.** While we can determine the range of the data from the box and whisker plot, we cannot determine the mode because a box and whisker plot does not show exact data points. Therefore, the relationship between the two quantities cannot be determined from the information given.
31. **Answer choice (B) is correct.** To find the percent decrease from 100 to 90, divide the change in the numbers by the starting number and multiply the result by 100:  $\frac{100-90}{100} \cdot 100 = \frac{10}{100} \cdot 100 = 10\%$ . To find the percent decrease from 50 to 40, divide the change in the numbers by the starting number and multiply the result by 100:  $\frac{50-40}{50} \cdot 100 = \frac{10}{50} \cdot 100 = \frac{1}{5} \cdot 100 = 20\%$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
32. **Answer choice (A) is correct.** Since 40 students take ceramics, but 20 of those students take both ceramics and woodworking, 20 students take only ceramics ( $40 - 20 = 20$ ). Since 40 students take woodworking, but 20 of those students take both woodworking and ceramics, 20 students take only woodworking ( $40 - 20 = 20$ ). Therefore, 20 students take only ceramics, 20 students take only woodworking, and 20 students take both ceramics and woodworking, so a total of 60 students take ceramics and woodworking. There are 200 total students, so 140 students do not take ceramics or woodworking ( $200 - 60 = 140$ ). Since 140 is more than half of 200, the probability of choosing a student who does not take ceramics or woodworking is greater than 50%, so the quantity in Column A is greater than the quantity in Column B.
33. **Answer choice (B) is correct.** Set up and solve the following proportion to find how many inches,  $x$ , represent 80 miles:  $\frac{7.5}{30} = \frac{x}{80} \rightarrow \frac{2.5}{10} = \frac{x}{80} \rightarrow 10x = 200 \rightarrow x = 20$ . Therefore, the quantity in Column B is greater than the quantity in Column A.
34. **Answer choice (C) is correct.** Find the quantity in Column A by multiplying the longest side of triangle DEF by the scale factor:  $8 \cdot \frac{2}{3} = \frac{16}{3}$ . Find the quantity in Column B by multiplying the shortest side of triangle DEF by the scale factor:  $4 \cdot \frac{4}{3} = \frac{16}{3}$ . Therefore, the quantities in both columns are equal.
35. **Answer choice (B) is correct.** The two missing sides of the triangle are congruent, so let each side equal  $x$ . Set up and solve an equation that represents the statement, “the perimeter of the triangle is 64

inches”:  $x + x + 24 = 64 \rightarrow 2x + 24 = 64 \rightarrow 2x = 40 \rightarrow x = 20$ . Therefore, the left and right side of the isosceles triangle are 20 inches. The height of the triangle, labeled  $h$ , splits the isosceles triangle into two congruent right triangles. The hypotenuse of each right triangle measures 20 inches, and the hypotenuse of a right triangle is always the longest side. Therefore, the height of the triangle,  $h$ , is less than 20 inches, so the quantity in Column B is greater than the quantity in Column A.

36. **Answer choice (A) is correct.** Convert  $\frac{1}{8}$  into a decimal by dividing the numerator by the denominator:  $\frac{1}{8} = 1 \div 8 = 0.125$ . Convert 0.125 into a percent by moving the decimal point two places to the right to get 12.5%. Therefore, Alyssa puts 12.5% of each paycheck into her savings account, and Kareem puts 15% of each paycheck into his savings account. Since Alyssa and Kareem both make \$1000 per week, Kareem puts more money into his savings account than Alyssa does every four weeks because 15% is greater than 12.5%. Therefore, the quantity in Column A is greater than the quantity in Column B.
37. **Answer choice (B) is correct.** Brandon ran 10 miles on Saturday, which is greater than the number of miles he ran on any of the other six days. The average of a set of numbers (unless the numbers are all equal) is always greater than the lowest number in the set and less than the highest number in the set. Therefore, the average number of miles Brandon ran each day is less than 10 miles, so the quantity in Column B is greater than the quantity in Column A.

### **Reading Comprehension**

1. The passage begins by mentioning two types of lakes: those that drain into the ocean, and those that don't. Those that don't are called terminal lakes, and one terminal lake is the Great Salt Lake in Utah. The rest of the passage provides information about the Great Salt Lake, including its size, how it is a critical habitat for millions of birds, and how it cannot host any fish. It also explains that brine shrimp are a major export from the lake, bringing in 60 million dollars annually. Finally, it explains that salt is a major export from the lake, and discusses how salt is extracted from the lake. Therefore, the main purpose of the passage is to inform the reader about the Great Salt Lake and its various utilities, **so answer choice (C) is correct.** Answer choice (A) is incorrect because the passage does not discuss the history of the Great Salt Lake: while it discusses how humans and birds use the Great Salt Lake, it does not provide information about the Great Salt Lake's past. Answer choice (B) is incorrect because the process of collecting salt is only discussed in the last paragraph, so it's not the main purpose of the passage. Answer choice (D) is incorrect because the passage only discusses the uses of one particular lake, not saline lakes in general.
2. The first paragraph informs us that there are two types of lakes, one of which is a terminal lake. The first paragraph explains that this type of lake does not drain into the ocean and is formed where there is a depression, therefore water can only flow into the lake, but not out. It finishes by explaining how these lakes become salty: inflowing streams and rivers bring sediments containing various salts into the lakes. Therefore, the first paragraph is providing facts about salinity levels in lakes and how lakes become salty, **so answer choice (D) is correct.**

3. Lines 4 through 7 say, “These often exist wherever the landscape forms a depression or basin where water cannot flow anywhere but inland.” A basin in a valley or dip in the land, so we can assume depression is similar to a basin. Therefore, the word “depression” is used to mean a low spot, **so answer choice (A) is correct.**
4. In lines 20 through 21, the passage says, “Because of its high salinity, the lake can’t host any fish.” However, we know that fish live in the ocean. Therefore, the Great Salt Lake must be saltier than the ocean, **so answer choice (B) is correct.**
5. The last paragraph discusses how mineral companies isolate salt from the lake water. Lines 45 through 48 say, “In the arid environment of Utah, the sun works hard to evaporate water from the pool until it becomes too concentrated with salt.” This means the sun is used to evaporate most of the water, **so answer choice (C) is correct.**
6. Lines 38 through 39 state, “Potassium is a crucial nutrient for most crop production and is, therefore, a necessary ingredient in fertilizer.” We can conclude that since potassium is a necessary ingredient in fertilizers, it is a necessary nutrient for most crop production. The word crucial therefore most nearly means necessary or critical, **so answer choice (D) is correct.**
7. The passage starts by stating that there are aspects of humanity that are unique, such as human civilizations and technologies, that have not been observed among other members of the animal kingdom. Human social dynamics, however, are not unique and can be observed among primates and elephants. Lines 12 through 14 talk about another animal that has unique social dynamics: the killer whale, which is also known as an orca. The rest of the passage talks about these dynamics and discusses similarities between orcas and humans. For example, both orcas and humans have similar lifespans, female orcas and humans experience menopause, and orcas have vocalizations similar to human accents. We can conclude that the main purpose of the passage is to discuss the orcas’ social dynamics and their similarities to humans, **so answer choice (B) is correct.** Answer choice (A) is incorrect because although other animals are mentioned as having similar social dynamics to humans, these animals are only briefly mentioned in the second paragraph and are not discussed again. Answer choice (C) is incorrect because the passage only discusses orcas’ unique social dynamics, not the uniqueness of orcas in general. Answer choice (D) is incorrect because the vocalization of orcas is only mentioned in the last paragraph, so it is not the main focus of the passage.
8. Lines 15 through 17 say, “Killer whales (orcas) are mammals, and it turns out that they have a lot in common with humans.” These similarities are that they can live to be 100 years just like humans, and the female killer whales experience the process of menopause just like a female human. We can conclude that the passage mentions that both killer whales and humans experience the process of menopause to show their similarities, **so answer choice (C) is correct.**
9. Lines 42 through 44 say, “Scientists have observed that the more distantly related these clans are, the more their vocalizations will differ from one another.” The last two lines of the passage state, “Chances are if someone has a strong southern accent, their parents, siblings, and cousins probably do as well. The same is true for how killer whales sound to one another.” Therefore, we can assume that

the more closely related orcas are, the more their vocalizations are similar, **so answer choice (A) is correct.**

10. The last paragraph says that the more distantly related killer whales are, the more their vocalizations differ. These differences are what help them know how closely related they are to each other, which helps them avoid breeding with close relatives. We can then assume this is a social structure that only allows breeding to happen between distant relatives. These vocalizations are similar to accents in humans: certain families have similar accents, and the more distant humans are from each other, the more their accents differ. This comparison between human accents and vocalizations shows how a specific similarity between the social structure of orcas and humans has emerged, **so answer choice (D) is correct.**
11. In lines 12 through 14, the passage states, “But there is another animal with unique social dynamics that may come as a surprise”. The use of the word surprise shows this aspect of the orcas is unexpected and therefore interesting. When the author talks about menopause in killer whales, the passage says, “This is a seemingly rare trait in mammals other than humans.” The use of the word seemingly shows what was previously thought to be unique in humans is surprisingly shared with killer whales, a fact the author finds interesting. The author even compares killer whales’ vocalization to human accent, showing that they are fascinating animals. We can therefore conclude the author is intrigued by orcas, **so answer choice (A) is correct.**
12. In lines 5 and 6, the passage states, “However, many of our social dynamics are not as unique as we may have assumed.” This means that some people believe that our social dynamics are unique, but they are not as unique as some people believe: they are actually shared by other animals. From this statement, we can assume that the author believes that some people believe that humans have distinctive (unique) social dynamics, **so answer choice (B) is correct.**
13. The passage starts by stating that unblinking, slow-moving lights observed in the night sky are usually satellites, but could also be the ISS. It then provides information about the ISS including when it was constructed and which countries collaborate to create it. It continues by discussing why the ISS was constructed: with the aim of studying how biological life behaves in low gravity. It ends by discussing how the ISS is used, what life is like on the ISS, and what EVAs are: extravehicular activities that take place so astronauts can work on the exterior of the ISS. We can conclude the main purpose of the passage is to provide information about the ISS, including why it was constructed and how it is used, **so answer choice (C) is correct.** Answer choice (A) is incorrect because the construction of the ISS is only mentioned in the second paragraph, so it’s not the main focus of the passage. Answer choice (B) is incorrect because the passage does not discuss similarities and differences between Russian and American astronauts other than their names. Answer choice (D) is incorrect because how the astronauts live on the ISS is only one of the many details mentioned, so it is not the main purpose of the passage.
14. Lines 11 through 13 say, “The construction of the ISS was completed in 2000, and by the end of the year, there were two Russians and one American living inside.” We can conclude that the ISS was initially occupied by Americans and Russians, **so answer choice (D) is correct.**

15. The fourth paragraph says, “Vignettes of life on the ISS have been widely shared around the world.” The lines that follow say astronauts have shared footage of their daily lives in low gravity, including videos showing how they exercise, sleep, eat and drink. We can assume the word vignette means sneak peeks into the lives of astronauts on the ISS. Therefore, the word “vignettes” most nearly means accounts, **so answer choice (D) is correct.**
16. According to lines 34 through 37, EVAs are extravehicular activities “when the astronauts spend extended periods of time outside the station.” Lines 38 through 39 say, “These EVAs take place so that the astronauts can work on the exterior of the ISS.” We can conclude the purpose of the EVAs is to allow astronauts to work on the ISS from the outside, **so answer choice (C) is correct.**
17. In lines 17 through 18, the passage says, “The ISS was constructed with the primary goal of research in low-gravity.” So the main purpose why the International Space Station was to conduct research, **so answer choice (B) is correct.**
18. The passage says in lines 34 through 37, “Also widely televised has been videos of extravehicular activities, EVAs, when the astronauts spend extended periods of time outside the station.” The use of the phrase “widely televised” implies that the activities of astronauts have been televised to the public. We can therefore conclude that the general public is able to see what astronauts experience on the exterior of the ISS, **so answer choice (B) is correct.**
19. The first paragraph says that while walking around the streets of New York you are likely to see Rock Pigeons and Mourning Doves. Lines 7 through 10 say, “While these two species of birds are closely related, there is a distinct difference between them: one is native, and one is nonnative.” To clarify which bird is native, lines 15 through 18 state, “For instance, New York city’s pigeons were originally introduced by European settlers who most likely brought them as a food source.” We can therefore conclude that Mourning Doves are native to New York, while pigeons are non-native because they were introduced by European settlers, **so answer choice (A) is correct.**
20. The second paragraph says that all animals and plants can be put into the category of nonnative and native. Lines 13 through 15 say, “Biologists deem something as nonnative if it was brought into a new place (like a country or state) by humans.” This statement means that biologists categorize or describe a species nonnative if it was brought into the new place by humans. Therefore, the word deem most nearly means describe, **so answer choice (A) is correct.**
21. The passage says a species is considered an invasive native species “when its population dramatically rises in a way that is both ‘unnatural’ and detrimental to other species in the habitat.” (lines 54 through 57). The passage further explains that this usually happens because “humans provide extra food and habitat that normally wouldn’t be there.” From the choices, the scenario that fits this description is the fourth option. This option mentions a fish that has lived in the Mississippi River for millennia, which means the fish is a native species, and it mentions that this fish is able to triple its population, or rise in a way that’s unnatural, after a new farm starts dumping potassium into the river

- (humans providing extra food that normally wouldn't be there). **Therefore, answer choice (D) is correct.**
22. The third and fourth paragraphs give reasons why and how nonnative species are spread around the world. One reason is for their aesthetic value, and another reason is for sport. Plant species have also spread accidentally when their seeds are stuck on the soles of shoes. Therefore, the purpose of these two paragraphs is to list a variety of ways new species of plants and animals are introduced into new habitats, **so answer choice (C) is correct.**
23. Lines 21 through 26 state, "One reason that many species of plants were brought into new countries was because of their aesthetic value. People brought these ornamental plants with them to new countries so that they could be planted in private and public gardens." Ornamental means decorative, so we can assume that plants were brought into new habitats for their decorative value. Therefore, the word "aesthetic" most nearly means "decorative", **so answer choice (A) is correct.**
24. The last paragraph says that ravens are an example of a native invasive species. According to lines 60 through 63, "raven populations have spiked throughout the western United States because ravens often scavenge on roadkill from highways and garbage from landfills." We can conclude the population of ravens has increased, or ravens can multiply faster, due to human behavior (roadkill and garbage from landfills). **Therefore, answer choice (B) is correct.**
25. The passage begins by informing us about the Colorado River. 40 million people in the West depend on the Colorado River for all their water needs. The passage explains that this dependency led to the construction of dams such as the Hoover Dam which was constructed in Nevada to fill Lake Mead – the largest reservoir in the United States. The passage continues by providing information about the Hoover Dam including information about the construction of the dam, why the dam was built, and why the Hoover Dam is useful: it controls the flow of water to fill Lake Mead which is the latest reservoir in the United States. Therefore, the main purpose of the passage is to discuss the history and significance of the Hoover Dam, **so answer choice (D) is correct.** Answer choice (A) is incorrect because the passage does not discuss the history of the Colorado River; it mentions the Colorado River in order to explain why the Hoover Dam was built. Answer choice (B) is incorrect because while the passage mentions that various dams were built to control the water in the Colorado River, the passage does not provide any additional information about these dams. Answer choice (C) is incorrect because droughts are only briefly mentioned in the last paragraph, so this is not the main focus of the passage.
26. The first paragraph explains that the word Colorado is a Spanish word describing the ruddy red color of the sandstone in the West. Lines 4 through 8 say, "The sediment from these rocks enters the river through the rainfall and snowmelt that trickles down the landscape. This sediment is then suspended in the water, giving it its characteristic red color." We can therefore conclude that the Colorado River was named due to the red color it gets from these sediments, so the word "aptly" most nearly means appropriately. **Answer choice (A) is correct.**

27. Lines 45 through 48 say, “The Hoover Dam was built in Nevada to control the flow of the Colorado River and to fill the largest reservoir in the United States: Lake Mead.” This lake was created to store water which would then be diverted to California, Nevada, and Arizona. Therefore, we conclude that the dam was created to provide water to these western states, **so the answer choice (C) is correct.**
28. The second paragraph says that millions of people recreate on the Colorado River. Lines 10 through 12 state, “40 million people in the West depend on the Colorado River for all their water needs.” Since millions of people depend on the river for all their water needs, that means the Colorado River is the lifeblood (meaning it provides people with a necessity for life - water) of the American West, **so answer choice (A) is correct.**
29. According to the fifth paragraph, the Hoover Dam was constructed during the Great Depression. Lines 34 through 35 say, “The dam was famous for its ingenuity as well as its dangerous construction process.” These dangers included workers having to repel into the canyon using ropes, where they would place dynamite into the canyon walls. The desert heat was another danger. We can therefore conclude the construction posed dangers to the workers, so the author would agree it was treacherous, **so answer choice (B) is correct.**
30. The fifth paragraph talks about the construction of the Hoover Dam and says the construction was dangerous. The paragraph provides examples of these dangers including that workers repelled into canyons on ropes, workers placed dynamite into the canyons walls, and many workers succumbed to heat exhaustion due to extreme desert temperatures. Therefore, the purpose of the paragraph is to provide evidence of how the construction of the Hoover Dam was dangerous, **so answer choice (D) is correct.**
31. The passage begins by providing information about beavers, including adaptations that help them build dams. The passage continues by explaining that beavers are constantly building dams, which create wetlands containing many aquatic and terrestrial plant and animal species. These wetlands decrease the risk of droughts and flooding. The passage ends by saying that without beavers, many habitats and species would cease to exist. Therefore, the main idea of the passage is that beavers are a crucial part of our ecosystem, **so answer choice (D) is correct.** Answer choice (A) is incorrect because the adaptations of beavers are mentioned to explain how they build dams, not to explain how they survive. Answer (B) is incorrect because while the passage mentions that beavers can help decrease river flooding, this is only one of the ways that beavers benefit our ecosystem. Answer choice (C) is incorrect because the passage does not say beavers are different from other rodents: it only says they are the second-largest rodents.
32. Lines 38 through 42 say, “Creeks and rivers that have beavers present also have cleaner water since the water slows down so debris can settle on the riverbed, and pollutants are filtered out as the water passes through vegetation.” Therefore, beavers indirectly improve the quality of water in rivers, **so answer choice (A) is correct.**
33. The fourth paragraph says beavers constantly build dams, and this creates wetlands habitats with different plant and animal species. Lines 35 through 38 say, “Since these areas are the intersection

between terrestrial and aquatic habitats, they contain a large variety of both types of species.” Aquatic means relating to water, so terrestrial must mean the opposite: relating to land. **Therefore, answer choice (B) is correct.**

34. The second paragraph lists the beavers' adaptations such as webbed back feet, a wide paddle-like tail, and nictitating membranes over their eyes. The third paragraph says they use these adaptations, together with their “dexterous front feet and iron-containing front teeth” to “cut and drag trees adjacent to the water.” We can assume they use their iron-containing front teeth to cut the trees and use the rest of the adaptations to drag the trees into the water. This means the front teeth must be strong enough to chew on trees and cut them down, so we can assume that the iron in beaver’s teeth make the teeth stronger. **Therefore, answer choice (C) is correct.**
35. The last paragraph says that beavers are the unsung heroes of the wild. Lines 50 through 53 say, “Other species’ dependence on the habitats that they create has earned them the label of ‘keystone species’”. The passage then says without beavers, many habitats and species would cease to exist. We can therefore assume that if beavers were to go extinct, many species would have a difficult time surviving, **so answer choice (B) is correct.**
36. The passage discusses all of the benefits provided by beavers such as the creation of dams that result in biodiverse wetland habitats, the indirect cleaning of water in rivers and creeks, the decrease of the impact of drought on the ecosystem, and the decrease in the risk of flooding. The passage then describes beavers as more than just large rodents: they are the unsung heroes of the wild. We can say the statement “Often overlooked as large rodents, beavers are the unsung heroes of the wild” means that beavers are often overlooked as an important ecological species, **so answer choice (D) is correct.**

### **Mathematics Achievement**

1. **Answer choice (A) is correct.** To find the GCF, or greatest common factor, of a set of numbers, list the factors of each number, and find the largest factor that all three numbers have in common. Factors of 64: 1, 2, 4, 8, 16, 32, 64. Factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36. Factors of 80: 1, 2, 4, 5, 8, 10, 16, 20, 40, 80. The largest factor that all three numbers have in common is 4, so 4 is the GCF of 64, 36, and 80. Since writing out all of the factors takes a while, you can use a shortcut when finding the GCF of a set of numbers: check if 64, 36, and 80 are divisible by each answer choice, and choose the largest number they are all divisible by.
2. **Answer choice (A) is correct.** Let  $m$  represent the number of bouquets Mira sold. Drew sold twice as many bouquets as Mira, so Drew sold  $2m$  bouquets. Mira sold 10 fewer bouquets than Bonnie, so Bonnie sold 10 more bouquets than Mira. Therefore, Bonnie sold  $m + 10$  bouquets. Set the sum of the number of bouquets Mira, Drew, and Bonnie sold equal to 90 and solve for  $m$  to find the number of bouquets Mira sold:  $m + 2m + m + 10 = 90 \rightarrow 4m + 10 = 90 \rightarrow 4m = 80 \rightarrow m = 20$ .
3. **Answer choice (C) is correct.** A rhombus is a four-sided shape that has four equal sides. Since the diagram does not say that all four sides of the shape are equal, we cannot classify the shape as a rhombus.



4. **Answer choice (D) is correct.** The first two hours of rental cost \$20 each, so the first two hours of rental cost a total of \$40. Every additional hour costs \$10 per hour. Therefore, if you rent an office for 3 hours, the additional cost is  $\$10(3 - 2) = \$10(1) = \$10$ . If you rent an office for 4 hours, the additional cost is  $\$10(4 - 2) = \$10(2) = \$20$ . From this, we can see that the equation representing the total cost,  $T$ , of renting an office for  $h$  hours is  $T = \$40 + \$10(h - 2)$ .
5. **Answer choice (B) is correct.** Use PEMDAS to simplify each answer choice.  
 Answer choice (A):  $30 \div (10 - 4) \cdot 5 - 2 = 30 \div (6) \cdot 5 - 2 = 5 \cdot 5 - 2 = 25 - 2 = 23$ .  
 Answer choice (B):  $30 \div (10 - 4) \cdot (5 - 2) = 30 \div (6) \cdot (3) = 5 \cdot 3 = 15$   
 Answer choice (C):  $30 \div 10 - 4 \cdot (5 - 2) = 30 \div 10 - 4 \cdot (3) = 3 - 4 \cdot 3 = 3 - 12 = -9$ .  
 Answer choice (D):  $30 \div 10 - 4 \cdot 5 - 2 = 3 - 4 \cdot 5 - 2 = 3 - 20 - 2 = -17 - 2 = -19$ .
6. **Answer choice (D) is correct.** The area of the shaded region is equal to the area of the square minus the area of the circle. To find the area of the square, we need to find the side length. The perimeter of a square is equal to four times the side length, so find the side length of the square by dividing the perimeter by 4:  $64 \text{ cm} \div 4 = 16 \text{ cm}$ . Find the area of the square by squaring the side length:  $(16 \text{ cm})^2 = 256 \text{ cm}^2$ . Therefore, we can eliminate answer choices (A) and (B). To find the area of the circle, we need the radius. The diameter of the circle is equal to the side length of the square, so the diameter of the circle equals 16 cm. The radius of a circle is equal to half of the diameter, so the radius is equal to 8 cm. The equation for the area of a circle is  $A = \pi r^2$ , where  $r$  is the radius of the circle, so the area of the circle equals  $\pi(8 \text{ cm})^2 = 64\pi \text{ cm}^2$ . Therefore, the area of the shaded region is  $256 - 64\pi \text{ cm}^2$ .
7. **Answer choice (B) is correct.** From the circle graph, we can tell that the number of kids who chose ice cream is twice the number of kids who chose cookies, the number of kids who chose cookies is twice the number of people who chose pie, and the number of people who chose pie is equal to the number of people who chose cake. Therefore, answer choice (B) is the only answer choice that could be represented by the circle graph.
8. **Answer choice (B) is correct.** Find Sahila's speed in miles per hour using the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Plug in 120 miles for  $d$  and 3 hours for  $t$  and solve for  $r$ :  $120 = r \cdot 3 \rightarrow r = 40 \text{ mph}$ . Increase Sahila's speed of 40 mph by 25%:  $40 + 25\% \text{ of } 40 = 40 + 0.25 \cdot 40 = 40 + 10 = 50 \text{ mph}$ . Find the time it will take Sahila to drive 100 miles using the equation  $d = rt$ , where  $d$  represents distance,  $r$  represents rate, and  $t$  represents time. Plug in 100 miles for  $d$  and 50 mph for  $r$  and solve for  $t$ :  $100 = 50t \rightarrow t = 2 \text{ hours}$ .
9. **Answer choice (C) is correct.**  $-1.25$  is between  $-1.5$  and  $-1.0$ , so point D represents  $-1.25$ .  $-3 \frac{1}{4}$  is smaller than  $-3$ , so it is to the left of  $-3$  on the number line. Therefore, point A represents  $-3 \frac{1}{4}$ .  $\frac{2}{3}$  is between  $\frac{1}{2}$  and 1, so point G represents  $\frac{2}{3}$ .
10. **Answer choice (B) is correct.** The median of a data set is the middle number when the data is lined up from least to greatest. Line the data up from least to greatest: 10, 20, 30, 30, 50, 60, 70, 90. Since we have eight numbers, the median is the average of the two middle numbers. Find the average of 30

and 50 by adding them together and dividing by 2:  $\frac{30+50}{2} = \frac{80}{2} = 40$ . The mode of a data set is the number that appears the most, so 30 is the mode of the data. Find the average of the median and the mode by dividing the sum by 2:  $\frac{40+30}{2} = \frac{70}{2} = 35$ .

11. **Answer choice (D) is correct.** Four-ninths of the bathtub have been filled, so there are five-ninths of the tub that still need to be filled. Since five-ninths is greater than four-ninths, the time it will take to fill the rest of the tub is greater than the time it took to fill the first four-ninths of the tube. Therefore, we can eliminate answer choice (A). Find the time it takes to fill one-ninth of the tub by dividing the time it takes to fill four-ninths by 4:  $5 \div 4 = 1.25$  minutes. It takes 1.25 minutes to fill one-ninth of the tub, so find the time it takes to fill five-ninths by multiplying 1.25 by 5:  $1.25 \cdot 5 = 6.25$  minutes.
12. **Answer choice (B) is correct.** We are looking for a fraction that is greater than  $\frac{3}{8}$  but less than  $\frac{2}{3}$ . Answer choice (A) is  $\frac{1}{3}$ , which is equal to  $\frac{3}{9}$ .  $\frac{3}{9}$  is less than  $\frac{3}{8}$ , so answer choice (A) is incorrect. Since  $\frac{2}{3}$  is equal to  $\frac{6}{9}$ , answer choice (C) is incorrect because  $\frac{7}{9}$  is greater than  $\frac{6}{9}$ . When comparing  $\frac{2}{3}$  and  $\frac{5}{6}$ , we want to realize that both fraction's numerators are one fewer than their denominators. Therefore, since  $\frac{5}{6}$  has a larger denominator than  $\frac{2}{3}$ ,  $\frac{5}{6}$  is greater than  $\frac{2}{3}$ . Think about a pizza. If you slice a pizza into 6 equal slices, each slice will be smaller than if you had sliced the pizza into 3 equal slices. Therefore, if we take one slice away from the pizza with 6 slices, the remaining pizza will be more than if we take one slice away from the pizza with 3 slices. Therefore, answer choice (D) is incorrect. We are left with answer choice (B) as the correct answer.
13. **Answer choice (A) is correct.** Trina has  $q$  quarters, and she has five more dimes than she does quarters. Therefore, she has  $q + 5$  dimes. Since the value of 1 quarters is \$0.25, the value of  $q$  quarters is  $\$0.25q$ . Since the value of 1 dimes is \$0.10, the value of  $q + 5$  dimes is  $\$0.10(q + 5)$ . Now we need to set up an equation that represents the statement, "The value of Trina's quarters is \$0.10 more than the value of her dimes." So we need to write an equation that says the value of Trina's dimes plus \$0.10 equals the value of her quarters:  $\$0.10(q + 5) + \$0.10 = \$0.25q$ . We can get rid of the dollar signs on both sides of the equation to get  $0.10(q + 5) + 0.10 = 0.25q$ .
14. **Answer choice (A) is correct.** Line  $m$  crosses the  $x$ -axis at 6, so it passes through the point (6, 0). Line  $m$  crosses the  $y$ -axis at 3, so it passes through the point (0, 3). To find the slope between these two points, use the equation  $slope = \frac{y_2 - y_1}{x_2 - x_1}$ , where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point. Plug the given points into the formula and simplify:  $slope = \frac{3 - 0}{0 - 6} = \frac{3}{-6} = -\frac{1}{2}$ . The slopes of perpendicular lines are opposite reciprocals (flip the fraction and change the sign), so the slope of the line perpendicular to line  $m$  is 2.
15. **Answer choice (C) is correct.** Use PEMDAS to solve this problem: when choosing between subtraction and addition, move from left to right, so perform the subtraction first:  $50 - 30.5 = 50.0 - 35.5 = 19.5$ . Now 15.3 to the result:  $19.5 + 15.3 = 34.8$ . To see a step by step solution for each part of

this problem, follow this link and type in each part of the problem: [how to solve operations with decimals](#)

16. **Answer choice (B) is correct.** Plug in 10 m for  $h$  and  $160\pi m^3$  for  $V$  in the given equation. Then solve for  $r$ :  $160\pi = \pi r^2(10) \rightarrow 16 = r^2 \rightarrow r = 4$  m.
17. **Answer choice (B) is correct.** To find the probability of multiple events, multiply the probability of each event. There are 10 marbles, 2 of which are black, so the probability of choosing a black marble is  $\frac{2}{10}$  or  $\frac{1}{5}$ . There are 6 blocks, 1 of which is black, so the probability of choosing a black block is  $\frac{1}{6}$ . Multiply the two probabilities:  $\frac{1}{5} \cdot \frac{1}{6} = \frac{1}{30}$ .
18. **Answer choice (B) is correct.** Factor out an  $x$  from both terms on the left side of the given equation:  $xy - xz = 72 \rightarrow x(y - z) = 72$ . Plug in 6 for  $y - z$  and solve for  $x$ :  $x(y - z) = 72 \rightarrow x(6) = 72 \rightarrow x = 12$ .
19. **Answer choice (C) is correct.** The perimeter of a rectangle can be found by adding up all four sides or using the equation  $P = 2l + 2w$ , where  $l$  represents the length of the rectangle and  $w$  represents the width. Plug 12 cm in for  $w$  and 60 cm in for  $P$  in the given equation and solve for  $l$ :  $60 = 2l + 2(12) \rightarrow 60 = 2l + 24 \rightarrow 36 = 2l \rightarrow 18 = l$ . Therefore, the length of the rectangle is 18 cm. The area of a rectangle can be found by multiplying the length by the width: Area = 12 cm  $\cdot$  18 cm = 216 cm<sup>2</sup>.
20. **Answer choice (D) is correct.** Change  $\frac{7}{9}$  and  $\frac{4}{5}$  into decimals by dividing the numerators by the denominators:  $\frac{7}{9} = 7 \div 9 = 0.\overline{7}$  and  $\frac{4}{5} = 4 \div 5 = 0.8$ . Change 65% into a decimal by moving the decimal point two places to the left to get 65% = 0.65. If we order the decimals from least to greatest we get 0.65, 0.7,  $0.\overline{7}$ , 0.8. Therefore, if we order the original numbers from least to greatest we get 65%, 0.7,  $\frac{7}{9}$ ,  $\frac{4}{5}$ .
21. **Answer choice (B) is correct.** Write  $2.3 \times 10^5$  in standard form by moving the decimal point 5 places to the right:  $2.3 \times 10^5 = 230,000$ . Write  $5.9 \times 10^4$  in standard form by moving the decimal point 4 places to the right:  $5.9 \times 10^4 = 59,000$ . Add 230,000 and 59,000 to get 289,000. Write 289,000 in scientific notation to get  $2.89 \times 10^5$ .
22. **Answer choice (B) is correct.** Plug 10 in for  $x$  in the given equation and solve for  $y$ :  $5x - 20 = 2y \rightarrow 5(10) - 20 = 2y \rightarrow 50 - 20 = 2y \rightarrow 30 = 2y \rightarrow 15 = y$ .
23. **Answer choice (B) is correct.** A box-and-whisker plot shows the lowest value of the data set (represented by the leftmost line), the first quartile of the data (represented by the left side of the box), the median of the data (represented by the line inside the box), the third quartile (represented by the right side of the box), and the highest value of the data (represented by the rightmost line). The interquartile range of a data set is equal to the difference between the third and first quartile. The first quartile of the data is 25, and the third quartile of the data is 60, so the interquartile range equals  $60 - 25 = 35$ .

24. **Answer choice (D) is correct.** We want to find a table that is shaded in a way that will help Fiona determine the probability of flipping a coin and having it land on heads and rolling a die and having it land on a number that is no more than 4. A die is labeled with the numbers 1, 2, 3, 4, 5 and 6, so 1, 2, 3, and 4 are no more than 4. Therefore, we want a table that is shaded with heads and the numbers 1, 2, 3, and 4, which is the table in answer choice (D).
25. **Answer choice (D) is correct.** Solve for  $x$  by first adding 6 to both sides of the equation and then dividing both sides of the equation by  $\frac{1}{2}$ :  $\frac{1}{2}x - 6 = 14 \rightarrow \frac{1}{2}x = 20 \rightarrow x = 40$ .
26. **Answer choice (C) is correct.** Set up the following proportion, where  $x$  represents the cost to buy 8 tickets:  $\frac{5}{d} = \frac{8}{x}$ . Isolate the  $x$  in the proportion by first cross multiplying and then dividing by 5:  $5x = 8d \rightarrow x = 1.6d$ .
27. **Answer choice (A) is correct.** When creating a ratio with two quantities, both quantities need to be in the same units. There are 12 inches in 1 foot, so convert the width of 2 feet into inches by multiplying 2 by 12 to get that 2 feet equals 24 inches. Therefore, the width to height ratio of the window is 24:8 which simplifies to 3:1.
28. **Answer choice (C) is correct.** At 0 hours, the pool is filled with 800 gallons. After 3 hours, the pool is filled with 2000 gallons. Find the number of gallons added to the pool over the first three hours by subtraction 2000 by 800 to get 1200 gallons in 3 hours. Change this into a unit rate:  $\frac{1200 \text{ gallons}}{3 \text{ hours}} = \frac{400 \text{ gallons}}{1 \text{ hours}}$ . Therefore, the pool is being filled at a rate of 400 gallons per hour.
29. **Answer choice (C) is correct.** Find the value of  $ab$  by cross multiplying the given proportion:  $\frac{a}{6} = \frac{12}{b} \rightarrow ab = 6 \cdot 12 \rightarrow ab = 72$ .
30. **Answer choice (C) is correct.** Angles around a point add up to  $360^\circ$ , so set the sum of the four angles equal to  $360^\circ$  and solve for  $x + y + z$ :  $x + y + z + 25^\circ = 360^\circ \rightarrow x + y + z = 335^\circ$ .
31. **Answer choice (B) is correct.** A face of a 3D figure is any of the individual flat surfaces of the figure. Therefore, the given figure has 5 faces: 2 triangular faces and 3 rectangular faces.
32. **Answer choice (D) is correct.** When a point  $(x, y)$  is rotated  $180^\circ$  about the origin, the point becomes  $(-x, -y)$ . Therefore, when a point is rotated about the origin, the signs of both the  $x$ -coordinate and the  $y$ -coordinate change. Point B has coordinates  $(1, 3)$ , so when it is rotated  $180^\circ$  about the origin it becomes  $(-1, -3)$ .
33. **Answer choice (C) is correct.** Using PEMDAS, we know to perform the multiplication first, so multiply  $\frac{3}{8}$  and  $\frac{4}{9}$  by multiplying the numerators and multiplying the denominators, cross reducing

when possible:  $\frac{3}{8} \times \frac{4}{9} = \frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$ . Now add  $\frac{1}{4}$  and  $\frac{1}{6}$  by first making a common denominator and then adding the numerators:  $\frac{1}{4} + \frac{1}{6} = \frac{3}{12} + \frac{2}{12} = \frac{5}{12}$ .

34. **Answer choice (B) is correct.** To find the area of triangle ABC, we need to find the length of side BC. To find the length of BC, set up and solve the following proportion:  $\frac{5}{15} = \frac{BC}{36} \rightarrow \frac{1}{3} = \frac{BC}{36} \rightarrow 3(BC) = 36 \rightarrow BC = 12$  m. The formula for the area of a triangle is  $A = \frac{1}{2}bh$ . Plug in 5 meters for  $h$  and 12 meters for  $b$  and simplify to find area of triangle ABC:  $A = \frac{1}{2}(5 \text{ m})(12 \text{ m}) \rightarrow A = 30 \text{ m}^2$ .
35. **Answer choice (A) is correct.** Two events are said to be complementary when one event occurs if and only if the other does not. The probabilities of two complementary events add up to 1. Therefore, the probability of the complement of an event is equal to 1 minus the probability of the event, so the probability of the complement of event A equals  $1 - P(A)$ .
36. **Answer choice (B) is correct.** Each black card is worth 5 points, so find the value of Sam's black cards by multiplying the number of black cards Sam chose by 5:  $3 \cdot 5 = 15$ . Each red card is worth  $-3$  points, so find the value of Sam's red cards by multiplying the number of red cards Sam chose by  $-3$ :  $6 \cdot (-3) = -18$ . Find Sam's scores by adding the value of her black cards and the value of her red cards:  $15 + (-18) = -3$ .
37. **Answer choice (A) is correct.** Simplify the square root of 16 first:  $\frac{\sqrt{16(6x-3^2)}}{3} \rightarrow \frac{4(6x-3^2)}{3}$ . Evaluate the  $3^2$ :  $\frac{4(6x-3^2)}{3} \rightarrow \frac{4(6x-9)}{3}$ . Distribute the 4:  $\frac{24x-36}{3}$ . Finally, divide the numerator and denominator by 3:  $\frac{24x-36}{3} = 8x - 12$ .
38. **Answer choice (C) is correct.** To find 60% of 45, change 60% into a fraction or decimal and multiply the result by 45:  $60\% \text{ of } 45 = 0.6 \cdot 45 = 27$ .
39. **Answer choice (A) is correct.** Dilation is the process of resizing an object by a certain scale factor. Therefore, a dilation changes the size of a figure.
40. **Answer choice (D) is correct.** Add 4 to both sides of the equation  $8x = 2y - 4 \rightarrow 8x + 4 = 2y$ . Factor out a 4 from both terms on the left side:  $8x + 4 = 2y \rightarrow 4(2x + 1) = 2y$ .
41. **Answer choice (D) is correct.** To get from the first element to the second element, rotate the first element  $90^\circ$  counterclockwise. To get from the second element to the third element, rotate the second element  $180^\circ$  counterclockwise. To get from the third element to the fourth element, rotate the third element  $90^\circ$  counterclockwise. To get from the fourth element to the fifth element, rotate the fourth element  $180^\circ$  counterclockwise. Therefore, the pattern alternates between rotating  $90^\circ$  counterclockwise and rotating  $180^\circ$  counterclockwise, so to find the sixth element of the pattern, rotate the fifth element  $90^\circ$  counterclockwise to get the figure in answer choice (D).

42. **Answer choice (A) is correct.** To find the fraction of the questions Quinn answered incorrectly, we need to find 10% of  $\frac{3}{4}$ . To find 10% of  $\frac{3}{4}$ , we need to multiply the two quantities. Since the answer choices are fractions, change 10% to a fraction and then multiply the result by  $\frac{3}{4}$ :  $10\% = \frac{10}{100} = \frac{1}{10}$ . Multiply  $\frac{1}{10}$  by  $\frac{3}{4}$ :  $\frac{1}{10} \cdot \frac{3}{4} = \frac{3}{40}$ .
43. **Answer choice (C) is correct.** Every week, Greta makes between \$1800 and \$3000, so we can estimate that she makes an average of \$2400 each week since \$2400 is halfway between \$1800 and \$3000. Therefore, every four weeks, Greta makes  $\$2400 \cdot 2 = \$4800$ . Every week, Greta spends between \$400 and \$800, so we can estimate she spends an average of \$600 each week because \$600 is halfway between \$400 and \$800. Therefore, every four weeks, Greta spends  $\$600 \cdot 4 = \$2400$ . Since Greta makes an estimated \$4800 every four weeks and spends an estimated \$2400 every four weeks, we can find how much she deposits into her bank account every four weeks by subtracting \$2400 from \$4800:  $\$4800 - \$2400 = \$2400$ .
44. **Answer choice (A) is correct.** We can rewrite the given expression as  $(0.8 - \frac{3}{4}) \div 0.2$ . Using PEMDAS, we know to perform the subtraction inside of the parentheses first. To do so, change  $\frac{3}{4}$  into a decimal and then subtract:  $(0.8 - \frac{3}{4}) \div 0.2 = (0.8 - 0.75) \div 0.2 = 0.05 \div 0.2 = 0.25$ .
45. **Answer choice (A) is correct.** To find the probability of throwing a dart and having it hit the shaded part of the board, divide the area of the shaded region by the area of the entire dartboard. The area of the outer square is  $64 \text{ in}^2$ , which is the area of the entire dartboard. The area of the shaded region is equal to the area of the middle square minus the area of the innermost, small white square:  $36 \text{ in}^2 - 16 \text{ in}^2 = 20 \text{ in}^2$ . Therefore, the probability of throwing a dart and having it hit the shaded part of the board is  $\frac{20 \text{ in}^2}{64 \text{ in}^2} = \frac{20}{64}$  which can be written as 20 out of 64.
46. **Answer choice (B) is correct.** The median of a data set is the middle number when the data is lined up from least to greatest or greatest to least. First write the data points from the graph:  $30^\circ, 10^\circ, 20^\circ, 50^\circ, 60^\circ, 40^\circ, 80^\circ, 60^\circ, 60^\circ$ . Now order the numbers from least to greatest:  $10^\circ, 20^\circ, 30^\circ, 40^\circ, 50^\circ, 60^\circ, 60^\circ, 60^\circ, 80^\circ$ . The middle number is  $50^\circ$ , so the median average temperature over the nine months was  $50^\circ$ .
47. **Answer choice (D) is correct.** Each answer choice is in the form  $y = mx + b$ , where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept, so we need to find the slope and  $y$ -intercept of the graphed line. The line passes through  $(2, 0)$  and  $(0, 4)$ . To find the slope between two points, use the equation  $\text{slope} = \frac{y_2 - y_1}{x_2 - x_1}$  where  $(x_1, y_1)$  represents the coordinates of the first point, and  $(x_2, y_2)$  represents the coordinates of the second point. Plug the given points into the formula and simplify:  $\text{slope} = \frac{4 - 0}{0 - 2} = \frac{4}{-2} = -2$ . The line crosses the  $y$ -axis at 4, so the  $y$ -intercept of the line is 4. Therefore, the equation of the line is  $y = -2x + 4$ .

