# Lower Level ISEE®
# 1000+ Practice Questions

# Answer Keys & Explanations

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# Diagnostic Practice Test (Form A)
## Verbal Reasoning

1. C. Something that is different varies from the usual. This is the opposite of something similar, or widespread. The thing doesn't need to be exact, just not the same as something else.

2. B. If something is "prevented," then it is not allowed to happen. Therefore, we're looking for the opposite of "allow." If disaster is "prevented," then we can say it has been "avoided." Both words have similar meanings. The "prevent" doesn't mean to calm or to frustrate, since it relates not to emotions, but to whether or not something happens.

3. B. Think of "frequent fliers," who are rewarded by airlines for flying a lot. Or, think of a frequent visitor to a store. In both cases, "frequent" describes something that happens many times, or often (as opposed to few and seldom). It's important to distinguish that just because something happens a lot doesn't make it valuable, necessarily.

4. B. When a volcano erupts, it explodes, or bursts. Don't let the association of a volcano erupting and burning confuse you.

5. B. "Debate" can be used as a noun or a verb, but they have similar meanings. A debate is a discussion, or exchange of ideas. To debate is to have a discussion or exchange of ideas, not to distract. A debate can be spoken or yelled, but the words are not interchangeable (since a discussion has nothing to do with the volume of speech). To admit something might be the result of a debate, but isn't the action of a debate itself.

6. D. Something scarce is rare, or uncommon. It's not necessarily blessed (or sacred), or remote and isolated by itself, or even terrifying.

7. C. "Ambition" is often used to describe someone's drive, determination, and motivation to pursue his or her goals and dreams. It doesn't have anything to do with how careful (or not) or thoughtful (or not) he or she is. The person's ability may help achieve these goals, but this is separate from the desire to achieve the goal.

8. D. "Indicate" means to suggest, or point out. "The footprint indicated that someone was nearby." In this sentence, we don't know that someone was nearby, but the evidence of the footprint suggests that there was someone nearby. This doesn't have anything to do with arguing, approving, or rejecting something.

9. C. "Cease" is based on the root word "ceas," which means "to yield" or "surrender." If this happens, one stops whatever one is doing. Be careful not to be tricked into thinking this is like the word "crease" (fold), or "ease" (relieve).

10. C. To adhere to something is to stick to it, or remain with it. "Adhere" is similar to the word "adhesive."

11. B. To discharge is to release, or let go. For example, patients are discharged from hospitals, and electricity is discharged in the form of lightning.

12. B. When something abates, it decreases, or goes away. This is the opposite of "intensify," and doesn't have the same meaning as "absorb." "Abate" may sound like "rebate," but the two words have nothing to do with one another, so "discount" isn't an appropriate choice.

13. A. "Hearty" has a very positive connotation that means "cheerful." "He had a hearty laugh that made everyone feel at ease." The other words have negative connotations and can be eliminated.

14. D. People often say that thirst can be quenched. In other words, one's thirst can be satisfied. So, we know that the word "quench" means "to satisfy." This doesn't have to do with making a suggestion (propos), exercising, or developing.

15. A. The prefix "ab" means "away from" (think "abduct"). So, to be "away from" the normal is to be unusual, or odd, the opposite of something representative. This is the opposite of being "typical," and has nothing to do with being tough or necessary (or not).

16. D. To boycott something is to refuse or reject it. This is generally used to describe a situation where many people decide not to buy (or decline to use) a product. This is the opposite of consuming (or using) it.

17. D. The word "flourish" is used in a number of different ways. One of these is to say that something is doing very well, or prospering. "Flourish" has a very positive connotation, which only "prosper" matches.

18. C. The sentence is written in such a way that it defines the missing word. We can infer that the sentence describes a guardian, or protector of something. A thief would do the opposite of a guardian, and the other words do not refer to a person at all.

19. B. The sentence tells us that people thought that the relationship between the game show judge and contestant meant that the judge wouldn't be able to be fair about deciding a winner. This describes a conflict of interest, where the judge can't be fair, or impartial (think independent). These people would say that the judge could not remain fair or able, not unfair or unable.

20. C. We're told that Blake has a hard time seeing, which means that he needs glasses. If he needs glasses, then his eyesight is not perfect. Imperfect vision can be described as hazy, not necessarily bright, broad, or serious.

21. B. If something is tangible, it can be physically touched. It is not theoretical, since theoretical things can only be thought about and not touched. The thing may or may not be curious or natural.

22. C. To strengthen something is to reinforce it, not to impair (weaken) it. If the thing remains (as the building does, in this case), then it is not being replaced.

23. A. The sentence describes how something is unique, and how because of that, Aubrey was unable to find something similar. Something similar is referred to as that thing's equivalent. The vase might be valuable or impactful, but not necessarily. All we know about it is that it is unique.

24. D. Though one can display or exchange a sweater, the context of the sentence tells us that the sweater was left in Brody's car, who then went to get it to use it later. The best word to describe what Brody did is to say that it was retrieved. It doesn't make sense to say that Brody went back to forget it, since it had already been forgotten and then remembered again.

25. A. The sentence describes some quality of bacon and coffee "filling the air." Taste and flavor doesn't do this, and neither does a recipe. Only an aroma, or smell, does.

26. A. The sentence uses the word "unless" to show that the first part of the sentence is the opposite of the second. In the first, we're told that sometimes exact measurements are needed. In the second, the opposite of "exact" would be "approximate" (whereas "detailed" and "precise" are synonyms).

27. B. The sentence equates the first part of the sentence with the second. In the second, we're told that the people are "traveling." The word "return" doesn't make sense, since the sentence describes a "new country." When one moves to, or immigrates to, a new country for new jobs, one does not do so as simply a visit.

28. C. The adjectives included in the sentence together describe the word "luxurious." "Gaudy" and "tacky" are contradicted by the word "tasteful," and "cheap," contradicts "expensive."

29. B. "Because" tells us that the second idea in the sentence must be related to, or even the cause of, the first idea in the sentence. "Because" is similar to "since" and "for." The only logical reason why someone spends "all of his free time" time studying for the test is to get a good grade. It is not "because" he disliked the class" that he spent time studying (perhaps "in spite" of his dislike for the

class). Similarly, it is not "because" he sat next to the window or would rather play video games that he spent free time studying.

30. D. "Instead of" tells us that the opposite of something happened. In this case, we know we're looking for the opposite of "recovering." The only option that describes this is "became sicker," not "improved." We don't have enough context to know whether or not the horse threw a rider or snorted and stamped its feet.

31. D. The semicolon is a sign that the second part of the sentence must be logically consistent with and related to the first part. Mrs. Jones has "an amazing memory." It follows that what follows after the semicolon will somehow show that she has an amazing memory. The only choice that does this describes how she can remember many campers by name, which is the opposite of the choice which describes how she forgets (never remembers) where she leaves her keys. Making learning fun and running camp efficiently is not evidence of her amazing memory.

32. C. The key words her are "instead of" and "generously." This means that the correct answer has to do with not spending the money on himself. If Robert went on a vacation or bought himself clothes, then he spent it on himself. Not accepting the money doesn't make sense, since the sentence implies there was money that was spent (just not on himself). The only choice that makes sense is that he shared the money.

33. B. "Since" is similar to "because." Since Jackie eats out or orders delivery, we can infer that her idea of a meal does not involve cooking. We don't have context to tell us how quickly she eats her meals, or who she likes to eat it with.

34. D. We're told that Shakespeare was "famous" and wrote in "many different genres." We are also told that this is "unlike" his peers. The word "who" tells us that we need to describe these peers. If the peers are unlike Shakespeare, then they were either "not famous" or only wrote in a few genres. The only choice here is that they concentrated in "specific types of plays." We don't have context to tell us that they only wrote in rhyme, were more popular then than now, or for whom they wrote.

# Quantitative Reasoning

1. C. *Numbers & Operations – Charts.* Since we know that Zach spent a total of $10 on soda (find the column that says Zach and the row that says Can of Soda), and that he bought a total of 5 cans of soda, then we know he spent a $10 ÷ 5 = $2 on each can of soda. Tyler and William spent a total of $6 + $8 = $14 on soda. Since each can costs $2, we know that they bought a total of $14 ÷ $2 = 7 cans of soda.

2. D. *Numbers & Operations – Order of Operations.* Be care to observe order of operations (PEMDAS). First, simplify inside both sets of parentheses. This leaves us with $\frac{10 + 10(20)}{10 - 10(0)}$. Then, perform multiplication, which gives us $\frac{10 + 200}{10 - 0}$ and finally $\frac{210}{10} = 21$.

3. B. *Numbers & Operations – Number Lines.* We can find the incremental value between each tickmark by counting, or using arithmetic. 5.1 – 3.0 = 2.1. There are a total of 7 spaces between the two points. So, 2.1 ÷ 7 = 0.3. From 5.1, subtract 0.3 each time we move one tickmark to the left. This gives us 5.1 – 0.6 = 4.5.

4. D. *Numbers & Operations – Word Problems.* If there are a total of 24 eggs and 6 friends, and we are trying to determine how many eggs each of the 6 friends ate, then we would divide the number of eggs by the number of friends. The other choices describe different operations: multiplication (or addition) in the first and second, and subtraction in the third.

5. D. *Measurement – Area & Perimeter.* A rectangle has four sides. The opposite sides of a rectangle have equal lengths. If one side is 12, then so is the side opposite it. This is 12 + 12, or 2 × 12. We

don't know what the other side is, so let's call it $w$. Since there are two other sides, and they're the same width, we have $w + w$, or $2w$.

6. A. *Algebraic Concepts – Patterns*. There are two ways to solve this question. We can pair off small and large values to find that each pair equals 18 (for example, $2 + 16 = 18$, and $4 + 14 = 18$, etc.). There are 4 total pairs, so $18 \times 4 = 72$. We know that $9^2 = 81$ ($9 \times 9 = 81$) and that $81 - 9 = 72$. Or, we can use the pattern provided. The expression on the left of the equation adds an additional number in each row, while the expression on the right of the equation increases as well. If we do this 4 more times, we will arrive at $2 + 4 + 6 + 8 + 10 + 12 + 14 + 16$ on the left side of the equation, and $5 + 4 = 9$ as the two numerical values on the right.

7. A. *Algebraic Concepts – Creating Expressions & Equations*. It may help to write out the information provided. Represent the weight of a hammer as $h$, the weight of a screwdriver as $s$, and the weight of a wrench as $w$. So, we know that $h = 2s$, $w = 3s$. We also know that $h + w + s = 12$. Simply substitute the values of $h$ and $w$ into the equation to get $2s + 3s + s = 12$. This gives us $6s = 12$. Divide both sides by 6 to isolate $s$, finding that it equals 2.

8. A. *Geometry – Geometric Objects*. A quadrilateral is any shape with four sides. A trapezoid has one pair of parallel sides. A square has four equally long sides and four right angles. A rhombus has four equally long sides. This shape does not have four equally long sides, and it has two pairs of parallel sides.

9. B. *Measurement – Area of Shaded Figure*. Find the area of a square by squaring (multiplying the number by itself) the length of one of the sides. The length of a side is 5, so $5^2 = 5 \times 5 = 25$. This gives us the total area of one square, but there are two. The total area of both squares would be $25 \times 2 = 50$, but they overlap. The area of the overlap is a square with side length 2. The area of the overlap is $2^2 = 4$, but we must subtract this from both squares (since the question asks only for the shaded area of the figure). Thus, $50 - 4 - 4 = 42$.

10. C. *Numbers & Operations – Word Problems*. Since $c$ represents the cost of the hotel room *per night*, we know are given a big clue. The word "per" tells us that we're talking about a rate, or a total value divided by some other number.

11. D. *Measurement – Irregular Shapes*. The perimeter of the figure is the length of all of its sides added together. We know the lengths of all sides but two, but we can figure out the missing values. We could figure out the missing sides as follows: the horizontal side has a length of $12 - 4 = 8$, and the vertical side has a length of $10 - 3 = 7$. This means the perimeter is $7 + 8 + 3 + 12 + 10 + 4 = 44$. Alternatively, we can see that this shape could be a rectangle if we moved the line with length 7 in-line with the line with length 3, and the if we moved the line with length 8 in-line with the line with length 4. So, the perimeter would simply be $2(10) + 2(12)$, or $20 + 24 = 44$.

12. D. *Algebraic Concepts – Solving Algebraic Equations*. Solve for each variable separately, then add them together. In each equation, use inverse operations to isolate each variable. Subtract 9 from both sides of the first equation to find $v = 6$, and add 9 from both sides of the second equation for $w = 24$. $6 + 24 = 30$.

13. B. *Numbers & Operations – Estimation*. Round each number to its first place based on its second place. If the second place is 5 or more, round up. If it is less than 4, round down. 31 becomes 30, 653 becomes 700, and 19 becomes 20. So, we have $30 \times 700 \div 20$. This gives us $21{,}000 \div 20$, or approximately 1,050.

14. D. *Measurement – Volume & Surface Area*. A cube has equally long side-lengths; if one side-length is 2, then all are. This means the area of one side of the small shaded cube is $2 \times 2 = 4$. We can see that 9 of the smaller cubes could fit along the left-most face of the big cube. This means that 1 of the 6 sides of the big cube has an area of $4 \times 9 = 36$. All 6 sides of the big cube, then, has a surface area of $36 \times 6 = 216$.

15. D. *Algebraic Concepts – Proportions*. Since the snail crawls 3.5 cm every 5 minutes, and we can fit 3.5 cm in 14 cm 4 times, we know that it can crawl all 14 cm in $5 \times 4 = 20$ minutes. A sure-fire way to solve this question is to set up a proportion, setting two fractions equal to each other. In this case, we'll put distance in the numerator, and time in the denominator, and let $x$ represent the amount of

time that is unknown. The proportion becomes $\dfrac{3.5}{5} = \dfrac{14}{x}$. Cross multiply to find $14(5) = 3.5x$, or $70 = 3.5x$. Divide both sides by 3.5 to end up with $x = 20$.

16. B. *Numbers & Operations – Estimation*. We can round the depth given to a number that is easily divisible by 5. This could be 35,000, which when divided by 5, gives us 7,000.

17. C. *Data & Probability – Interpreting Data*. Since a total of 600 students voted in total, half of that would be 300, which would mean that the Vanilla portion of the chart should take up half of the entire circle (which it does not). Meanwhile, one quarter (one-fourth) of 600 would be 150, which would make the central angle 90°, which it is not. So, the total must be in between 150 and 300, and only 200 is in this range.

18. C. *Data & Probability – Mean, Median, Mode*. The range is the difference between the greatest number in a range and the least. We don't need to know how many red cars drove by his house each day, only the least and the greatest. In this question, we are given the least number of cars, as well as the range. Therefore, we can add the range to the least number of cars and find the greatest number of cars. This is $5 + 9 = 14$.

19. D. *Measurement – Area & Perimeter*. An equilateral polygon has sides that all have the same side length. A triangle has 3 sides, so an equilateral triangle has 3 sides with the same length. The perimeter is the sum of the lengths of all 3 sides. Therefore, the length of one side is $27a \div 3 = 9a$.

20. C. *Data & Probability – Interpreting Data*. We should test each choice in turn to see which is NOT true. We can eliminate the first choice because the set of data is {4, 8, 12, 12, 16}. The median is the middle number, or 12. We know the sum is equal to 52, which is a multiple of 2. The total number of miles run in week 1 and week 5 is 24, which means Effy ran $52 - 24 = 28$ on the other days. This makes the third statement false.

21. B. *Data & Probability – Probability*. Probability describes the chance of something to happen, and is often expressed as a fraction. The question tells us that 7 of 10 songs are pop songs. If there were only 10 songs, this would mean that 3 of 10 songs are not pop songs. However, we have 90 songs. So, can simply multiply 3 and 10 by 9 to find out that 27 of 90 songs are not pop songs.

22. C. *Data & Probability – Probability*. We are told the probability of picking a boy's name is 2 out of 5, or $\dfrac{2}{5}$. As a decimal, this equals 0.4, and as a percent, 40%. We must simply find which choice gives us the same probability. However, we cannot divide the number of boys by the number of girls; we must divide the number of boys by the number of girls AND boys. So, the choices give us a total number of students as 7, 14, 20, and 35. We divide the number of boys by these numbers and find that only $8 \div 20 = 0.4$.

23. C. *Data & Probability – Interpreting Data*. We can write out the values in the set, or simply eliminate the least and greatest numbers one at a time. The set contains {3, 6, 8, 10, 11, 15}. In a set with an even number of numbers, we find the average between the remaining numbers after we eliminate small-big pairs. We eliminate 3 and 15 first, then 6 and 11, leaving us with 8 and 10. The average is 9.

24. C. *Data & Probability – Mean, Median, Mode*. Since the average is in between two numbers, and we know that the average is 12 and one number is 10, we must look for a number that is $12 - 10 = 2$ bigger than the average. This is $12 + 2 = 14$. We can calculate the average by adding all of the values in a set and dividing that sum by the number of values in the set. In this case, the set should contain two numbers: the number of milk chocolates sold, and the number of dark chocolates sold. Since we know that 10 milk chocolates were sold, let's say that $x$ dark chocolates were sold. We know that $\dfrac{10 + x}{2} = 12$. Multiply by 2 on both sides then subtract 10 for $10 + x = 24$ and then $x = 14$.

25. A. *Geometry – Coordinate Grids & Transformations*. We can sketch the coordinates on a rough graph to see that what we have is a four-sided shape with only one pair of parallel lines. A parallelogram has two pairs of parallel lines, as do rectangles and rhombuses.

26. C. *Algebraic Concepts – Patterns*. Count the number of dots in each figure: 1, 4, 12, 16. We can see that they represent the squares of 1, 2, 3, and 4. So, the 5th figure will have $5^2 = 25$ dots, and the 6th will have $6^2 = 36$.

27. A. *Measurement – Area & Perimeter*. The perimeter is the sum of the lengths of all sides of a shape. The opposite sides of a rectangle have the same measurement. We are given one pair as being $7 + 7$, and we know the remaining pair should be $w + w$. If the total is 30, then $30 = 7 + 7 + w + w$, or $30 = 14 + 2x$. Isolate $x$: $16 = 2x$ and $x = 8$.

28. C. *Numbers & Operations – Comparing Fractions*. We are looking for a number that is greater than $\frac{1}{2}$. We know that half of 18 is 9, so the first choice is a possibility. We know that half of 24 is 12, and half of 17 is 8.5, so the second and fourth choices can be eliminated. We know that 18 is 3 times bigger than 6, so we can multiply 5 by 3 to find that $\frac{5}{6} = \frac{15}{18}$. This leaves us with the third choice.

29. B. *Algebraic Concepts – Solving Algebraic Equations*. Isolate $m$ by first adding 8 to both sides, giving us $16 = 4m$. Divide both sides by 4 to find $m = 4$.

30. D. *Data & Probability – Interpreting Data*. The left circle represents students who walk to school, and the right circle students who bring lunch to school. The overlap, or the shaded area, represents students who do both. Only Mila does this.

31. C. *Numbers & Operations – Comparing Fractions*. We know that half of 16 is 8, so $\frac{8}{16} = \frac{1}{2}$, which is smaller than $\frac{2}{3}$ and $\frac{4}{7}$, since half of 7 is 3.5. Half of 13 is 6.5, and 6 is less than 6.5, so we know that $\frac{6}{13}$ is less than $\frac{1}{2}$.

32. B. *Algebraic Concepts – Solving Algebraic Equations*. Solve for $y$ by first multiplying both sides by 4 to give us $y = 4(y - 6)$, or $y = 4y - 24$. Subtract $y$ from both sides and add 24 to both sides. This gives us $3y = 24$, or $y = 8$.

33. C. *Numbers & Operations – Word Problems*. We should work backwards to find the total number of chocolates in the box. Since 4 friends each had 9 chocolates, this means the total chocolates given to the 4 friends was $4 \times 9 = 36$. This was after he already ate 12 chocolates, so the total number of chocolates must have been $36 + 12 = 48$ to begin with.

34. D. *Algebraic Concepts – Patterns*. First find the difference between each term, or 3, 6, and 12. We can see that the value of the increase between terms is twice as much as the preceding increase. This means that between the 4th and 5th number in the pattern would be an increase of $12 \times 2 = 24$, making the 5th number $22 + 24 = 46$. Repeat this and the increase would be $24 \times 2 = 48$, so the 6th term would be $48 + 46 = 94$.

35. A. *Numbers & Operations – Vocabulary & Properties*. The associative property tells us that we can multiply more than two in any order and always get the same value. So, it doesn't matter which value we multiply first, second, or third. Both sides of the equation will be equal.

36. D. *Algebraic Concepts – Functions*. We should test a few values in the table in each equation given. Simply plug in a couple of values of $x$ to see if the corresponding value of $y$ results. Be sure to test more than one value of $x$!

37. C. *Numbers & Operations – Number Lines*. Find the distance between each tickmark. There are 4 spaces between 1 and 2, and we know this value represents 1 unit. So, each tickmark represents $1 \div 4 = 0.25$, or $\frac{1}{4}$ of a unit. Going left along the number line means subtracting the value of each tickmark, or $1 - \frac{1}{4} = \frac{3}{4}$.

38. B. *Numbers & Operations – Estimation*. We should round all values to the first place to make it easy to add. This is 100, 40, 60, 60, 70, and 20 = 350.

# Reading Comprehension

1. D. *Main Idea.* The primary purpose of this passage is to provide a history of the development of a useful product: toothpaste. The passage does not try to persuade the reader that toothpaste is useful. There are different uses for the product mentioned, but the passage does more than simply compare these different uses. The passage does not investigate the primary inventor of toothpaste, which the passage describes as not having a single inventor (line 7).

2. D. *Organization & Logic.* According to the passage, the invention of the lightbulb and telephone are generally credited to Thomas Edison and Alexander Graham Bell. Line 7 explains that "toothpaste did not have a single inventor." The lightbulb and telephone are mentioned to provide a contrast to how toothpaste developed over the centuries. The passage does not invoke these inventions to draw similarities to toothpaste. Toothpaste is described as having different purposes.

3. C. *Supporting Ideas.* The passage states that, "Just like today, [ancient Egyptians] needed to keep their teeth and gums clean." The passage does not mention how ancient Egyptian toothpaste was stored, what it was flavored with, nor that it was used to reduce tooth sensitivity.

4. C. *Vocabulary.* The word "abrasive" in this context means "rough." The sentence uses "abrasive" as the opposite of "smooth" so the choice "silky" is incorrect. Abrasive can also be used to describe a person who is considered annoying or showing little concern for the feelings of others. However, in this case the usage of "abrasive" is more literal.

5. B. *Inference.* Today's toothpastes are described as being sold in tubes and having many purposes including helping with sensitivity and staining. This is the opposite of being sold in jars and only having one purpose. The passage doesn't talk about the flavors of toothpastes today.

6. C. *Main Idea.* The main purpose of this passage is to explain why people should start using more renewable energy sources over non-renewable energy sources. The passage does not describe try persuade that renewable energy sources are unreliable, instead stating that despite this drawback, cleaner energy is better for the long term. The passage mentions how non-renewable sources like coal and oil are turned into energy as a supporting detail, but this is not the main idea.

7. D. *Style.* The author writes about how renewable energy sources, like solar power, is good, and should be used more than non-renewable energy sources. An encyclopedia presents only the facts, not an opinion. A novel tells a story, with a beginning, middle, and end. Both a commercial and an advertisement present opinions (and sometimes facts). However, the opinion in this passage is in favor of clean energy (like solar) not like oil power.

8. C. *Inference.* While the passage does not mention hydropower, it can be inferred from the information given in the question that hydropower should be described as a renewable resource. The question describes hydropower as a clean source of energy that does not use up the water in the process. This matches the definition of a renewable energy source from lines 17-27. Line 35 also describes renewable energy as "clean energy," which matches how hydropower is described in the question.

9. A. *Supporting Ideas.* Lines 40-43 describe cost as a reason the United States uses more energy from non-renewable sources. The answer is that most people aren't willing to pay more for energy from renewable sources. While it's true that coal, natural gas, and oil are examples of non-renewable energy sources according to the passage, this is not a reason why most energy in the U.S. comes from non-renewable sources. It is false according to the passage that non-renewable energy sources are better for the environment.

10. A. *Vocabulary.* "Reliable" means consistent. Line 45 describes non-renewable energy as more "consistent." This word is a good synonym for reliable in this instance. Untrustworthy is the opposite of consistent. While non-renewable energy is described as polluting, that is not what this paragraph is about. Non-renewable energy is described in the passage as cheaper than renewable energy. Nowhere does it describe non-renewable energy as being "expensive.

11. C. *Main Idea*. The ceiling of the Sistine Chapel is explored throughout the entire passage. The passage describes what it looks like, where it is, and how it was painted. The painting technique he

used is briefly touched on as part of this detail. The artist's life and the Sistine Chapel itself is discussed only briefly, in context of the ceiling itself.

12. B. *Vocabulary*. A few sentences before the word is used, the painting is described as famous (line 6). Using this context, we can assume that "iconic" means "famous." Some may think the painting is "artistic," but the passage doesn't make note of these sentiments. While the painting may be "old," within the context, we can assume that "iconic" and "old" are not the same thing, or that the "oldness" of the painting is what attracts people to see the painting. There is no evidence in the passage that the painting is "simple."

13. D. *Organization & Logic*. The second paragraph describes how Pope Julius II hires Michelangelo to paint the ceiling of the Sistine Chapel. The passage refers to neither Michelangelo's other projects nor the Sistine Chapel's popularity. While one can assume that Pope Julius II and Michelangelo have a relationship, it is not specifically mentioned in the paragraph in any detail.

14. C. *Supporting Ideas*. Michelangelo's methods are detailed in paragraphs 3-5. Paragraph 3 focuses on his use of a scaffold. The "fresco" technique is described in paragraph 4. He is said to have assistants in paragraph 5. There is no mention of him using his sculptures as reference, though his painting is compared with sculptures in the last paragraph.

15. B. *Inference*. The passage describes Michelangelo learning a new art form, creating a mechanism to reach the ceiling, and coming up with painting ideas. These are all reflections of his adaptability. Pope Julius II is never described as a ruler. The author writes that The Sistine Chapel is popular. We don't know if it's difficult to see the details Michelangelo included.

16. D. *Main Idea.* The main objective of this passage is to describe a child's meaningful experience learning something from her grandfather, in this case how to make his favorite recipe. While the passage describes in general terms how to make this dish, its main purpose is not to provide a recipe. The passage doesn't go into the benefits of cooking. It describes the tradition as weekly.

17. A. *Vocabulary*. In line 25, Julia's confusion changes to "apprehension," or concern. Line 28 explicitly mentions the "worry" on Julia's face, which is consistent with the word apprehension. While the opposite of "confusion" is "understanding," this is not a possible meaning of the word "apprehension" and it does not make sense given the context provided in the next few lines. Julia is a little anxious and worried, or concerned, when she finds out she will be cooking, but the passage does not suggest in this moment she is experiencing joy or sadness, which also are not possible meanings of the word "apprehension."

18. B. *Supporting Ideas*. Line 42 mentions that "The first step is to flatten the chicken." Lines 44-50 describe how they did so with a metal mallet. The best answer is that she flattened the chicken with a tool. The other choices describe steps taking place after flattening the chicken.

19. A. *Style*. The comparison of the breadcrumbs to a sandy beach tells us what the pan of breadcrumbs looks like. Going back to the passage to read the full simile in lines 61-63, it is clear that this comparison refers to the visual similarities between the breadcrumbs and a beach. The passage states, "I placed the chicken in what resembled a sandy beach of breadcrumbs." The keywords there is "resembled." We're not able to draw a conclusion about the other choices.

20. D. *Logic/Organization.* The passage consistently portrays a positive, loving relationship between Julia and her grandfather. Logically, the more negative answers describing her as "upset" or "relieved" do not fit with the rest of the story. While Julia is probably happy at the end of the passage, this is not because she is finally going home. She appears to genuinely enjoy spending time with her grandfather. The best answer is therefore that she is appreciative of the strong relationship she has with her grandfather.

21. B. *Main Idea.* The main objective of this passage is to describe the narrator's experience as he starts his first day at a new school. The passage does not give advice on moving to a new school nor does it try to persuade parents not to move their kids to a new school. The story mentions teachers and drivers, but in a very minor role.

22. C. *Vocabulary.* The word "preoccupied" can mean lost in thought, or in other words "distracted." The choice "attentive" is the opposite meaning. The narrator may be early for the school bus (not every

word that begins with "pre-" means "before"), but this is not why he didn't notice his mom talking to him. The narrator certainly is not carefree. Instead, he is very worried, early on in the passage.

23. B. *Style.* Drew's feelings change from nervous to relieved throughout the passage. His feelings start out as more negative and move toward a more positive emotion. The only answer choice that moves from negative to positive is "from nervous to relieved."

24. C. *Inference.* Up until this point in the passage, the main idea is that Drew is starting at a new school where he is nervous because he does not know anyone. Even though the passage does not directly state why Drew is unsure where to sit, it can be inferred that he is unsure because he doesn't have any friends at his new school yet, so he doesn't know who to sit with. In addition, later in the paragraph, the author describes how Drew hoped "the kid across the aisle wouldn't notice" him. This suggests that he is shy. While the other choices are reasons someone might be unsure where to sit on a bus, the passage does not provide any evidence that these are reasons why he doesn't know where to sit.

25. D. *Inference.* We're not told what Drew asked, but since Jake responds with "teachers are actually pretty cool," we know that it has something to do with the teachers' disposition. This is reflected in the question of whether or not the teachers are nice.

# Mathematics Achievement

1. C. *Numbers & Operations – Fractions.* To combine fractions, convert the fractions so that the have the same denominator. Simply multiply $\frac{5}{6}$ by 2 to get $\frac{10}{12}$. $\frac{10}{12} + \frac{5}{12} = \frac{15}{12}$. This is an improper fraction, so if we subtract 12 from the numerator, we are left with $1\frac{3}{12}$, or $1\frac{1}{4}$. We add this to 14 and 4 for $19\frac{1}{4}$.

2. A. *Geometry – Coordinate Grids & Transformations.* Find point *S* and trace up over to the *x* and *y* axes, which are labelled. Along the *x*-axis, the value is –3, and along the *y*-axis, the value is –2. In a coordinate pair, the first value is always the *x*-axis value.

3. A. *Numbers & Operations – Vocabulary & Properties.* The commutative property tells us that with addition (and multiplication), the order in which we perform the operations does not matter.

4. D. *Algebraic Concepts – Creating Expressions & Equations.* We can multiply the number of cookies in each box by the number of boxes to find *c*, the total number of cookies. This would be $5(6) = c$, but we don't see that anywhere. However, if we divide both sides by 5, we end up with the $c \div 5 = 6$.

5. C. *Numbers & Operations – Estimation.* Round to the nearest integer, for $4 \times 2 = 8$.

6. C. *Numbers & Operations – Rules of Divisibility.* We are trying to find a number evenly divisible by 6. 6 will only fit into even numbers whose digits add up to a multiple of 3.

7. A. *Geometry – Symmetry, Congruency, & Similarity.* A line of symmetry is a line over which the shape can be folded such that all of the lines line up perfectly. In a square, there are 4 lines of symmetry (vertically and horizontally through the middle, and through both diagonals). In a circle, there are infinitely many lines of symmetry so long as those lines run through the exact center of the circle. In the cross, there are exactly two lines of symmetry. In this triangle, there is only one: vertically through the point.

8. C. *Data & Probability – Probability.* There are 26 letters in the alphabet. B is 1 letter out of 26 in the alphabet. Probability can be represented as the number of possible desired outcomes out of the total number of possible outcomes. So, this is 1 out of 26.

9. C. *Numbers & Operations – Operations with Whole Numbers.* We can round to $8,000 \times 70 = 560,000$ and see that 520,467 is the closest.

10. D. *Numbers & Operations – Comparing Percents, Fractions, & Decimals*. If we add the numbers together, we get 10.45. We can easily convert this to a fraction, since 0.45 represents 45 hundredths, or $\dfrac{45}{100} = \dfrac{9}{20}$.

11. A. *Numbers & Operations – Operations with Whole Numbers*. Since the ones digit of all the answer choices is the same, we need only compare the tens digit in the sum. If we begin adding the two terms, we see that the tens place is 2, not 1, so we need not find the rest of the sum.

12. A. *Measurement – Area & Perimeter*. A square has four equally long sides, and since we know the perimeter is 36, we know each side is 36 ÷ 4 = 9. The area is side$^2$, or $9^2 = 81$.

13. D. *Data & Probability – Interpreting Data*. Simply count the number of circles and half circles for each pair and take the difference. Guppy and Sully sold a total of 5 + 8.5 = 13.5 circles, while Harold and Tarley sold 2 + 3.5 = 5.5 circles. The difference is 8 circles, which is equal to 2,000 × 8 = 16,000.

14. D. *Numbers & Operations – Comparing Percents, Fractions, & Decimals*. Remember that to convert a decimal into a percent, simply multiply by 100. 0.3 × 100 = 30.

15. B. *Measurement – Area & Perimeter*. Since the length is 7, and the width is double the length, we can express this as $w = 7 \times 2$, or $w = 14$. The question asks for the perimeter, which is 2(7) + 2(14) = 42.

16. D. *Numbers & Operations – Order of Operations*. Remember to perform multiplication and division before addition and subtraction. Doing so shows us that only the last choice works.

17. C. *Numbers & Operations – Place Values*. Remember that to the right of a decimal point, the place values are tenths, hundredths, thousandths, ten thousandths, etc. Twelve hundredths is 0.12, which is only shown in the third choice.

18. D. *Measurement – Volume & Surface Area*. The large cube is 3 small cubes long per side, which means it contains a total of 3 × 3 × 3 = 27 cubes. We can see 9 small cubes on the front face of the large cube, and we can see that there are 3 "sheets" of this deep in the cube.

19. B. *Numbers & Operations – Word Problems*. There are a total of 50 books, and 9 at a time can fit onto a single bookshelf. If we divide 50 by 9, we end up with $5\dfrac{5}{9}$. This means after filling 5 bookshelves (with 5 × 9 = 45 books), we will have 5 left over that must go on a 6$^{th}$ shelf. The question asks how many shelves can be completely filled.

20. A. *Algebraic Concepts – Creating Expressions & Equations*. When a question says "product," this means multiplication between the thing after "of" and after "and." The phrase "less than" means subtraction, but the order here is important (after all, 1 – 2 is different from 2 – 1!). Some amount less than another amount means that we take the latter and subtract from it the former; in this case "the number" and subtract 10 from it.

21. D. *Numbers & Operations – Order of Operations*. Observe PEMDAS by performing division and multiplication first (it doesn't matter which). This leaves us with 32 – 16 + 4 = 20.

22. B. *Numbers & Operations – Fractions* The question asks for the amount of hay eaten over both days. This means we must add the two amounts together. Remember to properly line up the place values.

23. B. *Algebraic Concepts – Functions*. We are looking for the number in the star column that will produce a 30 in the diamond column. This means we must find the pattern. For every increase of 1 in the star column, the diamond column increases by 4. So, 18 + 4 = 22, 22 + 4 = 26, and 26 + 4 = 30. This means the star column should increase 3 more times, or 5 + 3 = 8.

24. B. *Measurement – Converting Units*. We must convert all values into gallons. 40 cups ÷ 2 cups per pint ÷ 2 pints per quart ÷ 4 quarts per gallon = 2.5 gallons. 20 quarts ÷ 4 quarts per gallon = 5

gallons. 24 pints ÷ 2 pints per quart ÷ 4 quarts per gallon = 3 gallons. Add all of the gallons together for 2.5 + 5 + 3 = 10.5 gallons.

25. D. *Data & Probability – Predictions*. We need only look at Annie's column. Over each week, Annie's number of pullups performed increases by 6. Week 6 is 2 weeks from Week 4, so she should be able to do 28 + 6 + 6 = 40 pullups.

26. B. *Measurement – Units*. Since it is 12PM in NY when it is 9AM in LA, then NY is 3 hours ahead of LA. If it is 11PM in LA, then it is 3 hours ahead in NY, or 12PM, then 1AM, then 2AM.

27. A. *Data & Probability – Predictions*. It may be helpful to number each student 1 to 5, with 1 being the student with the most votes. This shows us that Drew will be president (1), Bobby will be vice president (2), and Alex will be secretary (3).

28. A. *Algebraic Concepts – Proportions*. The fact that Bea reads 14 books every 70 days can be thought of as the speed at which Bea reads. We can see in fraction form $\frac{14}{70}$ that this can be simplified to $\frac{1}{5}$ by dividing both the numerator and denominator by 14, or 1 book every 5 days (in $5 \times 14 = 70$ days, she could read $1 \times 14 = 14$ books). Applied to 100 days, Rue could read $100 \times \frac{1}{5} = 100 \div 5 = 20$ books.

29. B. *Geometry – Geometric Objects*. A square has equally long sides, so to make a square, we must have a figure with the same number of smaller squares on all sides. The height of the figure shown is 6 small squares. The width is 6 small squares. Therefore, we are missing $6 - 2 = 4$ small squares along the top, and $6 - 2 = 4$ small squares along the right hand side. Only the second choice shows us a figure with these dimensions.

30. C. *Data & Probability – Mean, Median, Mode*. The range is the difference between the least and greatest values in a set, in this case, a set of stock prices over 10 days. We can see visually where these are. Day 9 had the least price at $25, while day 8 had the greatest price at $75. The difference is 50.

# Verbal Reasoning – Synonyms

## Introductory

1. D. Something that is "familiar" is well known (think of a "familiar face"). The only other word that carries a similar meaning is "recognizable," which refers to something that one knows, or recognizes. If something is "new," then it is not well known. Just because something is friendly doesn't mean that it is familiar – something new could be friendly.

2. B. "Harsh" carries a very negative connotation (think of "harsh words" or a "harsh sound"). We can rule out "gentle" and "patient," since these words have very positive connotations. Something that is complex is not necessarily harsh, it is just complicated or not easy to determine. Something that is harsh is either rough to the senses, or very cruel or severe.

3. D. Notice that "origin" is a noun (consider: "The origin of a river."). The origin of something is its source, or its beginning (think of the origin of a word, or rumor).

4. C. "Loyal" carries a very positive connotation (think of a "loyal sidekick"). We can therefore rule out "dishonest." If someone is loyal, they are reliable, trustworthy, and always support another person or idea. They may or may not be attractive, and might not be royal (a king, queen, etc.).

5. B. The word "ascend" means to go up, climb, or rise up through the air. Think of a hiker "ascending" a mountain, or an airplane's "ascent." The closest word to this is "mount," which describes getting on something (like a horse, or a throne).

6. C. The word "dismiss" is made up of two root words: "dis," which can mean "away," and "miss," which means "send" (think of a missive, which is a fancy word for a letter, or a missile, which is "sent" through the air). Putting these roots together, we can see that the word means to send away, or release something (think of school "dismissal," where students are "released" from school).

7. B. A judge is someone who makes a decision. For example, in a pie-making contest, a judge will determine whose pie is best. A judge doesn't accuse or defend, but instead decides. The word "judge" can be used as a verb or a noun. As a verb, it means to decide, not to remember.

8. B. An occurrence is an event, or a happening. If we think about "occurrence" as a verb instead of as a noun, we end up with the word "occur," which means "happen." Something that happens over and over again repeats, but this doesn't mean that all occurrences happen repeatedly.

9. A. The word "identical" means "exactly alike" (think of identical twins, for example). Though twins are related, the word "identical" means more than just "similar" or "approximate." Instead, it shows a relationship that is equal, or exact. This does not mean that it is rare, or infrequent. For example, a million copies of a book are identical, but not rare.

10. D. To notify someone is to describe or tell something to someone. To report is to do the same thing (think of a book report, for example, which informs someone by describing the book). A person will notify someone of something learned, but the action of reporting is not the same as learning. The notification may or may not be bothersome.

11. D. Something that is urgent is very important, or crucial. Something that is vital is the same thing. Think, for example, of the body's vital organs, which are important, or crucial to the body's functioning. To demonstrate urgency, people often use bright lights or loud noises (like an ambulance). However, these demonstrations of urgency are not the same thing as urgency itself.

12. C. The word "absent" actually begins with the root word "abs," which means "away from" or "off." Think of someone who is absent from school. That person is not at school, or is away from school, or is off of school grounds. We could say that this person is unavailable, or not present. The person isn't late, since he or she isn't there at all, and obviously isn't visible.

13. C. The word "potential" means that something has the ability to happen in the future. For example, consider: "There is the potential that heavy snow will result in a day off from school." The fact that there might be a day off from school is possible (because of heavy snow), but not absolutely certain, and definitely not doubtful.

14. B. To estimate is to roughly calculate, or approximate, the value of something. For example, there might be a contest asking players to estimate the number of candies in a large jar. It doesn't mean to bargain (argue about the value), purchase (take action based on some value), or necessarily to subtract (estimating could involve adding, for example).

15. C. The word "common" begins with the root word "com," which means "with" or "together." We can tell that this word has something to do with things that are together, or shared, not personal or unfamiliar. For example, a "common language" is one that is shared with many people. A "common area" is a space that is shared by many people.

16. B. If someone is careful, or cautious, they are not casual or at ease. If someone is careful, they're not necessarily formal – they just take great care in what they do. A careful person is not necessarily remarkable, but simply cautious.

17. A. To hesitate is to pause, or wait. This results in a delay. One might hesitate because one is guessing, or trying to understand something, but not necessarily. For example, one might hesitate because one is scared. To perform is to act in some way, which is the opposite of waiting or delaying.

18. C. Something that continues doesn't stop, or end. Something continuous is ongoing, or constantly happening – unbroken. This thing would be predictable and regular. Something that is continuous could be frequent or not. The only thing that matters is that it is ongoing, or permanent and unending.

19. B. "Mimic" is used to describe the action of copying or imitating something. It is true that one would may need to watch something in order to copy it, but it's not quite the same thing as actually making a copy.

20. B. The word "exclude" is made up of two root words: "ex," which means "out of," and "clud," which means "close" or "shut" (think "include," or "conclude") Therefore, "exclude" means to shut someone or something out of something else. The closest word to this meaning would be "ban," which means to refuse to allow something.

21. C. The word "unique" begins with the root word "uni," which means "one." If there is only one of something, then it must be very special, or extraordinary. Don't be confused because "universal" also begins with the word "uni" – the two words have totally different meanings! Unique things aren't always expensive or costly.

22. C. To prepare something is to get it ready for something else. In this case "ready" is used as a verb ("to ready"), not like a noun ("I am ready.").

23. D. "Brilliant" has a positive connotation, so we can rule out the other answer choices. Something brilliant shines brightly, or sparkles, and radiates light (is radiant).

24. A. "Primary" is related to the root word "prime," which means "first." The word "initial" means the first in a sequence of some kind. "Primary" can also mean "important" or "main," which is the opposite of the meaning of the other answer choices.

25. B. "Obtain" contains the root words "ob," which means "toward," and "tain," which means "hold" or "have." From this, we can tell that the word must have a meaning related to possession, or the action of "having" something. If we get something from somewhere else (think of pulling something toward you), then we can say that we "get" it (as opposed to giving, or donating something).

26. A. A myth is a story about an idea (for example, a myth about the origin of the world), sometimes about gods, which are sometimes then carved into statues. However, the word myth doesn't most closely mean "god" or "statue." Instead, the closest word to the meaning of myth is fiction, which is an idea that we know to be false.

27. C. If someone is cautious, then they take care in the things they do, and don't act without thinking or preparing. We could say such a person is thoughtful in the things he or she does. This is the opposite of someone who is impatient. Being friendly or clumsy has nothing to do with being careful or cautious.

28. C. Think of a wildlife preservation, or even a restaurant reservation. In both of these, space is being saved for a particular purpose. It is not being wasted, or necessarily presented to any person or thing. It is more than simply considered, or thought about. It is set aside and saved.

29. A. Something obvious is very clear or apparent. It is probably not complicated, but it might be. All that matters for something to be obvious is that it is not insecure or uncertain, but instead clear to people.

30. D. If someone is alert, he or she is vigilant, or watchful, keeping an eye on things. An alert (noun), is a warning that results when something happens, for example when someone sees something happen. To be alert is not necessarily to be happy.

31. D. A miniature (noun) is a smaller replica of something. Something that is miniature (adjective) is very small. The word "miniature" contains the root word "min," which means "little" or "small" (think "minimum" or "minority").

# Intermediate

1. C. "Suspend" contains the root word "pend," which means "hang" (think of a suspension bridge). "Suspend" can also mean to pause. For example, suspension from school means a pause from school. The opposite of "suspend" would be to resume, or continue. One cannot suspend something if it has not begun, so "begin" is not the closest in meaning to "suspend."

2. A. To grant is to give, or to allow or authorize. Think of the phrase "permission granted." This is the opposite of block, restrict, or withdraw.

3. C. Something that lingers stays, or remains (think of a lingering odor, for example). "Linger" how something changes over time. Does that thing disappear quickly, or does it remain? Be careful not to associate "lingering odor" with an "overpowering odor" or an odor that spreads. An odor that spreads (or doesn't spread) can still remain, or disappear quickly.

4. C. "Vast" is used to describe something very large, or great. Consider the sentence "The ocean is so vast that it takes weeks sail across it." This is the opposite of something "restricted," and has nothing to do with its being perfect (or imperfect) or bearable (or otherwise).

5. C. "Keen" is used to describe someone who is very eager, intelligent, or perceptive. One is often called "sharp" if he or she displays these qualities. This is the opposite of someone who is bored, dull, or unaware. "Keen" and "sharp" (as well as "dull") are also used to describe the edge of a knife.

6. A. To yearn for something is to desire, want, or crave it greatly ("He yearned for his freedom."). To reward is to give as a result of something. This is different from wanting something – someone can want something without doing anything, or even without deserving it.

7. A. Something that is significant is very important, essential, or crucial. It doesn't have to necessarily be factual – something made-up could be essential to a plot, for example. Something very important is the opposite of something inferior (lesser than), unimportant, or trivial.

8. C. Think of "appropriate behavior." This refers to behavior that is proper, or correct, for a certain situation. For example, it is not appropriate to yell and scream in class. Being quiet or clean may be examples of appropriate behavior or hygiene. However, be careful not to confuse examples of something with the thing itself.

9. C. "Expedition" contains the root word "ex," which means "away from," and "ped," which means "foot." We can infer that this means "expedition" has something to do with moving away from something, or going somewhere – for example, on a journey. One travels to a country or a jungle, but these are examples of different types of expeditions, but aren't journeys or expeditions in and of themselves.

10. B. "Companion" contains the root word "com," which means "together," or "with." This helps us rule out the other answer choices, since a partner is someone who works "with" you or is your equal. The other people listed do not demonstrate the idea of "with" or "together."

11. D. "Navigate" is often used in context of helping to set and follow a path (think of navigating through a maze, or navigating dangers). This is similar to steering, or controlling the direction of something. While one can navigate one's way to discovery, and experience risk along the way, or celebrate at the end, these are distracting associations that don't mean the same thing as setting and following a path.

12. B. "Compute" is made up of the root words "com," which means "with," or "together," and "pute," which means "think." When one thinks about something, and considers many facts or points together, one is said to be evaluating, or making a computation (think of evaluating a math question, or one's

options). Again, the other choices are presented as associations. Don't confuse examples of a computation (like adding) with the action of computing itself.

13. D. "Alternate" contains the root word "alter," which means "other." When something is altered, it is changed into something else – some "other" thing. When used as an adjective, "alternate" means other, or "substitute." For example, alternate plans are replacement (substitute) plans for some main plan.

14. B. "Wary" has a strong negative connotation, so we can result out "worth" and "trustworthy." Someone who is described as "being wary" is being suspicious, or cautious, not trusting or casual/informal.

15. D. To appreciate something is to value it, or realize the value of it. This is the opposite of disregarding it. "Appreciate" can also mean "to grow in value," which is the opposite of "diminish" and is unrelated to lending.

16. A. Something that is massive has a lot of mass, or is very large. Another way of saying this is to say that it is huge. This is the opposite of something short. The strength of something doesn't have anything to do with its size.

17. B. To utilize something is to use it, or employ it. Keeping or tossing or buying something doesn't have to do with using it.

18. B. To simplify something is to make it easier to understand. This is similar to clarifying something, not complicating it. Simplifying something doesn't necessarily mean building or dividing that thing.

19. D. A murmur is a soft sound, which is closest to a whisper. "Jake often murmured to himself as he studied in the library."

20. C. "Anxious" is related to the word "anxiety." When someone is full of anxiety, they are very nervous. "She was anxious about the test."

21. A. To inquire is to ask about something. "Remember to inquire about the field trip at school today." This is related to the word "inquiry."

22. D. Something that is prominent is projecting from something, or famous. In both cases, these things would be very noticeable (it might be very easy to spot a famous actor in a crowd, for example). Something prominent may be located at a noticeable place, and an expert may be prominent. But not all experts are prominent, for example.

23. A. Think about an intense workout, or an intense study session. These are very difficult, or require a lot of work or effort. One could say that they are extreme. Don't confuse "intense" with "tense," which would mean "worried" or possibly even "upset."

24. B. If someone is furious, they are very energetic about something. It could be about being angry. Or, it could apply to something else, for example, an art (someone painting or writing furiously). "Furious" describes how something is being done, so "forgiving" and "confused" don't make sense here.

25. A. "Exhaust" is related to the word "exhaustion," or the state of being very tired. If one is tired, one is drained of energy. "Exhaust" is also used to describe a situation where something has been completely used up, or drained (for example, a natural resource like gas). This is the opposite of "fill."

26. B. "Tragedy" has a very strong negative connotation ("The earthquake was a tragedy."). The only word with a similarly strong negative connotation is "disaster," which we can actually use to replace the word "tragedy" in the previous example.

27. B. Something that is occasional happens once in a while, or infrequently. It is likely unexpected. In other words, it's not normal, and is seldom in occurrence.

28. D. "Amiable" contains the root word "ami," which means "love," or "like." "Amiable" means friendly, and has a strong positive connotation, so we can rule out C. Someone could be capable or accurate, but these words don't mean anything close to "love" or "like." However, being friendly is an expression of "like" or "love."

29. C. Don't be confused by the "ton" in "monotonous" – the meaning doesn't actually have to do with sound, as the other answer choices would have you believe. Something monotonous is actually very boring, or repetitive. The clue here is "mono," which means "single" or "one." If something is monotonous, then it is the same (one) thing, over and over again.

30. D. To advocate is to defend something, or to support it, especially on another's behalf. For example, someone who believes that children benefit from play time during the school day would advocate for recess. "Advocate" contains the root word "voc," which means "call." Words containing "voc" have to do with speaking, or making a sound. In this case, only "recommend" (with one's words, for example) has to do with speaking.

31. D. "Esteem" may sound like it should relate to the word "steam" (so "heat" and "moisture"). It may also sound like the word "estimate." It's important not to make this associations, and to think about how the word might be used. The word is often used positively, which is how "respect" is used. In fact, "respect" is another way of saying "esteem."

# Advanced

1. A. Try to use the word in a sentence like "He loved helping people, and decided to devote his life to charity work." We can infer that this means that he would like to commit his life to charity, or helping people.

2. B. A fundamental concept is one that is extremely important, or crucial, to something. This is the opposite of extra (surplus). It's not necessarily crazy or severe. Just because something is fundamental doesn't make it extreme, or abnormal.

3. A. "Prejudice" is a preconceived idea, or preference, which is not actually based on experience or reason. Therefore, it's not accurate to call it knowledge. Instead, it is a bias, or uninformed or unconscious belief. One might take comfort in one's prejudices, but the two are not the same thing.

4. B. When someone is asked to elaborate (verb), they are asked to provide more details. If something is elaborate (adjective), then it is very detailed. Try using the word in context: "Please elaborate on those instructions."

5. C. "Disgraceful" has a very strong negative connotation, and only "embarrassing" carries a similar connotation. Things that are "appropriate," "elegant," or "praiseworthy" are all positive.

6. C. To be vigilant is to be watchful, or observant. This word is related to "vigil" (noun) which refers to a watch (like a guard's). The word is similar to, but should not be confused with a vigilante, which is a person who is an outlaw.

7. C. To salvage something is to save it, reclaim it, or rescue it. The verb is used to describe something that has been thrown away, and would otherwise be useless. "We can salvage many valuable goods from the garbage."

8. B. A consequence is an effect, or result of something. It may be the cause of something else, but the word itself refers to some sort of impact from another. "Consequence" contains two root words: "con," which means "with," and "sequ," which means "follow" (think "sequential"). Together, we can infer that the word has to do with something that follows when something else happens. In other words, a result.

9. B. "Acknowledge" contains the root words "ac," which means "toward." The word "knowledge" is also in the word, so we can assume that it has something to do with approaching knowledge, or

understanding. The only word related to this is "recognize." When there is recognition, there is knowing, or understanding.

10. D. "Reprimand" means to scold, or admonish. It has a strong negative connotation, so we can rule out the other answer choices.

11. B. "Emphasize" means to highlight, or underscore something, usually something important. It sounds similar to the word "empathize," which is related to the word "sympathize." However, the two are not the same. Think of using a highlighter to emphasize something important in a book or other writing.

12. C. "Sentiment" contains the root word "sent," which means "think" or "feel." This is like the word "sentient," which is a word used to describe conscious, or thinking life. Since the word has to do with feeling or thinking, we can rule out the other choices. One may experience feelings other than enjoyment.

13. A. "Hostile" has a strongly negative connotation, and only "aggressive" has a similarly negative connotation. "The mother bear was hostile to those that threatened her cubs."

14. B. To improve something is to make it better, or to enhance it. This is the opposite of "weaken," and isn't the same thing as "start," since "improve" suggests that one is taking something that already exists and making it better. "By studying hard, she hoped to improve her grade."

15. A. Something that is genuine is real, or authentic. Whether something is real or fake has nothing to do with whether or not it is graceful or intelligent. Sometimes, something that is genuine isn't believable, but sometimes, it is.

16. A. "Obnoxious" has a strong negative connotation, as does the word "bothersome." Neither "generous" nor "honest" share this association. Something that is annoying is certainly still possible.

17. D. "Solemn" is used to describe something very serious, not something carefree, feisty, or distracted. For example, the word "solemn" is often used to describe an oath, or a promise, which is very serious.

18. B. A catastrophe is a disaster, or deep misfortunate. Consider the sentence: "The tsunami was a catastrophe, destroying many homes and businesses." It has a very strong negative connotation. This is unlike the other word choices. "Boon" may seem like "boom," but in fact "boon" means "a great benefit."

19. D. Something that is subtle is faint, and not very noticeable. "Subtle" contains the word "sub," which can mean "secretly" (think of "subvert," for example). If something is a secret, then it is not very noticeable, which is the opposite of something apparent, blinding, or deafening.

20. C. People often speak of comparing and contrasting things, which simply means to find the similarities and differences. Contrasting colors, for example, are ones that are very different, but not necessarily bright or secretive.

21. D. To provoke is to taunt or cause some sort of reaction in someone, typically a negative reaction. "Provoke" actually contains the root word "voc" (though it has been changed to "vok" in English), which means "voice" or "call." So, we know that the word has some relationship to speech, which isn't the case for "cancel" and "capture."

22. A. "Concur" sounds a lot like "conquer" (defeat), but the two words are very different. In fact, "concur" includes the root words "con," which means "with," and "cur," which means "run." If we run with someone or something (metaphorically), we agree with them.

23. C. In a car, to "accelerate" is to increase the speed. Doing this hurries the car along, it doesn't hinder or hamper it. People yield in cars (to other cars), but this doesn't have to do with the actual meaning of the word "accelerate."

24. A. "Chronological" is related to the root word "chrono," which means "time." Therefore, we know that the word has something to do with time. Time as we know it proceeds consecutively, or

sequentially. Things happen in time one after the other, before, or after. This doesn't mean those things are done on purpose, or even are done slowly or quickly. It just means that something follows after another.

25. D. Something abrupt is sudden, or unexpected (unpredictable). It might be confusing, but it doesn't have to be, since "abruptness" refers to how expected or unexpected it is. "Abrupt" contains the root word "ab," which means "away" or "from," and "rupt," which means "break" or "burst." So, something that "breaks away from" the normal course of things might be called abrupt.

26. B. Try using the word in a sentence: "The senator threw a lavish party, serving only the finest food and drink." From this we can infer that the party was expensive, or very rich, and fancy, since she served the best things (which are often very expensive). This doesn't mean that the party was boring, clean, or avid (which doesn't really make sense, since "avid" means "very interested in").

27. B. Someone who is adept at something is very skilled at that thing. "After 35 years of practice, Marie was adept at delivering speeches, and considered the best in town." This is the opposite of "unprofessional," "sloppy," or "crude," which means that something is not done well. The word has a strongly positive connotation, as does "skilled."

28. C. "Malicious" contains the root word "mal," which means "bad" or "ill." Words containing this root word usually have strongly negative connotations, like "hurtful" and "angry." However, someone who is malicious is not necessarily angry – he or she could be quite happy to be hurtful toward someone else.

29. D. "Manipulate" contains the root word "mani," which means "hand" (think of a manicure, for example, which is a treatment for the hands). Since the word has to do with hands, and since shaping things is done with the hands, the two words might be related. In fact, to manipulate something is to handle something, changing it or controlling it, or even shaping it the way one wants.

30. C. Something that is toxic has the opposite of something harmless. A toxic substance is dangerous, and bad for health. The most extreme idea of this is that which can cause death. Such a substance is called "lethal." The fact that something is lethal doesn't mean it has to be painful, or that it is hidden. There are many lethal substances which are clearly marked, for example.

31. D. "Factor" is used in math to describe the smaller numbers that can be multiplied together to make a certain number. These smaller numbers can be thought of as parts. People also consider "factors," or parts or qualities of things, when making decisions.

# Verbal Reasoning – Sentence Completion
## Single Blank – Introductory

1. D. We know that we are looking for a verb (action) in this sentence that describes what birds do in the sky but that Erica can't do. Erica can sing, hop, and feed, but not soar. The only word that makes sense here is "soar," which means to float or fly through the air.

2. B. It doesn't make sense that Brian would want to injure or strengthen his legs. Since the airplane was small, we can infer that there isn't much room for Brian to sit. If this is the case, he would have a hard time extending, or stretching out, his legs. He would likely have to bend his legs. In this case, the key ideas are the fact that the airplane is small, and that Brian couldn't do something.

3. A. Be careful not to confuse "affect," which is a verb, with "effect," which is a noun. An "effect" is a result of something. Something can have an "affect" on something else (some sort of influence). The other words don't make sense in context of the sentence.

4. A. If Mark always did the right thing, then he must have been a moral person, not a selfish, stingy, or wicked one. Only "moral" has a positive connotation, which is appropriate to use to describe someone with who always does the right thing.

5. C. The sentence describes appearances, and how the family, baby, and mother share black hair. The only word that relates to appearances is resembled.

6. A. We're told that the lawyer has a desk covered in papers, and that she is looking for something. We can infer that these are documents, or papers with writing on them. The sentence doesn't provide context for knowing that the lawyer is looking for any of the other choices.

7. A. We're told that the host wants something that the guests can drink. A word for "drink" is "beverage." One cannot drink the other nouns mentions as answer choices.

8. B. If Natalie was busy, then she isn't free to do anything. If her friends want to watch a movie with her, then Natalie needs to be available, or free, not occupied. "Offended" means that Natalie would not want to watch a movie with her friends, which is not something her friends would hope.

9. B. The sentence describes how trees can't live high up in the mountains. This describes the height of something in the air, the word for which is "altitude."

10. A. We are looking for a verb that describes an action performed by a stylist on an outfit. The only verb here that works is "design," as other types of artists would do things like "stage" or "write." "Govern" is something that a politician might do.

11. C. If the movie reviewer didn't like the movie, then he wouldn't write a praising or encouraging review. Being careful is a neutral to positive idea that doesn't logically make sense if a movie reviewer, whose job it is to review movies, is writing a review.

12. B. The sentence tells us that the goal is to save time and energy, not to find the most interesting or memorable way. "Efficient" describes something that is done quickly, easily, and in an organized way.

13. D. If Freida found the homework to be educational, important, or meaningful, she would have understood the point of the homework. Instead, she didn't, so she found it senseless.

14. A. The word "concept" refers to an idea, which only older students understood (and Rosemary struggled to "learn"). One does not "learn" experience or progress, and it is illogical to pair the verb with the noun "ornament."

15. C. The clue to this sentence is the phrase "anywhere he wanted to." So, we are looking for a word that refers to the ability to take things wherever one wants. The word we are looking for is "portable." The other words don't mean the ability to take things wherever one wants. "Imported" describes something brought in from one place to another, "pricey" refers to something expensive, and "popular" refers to something a lot of people like.

16. D. If something is not lasting, as we are told by the second part of the sentence, then it can be called "temporary" not "permanent." A "friendly" fix doesn't make sense, nor does a "temporary" one.

17. B. If someone is trying to comfort someone who is worried, as Tyler is trying to do here, then it can be said that the person is trying to reassure the other. In this case, we don't know that Tyler wants to thrill, shock, or protect Grace from worry, but rather to relieve her from it (since he's trying to convince her that she did fine).

18. C. Olivia might be lazy, smart, or young, but these attributes don't make sense in context of the sentence. This is because the sentence describes how Olivia remembers things best "when she could see them." The word "visual" refers to things that can be seen, like the word "vision."

19. D. The reaction of the audience members to Zachary's words are negative. The only word to match this in the second half of the sentence is "ridiculous." If something was "acceptable," "amusing," or "factual," the audience members would probably not be confused.

20. A. Since Christian "stood in awe," then the feat mentioned in the second half of the sentence was probably very difficult, or impressive. It wouldn't make sense for Christian to be in awe of a simple act.

21. B. Someone who is compassionate is very sympathetic toward other people, often putting themselves in other people's shoes and treating them kindly. This is the opposite of someone who is very cold toward other people. People can be complicated or very traditional, but this doesn't mean that they're very nice or sympathetic.

# Single Blank – Intermediate

1. A. "Capacity" describes the amount of something that an object has. In this case, we know that we're talking about amounts (not color, cost, or material) because we're talking about an amount of soup, and how the amounts in the bowl could not be contained in the cup.

2. C. The sentence describes two similar things: Kylie doing something to her dream, and a lion doing something to a gazelle. Even if we don't know what a lion or gazelle are, we know that the former "chases" the latter. So, we are looking for a word that means something similar. The only word that does so is "pursue," which tells how Kylie chased her dream like a lion chases a gazelle.

3. B. "Petrified" describes a state of being where someone or something is frozen. In this case, we are told about Ian's fear of heights, and how he couldn't move. This is the definition of petrified. Note also that the other words do not carry a similarly negative connotation from the idea of Ian being unable to move.

4. D. If someone is very stubborn, he or she cannot be convinced (or persuaded) to do something. This describes Dominic's friend, who would not need to be discouraged from helping Dominic.

5. A. The sentence describes how people like to see a "display" of plants. A display is something where items are shown, or exhibited. This is similar to the verb "exhibit." The other words describe things that people do to plants, but in context, this doesn't make sense, since the fair's purpose is to showcase plants, or exhibit them.

6. A. If one does not want to admit that he is wrong, then he is wrong and the facts support the opposite of what he says or believes. This is to say that the facts contradict what the person says or believes, not that they verify or prove what he says or believes.

7. A. To appeal is to make an urgent request. In this case, since Gavin did not agree with his mother, he wanted to ask his father instead. Another way of saying this is to say that he "appealed" to his father, not that he appeared (showed up), applied, or vowed to do anything.

8. D. Based on the sentence, we can tell "showing the bottom of one's foot" is not described as being a positive thing. This is because it is equated to an "offensive sign." Therefore, we're looking for a negative word like "disrespect" (the other choices are all positive).

9. D. The sentence describes a situation where someone can still see things clearly even though it is just a memory. The word "vivid" describes something that creates a powerful feeling or clear image in one's mind. If Bryan's memory were only average, or were blurry, he would not be able to recall the image of this memory clearly when he closed his eyes. "Inappropriate" suggests that the memory was bad, which isn't supported by the rest of the sentence.

10. A. We know that a freezer produces cold air, so we're looking for a word that means "cold." Only "frigid" does this. While the other adjectives can describe air quality, we're not looking for synonyms of "hot" or "humid."

11. C. The sentence describes a hungry person who is searching for something (anything) to eat. A thing that can be eaten is something "edible." This might provide comfort to Kennedy, but the most appropriate word describes something that can be eaten. Kennedy may or may not prefer that thing, so "preferable" isn't the best word. Something "audible" can be heard, which does not necessarily describe something that can be eaten.

12. A. In some sentences, a phrase (clause) interrupts the rest of the sentence by providing additional information. This is called a parenthetical expression, and is usually offset (preceded and followed by) commas. In this case, "the most ------- element in the universe" is the parenthetical expression. Usually, parenthetical expressions only work when they are logically equal to the rest of the sentence. In this case, we are told that "Hydrogen can be found in large amounts practically everywhere we look." So, we know that we are looking for a word for the blank that would make the parenthetical expression logically equal to the rest of the sentence. The only word that does so is "abundant," which means "plentiful." This is the opposite of "endangered," and has nothing to do with whether or not hydrogen is "mighty" or "useful."

13. D. Being rude or inconsiderate is not generally considered to be a good thing, and is not something that people usually want in a relationship. Therefore, we can tell that the relationship would not be nurtured (grown) by this type of action. Neither would this be a good way to start (begin; form) a relationship. Instead, doing this would likely end or cut off (sever) a relationship.

14. A. Since we know that Devon likes strong flavors, he would enjoy a flavorful or tasty coffee. However, we are told that Devon does not like the coffee, so it is probably the opposite of "flavorful" or "tasty." The best word for this is "bland," as the cost of something does not necessarily have to do with its flavor.

15. A. If Braden simply mumbled, remembered, or thought that his opponent was cheating, it's not likely that he drew attention to himself. Instead, we're told that Braden spoke in a loud voice. In other words, he made a declaration.

16. B. When two objects collide, they crash into each other. When this happens with people, they often get hurt, or injured. This usually doesn't happen when people speak with or work with one another.

17. D. The sentence describes how someone wants to return something to its original state. The word that best describes this is "restore." The other verbs don't mirror the idea of returning something to its original state, instead describing how the thing may be changed in a way that is not similar to how it used to be.

18. A. Since Nadia hired people to do make a physical change, this is more than just dreaming. We know that Nadia wants to make her bedroom into a study. We can describe a transformation as a conversion. The verb to describe a conversion is "convert."

19. B. The spy is described as remaining loyal. We're told that the spy would not do something. If the spy was loyal, then he would not need to be forced to admire, protect, or salute his country. Instead, he would need to be forced to betray his country.

20. B. The sentence describes how driving without getting enough sleep is negative (risky). Therefore, we are looking for a word to describe a negative impact on the lives of drivers and passengers. The only such word is "endangering."

21. B. The word "though" gives us a clue that one part of the sentence should refer to the opposite of another. In this case, the opposite of wanting to work is being forced not to work, or not wanting to work. The word that best describes this is "retire."

# Single Blank – Advanced

1. A. The sentence describes how cooks must do something in context of rules requiring them to wash their hands in order to protect the health of diners. This suggests that the cooks must follow, or comply, with the rules, not disagree or defy the rules. To "grow" the rules doesn't make sense.

2. C. If something is set "back to its original state," this means that the state it is in now is not the original. The word "revert" describes this action very closely. The prefix "re-" gives us a clue as to this meaning. The other words don't have this meaning, since to "advance" or "progress" something is to improve it into another state that is not its current (or former) state.

3. A. The sentence describes how Anastasia moves to a new city and has to do something with a new lifestyle. In this case, the word "adapt" means to become comfortable with a new situation or set of circumstances. This is the only word that makes logical sense in context, since Anastasia would likely not stop (cease) a new lifestyle. The other choices are often followed by "to," but not "to a."

4. A. The image described is called "ridiculous," so we're looking for a word that reflects this feeling. The only word that does so is "absurd," as the other words have positive connotations. Even if we don't know the meaning of the words, we can solve this question by using the word choices' connotations.

5. A. The sentence describes how something happened despite something that Jaiden knew (the clue here is the word "though" at the beginning of the sentence). The sentence is talking about what Jaiden knew and how what happened ran contrary to what he had thought. The verb "anticipate" means to know ahead of time, which is what is implied by the phrase "Jaiden had known." Jaiden would not prefer a line that goes around the block, but this doesn't have anything to do with how things turned out compared with what he had thought initially.

6. A. The words are not removed (deleted), but shortened (not lengthened). A synonym of "shorten" is "abbreviate." Baylee chooses to do this, but she doesn't "choose" long words – she shortens them.

7. B. Pay attention to negatives. In this case, we are told that Precious did NOT want something to happen. The sentence tells us that she wanted to lighten the mood, which is to remove, break, pass, or reduce tension. The opposite of this would be to increase, or escalate.

8. B. We can infer that Felicity is speaking to Cedric, so the verb we're looking for should have to do with sound, or hearing. Underlining, circling, and writing all have to do with sight, not sound, as "dictate" does.

9. A. The first part of the sentence has to do with the second part of the sentence. Since Lila went to confirm whether or not the autograph was genuine, we know that she was questioning whether or not it was authentic (a synonym for "genuine").

10. A. The sentence describes how a real bill has many security features, but that a particular bill doesn't have these features. This means that the bill is not real, so we can rule out words like "real," "valid," and "valuable." This leaves us with "counterfeit," which means "fake."

11. C. Since we are told that sunlight and water are "necessary for life," if a plant does not get enough of these things, it is not getting enough of that which is "necessary for life." When this happens, the plant will not bloom, grow, or thrive (all of which are positive things that will happen) but will instead die (perish).

12. B. The information about setting and characters of a book can be thought of as background information, or context. This information isn't necessarily advice, a goal, or a reason. Instead, it is described as being necessarily in order to understand something, which is what context is.

13. C. We can infer that Johan made a mistake in sending the presents and needs to stop the deliveryman before he can "complete" the delivery. The only word that conveys this meaning is "intercept." He

would not need to "confirm" or "convince" the deliveryman, since this is a mistake. Whether or not he needs to pay the deliveryman before the delivery is completed is unsupported by the sentence.

14. B. The sentence tells how Rory did not want to do something, but that he did anyway. The thing he did anyway was to "admit" to doing something bad (breaking his mother's lamp). A synonym for "admit" is "confess," or tell the truth about something. Note that the opposite of this would be "lie," which means to not tell the truth about something. Rory did not want to tell the truth, but he did anyway. This is not the same as Rory not wanting to lie, but telling the truth anyway.

15. A. The word "instead of" tells us that the opposite to "melting as soon as it hits the ground" will happen. If snow does not melt right away, then it piles up, or accumulates. The snow is already falling, so to say that it will begin to fall doesn't make sense. Nor does it make sense to say that it will begin to vanish, since it already is melting as soon as it hits the ground.

16. A. "Adequate" describes something that is only satisfactory, or something that only meets minimum requirements. The other answer choices are words with very positive connotations, which would suggest that a performance be memorable, not forgettable, as an adequate performance might be.

17. A. The house is described as being "close to Sandy's." The house is so close that she can hear the television from that house. This would not be the case if the house were secluded (isolated, or far away), or peaceful (quiet). A "particular" house" doesn't make much sense. Instead, an "adjacent" (next to) house makes the most sense.

18. D. The word "though" tells us that one part of the sentence will be the opposite of the other. In this case, the opposite of having things explained and understood is having things that are unexplained or not understood. This doesn't mean that those things are boring or interesting. It means that those things are not known, or unfathomable.

19. A. The sentence tells us that unless something is done, no resources will be left for future people. By conserving (saving) such resources, they will be preserved for future people. This is the opposite result of using them all up, throwing them away, or destroying them.

20. C. We are told that the deer escaped from the panther, which means the attack was not successful. The deer would not want to help (aid; promote) the panther. The deer and the panther had an encounter, but the verb we are looking for describes how the deer was able to escape. Thus, the deer was able to "evade" the panther.

21. B. If Efren was "too tired," then he must not have gotten much sleep. The word that describes not having enough sleep is "deprive." Efren was deprived of sleep, meaning he wasn't able to sleep. The other words don't mean to prevent or take away, like "deprived" means.

# Phrase Completion – Introductory

1. D. "Although" means that there must be two opposite ideas conveyed in the sentence. One idea is usually separated from the other by a comma. In this case, the first idea is that Darby "usually likes" to spend time exercising. The opposite of this would be that sometimes she does not. The sentence doesn't give us information about whether she likes to read. To say that she "usually likes to workout" in the second idea would be to say the same as thing as the first idea, which doesn't make sense because of "although." It doesn't make sense that her doctor would say she is healthy "although she enjoys spending time exercising," since there is no cause and effect relationship in this sentence. A "chore" is something one does not enjoy doing.

2. B. "But" tells us that the second idea in the sentence must be the opposite of the first idea in the sentence. The first idea tells us that buffalo were once plentiful. So, the second idea must be the opposite – that they are endangered (not thriving). It is not "thanks to overhunting" that the buffalo

"became a nuisance." Nor is it "thanks to overhunting" that they are an important part of Native American culture. Note that these choices represent cause and effect relationships.

3.  B. "Though" tells us that the second idea in the sentence must be the opposite of the first idea in the sentence. Since the first idea states that Lisbeth "decided" to run the race "anyway," we can infer that the opposite idea must be true in the second idea. If she had always wanted to run the race, her decision would not be described as being made "anyway." Whether her teammates cheer her on should follow from her decision to run "anyway," and should not be preceded by "though." This is similar to the idea of her coach encouraging her to do so.

4.  C. "For" tells us that the second idea in the sentence must be related to, or even the cause of, the first idea in the sentence. "For" is similar to "because" and "since." Therefore, we know we must be looking for an idea that talks about why he is proud – what caused Bronson to be proud. The fact that he likes eating vegetables is irrelevant (we don't know if his plant is vegetable), nor do we know that he dislikes getting his hands dirty. A cause for pride is time, energy, and hard work, not apathy (not caring).

5.  A. "Since" tells us that the second idea in the sentence must be related to, or even the cause of, the first idea in the sentence. "Since" is similar to "because" and "for." The word "since" prompts us to find a reason why Trystan was early for his appointment. One reason is that he did not want to be late. The other reasons don't make sense – if he was never early, then he wouldn't be early at this appointment either. If he did not worry about being late, he would not have "made sure" to show up early. If he had no time, he could not have spared the extra fifteen minutes to wait.

6.  B. "Despite" tells us that the opposite of what one wants to happen took place instead. A salesman's job is to convince someone to buy something. If he wasn't successful, then the customer was still not interested in buying that thing. The fact that the salesman's promises didn't work doesn't have to do with being allowed to shop in the store or walking around the parking lot. It doesn't make sense to say "despite" the salesman's promises and praise that the customer was "still" convinced.

7.  D. "Except for" tells us that but for some thing, the opposite is true. The sentence talks about sound ("chirping"). Therefore, the campsite must have been quiet "but for" the sound of crickets. The sound doesn't tell us anything about how it smelled, how it looked, or how bright it was.

8.  A. "As a result of" is like "because," which tells us that the idea that follows it was the cause of something else, which occurs later in the sentence. In this case, we're told that a hurricane caused something to happen to an unprepared city. The results should be negative, not positive like "prospering". The city may be proud of its culture, but this was not the result of the hurricane. It doesn't make sense that the city would "be spared the worst of the storm" as a result of the powerful winds and heavy rain.

9.  D. Like "because" and "as a result of," "since" tells us that the idea that follows it was the cause of something else, which occurs later in the sentence. In this case, the cause is "not enough rain," the effect of which is called a drought. During a drought, there is not enough water. This would cause people to have to limit the amount of water that they use, not stop doing this. The state wouldn't have extra water to sell.

10. D. Since the cats are described as being used as hunters, then the rest of the sentence should describe how the cats hunt things. In this case, the only choice that describes this is how the cats get rid of pests. The fact that the cats are great hunters has nothing to do with their suitability to be a pet, or that they would be good to protect property from robbery. In addition, being good at hunting doesn't mean that the cats help people travel long distances.

# Phrase Completion – Intermediate

1. C. The sentence begins with the word "because," which signals that the answer should be consistent with the idea that the restaurant has a convenient location, delicious food, and great service. Logically, it follows that because a restaurant has a good location, food, and service that it would be a successful restaurant and have many customers. While it's possible that the restaurant was located next to a flower shop, went out of business immediately, or served both American and Mexican food, there's no reason to believe any of these ideas would have been the result of a good location, food, and service.

2. D. We know that *Grease* is a musical and that the school is putting on a production. We're asked why the school cast Samantha as the lead. That the play received very good reviews could be an effect, but not the cause for Samantha getting the lead. If she was not a good actress, they would not have cast her as the lead. Whether or not she wasn't or was a good student doesn't have to do with whether or not she was cast in the musical.

3. D. The correct answer is that Joseph loved studying Spanish despite the fact that he sometimes struggled with it. The word "despite" indicates that Joseph loved studying Spanish in spite of the fact that it can be a challenging pursuit.

4. C. The word "unlike" tells us that the part of the sentence offset by commas will be the opposite of the part after the commas. In the latter, the person is sad to leave friends. Therefore, the opposite of this would be to express happiness, as he does if he is excited for school to be over. An absent teacher or being late for class is irrelevant to these emotions.

5. B. The phrase "in order to" suggests that the second part of the sentence is something some animals do to survive. The correct answer is that some animals find and store food "in order to survive the long winter months…" If the animal sleeps all winter, then it does not eat during the winter. Taking care of babies and cleaning doesn't have to do with making sure they have enough to eat during the winter.

6. C. If the building is the "newest" and "tallest," then there can be no "taller" or "newer" building. It doesn't make sense to be able to walk to nearby shops from the top floor of the tallest building, but it does make sense to be able to see for miles in all directions.

7. D. Because the swimmer was exhausted, it makes sense that she would want to rest after her practice. The word "therefore" indicates that the correct answer is the one that is consistent with the idea that she is exhausted. Remembering to pick up groceries, does not necessarily follow the first part of the sentence. While it's possible she forgot to bring her calculator to school or decided to hand in her homework early, these ideas also do not follow from the first part of the sentence.

8. D. The key word here is "however." The person in this sentence usually has dinner in front of the living room television. This tells us information about where something happens. The word "however" tells us that the right answer will somehow contradict this idea. The only phrase that contradicts in terms of location is to say that the person sometimes eats elsewhere, like in a dining room. This doesn't have anything to do with actually making a meal, versus having it delivered. Since the person likes watching television, he or she likes being entertained. Therefore, it doesn't make sense to negate "enjoy being entertained" with "however."

9. C. The person in this sentence generally doesn't like historical novels. The key word "thus" suggests the rest of the sentence will logically follow the first part of the sentence. The correct answer is therefore that the person was "surprised" to genuinely enjoy a book about British history. The person's surprise with the second part of the sentence happened because of the first part. The fact that

he didn't like a historical book about old presidents is not surprising, since he doesn't like historical novels in general.

10. D. The semicolon tells us that the first part of the sentence (that the punishment was thought to be enough to prevent cheating) should be related to the second part of the sentence. The second part of the sentence begins with "nevertheless," which is like the word "despite" in that it tells us that what follows must contradict expectations or ideas set forth in the first part of the sentence. Since the principal "thought" that nobody would cheat, what "nevertheless" happened was that at least one person cheated. The sentence doesn't tell us enough about the number of teachers or students. To say that "nevertheless no students were caught cheating" doesn't make sense; one would instead say "consequently, no students were caught cheating."

# Phrase Completion – Advanced

1. C. The words "surprisingly" and "but rather" are the key words in this sentence that indicate the second part of the sentence will contrast somehow with what's stated in the first part. The talented goalie did not start playing hockey when he was young, but rather he started when he was in older. Therefore the correct answer choice is "started when he was an adult." The choice "played seriously from a young age" is logically consistent with the first part of the sentence; therefore it is incorrect. The other two choices do not logically relate to the first and are therefore also incorrect.

2. B. The sentence tells us that Sullivan went outside and that it was cold, but he only took his hat, jacket, and gloves. Since this is the case, it doesn't make sense to say "rather than go out in the cold" and "rather than leave the warmth of his house." The only thing that does make sense is that he chose not to bring his scarf.

3. B. Since the smell is described as "fragrant," we can rule out "unpleasant." Since it was in the cellar and up in the attic, we can infer that it was everywhere – that it filled the entire house. This is the opposite of it being faint or hard to smell, or that it was overpowered by another smell.

4. B. The word "though" gives us a clue that the sentence will contain ideas that are the opposites of one another. In the first part, we know that "most" recognize the "general" appearance. The opposite about it would be if there were some things that "not most" people know about.

5. A. The passage tells us that the purpose of school uniforms is to help people "see past appearances." What people are wearing, how they are dressed, and what their hair and accessories look like are all superficial – only their personalities and ideas are not.

6. B. "While" tells us that there are going to be two points of view expressed in the sentence, with the second being the opposite of the first. In the second, we know that "others do it only because they have to." In other words, this is a requirement. The opposite of this would be if people want to do it because they want to, and are not forced to. This rules out being forced by parents and having athletics be part of the school schedule. It doesn't make sense to participate in athletics because they would rather play video games. That they "simply enjoy doing so" is closest in meaning to "because they want to."

7. C. "Except for" tells us that one piece of information is an exception to the rule. If one piece sold millions of copies, and it was the exception to the rule, then the rest did not sell millions of copies. Selling millions of copies is a sign of popularity and success; the opposite of this would be if the songs remained unknown and unloved. It would be incorrect to say that one song sold millions of copies and the rest of his works were very popular and successful because of the phrase "except for."

8. D. "Instead of" tells us that what should have happened did not happen. Since what should have happened was an agreement, the opposite of it is a disagreement. Disagreements arise when people

are not willing to agree, or compromise, especially if they are described as being "stubborn." If everyone was willing to cooperate, then there would have been an agreement.

9. B. "Instead" tells us that one thing lead to another. In this case, the couple ended up relying upon advice. This is because they did not know what to do with their home, and how to improve it. If they did, the word "instead" would not make sense in context of the sentence. It doesn't make sense to say that they disliked the idea of changing their home, since they ended up relying upon the decorator anyway.

10. B. We aren't told anything about whether or not the child also plays the violin, or whether or not she shares her toys with others. The phrase "not surprisingly" tells us that we should form an expectation about what a child who has daily lessons might be able to do. In this case, we would expect her to know how to play many songs, not to NOT know how to play many songs.

# Reading Comprehension

Passage 1

1. C. *Main Idea.* The main purpose of this passage is to describe Matthew's changing opinion about his family's safari vacation. The passage describes how Matthew initially dreads the trip but appreciates it by the end. While Matthew enjoys seeing a family of lions at the end (line 55), the passage does not describe Matthew as having a favorite animal. Matthew is not happy initially about the trip, but this changes by the end of the passage. While the passage mentions Matthew is skeptical about going on safari because he feels he has already seen animals in the zoo (lines 16-17), the passage does not try to persuade the reader on this matter.

2. A. *Vocabulary.* "Scowl" most nearly means an angry frown. Matthew is both somewhat angry and sad, as described in lines 9-12. There is no reason to believe that Matthew at this initial moment in the story is cheerful, confused, or neutral.

3. B. *Organization & Logic.* Matthew is surprised because it is winter where he lives, but summer in South Africa where he is visiting. Matthew's surprise is implied when he asks in line 30 "Why isn't it cold here?" His mom explains that even though he is on winter break, it is not winter in South Africa. Matthew responds, "That's pretty cool, I guess." (line 35) While Matthew's not completely enthusiastic, he does find it "cool" to learn this fact from his mom. While he is initially confused, he is not confused because South Africa was colder than he expected. It was warmer than he expected. He is not indifferent as indicated when he thinks to himself, "Maybe this trip won't be so bad" in line 36. Matthew does not appear to be frustrated.

4. B. *Supporting Ideas.* It is often helpful to read before the line mentioned in the question. While this question asks about line 43, line 41 clearly states the reason Matthew was nodding off. He was tired because it was so early. There is nothing in the passage to support that he didn't feel well from the plane, or that he was bored waiting for his vehicle to start moving. Matthew didn't even know there were lions when he started falling asleep.

5. D. *Style.* The final sentence of the passage ("He couldn't stop smiling.") indicates that Matthew was happy. He is happy after seeing the lion with his family. He is unable to speak because there are no words to describe what he just saw. The passage does not indicate that he is scared. While Matthew was bored at various times throughout the passage, that is not why he was unable to speak.

Passage 2

1. C. *Main Idea.* The primary purpose of this passage is to demonstrate how different speaking techniques made the "I Have a Dream" speech so effective. This is stated in lines 3-5, and expanded upon throughout the rest of the passage. The passage does not provide a biography of King, nor does it describe historical events leading up to the speech. While the passage mentions how King drew inspiration from various other sources, the passage does not describe anywhere how King's speech compares with others.

2. C. *Vocabulary.* "Alluded" in this context most nearly means to mention briefly. Lines 10-11 describe how King made references to these other works. In other words, he named them and drew inspiration from them, but didn't go into detail about any one of them. The passage does not provide evidence

that King referred to these sources to criticize or disagree with them. King did speak powerfully about these sources, but that is not what the word "alluded" means.

3. D. *Inference.* King would most likely agree with the importance of connecting a speaker with the audience. Lines 18-26 describe how King improvised to great effect when the crowd did not react how he expected to his written speech. While King had success improvising, this does not imply that he would advise to only speak from the heart and not prepare. Much of King's speech was carefully prepared. The other choices give advice not to use techniques that were very effective for King (improvising and varying volume). It can then be inferred that he would likely not agree with those statements.

4. B. *Organization & Logic.* We're told that King was losing his audience in the third paragraph. He needed to do something else to capture their attention, so he spoke from the heart and improvised. There's no evidence to support that he did this in order to explain his sources, calm down the audience, or change the volume of his voice.

5. A. *Supporting Ideas*. We're told that King uses the technique of anaphora (repetition) in saying "I have a dream." The passage tells us how the volume of his voice changes, how he improvised his speech, and how he referred to other famous sources.

Passage 3

1. D. *Main Idea.* The main purpose of this passage is to describe how Goodall made her childhood dream a reality and what the result of her work was. The passage is not primarily focused on Goodall's obstacles, though it does mention how she had to save money. It also does not answer the questions of why she decided to be a scientist (besides the simple fact that she liked chimpanzees). While it mentions that Goodall received awards and recognitions for her work, this was not the main idea of the passage.

2. D. *Organization & Logic.* The first paragraph describes Jubilee as a chimpanzee stuffed animal, Goodall's father gave her. The author mentions this toy in order to show how Goodall loved chimpanzees even at a young age. Goodall's parents' friends did not want to give the girl the toy, so their influence is not demonstrated by the love of the toy. There are no negative consequences of Goodall's loving this toy, so this doesn't support the idea that the toy shouldn't be given to children. The passage does not mention at all whether or not Goodall's parents travelled a lot.

3. C. *Supporting Ideas*. Lines 25-27 explains that Goodall named them based on "appearance or behavior." In other words, she named them based on what they looked like or how they acted. While other scientists gave their research animals numbers, Goodall was different because she named them. The passage does not say she named them based on where they lived or based on what Leakey suggested.

4. C. *Vocabulary.* Something that is unorthodox is contrary to what is traditional or expected. In other words, it is unusual. This has the opposite meaning of "typical." Goodall's methods may or may not have been scientific, and were definitely warm. However, in context, the preceding paragraph describes how they were primarily unusual (lines 22-35).

5. A. *Inference*. The author uses the idea of naming things throughout the passage to show familiarity or closeness to something. Goodall names her toy Jubilee, for example, then mentions how the chimpanzees she works with are named. In the third paragraph, the author describes how Goodall became close with the chimpanzees. One way of becoming closer was to name them. The passage never mentions how scientists will become more emotional, or are more intelligent, or learn more important things, necessarily.

Passage 4

1. A. *Main Idea*. The primary purpose of this passage is to inform the reader about the pitcher plant as an example of a carnivorous plant. The passage discusses various types of plants, but only as an introduction to the description of the pitcher plant. The passage does not try to persuade the reader how he or she should choose a favorite plant, even though it mentions this idea. It also does not discuss what qualities should be used to determine a favorite plant.

2. A. *Supporting Ideas*. A heterotroph is an organism that consumes other organisms as food, according to the second paragraph. An autotroph produces its own food, whereas a mixotroph uses a variety of

different food sources. While some plants are mixotrophs (autotrophic and heterotrophic), others could be only autotrophic, or only heterotrophic.

3. C. *Supporting Ideas*. This question asks which of the answer choices are NOT true, according to the passage. We are told in lines 43-46 that Venus flytraps and sundews are carnivorous, which makes then both heterotrophs. We are told in lines 21-23 that the pitcher plant is a mixotroph. This means that the plant does not produce all of the nutrients it needs by itself, since it would be an autotroph only, in that case.

4. D. *Organization & Logic*. The pitcher plant evolved as a carnivorous plant as a way to get nutrients like nitrogen when they weren't available from the soil. This is described in lines 43-54. It may make sense logically that plants would evolve to take advantage of a surplus of insects, but this is never mentioned in the passage as a possible reason.

5. B. *Style*. This question asks about the last paragraph. The line, "That is, unless you're a fly" is an informal and humorous way to end the passage, since clearly the author is not addressing a fly, but a human reader.

Passage 5

1. D. *Main Idea.* The author sets out to convince the reader why he thinks historical non-fiction is the best genre. The author describes the Boston Tea Party, but only as an example for why he likes historical non-fiction. Only one of the paragraphs deals with the process of a historical non-fiction writer. The author never shares the names of specific books.

2. D. *Organization & Logic*. Since the main idea of the passage is to describe why historical non-fiction is the best genre to read, the following paragraphs describe specific reasons why the author thinks this is the case. The second paragraph is one such example. The layout of Boston is not described in detail (we only know about a Harbor), nor is the clothing of colonists. The author does compare the Boston today with that from the past, but that isn't the purpose of the second paragraph. The fact that the author can do this – to be in a place that was historically significant – is the reason why he enjoys reading this genre.

3. A. *Vocabulary*. Based on the context, we know that the more details, the more a reader will be "absorbed in" a book, which means that he or she will be transported back in time (figuratively). We know this because in lines 27-28, the author tells us that a good history book is "so precise that the reader feels as if he's thrown back in time."

4. C. *Inference*. The fourth paragraph focuses on the importance of the lessons learned in historical non-fiction, not just on specific facts about history (like clothing). There's no suggestion that the author only reads about famous people, only that people should learn from others. There's no suggestion that the author wants to write his or her own non-fiction book.

5. D. *Style*. In the context, "build from" describes improving the reader's current situation using lessons from history. The author doesn't suggest that people relive, recreate, or replicate things from the past. Instead, he suggests that people learn from the past and make improvements for the future.

Passage 6

1. B. *Main Idea.* The main idea of the passage is that refined sugars are unhealthy and should be avoided, as stated in lines 11-13. The passage makes a distinction between simple and complex carbohydrates, saying that complex carbohydrates are healthier. It never mentions that all carbohydrates lead to obesity and diabetes. The passage also doesn't mention that the government should take any particular action. The passage gives examples of where refined sugars can be found (candy; soda), but this isn't the main focus of the passage.

2. A. *Vocabulary.* In line 26, the word "raw" describes sugar's state before it is refined. Therefore, "natural" is the best synonym for "raw" in this context. While raw can also mean that something is very realistic, this word does not make sense in context. Refined sugar is described as white in the passage, but this is not a synonym for raw (especially since it does not become white or "pure" until after it is processed, or refined).

3. A. *Organization & Logic*. The passage never says so directly, but we can infer that Halloween candy is filled with refined sugars. We know this from lines 30-43, where the link between energy levels, refined sugar, and candy is made. The passage never indicates that candy is consumed along with

soda, nor does it mention that candy contains complex carbohydrates. The passage states that candy and refined sugars raise blood-sugar levels, not lowers them.

4. D. *Supporting Ideas.* Refined sugars taste good according to line 55. Refined sugar is a simple carbohydrate according to lines 20-21. Even the healthiest person would do well to stay away from refined sugars, according to lines 57-58. This directly contradicts the statement that "Healthy people can have as much refined sugar as they want," making it the correct choice since the question asks for which is NOT true. The passage mentions diabetes as an example of a health problem.

5. D. *Style.* This passage attempts to educate the reader about why refined sugars are unhealthy and persuade the reader to eat refined sugar only in very small amounts. The passage does not use personal examples, vivid or imaginative descriptions, or humor to make these points.

Passage 7

1. A. *Main Idea*. The primary purpose of this passage is to describe squirrels and some of their traits and behaviors. The passage does mention how squirrels warn each other when danger is nearby and that there are many different types of squirrels. However, these are both discussed as supporting details and not as the main idea of the passage. The first paragraph notes that humans frequently encounter squirrels, but the passage does not elaborate on this idea, so this is also not the main idea.

2. B. *Supporting Ideas*. This question asks which answer choice is NOT true. There are hundreds of species of squirrels as described in line 7. Lines 17-23 describe "deceptive caching," a behavior in which some squirrels pretend to bury food. Squirrels' complex method of communicating danger with their voices and their tails is described in lines 44-57. The passage describes different signals used "whether a threat is approaching from the air or from the ground." It is not true that "Squirrels can only live in a few different types of habitats." Lines 10-11 explain that the opposite is true: "These creatures live in almost every habitat imaginable."

3. C. *Vocabulary*. "Deceptive caching" is a behavior described in lines 17-23. This behavior is intended to "deceive other animals that may be looking for the squirrel's hidden food." In other words, the behavior is meant to mislead. "Misleading" is therefore the best answer. This behavior is certainly not "trustworthy." It is not meant to be "harmful" to the squirrel or other animals either. While the behavior is "beneficial" to the squirrel, this is not a possible synonym for "deceptive" so this is not the best answer.

4. D. *Inference*. The passage describes a "secondary benefit" of scatter hoarding in lines 38-43 in which forgotten seeds and nuts grow into new trees. It can be inferred from this that if someone observed new oak trees in a park, some of which appear to be farther away from the parent tree than expected, this could be because squirrels dispersed seeds that fell from the parent tree. While we don't know for sure that squirrels are responsible, it is certainly a possibility. There is no reason to believe squirrels hiding seeds in many different locations would kill oak trees. There is also no evidence to support that an increase in the "deceptive caching" behavior would be a result of the practice of "scatter hoarding." It does not appear to be true that scatter hoarding would be the cause of a squirrel not being able to find any of its stored food. The passage notes in lines 31-33 that squirrels have good memories and recover up to 80 percent of the food they hide.

5. A. *Style*. The author seems to have positive feelings towards squirrels. The choices with more negative associations can be eliminated ("confusion," "disinterest"). This leaves "amazement" and "love." The passage describes squirrels as "interesting" (line 6), "intelligent" (line 24), "clever" (line 44), "fascinating" (line 59) and "diverse and complex" (line 61). While it's likely the author likes squirrels, the passage does not describe an affection or "love" for the animal. The author finds squirrels to be "fascinating." Hence, "amazement" is the best word to characterize the author's feelings about the animal.

Passage 8

1. D. *Main Idea.* The main purpose of the passage is to give reasons for why someone should visit a particular place, in this case the Galápagos Islands. The other choices represent supporting details mentioned in the passage, but only one choice gives the main purpose.

2. A. *Vocabulary.* An archipelago is a chain of islands. This definition is given in the next sentence (lines 13-14).

3. D. *Supporting Ideas.* It is not true that the giant tortoises are commonly found in many islands throughout the world. Lines 54-56 explain that the opposite is true: "There is nowhere else in the world where one can observe these gentle giants in person." The tortoises are indeed endangered (line 48), very large in size (line 52), and can live for a very long time (lines 48-49).

4. A. *Inference.* It can be inferred that marine iguanas possess unique traits and behaviors because they changed over time to adjust to their environment. The marine iguanas are given as an example of one of the types of unique animals found on the islands that have undergone changes as described in lines 32-35: "The most well-suited traits and behaviors" on each island became dominant. The discussion about marine iguanas also follows immediately from the discussion in the previous paragraph of how animal species change over time and give rise to unique animals.

5. D. *Style.* The passage is persuasive in that it puts forth an argument. In this case the argument is that the most meaningful and unique destination for a student or lover of science is the Galápagos Islands. The passage does not use humor (comic) or negative (grim) words or imagery to make this point. If the author was detached, he or she would not take a stance on the subject.

Passage 9

1. C. *Main Idea.* The passage explains the scientific definition of a fruit, compares fruit cakes and salads, and lists various types of fruits and vegetables all to make the point that tomatoes should not be call a fruit. The author clearly takes a stance here, and is not impartial.

2. D. *Supporting Ideas.* The best answer is that scientists define a tomato as a fruit because it is the part of a plant's flower that grows up to hold the seeds of a plant. This definition is stated in lines 11-14. The choice that a tomato is more likely to be found in a salad than a fruit cake is true according to lines 44-45, but this is why people typically think of tomatoes as vegetables, not why scientists think of them as fruit. The tomato was ruled to be a vegetable, not a fruit, in an 1893 Supreme Court case (lines 50-58). Tomatoes may be juicy, unlike most vegetables, but this is not why scientists define them as fruits. This is never mentioned in the passage.

3. C. *Logic/Organization.* The third paragraph (lines 15-31) describe foods that, like the tomato, are scientifically classified as fruits but commonly known as vegetables. These foods include cucumbers, zucchini, avocados, olives, and peas. If one accepts the idea that the tomato is a fruit, the author shows that the reader will also need to reclassify all these other foods as well. The supermarket will become a very confusing place because if one calls the tomato a fruit, one will need to move a number of foods currently considered vegetables to the fruit aisle, not vice versa.

4. D. *Vocabulary.* The word unanimous describes a decision in which everyone is in agreement. Lines 54-57 describe how in this decision, "all of the court's judges agreed." The best answer choice is therefore "united," which is the opposite of "divided" and different than unsure (uncertain) or uncaring (indifferent).

5. B. *Inference.* The passage argues that while tomatoes scientifically are classified as fruits, they should still be referred to as vegetables in common usage because it's more important to refer to them as what people already know them as. The main purpose of the passage is to persuade the reader that the common usage of a word is more important than the scientific definition. If the author applied this logic to the koala bear as well, the author would likely argue that people should refer to the koala bear as such because common usage of a term is more important than the strict scientific definition. We can't infer that the author would support calling the koala bear by the Latin name (which would be like calling the tomato plant by its scientific name – not the same thing as calling it a fruit or a vegetable). We also can't infer that the author would want to change the definition of a bear or koala bear, since the author never mentions how one might change the scientific definition of a fruit.

Passage 10

1. C. *Main Idea.* The main purpose of this passage is to describe the ways in which representative democracies have many benefits that even other types of democracies might not. This is stated clearly in lines 13-14 and lines 68-69 (which also refers to the idea that there are drawbacks, but that these are outweighed by benefits).

2. D. *Supporting Ideas.* By reading the full paragraph that contains lines 8-14, it is clear that the question is describing a representative democracy and not a direct democracy. The first paragraph

(lines 1-7) defines an aristocracy and a monarchy, and tell us that these are not forms of government where people govern themselves.

3. B. *Inference.* In context, we can tell that the author gives these things as examples of complicated things that people don't have time to become educated in. Instead, the author goes on to say that people should elect representatives to learn about these things for them and make decisions that way. This implies that the subjects are complicated, and difficult for most people to understand. Not every representative will understand these things, which is why the author says that they should consult with experts.

4. A. *Vocabulary.* The word "right" has many meanings, but is used in line 31 as a synonym for an "option" or ability. "To right" something is a possible synonym for "correction," and "right" is a direction, but we know in context that we are talking about how people can be involved in making decisions.

5. C. *Supporting Ideas.* In lines 15-20, the passage describes how people can save time and energy by voting for representatives. In lines 48-54, the passage describes how laws are made fair and balanced by a slow debating process. In lines 55-63, the protection of small groups (minorities) are possible in a representative democracy. The passage does not state that a representative democracy requires people to vote on every decision, which is something one would find in a direct democracy.

Passage 11

1. D. *Main Idea.* The primary purpose of the passage is to demonstrate that Ponce de León's search for the Fountain of Youth is likely only a legend. This idea is stated in lines 3-5 as well as in the concluding paragraph. The introductory and concluding paragraphs are generally good places to look for the answer to a question asking about a passage's "primary purpose." Other choices about Bimini and Florida represent supporting details and not the main idea of the passage. This is also the case for describing the lives of Columbus and Ponce de León.

2. C. *Supporting Ideas.* As described in lines 21-25, Florida was named after the Easter season, which in Spanish is sometimes referred to as *Pascua Florida*, meaning "Festival of Flowers." While newly discovered land is sometimes named after saints, or a description of the landscape, it is clearly stated that Ponce de León named Florida after the holiday season during which he landed there. The passage doesn't suggest that the Spanish Royal Court had to do with the naming of Florida.

3. B. *Inference.* The correct answer is that he was an important explorer even if the search for the Fountain of Youth was only a myth. While the passage does not explicitly mention that Ponce de León was an important explorer, it can be inferred from the list of discoveries he made on his explorations. It can also be inferred that the other choices are statements the author would most likely disagree with. The written records from Ponce de León's lifetime form are a major part of the author's argument that the Fountain of Youth was a myth. Therefore, the author would not agree that they should be disregarded. There's no reason to think that the author thinks the explorer is not as important if the search for the Fountain of Youth never occurred. The author suggests the work of historians after Ponce de León's death helped create a myth. Therefore, the author would probably not agree with the statement that their work provides important insight into the Fountain of Youth story.

4. D. *Vocabulary.* A "claim" has many definitions. One of these is that of an idea or belief. While the idea in this case turned out to not be true, the historians were not engaged in knowingly spreading "a lie," something that is definitely not true. Instead, this was something that they believed to be true, and could be true. In other words, this is a rumor. This wasn't an objection or something that can be owned.

5. D. *Inference.* Line 62 describes the Fountain of Youth as supposedly having the power to "turn men into boys." The only answer choice that involves making someone younger is turning an elderly person into a teenager. The choice "change a child into an adult" is the opposite of what the Fountain of Youth was supposed to be able to do. Curing a disease or allowing a blind person to see are not characteristics that would be attributed to the Fountain of Youth.

Passage 12

1. B. *Main Idea*. This passage is primarily about Fleming's discovery of penicillin. While it does give some details from his life in lines 24-31, this is not the main purpose of the passage. The passage

mentions ancient Egyptians in lines 11-17, but the main purpose of the passage is not to provide the history of antibiotics from ancient times through today. Furthermore, the passage does not describe the history of antibiotics through today since it does not discuss antibiotics past their use during World War II (besides just saying that they save lives today). The passage never says Fleming was inspired by ancient Egyptian wisdom. This is certainly not the main idea of the passage.

2. A. *Supporting Ideas*. Lines 15-17 state "This practice may have helped to relieve soreness and inflammation." Therefore "This practice sometimes helped relieve infections" is the best answer. The passage never says this practice is still used today. It is unlikely that the ancient Egyptians understood the exact mechanism by which this practice worked, and the passage never makes this claim. Fleming coined the name "penicillin," (line 53) not the ancient Egyptians.

3. C. *Vocabulary*. The word is used in the context of Fleming's "groundbreaking discovery." While his discovery was accidental and scientific, these are not possible synonyms for "groundbreaking." Fleming's discovery was not dangerous, so this is not the best answer. The best choice is "innovative" because "groundbreaking" means breaking new ground, in other words "innovative," since it led to something new that had not been seen before.

4. D. *Organization & Logic*. Over the course of the passage, we find that a scientist (Fleming) conducts an experiment, which goes wrong. From this, he makes a discovery, but it's not until other scientists look into his experiments that he becomes famous. We can tell, then, that the scientist (Fleming) doesn't immediately win a prize. We also know that he did not make his useful discovery (the effect of mold juice on bacteria) on purpose, since it was an accident from an experiment gone wrong. The other scientists weren't the ones to make the useful discovery, but rather they figured out a way to make it so that a lot of penicillin could be produced.

5. A. *Style*. The last sentence provides a useful lesson from Fleming's discovery: sometimes useful discoveries are made unintentionally. This life lesson does not appear to be a warning, nor is it humorous. This can't be interpreted a request for the reader to do any specific thing.

Passage 13

1. B. *Main Idea*. From the first paragraph, the content of the passage is introduced: a hike along the American River trail. This continues to be described throughout the rest of the passage, which is focused on the details of the trail. We learn a little bit about the Gold Rush and panning for gold, but not enough to consider it to be the main idea of the passage. We don't learn about any hiking methods.

2. A. *Supporting Ideas*. Mac, Louise, and Tim are all walking along the trail and they see other people on horses and on bikes. There is no mention of people on the trail in cars.

3. B. *Vocabulary*. When we read the word in context, we see that Tim is naming things to Louise and Mac while they're talking. This implies that his chiming in is "interrupting" the two friends' talk. We know that the word has to do with a sound, but it's not right to think that Tim is ringing, singing, or clanging the name of plants, for there's no evidence to support the fact that Tim is using an instrument to make sounds, or that he is singing.

4. B. *Inference*. The lines describe Tim reciting all the names of the plants as he passes. We can read this as meaning that he previous knowledge about the trail and the plants living in the area. There is no suggestion that Mac finds the names to be funny – be careful not to project your own thoughts onto the characters. We aren't told anything about nearby towns, or anything about animals (besides the people riding horseback).

5. A. *Style*. The paragraph before this line describes Mac daydreaming about the Gold Rush. He is not focused on the trail, and is therefore distracted. Mac is more eager to get to the river, but the sentence itself doesn't describe his excitement; it instead describes his preoccupation. Mac's daydreams do not suggest that he is puzzled. Mac may be tired, but this sentence by itself doesn't suggest that he is tired.

Passage 14

1. B. *Main Idea*. In the third paragraph, the author introduces what he will be writing about throughout: a family tradition. While this tradition involves some of his favorite things about California and

directions, these are not the main purpose of the passage. There is no evidence of Thanksgiving being the author's least favorite holiday.

2. C. *Supporting Ideas*. In the fourth paragraph, the author describes why he prefers Highway 1 to Highway 5. Highway 1 is along water and includes scenery that represents different parts of California. Highway 5, however, is a faster route than Highway 1.

3. D. *Inference*. We learn from these lines that there are very few people, if any, in the other restaurants. We can infer that this restaurant is popular, while the others are not. There is no mention of the quality or type of food in the other restaurants. We can therefore eliminate the answer choices involving food.

4. D. *Vocabulary*. When we read "wind" in context, we see that it is a verb, so we can eliminate "chilly." "Struggle" implies that the driving was difficult; however, the sentence describes them winding "easily." This leaves us with "inch" and "weave." If the author were stuck in traffic, they would inch along (move slowly). However, we're told there is no traffic. So, the best word must be weave, which means to zigzag or go back and forth, in this case, through the hills.

5. D. *Style*. The second and the last sentences of the final paragraph describe the author as dragging his feet and having heavy eyes. Both phrases imply that he is tired, or exhausted. There's no evidence in the paragraph that the drive was "thrilling" or "fun-filled," which may be inferred from earlier paragraphs. Only his grandparents' home is described as "warm," not the drive itself.

Passage 15

1. A. *Main Idea.* The primary purpose of this passage is to argue that there is no better food than pasta. The passage states this in lines 6-10. The passage does discuss the different ways of cooking pasta, but only as one reason why this makes pasta the best food. The passage talks about how pasta can be healthy or unhealthy, depending on different factors. Food is important to memory, but this isn't the primary focus of the passage.

2. A. *Vocabulary.* In this context, "versatile" most nearly means flexible. Line 10 describes pasta as "pairing well with many foods." The other choices are mentioned as qualities of foods, but in this case, the sentence is talking about how pasta can be eaten with many different kinds of food.

3. B. *Supporting Detail.* According to the passage, pasta is easy to find in the United States (lines 11-14). None of the other choices are true according to the passage. Lines 17-18 describe pasta as a cheap food. Lines 15-16 state that pasta is not a seasonal food. Lines 46-48 describe pasta as being a food that no religious or cultural groups forbid.

4. C. *Organization & Logic.* Steak is mentioned in the passage as an example of a food that people may prefer to pasta. The passage then explains why pasta is still a superior food according to the author. The passage mentions that pasta pairs well with other foods (line 10), but that is not why it mentions steak. The main purpose of the passage is to argue that there is no better food than pasta, so the answer choice that "pasta is actually not the author's favorite food" is not correct. While the passage does note that some people are allergic to pasta (lines 59-62), it does not suggest that steak is an alternative to pasta.

5. D. *Inference.* The best choice is a meal that contains pasta, meat, and a vegetable. The paragraph describes pasta as "part of a very healthy and well-balanced diet." A dish that contains only one type of food is not a more well-balanced choice. The paragraph also describes how too much pasta may not be healthy, so a dish that contains only pasta is not the best answer.

Passage 16

1. C. *Main Idea*. The passage deals extensively about voting and elections, but primarily in regards to state and local elections. It does not focus on history or a particular election throughout, but rather discusses the importance of voting in state and local elections. The passage uses examples of previous elections to help emphasize the importance of voting in state and local elections.

2. A. *Organization & Logic*. The first paragraph describes how people talk a lot about the election in the year before the election. This suggests that these elections are popular. There's no evidence of people not understanding the elections, nor that they are the only important elections. There is also no discussion about people from all over the world being able to vote.

3. D. *Supporting Ideas*. Paragraphs 4-6 each deal with a different reason why voting in state and local elections is important. Paragraph 4 focuses on the local impact of these elections. Paragraph 5 reveals that elected officials are most likely to respond to those who voted. Paragraph 6 describes the importance of each vote in a local election. None of these describe a minimum number of voters who need to vote in order for the results to be finalized.

4. B. *Inference*. The author stresses the importance of local elections throughout the entire passage. She indicates that the elections have results that are very important at the state and local level, not that they don't matter. The author never mentions which elections are more or less important than the other. She seems to be sad about the fact that young voters don't participate in state and local elections, and encourages the idea that more young people should vote in the smaller elections. The author writes that there is a "poor understanding" (lines 21-22) of local elections, something that might be fixed with more attention in the news (like presidential elections receive).

5. C. *Style*. The final paragraph is written as a call to action, telling the reader to go out and vote. There is nothing angry, humorous, nor sarcastic about the author's tone. Instead, she is trying to inspire the reader to take action in his or her community.

Passage 17

1. A. *Main Idea*. The passage deals with the farm-to-table movement and why the chefs behind the movement prefer this style of cooking. The passage does not attempt to argue for or against the farm-to-table movement, instead choosing to present both the positives and negatives of the movement. The author does not just describe the problems with supermarkets or inform about farming, doing so in context of describing the farm-to-table movement.

2. A. *Vocabulary*. This type of movement does not involve the motion of something, or the speed of something. Instead, it is talking about a gathering (group) of people supporting a particular goal – a campaign. The passage describes how the farm-to-table movement unites chefs behind a common goal, so "difference" does not make sense.

3. A. *Inference*. Farm-to-table chefs want to use the most local ingredients, so if herbs and spices can be grown locally, we can infer that they would use these. The passage only suggests that farm-to-table chefs have reacted against many of the scientific advances that have resulted in supermarket conveniences. There's no mention of how best to cook vegetables. The passage describes farm-to-table as a healthy way to cook, but not necessarily the only healthy way to cook. The passage doesn't go into the fact that vegetables are "best" cooked over a wooden fire, or that chefs should prioritize diners' happiness over the use of home-grown ingredients.

4. D. *Supporting Ideas*. There are few details about the farms and the restaurants that are involved in farm-to-table methods. We also aren't told about other chefs' opinions. Instead, we are told that the farm-to-table movement started because they believe that using local ingredients makes for a "better eating experience" – unhappy shefs who are unhappy with "how much frozen food" is being eaten.

5. B. *Organization & Logic*. Farm-to-table chefs rely on local produce. This means that they can only use the produce that is grown in a particular season. There is nothing in the passage suggesting changing tastes or diners' opinions. There's also no mention of the government's intervention into farm-to-table cooking.

Passage 18

1. C. *Main Idea.* Throughout the passage, the author misses activities because he keeps playing *Goats!* He runs into people, misses his meals, and misses the rides. We read about the rides, but there's never a ranking of which is most or least fun. While the author describes the game, he never describes how to play it. We learn about the relationship between the four friends, but only in context of the fact that one (the narrator) does not engage with the others.

2. B. *Inference*. In the previous sentence, the author describes how he had reached a new level. The sentence before that mentions that the rollercoaster was "all the way in Soggy Swamp." This suggests that Soggy Swamp is very far from Mystery Forest. While it may be true that the friends are fast walkers, we can't make an inference about that since there's no evidence to suggest this (perhaps, if the passage had included something about the friends passing everyone as they walked). The fact that they had walked across the park quickly could have suggested that the park was smaller than

expected, not bigger. The passage describes the friends going from one ride to another without stopping for any other rides and games along the way.

3. C. *Supporting Ideas.* While the author describes the levels the narrator reaches in *Goats!*, he never tells us which is the final level. Mickey picks the roller coaster in the Soggy Swamp, but does not say it is her favorite. We never read about how many times the friends have gone to Adventure Land. We are told that the author's name is Frankie, in lines 25-32, when Dan addresses Frankie with a question.

4. A. *Organization & Logic.* Throughout the passage, the author has been concerned primarily with the game *Goats!* We can infer that the author thinks the game is more fun than the rides, otherwise the author would have been joining in the rides, not playing the game. The fact that the author smiles, after breaking his phone and being unable to play *Goats!*, suggests that he has changed his mind.

5. C. *Style.* The author expresses regret at spending so much time playing video games while his friends were sharing experiences together. There is no language to suggest fear (what his he afraid of?). "Satisfaction" is a positive emotion, which does not align with the statements made in the sentences. "Disgust" is a strongly negative emotion (much like "regret"), but refers to something repulsive, not something that one feels disappointment over.

Passage 19

1. C. *Main Idea.* The primary purpose of this passage is to describe a student's experience learning about the history of the Liberty Bell during a field trip. While the passage primarily focuses on how the bell got its crack, the author does not argue that the crack in the bell needs to be repaired (or say that it should not be repaired). The passage also does not describe all the stops on a class' field trip to Philadelphia. While it mentions some stops of interest in the first paragraph, it only goes into detail about the stop at the Liberty Bell Center. The student does not argue that the bell should not be moved. If anything, the student would not support the moving of the bell, given the damage it suffered during its previous moves.

2. A. *Vocabulary.* While all these choices are possible meanings of the verb "cast," the only definition that works in context is "to create." This definition of the word is often used in connection with shaping metal, as was the case with the Liberty Bell. This definition of "cast" is also described in lines 35-37 in reference to the word "recast."

3. A. *Supporting Ideas.* The Liberty Bell was first cast in England (lines 17-19). This means it is not true that "The Liberty Bell was first cast in Philadelphia." This is therefore the best answer. The question asks which is NOT true. It is true that the National Park Service protects and cares for the bell today according to lines 73-76. While lines 51-71 describe the leading "theory" for how the bell became cracked, this is just a theory and not a certain truth. In other words, it is true that no one knows for sure how the bell cracked. It is also true that Pass and Stow recast the bell after it was first damaged during a test ringing (lines 35-37).

4. D. *Inference.* The best answer is Washington, D.C. to learn the history of some of America's most iconic monuments. We don't know much about the student described in the passage, but we do know that he is genuinely excited to learn about the history of the Liberty Bell, an "iconic piece of American history" (lines 80-82). The passage also notes "It's more fun to learn about history right where it happened rather than to just read about it from a textbook" (lines 1-3). He has a clear interest in American history. While seeing a Broadway, participating in a sports clinic, or attending a board game night show may be more fun than learning about typical school subjects for some students, the passage does not give reason to believe the student would prefer these to the option of learning about American history in Washington.

5. A. *Style.* In lines 32 and 42, the guide describes the student's questions as "excellent" and answers them in a friendly and informative matter. In line 42 the passage also notes that she smiled. Because she appears to view the questions in a positive way, words with negative connotations like "arrogant" and "frustrated" can be eliminated. There is no indication she is "humbled" by the student's questions, which she answers easily.

Passage 20

1. A. *Main Idea*. In the first paragraph of the passage, the author asks why stars twinkle. The popular children's song is only used to hook the reader in, as the author doesn't describe more about the song's history. He proceeds to explain this phenomenon throughout the entire passage, explaining how light is affected by the atmosphere.
2. A. *Vocabulary*. If we read "indistinguishable" in context, we see a contrast in the following sentence when the author writes that stars and planets appear quite differently. With this contrast, we can assume that the word will be an antonym for "different," which is closest to "identical." The word is not a synonym for different, so "opposites" cannot work. While both stars and planets can be "glowing" in the night sky, there is no evidence that "indistinguishable" means "glowing."
3. A. *Supporting Ideas*. The author gives a direct answer to this question in lines 26-28, when he writes, "Because planets are much closer to us than stars, we can see them more clearly, and their light shines more brightly." When objects are closer to the horizon, they are actually more difficult to see. The passage never discusses what happens when objects are rotating faster than the Earth. We learn about the atmosphere being gaseous, but never about objects in space being gaseous.
4. A. *Organization & Logic*. The sixth paragraph begins by describing a science project that one could perform with his friend and continues to describe how this applies to objects in the sky. The author is explaining what happens in a concrete way. There is no scientific process outlined in paragraph 6, just an example that clarifies the main idea. The experiment clarifies one concept but does not prove another wrong. There is no indication that the example is a personal story nothing personal about this paragraph.
5. B. *Inference*. The passage mentions our moon and Saturn, but never gives specific details about them. We know that stars are trillions of miles away, and that telescopes help us see farther. But we still don't know how far telescopes can see. Paragraph 6 describes why the moon doesn't twinkle; it's too close to us.

# Quantitative Reasoning & Mathematics Achievement
## Numbers & Operations

### Operations with Whole Numbers

1. C. Adding 258 + 159 results in 417.
2. A. Subtracting 951 – 159 results in 792.
3. D. Multiplying 456 × 8 results in 3,648.
4. B. Dividing 792 by 6 results in 132.
5. D. Adding 3,849 + 1,867 results in 5,716.
6. B. Subtracting 5,000 – 2,357 results in 2,643.
7. B. Multiplying 84 by 35 results in 2,940.
8. C. Dividing 972 by 12 results in 81.
9. D. Adding 65,408 + 37,094 = 102,502.
10. C. Dividing 3,476 by 79 results in 44.

### Order of Operations

1. B. Try each answer choice. We always solve parentheses first but the first equation doesn't have any so we do multiplication first: $3 \times 10 = 30$, then $30 - 2 + 6 = 44$. In the second equation we solve parentheses first, which results in $3 \times 8 + 6$, which simplifies to $24 + 6 = 30$. We found the answer, so we don't need to continue.
2. A. We solve parentheses first, giving us $5 + 3 \times 6$, which simplifies to $5 + 18$, which equals 23.
3. A. We simplify parentheses first, so *a* is equal to $\dfrac{12(12)}{2}$, which is equal to $\dfrac{144}{2}$, or 72.
4. D. We can try each answer choice. There are no parentheses in any of the choices, so we do multiplication and division first. In the first answer choice, we get $48 + 8 + 1 = 57$. In the second

answer choice, solving all the multiplication results in $192 + 2 + 1 = 195$. In the third answer choice, we get $8 + 6 + 8 + 1 = 23$. In the fourth answer choice, we get $8 + 24 – 2$, which equals 30.

5. A. Simplify the multiplication first giving us $9 + 10 – 6$, which results in 13.

6. B. We simplify parentheses first, so $b = \dfrac{40(60)}{4} = \dfrac{2{,}400}{4} = 600$

7. A. We can try each answer choice. There are no parentheses in any of the choices, so we do multiplication and division first. In the first answer choice, we get $12 – 9 + 2 = 5$, which is the correct answer, so we don't have to try any more choices.

8. D. Always solve any parentheses first, here giving us $10 – 8 ÷ 2$. Multiplication and division come next, which results in $10 – 4$, which finally equals 6.

9. A. We simplify parentheses first, so $c = \dfrac{90}{3(15)} = \dfrac{90}{45} = 2$.

10. B. We must try each answer choice. Following the correct order of operations, we solve everything inside parentheses first, followed by multiplication and division, and finally addition and subtraction. The first choice results in 18. The second choice results in 11, which is the answer we're looking for, so we're done.

## Place Values

1. A. We read whole numbers by their groups. The words tell us that there should be a 50 in the thousands group, followed by just a 2, which will be in the ones place, so we'll need 0's as place holders. This can only be written as 50,002.
2. A. The words tell us that there should be a 400 in the thousands group, followed by 700, which can only be written as 400,700.
3. B. The words tell us that there should be a 302 in the thousands group, followed by 905, which can only be written as 302,905.
4. B. The words tell us that there should be a 606 in the thousands group, followed by 606, which can only be written as 606,606.
5. B. The words tell us that there should be a 30 in the millions place, followed by an 8 in the thousands group (which will need two 0's as place holders), followed by 25, which can only be written as 30,008,025.
6. B. We see a 35 (thirty-five) in the thousands group, followed by 305 (three hundred five), so the number is thirty-five thousand three hundred five.
7. A. We see a 507 (five hundred seven) in the thousands group, followed by 608 (six hundred eight), so the number is five hundred seven thousand six hundred eight.
8. C. The only time to use the word "and" in a number is to represent a decimal point. The words say 105 followed by "and which tells us the rest should be decimal places. Five hundred one thousandths is written as 0.501, so the whole number is 105.501.
9. D. We see a 429 (four hundred twenty-nine) in the thousands group, followed by 602 (six hundred two), so the number is four hundred twenty-nine thousand six hundred two.
10. A. We see a 20 (twenty) in the millions place, followed by 112 (one hundred twelve) in the thousands group, and 057 (fifty-seven), so the number is twenty million one hundred twelve thousand fifty seven.
11. B. The number starts with 100 (one hundred), followed by a decimal point, which is read as "and", followed by .01 (one hundredth), so the number is one hundred and one hundredth.

## Rules of Divisibility

1. D. 2 will fit into any integer that ends with an even digit (0, 2, 4, 6, or 8). Only 3,514 satisfies this rule.
2. B. 5 will fit into any integer that ends with a 5 or a 0. Only 3,240 satisfies this rule.
3. C. 10 will fit into any integer that ends with a 0. Only 7,370 satisfies this rule.

4. D. 3 will fit into any integer whose digits add up to a number that is a multiple of 3. Only 879 satisfies this rule: $8 + 7 + 9 = 24$.
5. A. 9 will fit into any integer whose digits add up to a number that is a multiple of 9. Only 486 satisfies this rule: $4 + 8 + 6 = 18$.
6. A. 6 will fit into any EVEN integer whose digits add up to a number that is a multiple of 3. Only 582 satisfies this rule: $5 + 8 + 2 = 15$.
7. C. 4 will fit into any integer that ends with a two-digit number that is divisible by 4. Only 1,024 satisfies this rule, because the last two digits of 1,024 is "24" and 24 is divisible by 4.
8. C. David and his brother and sister are a total of three kids, so the number of cookies must be divisible by 3 (the digits must add up to a number that is a multiple of 3). Only 60 works: $6 + 0 = 6$.
9. D. If golf balls are sold in packs of 5, then the total number of golf balls must be a multiple of 5 (the integer must end in 0 or 5). Only 35 works.
10. D. Sean and his brother are a total of two kids, so the number of pieces must be divisible by 2 (ends with a 0, 2, 4, 6, or 8). Only 736 works.
11. C. If each brick weighs exactly 9 pounds, the total number of pounds must be divisible by 9 (the digits must add up to a number that is a multiple of 9). Only 684 works: $6 + 8 + 4 = 18$.
12. B. If tennis balls are sold in packs of 3, then the total number of tennis balls must be a multiple of 3 (the digits must add up to a number that is a multiple of 3). Only 48 works: $4 + 8 = 12$.
13. A. If we start solving each answer choice, the first choice results in $4 \times 123 = 492$. This is divisible by 3 because the digits add up to a number that is a multiple of 3: $4 + 9 + 2 = 15$. This works.
14. C. If we start solving each answer choice, the first choice results in $159 - 95 = 64$, which is not divisible by 9. The second choices results in $36 + 32 = 68$, which is also not divisible by 9. The third choice results in $54 \div 3 = 18$, which is divisible by 9, so we are done.
15. B. If we start solving each answer choice, the first choice results in $313 + 296 = 609$, which is not divisible by 2. The second choice results in $313 + 297 = 610$, which is divisible by 2, so we are done.

## Comparing Fractions

1. A. The larger the denominator of a fraction, the smaller each piece of that fraction. Since each fraction has a 1 in the numerator, we are only comparing individual pieces, of which $\frac{1}{3}$ has the largest.

2. B. First we know we are looking for a number that is larger than $\frac{1}{4}$, so we can eliminate $\frac{1}{6}$ and $\frac{2}{8}$ (which is equal to $\frac{1}{4}$). Next, we are looking for a number that is less than $\frac{1}{2}$, so we can eliminate $\frac{3}{6}$ (which is equal to $\frac{1}{2}$), leaving only $\frac{1}{3}$.

3. D. When trying to find the largest fraction, try grouping the answer choices into less than/equal to/greater than $\frac{1}{2}$. $\frac{2}{7}$, $\frac{4}{10}$, and $\frac{6}{14}$ are all less than $\frac{1}{2}$. $\frac{8}{16}$ is equal to $\frac{1}{2}$, so it is bigger than the other choices.

4. D. The larger the denominator of a fraction, the smaller each piece of that fraction. Since each fraction has a 3 in the numerator, we are comparing the same number of pieces, so the fraction with the largest number in the denominator will have the smallest value, which is $\frac{3}{7}$.

5. A. When trying to find the smallest fraction, try grouping the answer choices in less than/equal to/greater than $\frac{1}{2}$. $\frac{3}{5}$, $\frac{5}{8}$, and $\frac{7}{10}$ are all greater than $\frac{1}{2}$, meaning $\frac{1}{2}$ itself must be the smallest fraction.

6. C. First we know we are looking for a number that is larger than $\frac{1}{2}$, so we can eliminate $\frac{6}{15}$ (which is less than $\frac{1}{2}$) and $\frac{7}{14}$ (which is equal to $\frac{1}{2}$). Next, we are looking for a number that is less than $\frac{4}{5}$, so we can eliminate $\frac{9}{10}$, because $\frac{4}{5}$ is equal to $\frac{8}{10}$, and $\frac{9}{10}$ is greater than $\frac{8}{10}$. This leaves only $\frac{7}{10}$.

7. A. When trying to find the largest fraction, try grouping the answer choices into less than/equal to/greater than $\frac{1}{2}$. $\frac{3}{5}$ is greater than $\frac{1}{2}$, while $\frac{4}{9}$, $\frac{7}{15}$, and $\frac{8}{17}$ are all less than $\frac{1}{2}$, so $\frac{3}{5}$ is larger than the rest.

8. D. When trying to find the largest fraction, try grouping the answer choices into less than/equal to/greater than $\frac{1}{2}$. $\frac{6}{13}$, $\frac{9}{17}$, and $\frac{10}{21}$ are all less than $\frac{1}{2}$, while $\frac{5}{9}$ is greater than $\frac{1}{2}$, so $\frac{5}{9}$ is larger than the rest.

9. C. When trying to find the smallest fraction, try grouping the answer choices into less than/equal to/greater than $\frac{1}{2}$. $\frac{6}{12}$ is equal to $\frac{1}{2}$, while $\frac{8}{15}$ and $\frac{9}{17}$ are both greater than $\frac{1}{2}$, and $\frac{8}{19}$ is less than $\frac{1}{2}$, so $\frac{8}{19}$ is smaller than the rest.

10. D. When fractions have the same numerator, the largest of these fractions will be the one that is broken into the least number of pieces, so the fraction with the smallest denominator will be the largest fraction here, or $\frac{6}{12}$.

11. B. When trying to find the largest fraction, try grouping the answer choices into less than/equal to/greater than $\frac{1}{2}$. $\frac{8}{16}$ is equal to $\frac{1}{2}$, while $\frac{3}{5}$ and $\frac{5}{9}$ are both greater than $\frac{1}{2}$, and $\frac{7}{15}$ is less than $\frac{1}{2}$, so $\frac{7}{15}$ is smaller than the rest.

12. D. First we know we are looking for a number that is smaller than $\frac{1}{2}$, so we can eliminate $\frac{3}{6}$ and $\frac{9}{17}$ because $\frac{3}{6}$ is the same as $\frac{1}{2}$ and $\frac{9}{17}$ is greater than $\frac{1}{2}$. Then, we can eliminate $\frac{4}{10}$ because it is equal to $\frac{2}{5}$ and we are looking for a number greater than $\frac{2}{5}$. This leaves only $\frac{10}{21}$ which estimation can show us is just under $\frac{1}{2}$ and is also larger than $\frac{2}{5}$.

## Comparing Percents, Fractions, & Decimals

1. B. 0.8 can be read as "eight tenths" which can written in fraction form as $\frac{8}{10}$. This simplifies to $\frac{4}{5}$.

2. B. 0.65 can be read as "sixty-five hundredths" which can written in fraction form as $\dfrac{65}{100}$. This simplifies to $\dfrac{13}{20}$.

3. C. 0.246 can be read as "two hundred forty-six thousandths" which can written in fraction form as $\dfrac{246}{1,000}$. This simplifies to $\dfrac{123}{500}$.

4. C. To turn a percent into a fraction simply put the percent over 100. Here, $8\% = \dfrac{8}{100}$, which simplifies to $\dfrac{2}{25}$.

5. D. To turn a percent into a fraction simply put the percent over 100. Here, $85\% = \dfrac{85}{100}$, which simplifies to $\dfrac{17}{20}$.

6. B. One way to turn a fraction into a decimal is to divide the numerator by the denominator. Here, $7 \div 20 = 0.35$.

7. A. One way to turn a fraction into a decimal is to divide the numerator by the denominator. Here, $9 \div 50 = 0.18$.

8. B. One way to turn a percent into a decimal is to move the decimal point two places to the left. Here, we can place a decimal point right after the 4, so moving it two places to the left gives us 0.04.

9. B. One way to turn a percent into a decimal is to move the decimal point two places to the left. Here, we can place a decimal point right after the 375, so moving it two places to the left gives us 3.75.

10. D. One way to turn a fraction into a percent is to divide the numerator by the denominator, then move the decimal point two places to the right. Here, $4 \div 25 = 0.16$. If we move the decimal two places to the right, we get 16%.

11. A. One way to turn a fraction into a percent is to divide the numerator by the denominator, then move the decimal point two places to the right. Here, $12 \div 16 = 0.75$. If we move the decimal two places to the right, we get 75%.

12. C. To turn a decimal into a percent, simply move the decimal two places to the right. Here, 0.005 becomes 0.5%.

13. D. To turn a decimal into a percent, simply move the decimal two places to the right. Here, 2.09 becomes 209%.

14. C. If we divide $3.6 \div 9$, we get 0.4, which can be written in fraction form as $\dfrac{4}{10}$, which is equal to $\dfrac{2}{5}$.

## Word Problems

1. D. We are looking for the story problem that can be solved using $12 + 3$. The first problem uses the words "how many more" so we know it is a subtraction problem. The second problem says Jack put 3 shirts back, so this is also $12 - 3$. The third problem shows 12 three times and asks for the total, which is $12 \times 3$. Only the last problem would be solved using $12 + 3$ because 12 "and another 3" shows addition.

2. B. We are looking for the story problem that can be solved using $18 - 3$. The first problem uses the word "share" so we know it is a division problem. The second problem is correct because it asks how many do I have left, so we know it is a subtraction problem.

3. A. The first choice is correct because, if Gino reads 12 books every month, in 4 months he will read $12 \times 4$ books.

4. A. The first choice is correct because we can find how many times $5 fits into $20 using $20 \div 5$.

5. D. The first choice is incorrect because if Hunter eats 5 boxes every month, in 10 months he will eat $10 \times 5 = 50$ boxes. The second choice is incorrect because if one box contains 10 cookies, 5 boxes will contain $10 \times 5 = 50$ cookies. The third choice is incorrect because we don't know how many boxes Hunter started with, so we can't know how many he has left. Only the last choice works because if Hunter has sold 10 boxes so far and needs to sell 5 more, then he needs to sell a total of $10 + 5 = 15$ boxes.

6. A. When someone gives each of her friends the same number of something, that requires division. 12 pieces of candy divided amongst 4 friends is $12 \div 4$.

7. B. To figure out how many basketballs to order, the coach should subtract the basketballs the team has from the number of balls they need.

8. A. Assuming everyone needs one ticket, we would add the number of students to the number of adults going on the trip.

9. B. If Jason knows the total number of pumpkins he needs, he should divide that number by the number of pumpkins that will fit in each row.

10. B. We are looking for a number that is greater than 9 but less than 14, so our choices are 10, 11, 12, and 13. If the number also has to be greater than 12 but less than 16, the only number that works is 13.

11. B. If Delia had 35 books and bought 12 more, she now has $35 + 12 = 47$ books. If she then donates 25, she has $47 - 25 = 22$ left.

12. B. If Preston received $14 change from $50, the cupcakes cost $50 – 14 = \$36$. If he bought 12 cupcakes, each one cost $\$36 \div 12 = \$3$.

13. D. Working backwards, Kyile has 12 apples left after using $\frac{1}{2}$ to bake a pie, which means she had $12 \times 2 = 24$ before the pie. If she ate 6, she started with $24 + 6 = 30$.

## Word Problems with Fractions & Decimals

1. C. To find out how much is left, we subtract $6.0 - 0.4 = 5.6$.

2. A. Since we know how many boxes were left, we can subtract to find out how many were used: $6 - 2\frac{7}{10} = 3\frac{3}{10}$.

3. B. Most questions that ask "how many more" require subtraction, so $3\frac{1}{2} - 1\frac{3}{4} = 1\frac{3}{4}$.

4. D. To find how many kilometers Andy ran altogether, add the number of km he ran last week and this week: $15.90 - 9.51 = 25.41$.

5. B. Questions that ask "how many are left?" usually require subtraction: $7\frac{1}{3} - 4\frac{5}{9} = 2\frac{7}{9}$.

6. D. Finding the number of kilograms John bought altogether requires addition: $6\frac{2}{3} + 3\frac{5}{6} = 10\frac{1}{2}$.

7. D. To find out how many inches in all, add the numbers for the three months: $6.59 + 11.5 + 3.479 = 21.569$.

8. A. To find how many inches the plant grew, we subtract its original height from its height one month later: $7.30 - 5.58 = 1.72$.

9. A. To find out how many feet are left, we subtract: $9\frac{1}{4} - 2\frac{7}{8} = 6\frac{3}{8}$.

10. C. To find out how many kilograms of meat in all, add each of the amounts for beef, chicken, and pork: $12.7 + 8.85 + 7.4 = 28.95$.

11. D. To find out how many bags are left, subtract the number of bags eaten from the number of bags Kristen started with: $3\frac{2}{3} - 2\frac{11}{12} = \frac{3}{4}$.

12. D. To find out how many hours Frank spent reading in all, we add the Saturday and Sunday numbers:
$3\frac{3}{4} + 4\frac{3}{8} = 8\frac{1}{8}$.

13. B. When a problem asks to find how many of something is left, we subtract: $9.6 - 4.69 = 4.91$.

14. C. To find the number of inches crawled over the two days, add the distances from the two days:
$15.90 + 1.59 = 17.49$

15. D. Going on the round trip means biking 3.65 miles in one direction and then the same 3.65 miles in the other direction, for a total of $3.65 + 3.65 = 7.3$ miles.

16. C. The total amount of bread is the sum of the lunch and dinner amounts: $5\frac{4}{5} + 8\frac{7}{10} = 14\frac{1}{2}$.

17. D. The problem is asking for the total, which is $8\frac{1}{2} + 16\frac{3}{4} + 12\frac{7}{8} = 38\frac{1}{8}$.

## Estimation

1. C. To estimate, round each number to its largest place value. Here, 321 and 789 both round to the hundreds place. 321 rounds down to 300, and 789 rounds up to 800, giving us $300 \times 800$.

2. C. To estimate, round each number to its largest place value. Here, 9.63 and 6.39 both round to the ones place. 9.63 rounds up to 10, and 6.39 rounds down to 6, giving us $10 \times 6$.

3. B. Here, 4.29 and 6.87 both round to the hundreds place. 4.29 rounds down to 4, and 6.87 rounds up to 7, giving us $4 \times 7$.

4. D. We can try each answer choice. Looking at the first factor of each choice, we see that 1,250 would round down to 1,000, so we can eliminate it, while 1,710, 1,820, and 1,980 would all round up to 2,000. Looking at the second factors, we see that 614 and 635 would both round down to 600, so we eliminate both of them, leaving only 678, which would round up to 700.

5. C. Here, 369 rounds to the hundreds place, and 24 rounds to the tens place. 369 rounds up to 400, and 24 rounds down to 20, giving us $400 \times 20$.

6. C. Here, 36 and 72 both round to the tens place. 36 rounds up to 40, and 72 rounds down to 70, giving us $40 \times 70$.

7. A. To find a reasonable estimate, round all numbers to their largest place value. Here, we get $\frac{40 \times 600}{20} = \frac{24,000}{20}$, finally resulting in 1,200, which is between 1,000 and 1,500.

8. B. Round all numbers to their largest place value. Here, we get $\frac{60 \times 800}{30} = \frac{48,000}{30}$, finally resulting in 1,600, which is between 1,200 and 1,800.

9. B. round all numbers to their largest place value. Here, we get $\frac{600 \times 800}{400} = \frac{480,000}{400}$, finally resulting in 1,200, which is between 1,000 and 1,500.

10. C. Since the questions asks for "closest" we can use estimation. 93,638 is close to 90,000, so $\frac{1}{2}$ of that is 45,000, which is closest to the area of Korea.

11. A. Since the questions asks for "closest" we can use estimation. 2,073 is close to 2,000, so $\frac{1}{3}$ of that is about 600-700, which is closest to the height of the General Motors Building.

12. C. Since we are trying to find the number "closest" to $\frac{1}{4}$ of 17,400,000, we can think numbers that can be divided by 4 (the 4 times table). The closest number in the 4 times table to 17 is 16, so we can

approximate 17,400,000 to 16,000,000, of which $\frac{1}{4}$ is 4,000,000. Since 17,400,000 is slightly larger than 16,000,000, we go with the choice that shows a slightly larger number, which is Madrid.

13. C. The easiest way to find an estimated sum is to round each summand. Here, 4.95 rounds up to 5, 7.99 rounds up to 9, 0.89 rounds up to 1, and 8.98 rounds up to 9. Therefore, we add $5 + 8 + 1 + 9 = 23$.

14. B. Looking at the markings on the side of each container, we see that the container on the left is divided into thirds (and the water goes up to 1/3), while the container on the right is divided into fifths (and the water goes up to $\frac{1}{5}$). The total amount of water is $\frac{1}{3} + \frac{1}{5} = \frac{5}{15} + \frac{3}{15} = \frac{8}{15}$, which is closest to $\frac{1}{2}$.

15. C. The easiest way to find an estimated sum is to round each summand. Here, 2.89 rounds up to 3, 4.5 rounds up to 5, 1.35 rounds down to 1, 4.68 rounds up to 5, and 8.25 rounds down to 8. Therefore, we add $3 + 5 + 1 + 5 + 8 = 22$.

16. D. The easiest way to find an estimated sum is to round each summand. Here, 4.78 rounds up to 5, 9.63 rounds up to 10, 1.6 rounds up to 2, 8.31 rounds down to 8, and 6.21 rounds down to 6. Therefore, we add $5 + 10 + 2 + 8 + 6 = 31$.

17. B. Looking at the markings on the side of each container, we see that the container on the left is divided into fourths (and the shading goes up to $\frac{3}{4}$), while the container on the right is divided into thirds (and the shading goes up to $\frac{2}{3}$). The total amount of lemonade is $\frac{3}{4} + \frac{2}{3}$, which can be added as $\frac{9}{12} + \frac{8}{12} = \frac{17}{12}$, or $1\frac{5}{12}$, which is closest to 1.5.

18. C. Looking at the markings on the side of each container, we see that the container on the left is divided into fourths (and the water goes up to $\frac{3}{4}$), while the container on the right is divided into fifths (and the water goes up to $\frac{3}{5}$). The total amount of water is $\frac{3}{4} + \frac{3}{5}$, which can be added as $\frac{15}{20} + \frac{12}{20} = \frac{27}{20}$, or $1\frac{7}{20}$, which is closest to 1.5. Then, multiply by 2 (since there are 2 cups of water in each bottle).

Alternatively, since bottle 1 contains 2 cups, and it is $\frac{3}{4}$ full, then it contains about 1.5 cups of water.

Since bottle 2 also contains 2 cups, and it is $\frac{3}{5}$ full, then there is more than 1 cup of water, but less than 1.5 cups of water. This means there is more than 2.5 cups of water, but less than 3 cups of water in both bottles. Thus, the correct answer is 3 cups of water

19. C. If we add all the candy together, we get $12 + 9 + 7 + 3 + 2 = 33$ ounces. Dividing by 5 results in 6 $\frac{3}{5}$, which is closest to $6\frac{1}{2}$.

20. B. If we add all the nuts together, we get $11 + 8 + 6 + 3 + 1 = 29$ pounds. Dividing by 6 results in $4\frac{5}{6}$, which is closest to 5.

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21. B. To find an average, we fund the sum of the numbers first, giving us $5 + 7 + 9 + 4 + 3 = 28$. Dividing by 5 results in $5\frac{3}{5}$, which is closest to $5\frac{1}{2}$.

## Charts

1. B. We are told that Rachel spent a total of $21.50, so we can find the amount spent on orange juice by subtracting all the other items she bought: $21.50 – (5 + 4 + 9) = 21.50 – 18 = 3.50$.
2. C. The table gives us the total amount spent on cereal, which is $9. If we now know that one box of cereal costs $3, that means that 3 boxes of cereal were purchased because $9 \div 3 = 3$.
3. B. If Rachel spends $7.50 on 3 additional loaves of bread, then each loaf must cost $7.50 \div 3 = 2.50$. The chart told us that she originally spent $5 on bread, so she must have bought 2 loaves, because $2.50 \times 2 = 5$.
4. C. The table tells us that one box of nails costs $1.50. If Anne bought 4 boxes, she must have spent $1.50 \times 4 = \$6$.
5. B. The table gives us the total amount spent on screws, which is $12.50. If we now know that 5 boxes were purchased, then each box must cost $12.50 \div 5 = 2.50$.
6. D. Regardless of how many boxes of nails were originally purchased, if Anne needs a total of 6 boxes, she will spend a total of $\$1.50 \times 6 = \$9$. If we add this total to the other totals, we get a final total of $5.75 + 9 + 6.50 + 12.50 = 33.75$.
7. A. We are given Quentin's total running time, which is 14 minutes. If he ran 4 laps, then his average time per lap is $14 \div 4 = 3.5$ minutes.
8. C. We are given Sandy's average time per lap, which is 5.75. If we now know that Sandy ran 2 laps, her total running time must be $5.75 \times 2 = 11.5$.
9. C. To compare Parker's total running time to Reed's, we need to calculate Parker's total running time first. The table tells us that his average time per lap was 4.5 minutes. If we know that he ran 3 laps, then his total running time was $4.5 \times 3 = 13.5$. Reed's total time was 12.75 minutes, so Parker spent $13.5 – 12.75 = 0.75$ more minutes running.
10. D. Taylor and Zane spent a total of $\$5 + \$2.50 = \$7.50$ on pie. If 3 slices were bought, then each slice cost $\$7.50 \div 3 = \$2.50$. If Wesley bought 4 slices of pie, then he spent $\$2.50 \times 4 = \$10.00$ on pie, and his total spent at the bake sale was $\$8 + \$3 + \$2.50 + \$10 = \$23.50$.

## Number Lines

1. D. We see that there are 8 spaces between 12 and 44. This means that the number line is counting by 4. If M is 2 units above 12, it must represent $12 + 4 + 4 = 20$.
2. C. We see that there are 7 spaces between 6 and 20. This means that the number line is counting by 2. If A is 1 unit less than 20, it must represent $20 – 2 = 18$.
3. A. We see that there are 5 spaces between 24 and 39. This means that the number line is counting by 3. If R is 4 units less than 24, it must represent $24 – 3 – 3 – 3 – 3 = 12$.
4. A. If we ignore the decimal points, we see that there are 4 spaces between 15 and 35. This means that the number line is counting by 5. If C is 5 units above 35, it must represent $35 + 25 = 60$, which would be 6.0 when we put the decimal point back.
5. C. We see that there are 9 spaces between 100 and 1,000. This means that the number line is counting by 100. If U is 4 units above U, it must represent $100 + 400 = 500$.
6. C. If we ignore the decimal points, we see that there are 7 spaces between 18 and 81. This means that the number line is counting by 9. If A is 2 units above 18, it must represent $18 + 9 + 9 = 36$, which would be 3.6 when we put the decimal point back. Only answer choice C offers 3.6 as the first number.
7. B. If we ignore the decimal points, we see that there are 6 spaces between 42 and 60. This means that the number line is counting by 3. If D is 1 unit above 42, it must represent $42 + 3 = 45$, which would be 4.5 when we put the decimal point back. Point E is 2 more units up, which would be $45 + 3 + 3 = 51$, or 5.1 when we put the decimal point back

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8. A. This number line is just counting by 1. A is 3 units to the left of 0, so we are going into negative integers. 3 less than 0 is –3.
9. B. This number line is just counting by 1. B is 2 units to the right of –3, which is –1.
10. C. We are shown that 0 and 1 are separated by 3 spaces, so this number line is counting by thirds. 2 spaces up from 1 would be an additional two thirds, or $1\frac{2}{3}$.

## Vocabulary & Properties

1. D. Odd numbers end with 1, 3, 5, 7, or 9. Even numbers end with 2, 4, 6, 8, or 0. Neither of these applies to this list of numbers. Prime numbers have exactly 2 distinct factors, but every number in this list has more than 2 factors, which makes them all composite numbers.
2. D. This is not a list of prime numbers because neither 1 nor 6 are prime. It is not a list of multiples of 6 because 1, 2 and 3 are all factors of 6, not multiples (though 6 counts as both). It is not a list of odd numbers because 2 and 6 are even. All four numbers in the list are factors of 12.
3. A. This is not a list of whole numbers because whole numbers are the integers starting at 0 and counting up (0, 1, 2, 3…). It is not a list of negative numbers because neither 0, 1, nor 5 are negative. 1 is not prime. It is a list of integers because integers are any numbers that don't contain fractions or decimals.
4. C. 19 is neither a factor nor a multiple of 9. Every number in the list is a whole number, so they are all rational, not irrational. The only option left is for them to all be prime numbers.
5. C. Composite numbers have more than 2 factors, while 1, 2, and 3 do not have. Prime numbers have exactly 2 factors, which 1, 4, and 8 do not have. 8 is not a factor of 12. The numbers are all whole numbers because they have no fractions or decimals and are not negative.
6. B. Composite numbers are whole numbers with more than 2 factors. Integers have no fractions for decimals. Irrational numbers cannot be written in fraction form. A whole number mixed with a fraction is called a mixed number.
7. C. In this list, only 6 is a factor of 6. Only 6 and 12 are factors of 12. 6 is not a multiple of 12. Every number in the list is a multiple of 6.
8. A. The numbers in this list are not irrational because all whole numbers are rational. 9 is not prime. The only factor of 1 is 1. They are all odd, and they are all in a row, so they are consecutive.
9. B. The commutative property states that you can reverse the order of any addition or multiplication problem, which is what $3 + 5 = 5 + 3$ shows.
10. C. The associative property states that, when adding or multiplying 3 or more numbers, you can order them in any way you like, which is what $9 + (5 + 2) = (9 + 5) + 2$ shows.
11. D. The distributive property states that you can multiply a sum by multiplying each addend separately and then adding the products, which is what $2 \times (3 + 4) = 2 \times 3 + 2 \times 4$ shows.
12. A. The commutative property states that you can reverse the order of any addition or multiplication problem, which is what $ab = ba$ shows.
13. D. The associative property states that, when adding or multiplying 3 or more numbers, you can order them in any way you like, which is what $p + (q + r) = (p + q) + r$ shows.
14. A. The distributive property states that you can multiply a sum by multiplying each addend separately and then adding the products, which is what $x \times (y - z) = (x \times y) + (x \times z)$ shows.

# Algebraic Concepts

## Creating Expressions & Equations

1. A. "More than" means addition. What are we adding 5 to? "The product of a number and 10" which can be written as $10 \times x$ or just $10x$. Thus, the expression is $10x + 5$, or $5 + 10x$ (which are the same because of the commutative property).
2. B. "8 less than" means we must subtract 8 <u>from</u> a value, which means 8 will be at the end of the expression. "The quotient of 2 and a number" can be written as $2 \div y$.

3.  C. "The sum of 5 and" means we are adding 5 to something, but to what? "The product of a number and 9" which can be written as $9 \times z$, or just $9z$.

4.  C. "2 times the sum of a number and 10" can be written as $2 \times (b + 10)$, or just $2(b + 10)$, which eliminates choices A and B. We can find half of a number by either multiplying it by $\frac{1}{2}$, or by dividing it by 2. Choice D shows neither of these, but choice C shows $b \div 2$.

5.  D. First, we are subtracting 3 from a number, not the other way around, which eliminates choices B and C. The other half of the equation shows the product of 2 and the number (or the number and 2, using the commutative property), which eliminates choice A.

6.  A. "The quotient of 4 and the sum of a number and 8" can be written as $\frac{4}{m + 8}$, which only choice A shows.

7.  C. Choices A and B both say "nine more than" which would be addition, so we eliminate those. Choice D says "the sum of two and the number" which again would be addition, but we want multiplication, so we are left with choice C.

8.  B. If each pair of pants costs $p$ dollars, then the cost of 3 pairs can be written as $3p$. If she also bought a \$15 shirt, then her total cost is $15 + 3p$, which is equal to 39 as we know that is the total amount spent.

9.  B. Lana bought 3 items, so we can first find the sum of their costs $(4 + 7 + c)$ and then subtract that sum from 40. Only choice B shows this.

10. C. If Mallory jumped farther, then $x$ is greater than $y$. To find out how much farther, we subtract the smaller value, $y$ from the larger value, $x$, giving us $x - y$.

11. A. Since we are given the formula of a triangle, we can multiply both sides by 2, giving us $2a = bh$. Finally, we divide both sides by $b$ in order to isolate $h$.

12. B. If Ahmed and Beatriz have a total of 24 apples, then $a + b = 24$. Using our fact families, we can then state that $24 - b = a$, which is the same as $a = 24 - b$.

13. B. If Constance ate c cookies each day for d days, then she ate a total of $c \times d$, or just $cd$, cookies, which equals 36. Using fact families, we can then state that $36 \div d = c$, which can also be stated as $c = \frac{36}{d}$.

14. C. If we know the perimeter of a rectangle, we can find the missing width by first subtracting twice the length, and then dividing the difference by 2.

15. C. If the payers drank $b$ bottles, then there are $24 - b$ bottles left, which can be written as $24 - b = r$. Using fact families, we can also write this as $24 - r = b$.

16. B. If each box contain $p$ pens, and the teacher will buy $b$ boxes, she will buy $p \times b$, or just $pb$, pens, which will equal 100.

17. A. If everyone's food cost the same amounts, then we can first take the total cost (36) and divide it by 3 people ($\frac{36}{3}$), giving us the amount that each person spent. Subtracting the drink, $d$, from the quotient will leave us with the cost of the sandwich, $s$.

18. D. If Flor read $f$ books per week for $w$ weeks, then she read a total of $f \times w$, or just $fw$, books, which should equal 60.

19. A. If a mango weighs twice as much as a tangerine, $t$, then a mango weighs $2t$. If we add this weight to the 2 tangerines, which can also be represented as $2t$, then we get $4t$, which equals 12 ounces.

20. B. The distances the train traveled were $m$, $2m$, and $3m$, for a total of $6m$ miles. Since that total is equal to 36 miles, we can write the equation $6m = 36$.

## Solving Algebraic Equations

1.  C. To find the sum of $m + n$, we need to find the values of $m$ and $n$ first. If $6 + m = 10$, then $m = 4$, and if $6 - n = 4$, then $n = 2$. Therefore, $m + n = 4 + 2 = 6$.

2. C. One way to solve is to perform inverse operations to isolate the variable $x$. If we add 6 to both sides, we get $2x = 14$. Dividing both sides by 2 results in $x = 7$.

3. A. We can perform inverse operations to isolate the variable $y$ by first subtracting 8 from both sides, giving us $9y = 36$. Dividing both sides by 9 results in $y = 4$.

4. B. We must figure out what $a$ and $b$ are separately. $12 - 8 = 4$, so $a = 4$, and $4 \times 3 = 12$, so $b = 3$. Therefore, $a - b = 8 - 3 = 5$.

5. D. We can perform inverse operations to isolate the variable $z$ by first subtracting 7 from both sides, giving us $\dfrac{18}{z} = 3$. The fraction bar means division. Using our division facts, we know that $18 \div 6 = 3$, so $z = 6$.

6. C. We can perform inverse operations to isolate the variable [] by first dividing both sides of the equation by 3, leaving us with $[] + 5 = 9$. Subtracting both sides by 5 results in $[] = 4$.

7. D. $30 \div 2 = 15$, so $x = 30$, and $13 + 2 = 15$, so $y = 13$. Therefore, $x - y = 30 - 13 = 17$.

8. A. We can perform inverse operations to isolate the variable $x$ by first subtracting 6 from both sides of the equation, leaving us with $\dfrac{24}{x} = 6$. Using our division facts, we know that $24 \div 4 = 6$, so $x = 4$.

9. B. We can perform inverse operations to isolate the variable $\Delta$ by first dividing both sides of the equation by 7, leaving us with $\Delta - 8 = 4$. Adding 8 to both sides results in $\Delta = 12$.

10. D. Solving for $p$ and $q$ separately, we know that $54 \div 6 = 9$, so $p = 6$, and $9 \times 1 = 9$, so $q = 1$. Therefore, the product of $p$ and $q$ is $6 \times 1 = 6$.

11. C. We can try plugging in each answer choice. Only 10 results in a true sentence: $5 = 35 - 3(10)$.

12. A. If we add $b$ to both sides, we get $12 = 8 + 2b$. Subtracting 8 from both sides gives us $4 = 2b$. Finally, dividing both sides by 2 results in $b = 2$.

13. A. To find the quotient of $a \div b$, we need to find the values of $a$ and $b$ first. If $a \div 4 = 7$, then $a = 28$, and if $33 - b = 19$, then $b = 14$. Therefore, $a \div b = 28 \div 14 = 2$.

14. B. We can perform inverse operations to isolate the variable $x$. If we add 2 to both sides, we get $3x = 12$. Dividing both sides by 3 results in $x = 4$.

15. A. We can perform inverse operations to isolate the variable $c$. If we subtract 9 from both sides, we get $7c = 21$. Dividing both sides by 7 results in $c = 3$.

16. D. We can perform inverse operations to isolate the variable $\Delta$. If we multiply 12 on both sides, we get $\Delta - 2 = 72$. Adding 2 to both sides results in $\Delta = 74$.

## Functions

1. D. To solve any input/output question, figure out what operation is being performed in each pair of numbers. Here, the input number is getting subtracted by 4 each time. Since the problem tells us the output number must be 20, we think "what number must have 4 subtracted from it in order to equal 20?" The answer is 24 because $24 - 4 = 20$.

2. C. Try each answer choice. The first option is $x + 3 = y$. $1 + 3 = 4$, but $2 + 3$ does not equal 6, so that choice doesn't work. Next, $1 \times 4 = 4$ but $2 \times 4$ does not equal 4, so that option doesn't work either. Choice C says $(x \times 2) + 2$, which works because $(1 \times 2) + 2 = 4$ and $(2 \times 2) + 2 = 6$.

3. C. First, figure out the operation. In the fourth row, to go from 8 to 25, you can multiply by 3 and add 1. This also works for the other rows, so that is the operation. Therefore, $15 \times 3 + 1 = 46$.

4. D. To go from input to output, we add 8 each time. Therefore, we simply add 8 to 9 to get the answer, which is 17.

5. D. To go from 30 to 14, we can divide by 2 and then subtract 1. This works for all the other pairs as well, so that is the operation. Now just try that operation on all four answer choices. Only $42 \div 2 - 1$ equals 20.

6. B. The operation here is trickier, so try figuring it out from one of the "friendlier" numbers, like 30. If we divide by 3 and then add 2, we get the output number. Now just perform that operation on 3 to see what output we get: $3 \div 3 + 2 = 3$.

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7. B. If we try the last row, it is easier to see that the operation is multiply by 5, then add 1. Performing this operation on 0 gives us 1.

8. C. Looking at the last complete row, we see that an input of 4 results in an output of 15. We could add 12, but that doesn't work with any other row. We could multiply by 4 and subtract 1, but that also doesn't work anywhere else. The correct operation is to multiply by 3 and add 3. If we perform that operation on all four answer choices, only 9 results in an output of 30.

9. C. Looking at the last complete row, we can see that an input of 8 results in an output of 49. The operation is "times 6, plus 1." Trying each answer choice, we see that only 11 results in an output of 67.

10. C. Looking at the last row, we can see that dividing 33 by 3 and then adding 3 results in 14. Performing this operation on 27, results in $27 \div 3 + 3 = 12$.

11. D. Going through each answer choice, we see that 6 is not being added to every input number. Every input number is also not being multiplied by 3 or 7. Every input number is being multiplied by itself, but which is shown by exponents.

12. C. Looking at the last complete row, we can see that an input of 4 results in an output of 18. The operation is "times 4, plus 2." Trying each answer choice, we see that only 7 results in an output of 30.

13. C. Looking at the last complete row, we can see that an input of 7 results in an output of 19. The operation is "times 2, plus 5." Trying each answer choice, we see that only 12 results in an output of 29.

14. B. Looking toward the end of the list, we can see that the output begins to be smaller than the input. This can mean that there is division involved. The pattern is "divide by 2, plus 3." Following this pattern with 18 results in $18 \div 2 = 9$. Then $9 + 3 = 12$.

15. A. Going through every answer choice, we see that each output, $q$, is the input, $p$, plus 4. The outputs are not a result of multiplication or subtraction.

## Patterns

1. C. For problems involving visual patterns, try to turn the pictures into numbers. The first row has 1 circle, the second row has 2, the third row has 3, and so on. This means the next two rows will have 6 and 7 circles. Adding up every number from 1 through 7 results in 28.

2. D. If we turn the pictures into numbers, we see that the first row has 1 square, the second row has 3 squares, the third row has 5 squares, and so on. Therefore, the pattern is 1, 3, 5, 7, 9, 11, 13. The seventh number in the pattern is 13.

3. D. If we find the difference between each pair of consecutive numbers in the pattern, we see that we are adding 1, then 3, then 5, then 7. Therefore, the sixth number will be $17 + 9 = 26$, and the seventh number will be $26 + 11 = 37$.

4. D. After the first dot, each item in the pattern is an equilateral triangle. The numbers represented by the pattern are 1, 3, 6, 9, so each triangle (after the first dot) is increased by 3. The fifth figure will have 12 dots, and the sixth figure will have 15 dots.

5. D. We see that each figure has an extra row. The top row of each figure has one more square than the figure before it, so the next figure will have 5 squares on top. Then, each row under has an additional 2 squares, so the next figure will be $5 + 7 + 9 + 11 + 13 = 45$.

6. B. If we calculate the difference between each pair of consecutive numbers, we can see that, starting with 0, we are adding 1, 0, 1, 1, 2, 3, 5, 8, and 13. Except for the first number, this list is the same as the list of numbers itself. Therefore, the next number will be $34 + 21 = 55$.

7. D. The numbers represented by the figures are 4, 8, 12, and 16, so the pattern is plus 4. The seventh number in the pattern will be $16 + 4 + 4 + 4 = 28$.

8. A. If we find the difference between consecutive numbers in the pattern, it might not be easy to recognize a pattern. Therefore, try multiplication. Each number after the first is found by multiplying 2, then 4, then 6. The next number must be $48 \times 8 = 384$.

9. C. The numbers represented by the rows in the pattern are 3, 4, 5, and 6, so the next few rows will be 7, 8, and finally 9, which represents the seventh row.

10. D. If we find the difference between consecutive numbers in the pattern, we see that we are adding 3, then 9, then 27. These are all powers of 3. The next number to add is $27 \times 3 = 81$, so $40 + 81 = 121$.

11. B. If we find the difference between consecutive numbers in the pattern, we see that we are adding 1, then 2, then 4, then 8. These are all powers of 2. The next number to add is $8 \times 2 = 16$, so $17 + 16 = 33$.

## Proportions

1. D. If Sam can read 3 pages every 2 minutes then his unit rate is 1.5 pages per minute. Therefore, in 12 minutes he can read $12 \times 1.5 = 18$ pages.

2. B. The city has a population of 50,000, which is 50 times the rate given. Therefore, they can expect $13 \times 50 = 650$ births.

3. A. We must make sure that the units match in any proportion/rate problem. Here, the given rate includes minutes, but Staz walks 2 hours, so we turn 2 hours into 120 minutes. This is 4 times as much as 30 minutes, so $2 \times 4 = 8$ miles.

4. B. The given rate includes hours, but we are told Rose will drive 150 minutes, so we can turn that into 2.5 hours. This is 2.5 times as much as one hour, so Rose will drive $50 \times 2.5 = 125$ miles.

5. B. 4 hours is equal to 240 minutes, which is 6 times as much as the 40 minutes given in the initial rate. Therefore, Audrey will walk $2 \times 6 = 12$ miles.

6. D. One hour is 60 minutes, or 20 times as much as the 3 minutes given in the initial rate, so Danny will read $10 \times 20 = 200$ pages.

7. A. 2 minutes is equal to 120 seconds, which is 6 times as much as 20 seconds. Therefore, the factory will produce $8 \times 6 = 48$ donuts. However, the problem asks how many dozens the factory will produce. 48 is equal to 4 dozen.

8. B. 10 meters is 2.5 times as much as 4 meters, so the blueprint will show $1.6 \times 2.5 = 4$ meters.

9. C. $3.50 is 3.5 times as much as one dollar, so Tom can get $120 \times 3.5 = 420$ yen.

10. B. 9 is 1.5 times as much as 6, so it rained $2.4 \times 1.5 = 3.6$ inches.

11. D. 15 minutes is 5 times the 3 minutes given in the initial rate, so Derek will solve $5 \times 5 = 25$ problems.

12. D. Six months is equal to half a year, which means that the population should double four times over two years. So, if the original population of four is doubled four times, the final number of rabbits will be 64.

13. C. We must make sure that the units match in any proportions/rate problem. Here, the given rate includes minutes, but Konstantyn swims for 3 hours, so we turn 3 hours into 180 minutes. This is 6 times as much as 30 minutes, so $12 \times 6 = 72$ laps.

14. C. The given rate includes hours, but we are told that Oliver will be on the train for 240 minutes, so we can turn that into 4 hours. This is 4 times as much as one hour, so Oliver will travel $20 \times 4 = 80$ miles.

15. A. 6 years is equal to 72 months, which is 24 times as much as 3 months. Therefore, the company will publish $5 \times 24 = 120$ books. However, the problem asks how many dozens the company will publish. 120 is equal to 10 dozen.

16. C. 5 is 2.5 times as much as 2, so it snowed $3.6 \times 2.5 = 9$ inches.

# Geometry

## Geometric Objects

1. B. The shape shown has two pairs of parallel sides, and all 4 sides seem to be congruent. It can't be a trapezoid because a trapezoid has only one pair of parallel sides. It can't be a square because a square has 4 right angles. It can't be a pentagon because a pentagon has 5 sides. Of the given choices, only the rhombus has four congruent sides and doesn't require right angles.

2. A. The shape looks like a rectangle, but that is not an option. However, a rectangle is a type of parallelogram.

3. A. The given shape has 6 sides, so it is a hexagon. A pentagon has 5 sides, and octagon has 8 sides, and a rhombus has 4 sides.
4. C. The given shape has 5 sides, so it is a pentagon. A hexagon has 6 sides, an octagon has 8 sides, and a quadrilateral has 4 sides.
5. D. If we complete the drawing ourselves, we see that we need two squares on top with a 3-by-3 box of squares below it.
6. A. There are 15 unit squares, 8 double-size squares (measure 2 by 2), and 3 triple-size squares (measuring 3 by 3), for a total of 26.
7. C. Do not be fooled! Choice A only creates a 6-by-5 rectangle. In order to be a square, we need an extra row of 6 boxes at the bottom.
8. C. There are 12 unit rectangles, 6 double-size rectangles, and 2 triple-size rectangles, for a total of 20.

## Symmetry, Congruency, Similarity

1. D. The parallelogram has 0 lines of symmetry, the hexagon has 6, and the triangle has 1. Only the square has 4.
2. D. The arrow has 1 line of symmetry but the parallelogram has 0. The $\frac{3}{4}$ circle has 1 line of symmetry but the full circle has infinite lines of symmetry. The square-within-a-square has 4 lines but the heart has only 1. The two isosceles triangles each have 1 line of symmetry.
3. D. The figure shows the left side of a heart, which will have 1 line of symmetry when completed by choice D.
4. C. Congruent shapes are exactly the same shape and size, but can be in different positions or orientations. Choice C is the exact same shape and size as the given figure; it is just upside-down.
5. B. Congruent shapes are exactly the same shape and size, but can be in different positions or orientations. Choice C is the exact same shape and size as the given figure; it is just upside-down.
6. C. Congruent shapes are exactly the same shape and size, but can be in different positions or orientations. Choice C shows two shapes that are the exact same shape and size; one is just upside-down.
7. B. Similar figures are the exact same shape, but different sizes. The given figure is an isosceles right triangle. Only choice B matches this.
8. D. Similar figures are the exact same shape, but different sizes. Only choice D shows two figures that are the exact same shape, just differently-sized.
9. D. Only choice D is the exact same shape. Choices A and C are also pentagons, but their proportions are not the same.
10. C. A vertex is a corner. The cube shown has 4 corners at the top and 4 at the bottom, for a total of 8.
11. D. The cube shown has 4 edges that lie flat along the top face, 4 that lie flat along the bottom face, and 4 that are vertical, for a total of 12.
12. C. The figure has 1 face on top, 1 on the bottom, and 3 that stand along the sides, for a total of 5.

## Coordinate Grids & Transformations

1. C. The *x*-coordinate always comes first. Point *P* matches with 5 on the *x*-axis and 3 on the *y*-axis, so its coordinates are (5, 3).
2. B. Point Q matches with 3 on the *x*-axis and 6 on the *y*-axis, so its coordinates are (3, 6).
3. A. If we draw of rough sketch of the four coordinate points, we can see that they create a rectangle.
4. A. If we draw of rough sketch of the four coordinate points, we can see that they create a parallelogram.
5. B. If we draw of rough sketch of the four coordinate points, we can see that they create what seems to be a parallelogram, but that is not an answer choice. The four sides seem to be the same length, so it must be a rhombus.
6. D. To reflect over line *m*, just flip the point over the line. It should now be in the top right section of the grid. Only choice D shows this.

7. B. If we reflect over line *m* first, then point *Q* ends up in the top left section of the grid. If we then reflect over line *n*, point *Q* is now in the bottom right section. Only choice B shows this final result.
8. A. To fold point *M* over to point *N*, we only need to reflect it over line *p*.
9. D. If point *L* is shifted 3 units down, it ends up at (1, 1). If it is then shifted 1 unit to the right, it ends up at (2, 1).
10. C. If point *M* is shifted 3 units up, it ends up at (–3, 2). If it is then shifted 4 units to the right, it ends up at (1, 2).
11. A. If point *N* is shifted 2 units up, it ends up at (5, 0). If it is then shifted 5 units to the left, it ends up at (0, 0).
12. B. If point *W* is shifted 3 units down, it ends up at (4, –1). If it is then shifted 2 units to the left, it ends up at (2, –1).

# Measurement

## Area & Perimeter of Polygons

1. A. The perimeter of a figure is the sum of the lengths of its sides. In this hexagon, it is $7 + 7 + 5 + 6 + 6 + 8 = 39$ cm.
2. A. A regular polygon has sides of equal length. Since the perimeter is the sum of the lengths of its sides, and we know that the total is 65, then we can divide the perimeter by the number of sides to find the length of each side. This is $65 \div 5 = 13$ in.
3. B. A square's sides are all the same length, so the area of a square is $s^2$, or $s \times s$, where $s$ is the length of a side. We can find the area of a square by finding out what number squared (multiplied by itself) gives us 64 in$^2$. We can take the square root of 64 to find out, which is 8. The question asks for the perimeter, though, which means we have to add together the length of each of the 4 sides. This means the perimeter is $8 \times 4 = 32$.
4. C. Divide the perimeter by the number of sides, since the sides all have an equal length in a regular polygon. This is $96 \div 8 = 12$.
5. B. The original area of the rectangle is $3 \times 5 = 15$ in$^2$. If the photograph is enlarged, so the length and width are doubled, the enlargement will have an area of $2(3) \times 2(5) = 60$ in$^2$. The question asks how many times larger the enlargement will be, so $60 \div 15 = 4$.
6. A. The perimeter of a rectangle is $2(length) + 2(width)$, so we only need to multiply the dimensions in each choice by 2 and add them together to see if the choice DOES NOT equal 48. The first choice gives us $12 + 16 = 28$, which is NOT equal to 48. There will only be one correct answer, so don't waste time trying the other choices.
7. B. There are 5 outer triangles, with a total perimeter of $5 \times 20 = 100$. However, the base of each triangle shares a side with the regular pentagon, which we are told has a perimeter of 20. So, the legs of the triangles make up the perimeter of the star. We can find this by subtracting the bases from the total perimeter of all the triangles; this is $100 - 20 = 80$.
8. D. The perimeter of a square is simply $4s$, or 4 times the length of a side. This is $12 \times 4 = 48$ cm. This is also equal to the perimeter of the rectangle, which we know has a length of 9. We need to know the width of the rectangle in order to find its area. The perimeter of the rectangle can be given as $48 = 2(9) \times 2(w)$, where $w$ is the width and 9 is the length. Combine like terms: $30 = 2w$. Then, isolate the $w$ by dividing both sides by 2: $w = 15$. The area of the rectangle, then, is $9 \times 15 = 135$ cm$^2$.
9. C. The perimeter of a triangle is the sum of the lengths of its sides. Notice that $11 + 3 + 13 = 32$, not 31, so the third choice is incorrect.

10. C. If the length of the swimming pool is 10, and the width is 12, then the length of the swimming pool is 10 + 4 + 4 = 18, since on either end is the 4 foot wide patio. Similarly, the width is 12 + 4 + 4 = 20. This makes the perimeter 2(18) + 2(20) = 76.

11. D. One packet of seeds can cover an area of 10 × 10 = 100 ft². Monty's garden is 16² = 256 ft². 2 packets of seeds could cover an area of 2 × 100 = 200 ft². The amount of area uncovered would be 256 – 200 = 56 ft².

## Area of Shaded Figures

1. B. To find the area of a shaded figure, find the total area of the larger figure and subtract from it the area of any figure that is not shaded. Since the walkway surrounds the entire swimming pool, and is 2 m wide, then we must add 2 to each side of the swimming pool to find the dimensions of the walkway. The swimming pool has sides 6 m and 8 m, while the walkway has sides 6 + 2 + 2 = 10 m and 8 + 2 + 2 = 12 m. The area of the walkway, including the pool, is 10 × 12 = 120 m². The pool has an area of 6 × 8 = 48 m². So, the area of just the walkway, the shaded area, is 120 – 48 = 72m².

2. C. The total area of the figure is 14 × 12 = 168 yds², but the garden is unshaded, and has an area of 9 × 11 = 99 yds². The shaded area, then is 168 – 99 = 69 yds².

3. A. The large figure has an area of 10 × 10 = 100 in². There are 4 unshaded squares, each with an area of 2 × 2 = 4 in². The total area of the unshaded squares is 4 × 4 = 16 in², so the area of the shaded portion is 100 – 16 = 84 in².

4. C. We can break the shaded figure up into two parts – a triangle on top, and a rectangle on bottom. The rectangle on the bottom has a width of 6, and a height of 5, since the height of the triangle is 5, and the entire height of the figure is 10. So, the rectangle has an area of 6 × 5 = 30 units². The triangle on top is actually half the size of the rectangle below it, so it must have an area of 15 units². The combined area is 45 units².

5. A. Since $E$ is the midpoint of the top side of the square, and we know that the figure has equally long sides (since it is a square), we could draw a line down from $E$ to the bottom side and split the figure in half. Since the area of the entire square is given as 36 in², then half of this is 18 in². However, we can see that the shaded area represents half of half, or 18 ÷ 2 = 9 in².

6. B. The total area of the triangle is $\frac{1}{2}(base)(height)$, or in this case, $\frac{1}{2}(12)(12) = 72$ units². The shaded area is on the left half of the triangle, so at most, it could have an area of 36 units². We can subtract the area of the small unshaded triangle on top of the shaded area from the area of half the large triangle. The former is $\frac{1}{2}(3)(6) = 9$ units². So, the area of the shaded area must be 36 – 9 = 27 units².

7. A. This looks complicated, but we can break up the shaded figure further to see that it represents exactly half of the entire triangle's area. If we drew a line from $D$ to the hypotenuse, and from $G$ to the hypotenuse, then we would form a square and two smaller triangles, half of each of which are shaded. The area of the triangle is $\frac{1}{2}(6)(6) = 18$ m², so the area of the shaded figure is 9 m².

8. B. Since the total length of each side is 10, and the length from $BE$ and $DF$ are 6, the length from $CE$ to $CF$ is 4. The entire area of the square is 10 × 10 = 100 in². We could calculate the area of the shaded figure by taking half the area of the square and subtracting the area of the small unshaded

triangle *CEF*. Half the area of the entire square is 50 in². The area of the small unshaded triangle is $\frac{1}{2}$

(4)(4) = 8 in². So, the area of the shaded figure is 50 – 8 = 42 in².

9.  D. The area of square *ABCD* is 64 cm², as given. If we draw a line from *E* to *G* and *H* to *F*, we split the square into four smaller squares. We see that each of these smaller squares is split in half diagonally by four shaded triangles. So, the area of the shaded square is half of that of the larger square, or 32 cm².

## Volume & Surface Area

1.  C. The small shaded cube can fit into the larger cube $3^3 = 27$ times, since the larger cube measures 3 small cubes wide by 3 small cubes long by 3 small cubes high (or 3 × 3 × 3). If the volume of the small cube is 2 ft³, then the larger cube has a volume of 2 × 27 = 54 ft³.

2.  B. The small shaded cube can fit into the larger cube $3^3 = 27$ times, since the larger cube measures 3 small cubes wide by 3 small cubes long by 3 small cubes high (or 3 × 3 × 3). The combined volume of the 2 small cubes is 8 m³, which means 1 small cube has a volume of 8 ÷ 2 = 4 m³. So, the larger cube has a volume of 4 × 27 = 108 m³.

3.  C. The small shaded cube can fit into the larger cube $3^3 = 27$ times, since the larger cube measures 3 small cubes wide by 3 small cubes long by 3 small cubes high (or 3 × 3 × 3). If the volume of the larger cube is 27,000 yds³, then the small cube has a volume of 27,000 ÷ 27 = 1,000 yds³.

4.  B. The length of a cubes sides are all the same. The area of each face is simply the length times the width, or 1 × 1 = 1. There are 6 sides to a cube, so the total surface area is 6 × 1 = 6 in².

5.  D. Each face of the cube has an area of 4 × 4 = 16 in². There are 6 faces, so the total area is 16 × 6 = 96 in².

6.  B. This is not a cube, so we must be careful to calculate each face. The top and bottom of the prism will have the same areas, as will the front and back, and the left and right sides. The top of the prism has an area of 3 × 5 = 15 in². The front has an area of 5 × 4 = 20 in². The right side has an area of 3 × 4 = 12 in². The sum of these is 15 + 20 + 12 = 47. Remember to multiply by 2, since there 6 sides total. This gives us 94 in².

## Irregular Shapes

1.  C. The perimeter of a shape is the sum of the lengths of all of the sides. We know that before it was cut, the rectangle had a perimeter of 11 + 11 + 8 + 8 = 38. Once the square with a length of 3 was cut out, the perimeter became 3 + 3 = 6 longer, because this created two additional sides to add to the shape.

2.  D. Since this is a parallelogram, we know that opposite sides are parallel. This means we simply multiply the width by the length (the height, in this case). 14 × 4 = 56 mm². We could imagine that we cut the triangle formed by the dotted line off of the parallelogram, and move it to the right, below the diagonal side on the right-hand-side of the parallelogram. This would form a rectangle.

3.  A. The area of a trapezoid is the average of the bases times the height. This is (15 + 9) ÷ 2 = 12. The area, then, is 12 × 8 = 96 in².

4.  C. We could form a larger figure by extending the bottom-most side and the right-most side until they meet in the lower right-hand corner of the figure. This would give the figure a length of 6 + 8 = 14, and a width of 5 + 7 = 12. The area of this new figure would be 14 × 12 = 168, but we would have to subtract the area that we added to the old figure to make the new one. This would be 7 × 8 = 56. So, the original figure has an area of 168 – 56 = 112 m².

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5. D. The perimeter is simply the sum of the length of all of the sides. The top-most side would have a length of 5 + 7 = 12. The left-most side would have a length of 6 + 8 = 14. The perimeter, then, is 12 + 14 + 6 + 7 + 8 + 5 = 52 m.

6. A. The two cards, side by side, have a combined width of 4 + 4 = 8. The length would remain at 10 inches. Thus, the perimeter would be 2(8) + 2(10) = 36 in.

7. B. Since Jessica cut out a piece of the square and tapes it to the other side of the square, the area doesn't change. The original paper had dimensions of 9 and 12, so the area was 9 × 12 = 108 in². 

8. D. While the area doesn't change, the perimeter does. The original perimeter was 2(9) + 2(12) = 42 in. The square cutout has added several new sides to the figure. The two vertical sides measuring 4 in. don't add to the total perimeter of the figure, since they would have been counted in the original figure. However, the 4 new horizontal sides measure 4 in. each do. This adds 4 × 4 = 16 inches to the perimeter, bringing it to 42 + 16 = 58 in.

9. A. The height of the triangle has a length of 6, since it was once the opposite side of the rectangle (and opposite sides of a rectangle have the same length). The base of the triangle has a length of 12 – 8 = 4, since the entire bottom side of the figure was once 12. The area of a triangle is $\frac{1}{2}$ (*base*)(*height*), or in this case, $\frac{1}{2}$ (4)(6) = 12 in². The area of the rectangle was 12 × 6 = 72 in². What remains of this is 72 – 12 = 60 in².

10. D. If one piece has an area of 30 in², and we know its width is 5 in, then its length must have been 30 ÷ 5 = 6 in. If the other piece has an area of 10 in², and we know its width is 5 in, then its length must have been 10 ÷ 5 = 2 in. The length of the original piece of paper, then, is 6 + 2 = 8 in.

## Appropriate Units

1. A. Quarts measure volume, and yards measure distance. Only ounces and tons measure mass (weight). Ounces are best used to measure things that people can carry; tons are best used to measure things that most people can't carry – very heavy things, like cars, elephants, etc.

2. A. Pounds measure weight (mass), as do tons. Both feet and miles measure distance (length), but miles are used to measure very long distances, like the distance between cities, not the length of a car.

3. B. A yard is not a measure of capacity, neither is a pound. A bathtub can fit many, many cups of liquid – so many that we may not be able to understand what the measurement really represents (for example, a bathtub could contain 1,200 cups). Instead, use gallons, which helps make the number more manageable to understand (for example, the 1,200-cup-capacity bathtub holds 75 gallons).

4. A. The only measure of temperature shown is degrees. Grams measure mass (weight), inches measure distance, and liters measure capacity.

5. C. Meters measure distance, while grams measure mass (weight). Grams are very small, so the weight of an adult man would be expressed in a very large number that wouldn't make much sense. Instead, we can use kilograms, since there are 1,000 in every 1 kilogram.

6. C. Pints measure capacity, not distance. Inches and centimeters are very small – best use to measure small items, like pieces of paper, etc. Instead, meters, like feet, measure medium distances.

7. C. Grams are not a measure of capacity, but of mass. The capacity of a suitcase (which fits things like clothing, and other items) is too large to measure in milliliters, which are very small. We use milliliters to measure the amount of things that can fit into small bottles, for example. Instead, use liters.

8. B. New York and Los Angeles are very far apart (the entire width of the country). We would have a ridiculously high (and difficult to understand) number if we were to measure it using small units, like millimeters, centimeters, or even meters. Instead, we use the highest unit, or kilometers.

9. C. Cups measure capacity, and feet measure distance. Only ounces and tons measure mass (weight). Ounces are best used to measure things that people can carry; tons are best used to measure things that most people can't carry – very heavy things, like cars, elephants, etc.

10. B. Yards are not a measure of capacity. A pool can fit many, many cups and pints of liquid. Instead, use gallons, which will help make the number much more manageable to understand.

11. B. The only measure of temperature shown is degrees. Cups and liters measure capacity, while feet measure distance.

12. A. Liters and milliliters measure capacity. Milligrams is too small a unit to measure the mass of a backpack, so the best unit is kilograms.

13. C. Neighbor's houses are generally not too far from one another, but they are also not immediately touching. So, kilometers would be too far, and centimeters and millimeters would be too close. Meters would therefore make the most sense.

14. C. Los Angeles is 2 hours ahead of Honolulu, based on the information provided. If the flight arrived in Los Angeles at 2 PM Los Angeles time, then we know it arrived in Los Angeles at 12 PM Honolulu time. If it left Honolulu at 6 AM Honolulu time, then it flew for a total of $12 - 6 = 6$ hours.

## Converting Units

1. D. The perimeter of a rectangle can be found by adding together the length of its sides. The 2 lengths of a rectangle are the same length, and the 2 widths of a rectangle are the same length. So, the perimeter can be given as $2(3) + 2(1) = 8$ meters. However, the question asks for the perimeter in millimeters. There are 1,000 millimeters in 1 meter, so the perimeter is $8 \times 1,000 = 8,000$ millimeters.

2. D. The area of a rectangle can be found by multiplying the length times the width. There are 100 centimeters in 1 meter, so the length can be given as $3 \times 100 = 300$ cm, and the width can be given as $4 \times 100 = 400$. Therefore, the area is $300 \times 400 = 120,000$. Notice that we cannot simply multiply the length and width in meters and multiply by 100 (this would give us $12 \times 100 = 1,200$). Instead, we could multiply the length and width in meters and multiply by 100 and 100 again, for each of the measurements given in meters.

3. D. The combined weight is $60 \times 3 = 180$ kg, since each person weighs the same. There are 1,000 grams in 1 kilogram. So, the combined weight is $180 \times 1,000 = 180,000$.

4. B. 1 gram = 100 centigrams = 1,000 milligrams. The beef weights $3 \times 1,000 = 3,000$ grams (since there are 1,000 grams in 1 kilogram).. The chicken weighs $6,000 \div 100 = 60$ grams. The pork weighs $50,000 \div 1,000 = 50$ grams. So, in total, the meat weighted 3,110 grams.

5. B. 1 liter = 100 centiliters = 1,000 milliliters. He needs 3 liters, which equals $3 \times 1,000 = 3,000$ milliliters. He has 30 centiliters, which is 300 milliliters. He also was given 30 milliliters, so he has 330 milliliters in total. Therefore, he needs $3,000 - 330 = 2,670$ milliliters.

6. B. The answer choices are given in liters, so we should convert to liters. 500 centiliters = $500 \div 100 = 5$ liters. If he poured out 300 milliliters, we could say he poured out $300 \div 1,000 = 0.3$ liters. Then, he added 8 liters. In total, the amount of water in the beaker is $5 - 0.3 + 8 = 12.7$ liters.

7. B. The answer choices are given in meters, so we must convert the values into meters. There are 100 centimeters in 1 meter, so on Tuesday and Wednesday, it crawled $1,400 \div 100 = 14$ meters each day.

On Thursday, it crawled 20,000 ÷ 1,000 = 20 meters (since there are 1,000 millimeters in 1 meter).

The question doesn't ask for the sum, but the mean: $\dfrac{12+14+14+20}{4}=15$ .

8. D. If 1 inch is given as 2.5 centimeters, then the two cities that are 50 inches apart on the map are 50 × 2.5 = 125 centimeters apart.

9. C. Since 1 gallon equals 4 quarts, 3 gallons equals 4 × 3 = 12 quarts. If 1 quart = 2 pints, then 12 quarts = 24 pints. Since each glass is exactly 1 pint, then she ca fill 24 glasses.

10. A. The question asks for the amount of juice left in cups. So, we must use the information to convert. 1 gallon = 4 quarts, 1 quart = 2 pints, and 1 pint = 2 cups. This means 1 gallon = 4 × 2 × 2 = 16 cups. 1 quart, or 1 × 2 × 2 = 4 cups was spilled. 1 pint, or 2 cups, was drunk. So, of the 16 cups, 6 are gone, so 10 remain.

11. D. Since 1 yd = 3 ft, and 1 ft = 12 inches, then 40 yards is equal to 40 × 3 × 12 = 1,440 inches.

12. B. There are 3 feet in every 1 yard, so 1,500 feet equals 1,500 ÷ 3 = 500 yards.

13. D. If 1 ton = 2,000 pounds, then half a ton equals 2,000 ÷ 2 = 1,000 pounds. Since 1 pound = 16 ounces, then 1,000 pounds equals 1,000 × 16 = 16,000 ounces.

14. D. 2 tons equals 2 × 2,000 = 4,000 pounds. If the car weighed only 3,900 pounds after the four tires were taken off, then the weight of the four tires weighed a total of 4,000 – 3,900 = 100 pounds. The question asks for the weight of each tire, or 100 ÷ 4 = 25 pounds.

# Data & Probability

## Probability

1. B. The probability of something can be represented as a fraction, where the numerator represents the thing we want to happen (or are looking for), and the denominator represent all of the different way something could happen. In this case, we "want" Becky to point at a roller coaster. There are 12 roller coasters out of all 20 rides. So, we could say that she has a 12 in 20 chance of pointing at a roller coaster, or express this as $\dfrac{12}{20}$ . This fraction simplifies, since we could divide the numerator and denominator by 4, for $\dfrac{3}{5}$ .

2. C. If there are 6 sides, and each side is numbered 1 through 6, for a total of 6 numbers, then there are 3 even numbers on the cube (2, 4, and 6). Since the event we "want" is an even number, then we could say there is a 3 out of 6. We could show this as $\dfrac{3}{6}=\dfrac{1}{2}$ , or 0.5, or 50%.

3. A. If there are a total of 9 numbered cards in the bag, numbered 1 through 9, then we know we have 5 odd numbered cards (1, 3, 5, 7, 9) out of a total of 9 even AND odd cards. So, the chance of picking an odd numbered card is 5 out of 9. We could show this as $\dfrac{5}{9}$ .

4. D. First, find the total number of books in the library by adding together the number of fiction and non-fiction books. We know there are 20 fiction books, and 20 × 3 = 60 non-fiction books. So, the total is 20 + 60 = 80 books. We "want" to pick a non-fiction book, so we could say there is a 60 in 80 chance of picking a non-fiction book. This is $\dfrac{60}{80}=\dfrac{6}{8}=\dfrac{3}{4}$ , or 0.75 or 75%.

5. D. First, find the total number of candies in the bucket. This is $3 + 4 + 5 = 12$. The question asks what the probability of picking a candy that is NOT red. Since there are 3 red candies, then there are $12 - 3 = 9$ non-red candies. Since this is the value that we "want," we could say there is a 9 out of 12 chance of picking a candy that is NOT red. Or, we could express this as $\dfrac{9}{12} = \dfrac{3}{4}$, or 0.75, or 75%.

6. B. The total number of marbles in the bag is $5 + 7 + 8 = 20$. We "want" to pick a blue marble, and we know that there are 8 blue marbles in total, out of the 20. So, there is an 8 in 20 chance of picking a blue marble out of the bag. This is $\dfrac{8}{20} = \dfrac{2}{5} = 0.4 = 40\%$.

7. C. If there are 36 total envelopes and 21 of them are red, then there are $36 - 21 = 15$ white envelopes. This makes a fraction of 15 out of 36, which reduces to $\dfrac{5}{12}$.

8. A. First, find the total number of records in the collection. The question states that Leo has 4 times as many jazz records as classical music records. This means he has $12 \div 4 = 3$ classical records. Add together to find he has $12 + 3 = 15$ total records. There are 3 out of 15 classical records, which reduces to 1 out of 5. Divide to find the decimal answer: $1 \div 5 = 0.2$.

9. D. There are a total of 8 parts, 5 of which are labeled with numbers greater than 3 (4, 5, 6, 7, 8). So, if we spin the spinner, it has a 5 in 8 chance of landing on a number greater than 3.

10. B. A 20% chance of being picked is equal to a 1 in 5 chance (or $1 \div 5$) of being picked. There are a total of 15 shapes shown, so there would need to be 3 of the shapes in order for it to have a 3 in 15 chance (1 in 5) chance of being picked. This only applies to the triangle.

11. B. There are a total of 12 letters in "CONJUNCTIONS," 3 of which are N's. So, there is a 3 in 12 chance of drawing a paper with an N written on it. This is the same as 1 in 4, or 0.25, or 25%.

12. C. Since the box only contains black and blue pens, we know that there must be $48 - 20 = 28$ black pens. If this is what we "want," then we could say that the chance of picking out a black pen is 28 out of 48. This is This is $\dfrac{28}{48} = \dfrac{7}{12}$.

13. C. The numbers from 10 through 20 are 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, and 20. There are 11 in total, 6 of which are even. If picking out a paper with an even number is what we "want," then we could say that there is a 6 in 11 chance of it happening, or $\dfrac{6}{11}$.

14. C. If there are 15 red shits, and the chance of pulling a red shirt out of the closet is 5 out of 8, then we could also say that the chance of pulling 15 red shirts out of the closet is 15 out of 24. This is because if we multiply 5 by 3, we get 15. We could do the same to 8 to preserve the ratio. This means there are $24 - 15 = 9$ blue shirts.

15. C. If the chance of picking a milk chocolate out of a box milk and dark chocolates is 3 out of 4, then the chance of picking a dark chocolate is 1 out of 4. If there 12 dark chocolates, and the chance of picking them is 1 out of 4, then the total number of chocolates must be $12 \times 4 = 48$. This means there are $48 - 12 = 36$ milk chocolates.

16. D. Be careful to answer the question asked. We are asked how many notebooks there are in all. We know there are 20 purple notebooks, and that the chance of picking it out is 5 out of 9 (since the chance of picking an orange notebook out is 4 out of 9). This means the ratio of orange to purple notebooks is 4 to 5. If we multiply 5 by 4, we get 20. So, we could multiply 4 to get 16, which is the

number of orange notebooks, since 16:20 is the same ratio of orange to purple notebooks as 4:5. Thus, the total is 16 + 20 = 36.

17. A. There are a total of 3 + 4 + 5 + 6 = 18 pieces of fruit. If something has a 1 out of 6 chance of being picked out, and there are 18 pieces of fruit in total, then there must be a total of $18 \times \dfrac{1}{6} = 3$ pieces of that fruit. So, the fruit in question are the apples.

18. B. If there are only yellow and purple shirts, and the chance of picking a yellow shirt is 1 out of 3, then the chance of picking a purple shirt is 2 out of 3. So, the ratio of yellow shirts to purple shirts is 1 to 2 (for every 1 yellow shirt, there are 2 purple shirts, since this would make a total of 3 shirts). The sum of the shirts in the correct choice must be a multiple of 3. This rules out the other choices, which have a total of 1 + 3 =4, 3 + 1 = 4, and 4 + 12 = 16 shirts. Notice that a ratio of 2 yellow shirts to 4 purple shirts is the same as 1 yellow shirt for every 2 purple shirts.

19. C. We know we are looking for a total number of boys and girls that is a multiple of 5, since the probability of picking a boy's name is given "out of 5". This rules out the first (7), the second (14), and last (14) choices.

## Mean, Median, & Mode

1. D. The mean is also known as the average. It is calculated by taking the sum of values in a set, and dividing it by the number of values in that set. In this case, the set of numbers are the lengths of the different rulers. We are told the rules have lengths {6, 6, 6, 12}. There are 4 values in this set, so to calculate the mean, we add the values together then divide by 4: $\dfrac{6+6+6+12}{4} = \dfrac{30}{4} = 7\dfrac{2}{4}$. This is equal to $7\dfrac{1}{2}$.

2. C. Add the ages together: 8 + 11 + 11 + 12 + 12 + 12 = 66. Divide by the number of cousins, which was 6. 66 ÷ 6 = 11.

3. C. In this question, we are given the sum already, which is 16. We are told that this was done over 2 days. So, the average per day was 16 ÷ 2 = 8.

4. B. We are given the total number of books read over 2 months (12 books). The question asks how many were read on average each of the two months. So, this is 12 ÷ 2 = 6.

5. B. Monday to Friday represents 5 days, over which she found 15 pennies. The average number of pennies found each day would be 15 ÷ 5 = 3. Note that she could have found all 15 pennies on Friday, or found 7 pennies on Monday and 8 on Friday, etc. Any combination could have been the case, but the average is still the sum total divided by the number of days.

6. D. In this question, we are given the average number of fish caught per day (4), and told that the number of days is 3. So, we must multiply together the number of days and the average to get the total: 3 × 4 = 12. This could be shown as $\dfrac{x}{3} = 4$, where x represents the unknown sum of all fish caught over the 3 days.

7. C. The median of a set is the number that is in the middle, when listed in order from least to greatest (or greatest to least). A consecutive integer is one that follows the previous, like 1, 2, and 3, or 7, 8, and 9. In this case, the median is 9, which means that we must have 2 numbers on either side of 9 (since there were 5 in total). So, the numbers must have been {7, 8, 9, 10, 11}. The largest is 11.

8. B. The range of a set of values is the difference between the greatest and least values. We are told the greatest is 52, and that the range itself is 46. So, the least must have been 52 – 46 = 6. This is because

*greatest – least = range*. In this case, the values were 52 – *least* = 46. To solve for the *least*, we add it to both sides, and subtract from both sides 46.

9.  B. The safest thing to do is to write out the set in order from least to greatest: {68, 68, 68, 69, 70, 74, 75}. Cross out low-high pairs: 68 and 75, 68 and 74, etc, until we are left with 2 or fewer values. Doing so leaves us with only 1 value: 69.

10. C. When there is an even number of values in a set, we must average the two middle numbers to find the median. If the median is 30, we can immediately rule out every choice but the third, since clearly the two middle numbers do not average to 30. $(28 + 32) \div 2 = 30$.

11. C. The high temperature of 65 took place on Friday. The low temperature was 45, on Thursday and Saturday. The difference between these two, the range, is $65 – 45 = 20$.

12. C. Cross off low-high pairs. We can cross out Thursday and Friday, then Saturday and Monday, then Wednesday (or Sunday) and Tuesday. What remains is Sunday (or Wednesday), which has a value of 50.

13. D. The mode is the value which occurs most frequently. If there are is more than one value that occurs the same number of times, then those values are all the mode. In this case, 45 shows up twice (Thursday and Saturday), as does 50 (Wednesday and Sunday). So, the set is bimodal, with modes of 45 and 50.

14. C. First, find the four flavors that were served the most. These are: butter pecan (35), cheesecake (30), creamsicle (30), and rocky road (25). The mean would be $35 + 30 + 30 + 25 = 120$. Divide by 4 for 30.

15. A. Find the least and greatest values. These are 15 and 35, respectively. So, the range is $35 – 15 = 20$.

16. D. This question asks us to calculate multiple pieces of information. The mode is 15, which occurs 3 times. The median of {15, 15, 15, 20, 25, 30, 30, 35} is the average of the two middle numbers, 20 and 25. This is $45 \div 2 = 22.5$. The range is 20. So, the mode is not equal to the median, neither is the range equal to the median. However, the median is greater than the mode.

17. B. There are many numbers in this chart. Circle, box, underline, or otherwise group like numbers together. Doing so, we see that 9.8 shows up 4 times, making it the mode, since it shows up more than the other values.

18. B. Be careful to use only the values for the United States runners, which are {9.3, 9.7, 9.8, 10}, in order from least to greatest. We must average the two middle numbers to find the median, or find that it is $9.7 + 9.8 = 19.5$. Divide by 2 for 9.75.

19. B. Be careful to use only values for runners with label C, which are {9.2, 9.5, 9.5, 9.8}. We can calculate the average as $\dfrac{9.2 + 9.5 + 9.5 + 9.8}{4} = \dfrac{38}{4} = 9.5$.

## Interpreting Data

1.  C. Check each statement. The amount of rain that fell in April is 13 inches, which is NOT greater than the amount in March (10 inches) and May (10 inches) combined (20 inches). The amount of rain that fell in May (10 inches) is NOT greater than the amount that fell in February (8 inches) and June (8 inches) combined (16 inches). The amount of rain that fell in March and May combined (20 inches) IS greater than that which fell in February and June combined (16 inches).

2.  D. Add all of the values represented by all of the bars: $8 + 10 + 13 + 10 + 9 = 50$ inches.

3.  A. We're not shown the amount of rain in January, but we're told that the amount of rain was twice as much as was in February. If February saw 8 inches of rain, then twice this is $8 \times 2 = 16$ inches. The

question asks how much more it rained in January (16 inches) than April (13 inches), or $16 - 13 = 3$ inches.

4. B. In March, the price was $30, while in May, it was $60. This means the price doubled ($30 \times 2 = 60$). 50% of the March price is $15 ($30 \times 0.5 = 15$); if we add this to the March price ($30 + 15 = 45$), we see that this equals the price in April ($45). Similarly, the price in January was $40, and 50% of this is $20. If we add the two, to show a 50% increase, we get $60, which is the price of the stock in May. However, half of the May price stock of $60 would be $30; but in June, the price was $35. So, there was less than a 50% fall in the price from May to June.

5. D. The range is the difference between the least and greatest value in a set of values. In this case, the set represents the price of a stock in each month. The least is 30, and the greatest is 60, so the difference (range) is $60 - 30 = 30$.

6. A. If in January the price was $40, as shown in the graph, and this is $15 more than in December, then the December price was $40 - 15 = 25$.

7. C. Each rectangle represents 4 books. Since we're asked how many more books Anne read in July than in May, we need only count how many more rectangles there are in July than May. This is 5, which is equal to $5 \times 4 = 20$ books.

8. B. Count the total number of rectangles and multiply by 4. This is $15 \times 4 = 60$.

9. D. The table ends in August, with Anne having read $2 \times 4 = 8$ books. If she wants to read twice as many as this in September, she must read $8 \times 2 = 16$ books in September.

10. B. The shade part of the Venn diagram must be a shape that BOTH has more than 4 sides AND is EITHER red OR blue. A square doesn't have more than 4 sides, a triangle only has 3, but a pentagon has 5 and a hexagon has 6. Of these two shapes, only the hexagon is red or blue.

11. D. A shape that is NOT found in the shaded part of the Venn diagram must be NEITHER a shape with more than 4 sides NOR can it be red OR blue. An octagon has 8 sides, a pentagon 5 sides, and a decagon 10 sides. These are all shapes with more than 4 sides, so it COULD be in the shaded part of the Venn diagram. A rectangle has 4 sides, so it COULD NOT be in the shaded part of the Venn diagram, even though it is blue.

12. D. The shaded portion represents toys with wheels that are NOT made from wood. A police car, dump truck, and ambulance all have wheels, and are NOT made from wood (metal and plastic). So, they COULD be found in the shaded portion. We are asked for the toy that COULD NOT be found in the shaded portion. The wooden sports car, being both a toy with wheels and made of wood, would appear in the overlapping part of the Venn diagram.

13. D. If this is getting confusing, try writing the answer choice (A, B, C, or D) in the part of the Venn diagram in which it belongs. A would belong in the middle, B would not appear in any part of the Venn diagram (since the Venn diagram only describes biology or chemistry, and foreign languages), C would appear in the left part of the Venn diagram, and D would appear in the shaded part of the Venn diagram.

14. D. Using a similar strategy, we see that A, B, and C could all appear in the shaded portion of the Venn diagram, since they are all taking a foreign language. However, in D, the student takes a foreign language but also biology; this means (s)he must belong in the middle of the Venn diagram.

15. B. Since rent makes up half of the circle, or 50% of the total, then we know that the other categories also makes up 50% of the total. The sum of this is $500 + 800 + 300 + 400 = 2,000$. If this represents 50%, then so too much rent.

16. A. Transportation accounts for $800 out of a total of $4,000 ($2,000 in rent, and $2,000 in other expenses). As a fraction, this is $\dfrac{800}{4,000} = \dfrac{20}{100} = \dfrac{1}{5}$.

17. A. Entertainment accounts for $400 out of a total of $4,000. This is 0.1, 10%, or $\dfrac{1}{10}$. Notice that this is half of the amount of transportation, which was 0.2, 20%, or $\dfrac{1}{5}$.

## Predictions

1. D. The two plants start off at the same height, so the difference in height is 0. Each week thereafter, the sunflower gets 1 inch taller than the corn stalk. By week 5, the sunflower is 4 inches taller than the corn stalk. So, by week 9, the sunflower will be 8 inches taller than the corn stalk.

2. B. Brett's weight increases by 8.6 – 7.4 = 1.2 (9.8 – 8.6 = 1.2, etc.) each month. So, from 3 to 5 months, he will weigh an additional 1.2 × 2 = 2.4. He'll weigh 11 + 2.4 = 13.4 pounds.

3. D. Andy starts off weighing less than Cameron, but gains 1.5 pounds per month, unlike Cameron, who gains 1 pound per month. Fill out the rest of the chart to find out at which point Andy weighs more than Cameron. Andy will weigh 11 + 4(1.5) = 17 pounds in the 7th month, where Cameron will weigh 12.8 + 4(1) = 16.8 pounds. We multiply by 4 because this describes the number of weeks after the end of the chart, or the point at which Andy weighs 11 pounds and Cameron 12.8.

4. B. Kelly can do 4 more pushups per week, while Madison can only do 2 more pushups per week. In the 9th week, Kelly should be able to do 27 + 5(4) = 47 pushups, while Madison should be able to do 36 + 5(2) = 46 pushups. The 5 signifies how many more weeks we are progressing after the 4th week, or the week in which Kelly does 27 pushups and Madison does 36.

5. D. The population increases by 1 million every 5 years. The chart ends at a population of 8 million in 2015. If we are asked when the population would reach 12 million, this is an increase of 12 – 8 = 4 million, which should take 4 × 5 = 20 years. So, this would happen in 2035.

6. C. The number of tickets sold increases by 1,000 every year, and ends with 18,000 tickets sold in 2017. If we're asked when the amusement park would sell 22,000 tickets, this is 4,000 more than in 2017. So, it would take 4,000 ÷ 1,000 = 4 more years, for this to happen, in 2021.

7. A. Find which toys are the second and third highest-selling toys. It may help to rank each toy in order from 1 to 5, 1 being the toy that sells the most, and 5 being the toy that sells the least. This is the Board Game and Fire Truck.

8. B. Find the lowest selling toy. It may help to rank each toy in order from 1 to 5, 1 being the toy that sells the most, and 5 being the toy that sells the least. This is the Rag doll.

# Practice Test (Form B)
## Verbal Reasoning

1. A. Think of the signs on stores that say "established in" a certain year. This means that the store was founded, created, or built, in that year. "Demolish" is the opposite of "establish," and to watch ("observe" and "supervise") are unrelated to the idea of something's founding or creation.

2. C. The word "superior" contains the root word "super," which means "over," or "above." It also contains the suffix "-ior," which indicates a comparison is being made. So, we can infer that "superior" has something to do with being "over" or "above" something else. In this case, this would be something that is higher than or above something else. It would not be cheap or worse, and isn't necessarily expensive.

3. B. An occasion is a particular time, or instance, when something happened. Said differently, it is an event. Events can be happy, or sad. They can also take place at a venue (like a banquet hall, or home), or elsewhere. An occasion is more specific than a century.

4. D. To reveal something is to make known something that was previously unknown. In other words, to reveal something is to show something for people to see, read, etc. This is the opposite meaning of cover. To reveal something doesn't mean to grasp it or necessarily understand it (someone could reveal something – like a secret – without understanding what it is they were revealing).

5. C. Think of the imagination, or imaginary friends. These things aren't real, but invented, or created. These things could be scary, or beautiful (or even both), and they may be very creative, or very boring. The realness of something doesn't have anything to do with how it looks, feels, or seems.

6. D. Think of a narrator, who tells a story. The word "narrate" has a similar meaning, which is to explain, describe, or "relate" something. A narrator may gesture or even dance, but this isn't his or her main function, which is to describe or explain.

7. B. "Acquire" contains two useful root words: "ac," which means "in addition to," and "quir," which means "seek." We can piece this information together with what else we might know about "acquire," which is that if we look or find, we may get or gain something as a result. This is the opposite of giving or freeing (giving up), and has nothing to do with playing.

8. A. "Tentative" means that something is uncertain, or done without confidence. This is most similar to the word "hesitant," which is related to "hesitate," which means to pause or doubt. This is the opposite of being positive, or sure of something. The fact that there is doubt means that it is not stable or sturdy.

9. A. "Accomplish" contains two root words: "ac" and "com." The first means "toward" or "near," and the second means "fully." We can infer from this that "accomplish" has to do with completing something, or finishing it, or otherwise working on it until it is achieved. This is the opposite of "fail." One could require contribution of some kind with achieving something, but they're not the same thing.

10. D. To analyze something is to try to understand it. One might try to understand something by examining it, not annoying, arguing, or criticizing it.

11. B. People are often asked if they can speak another language fluently. "Fluently" is an adverb, which describes how a language is spoken. In this case, people are asking if they are very good at speaking another language. If one is very good at speaking a language, one might do so effortlessly, without any difficulty. This doesn't mean the person speaks in a strained or choppy manner.

12. C. "Influence" contains the root words "in," which means, "toward," and "flu," which means "flow." Someone that can direct the flow of things (information, money, etc.) is said to have influence, or control (but not necessarily concern) of the effect of that thing.

13. C. "Unanimous" may look like it means "lifeless," since "un" tends to mean "not," and "anim" often means "life" or "spirit." However, "unanimous" actually comes from "uni," meaning "one" or "single." So, if two people are of one spirit, they could be said to be united. Think of a "unanimous vote," which means that everyone voted for the same thing.

14. B. "Antagonize" has a very negative connotation, and only "hassle" has a similar connotation. The word is similar to "antagonist," which is a character in a story that has goals opposite of the protagonist (think of the villain in a story, who tries to annoy, irritate, or get in the way of, the hero). "Antagonist" contains the word "anti" (without the "i"), which means "against" or "opposite."

15. D. "Diversity" is the state of having many different types of things, or a large variety of things. This is the opposite of "similarity." "Appearance" could be one of those types of things, but it doesn't have

to be. "Diversity" can be accepted by people, or not. "Having a diversity of ideas can be helpful in finding a solution to a difficult problem."

16. B. "Industrious" is a word used to describe something or someone very hardworking, or productive (think of beavers or bees, which are often described as busy or industrious). Working hard means producing a lot of things (in the case of bees, honey). This doesn't have anything to do with power (influence) or necessarily getting rich.

17. D. A sanctuary is a place of shelter, or protection from something. A wildlife sanctuary, for example, is a place where animals are sheltered or protected from hunters.

18. A. We know that whatever Mason had is called an "accomplishment." This word is a synonym for "achievement," which is the only logical choice to include in the blank. Mason's family would probably not be suffering distress, and a goal isn't itself an accomplishment.

19. C. The sentence explains how a group of people can't wrap their arms around a tree. We can infer that the trunk of the tree is very large, wide, or immense. The fact that it is "clear" or "brown" has nothing to do with the ability of people to wrap their arms around a tree.

20. B. The sentence describes the eyes of the giant squid, saying that they're large like dinner plates, and are bigger than those of other animals. While the other words might accurately describe their eyes, the only logical word is one that has to do with the size of the eyes.

21. D. The opposite of a crowd, or being around many other people, is being alone. This describes a "solitary" life, not necessarily one that is boring, eventful, or joyful.

22. A. To pardon is to forgive. Dalton asked a question, and did not ask "for" a question. Similarly, Dalton made a request, he didn't ask for one.

23. B. Since Kiara worked hard and graduated, she would be filled with positive emotions, not negative ones. The only positive one is "jubilation," which means "happiness."

24. B. The sentence suggests that Gage needs to do something because he did not do something else. This describes the action of compensation, which is to make up for the lack of something.

25. B. We are looking for a verb that is frequently used with the noun "time." We are also told that a writer is pressed for time, and needs to focus on writing. To do this, the writer doesn't need to think about (assess) time, but to devote (dedicate) it. The idea of reducing or involving time doesn't make sense, since time is usually described as a resource to be spent, saved, or allocated.

26. C. We know that Irving learned French years before he visited France. We also know that he wasn't able to understand anyone all those years later. There could be many reasons for this, but the only word that makes sense is "retain," which is a synonym for "remember." If he could not retain what he learned, then he forgot it.

27. B. Be careful of the word "not." The contestant was "disappointed," and "did not meet the requirements" to "participate." To be able to participate by meeting certain requirements is to be "eligible." Note that "unqualified" would be appropriate if the word "not" did not come right before it. The certainty of the prize going or not going to the contestant is not in question.

28. D. "Reign" refers to a period of time, usually in reference to the period of someone's rule, or control. In this case, it doesn't make sense that the queen's anger are good for people. Her crown might be valuable, but it doesn't make sense to say that it benefited everyone. It's not necessary that there even is a princess, let alone that she was viewed as being beneficial.

29. A. "So" tells us that the second idea in the sentence must be related to, or even the effect of, the first idea in the sentence. The traffic caused a delay, which means she didn't make it on time to the theater, causing her to miss a show. It's not necessarily true to say that a traffic delay caused her to see a car accident, or caused her to buy candy instead of popcorn, or to remember something for later.

30. C. "Because" is like "as a result of," which tells us that the idea that follows it was the cause of something else, which occurs later in the sentence. In this case, we're told that something happened as a result of there only being one cashier in the store during the big sale. We can infer that during big sales, there are a lot of customers. If there is only one cashier, then there must have been a long <u>line</u>. The fact that there is a sale does not cause the customers to remember coupons, or that they wanted to return something.

31. B. The sentence tells us that there is "no specific prompt," which means that there is no specific topic or instruction. The second part of the sentence should reflect this idea, not contradict it. Therefore, it is incorrect to say that the test "gave instructions" or "required students" to do something.

32. D. The "so" tells us that the two parts of the sentence are logically related, where the second part should be "because" of the first part. If Sasha did not expect much, then it doesn't make sense that she would decide to give it a chance, or to convince her friend to have a party there. She would not be surprised when the food and service was bad; rather, she would be surprised that she had the best food there.

33. B. If the game was chaotic, and nobody know what was fair and what was not, then the rules were not clearly established. "Because" tells us that as a result of something, this was the case. If everyone agreed on the same set of rules, then this would not have been the case. If nobody knew the rules, then this was the case. Having friends play together frequently is irrelevant. Having a clear winner and clear loser could be a result of a game, but was not the cause of the game being chaotic or unfair.

34. D. Since Roxana didn't know she forgot the key ingredient, she would have expected that it would turn out perfectly, or as hoped. Since she forgot a key ingredient, we can infer that it did not turn out as hoped, and this was surprising. She wouldn't be startled for it to be exactly as expected. We can't infer anything about Roxana's baking preferences.

# Quantitative Reasoning

1. B. *Numbers & Operations – Estimation*. If we were to visualize the amount in vase 1 transferring into vase 2, we'd see that it vase 2 would come close to being at the second tickmark, making the 3 gallon vase $\frac{2}{3}$ full, or nearly contain nearly 2 gallons. We can see in vase 1 that $\frac{1}{4}$ is filled. $3 \times \frac{1}{4} = \frac{3}{4}$. Vase 2 is $\frac{1}{3}$ filled. $3 \times \frac{1}{3} = 1$. So, combined, there would be $1\frac{3}{4}$ gallons, which is closest to 2.

2. C. *Numbers & Operations – Order of Operations*. Remember to follow PEMDAS by first simplifying the term inside the parentheses. Right away, we can eliminate the first and second choices, since both choices ask us to add something to 18, and we can see that we won't end up with a negative number, so the rest of the expression will only add to 18, and we are looking for 10. Try the remaining choices. If we try the third choice, we end up with $18 - 16 \div 4 \times 2$, or $18 - 4 \times 2$, or $18 - 8 = 10$.

3. C. *Numbers & Operations – Vocabulary & Properties*. The distributive property tells us that we must multiply a factor outside the parenthesis by each factor inside the parenthesis and observe the addition or subtraction sign within.

4. B. *Measurement – Area of Shaded Figures*. Based on the information provided, if we draw a straight line down from point $E$, we would cut the square in half. This means everything to the left of $E$ would have an area of $64 \div 2 = 32$ cm². However, the question asks for the area of the shaded region. If we do the same thing and draw a line down from $F$, we cut the rectangle between $A$ and $E$ in half. The left half contains two triangles, as does the right half. One from each side is shaded, so the shaded area represents half the rectangle between $A$ and $E$. This means the area is $32 \div 2 = 16$.

5. B. *Measurement – Irregular Shapes*. We could extend the sides with lengths 3 and 4 to be as long as their opposite sides, or 10 and 12, respectively. This would make us a large rectangle of $12 \times 10 =$

120 cm². However, to find the area of the figure would require us to subtract the area of the extension, or 10 – 3 = 7 by 12 – 4 = 8. This is 7 × 8 = 56. Thus, the area of the figure is 120 – 56 = 64 cm².

6. C. *Algebraic Concepts – Solving Algebraic Equations*. Perform inverse operations to isolate $p$. First add 8 to both sides, giving us $4p = 24$. Then divide both sides by 4 for $p = 6$.

7. C. *Numbers & Operations – Order of Operations*. Simplify the numerator and denominators first (there are "invisible" parenthesis surrounding the terms in the numerator and in the denominator). This gives us 45 ÷ 15 = 3.

8. C. *Measurement – Volume & Surface Area*. A cube has 6 sides of equal area. If the total surface area of the cube is 54, and there are 6 equal sides, then each side has an area of 54 ÷ 6 = 9 cm². We can see that the side of the smaller cube could fit on the side of the larger cube 9 times. Thus, the area of one side of the smaller cube must be 9 ÷ 9 = 1 cm². However, the question asks what the combined area of all the surfaces of the smaller cube is. Since there are 6 sides here as well, it is 6 × 1 = 6 cm².

9. C. *Algebraic Concepts – Patterns*. First, find the difference between each term in the sequence. This is 1, 3, 9, and 27. We can see that the increase between terms itself increases by 3 times the previous increase. So, if the increase between 14 and 41 was 27, then the increase between 41 and the next term must be 27 × 3 = 81. Thus, 41 + 81 = 122.

10. B. *Data & Probability – Interpreting Data*. If $\frac{1}{5}$ of the 600 students voted for green, then 600 ÷ 5 = 120 students did so.

11. D. *Algebraic Concepts – Creating Expressions & Equations*. Let's let $b$ represent the weight of the beef, $c$ represent the weight of the chicken, and $p$ represent the weight of the pork. If the total is 21 ounces, then we know that $b + c + p = 21$. However, we're also told that $b = c = 3p$ (each were 3 times as much as pork). We can substitute this to rewrite the equation as $3p + 3p + p = 21$, or $7p = 21$. Solve to find that $p = 3$. However, the question asks for the weight of the beef, or $3p$, or $3(3) = 9$.

12. D. *Data & Probability – Probability.* Since we know that for every 5 socks there 3 are white, then we know that if there are 5 × 6 = 30 socks, then there should also be 3 × 6 = 18 socks.

13. A. *Data & Probability – Mean, Median, & Mode.* The friends are dividing a total number of pieces of candy so that each friend gets the same amount of candy. This is the same operation as adding together the number of pieces of candy and dividing it by the number of friends, or calculating the average, or mean.

14. B. *Algebraic Concepts – Patterns*. The cross adds two squares vertically, then two squares horizontally, and repeats this process again. So, the final cross should have 3 squares in each direction from the central square.

15. D. *Data & Probability – Mean, Median, & Mode.* The mode is the number or numbers that appears most frequently in a set. In this case, write down all values in the set, which we can find by circling each point on a vertical gridline and tracing over to the $y$-axis: {25, 30, 40, 45, 50, 50, 60, 70, 70, 75}. Both 50 and 70 show up twice, so the set is bimodal.

16. B. *Data & Probability – Probability.* We can calculate the probability of picking a red marble out of each possibility. In the first, we have 1 + 2 + 2 = 5 total marbles, so the probability would be 1 out of 5, or $\frac{1}{5}$. In the second choice, we have 2 + 2 + 4 = 8 total marbles, so the probability would be 2 out of 8, or $\frac{1}{4}$.

17. B. *Measurement – Area & Perimeter of Polygons*. Given the area of a square, we know that we can take the square root of that area to find the length of one side (since side × side, or side², gives area). $\sqrt{100} = 10$. The perimeter of a square is 4 × side, or 4 × 10 = 40.

18. C. *Numbers & Operations – Comparing Fractions*. We can see that $\frac{8}{16} = \frac{1}{2}$, so the last choice is not greater than $\frac{1}{2}$. Half of 21 would be 10.5, so $\frac{10}{21}$ is less than $\frac{1}{2}$, ruling out the second choice. $\frac{7}{8} \times \frac{3}{3} = \frac{21}{24}$, which means that we can eliminate the first choice because $\frac{22}{24} > \frac{21}{24}$.

19. B. *Data & Probability – Mean, Median, & Mode*. The father is $44 - 40 = 4$ years older than the average. This means the mother must be 4 years younger than the average, or $40 - 4 = 36$. Algebraically, we could represent this as $\frac{m + 44}{2} = 40$, where $m$ is the age of the mother. Solve for $m$: $m + 44 = 80$, and $m = 36$.

20. C. *Algebraic Concepts – Proportions*. We could set up a proportion, or reason through the question. 100 fits into 350 exactly 3.5 times. So, this would represent $1.8 \times 3.5 = 6.3$

21. A. *Data & Probability – Interpreting Data*. Since the shaded area represents students who both walk to school and bring their own lunch, as long as a student does not do one of those things, he cannot be in the shaded area.

22. A. *Numbers & Operations – Word Problems*. The last two choices describe addition/subtraction situations. The second choice tells us that 15 is the total, and that this was 3 times some other number (5). Only in the first choice does one add three of the same numbers together, which is the same as multiplying that number by three.

23. B. *Numbers & Operations – Word Problems*. First, find the total number of slices Monica's pie consisted of. This is $5 \times 6 = 30$. Since there were a total of 72 slices, then we know that Luanne made $72 - 30 = 42$ of them. Since there are 6 slices per pie, then there are $42 \div 6 = 7$ pies.

24. D. *Numbers & Operations – Comparing Fractions*. Use $\frac{1}{2}$ as a reference, since this is equal to $\frac{9}{18}$. Half of 8 would be 4, so $\frac{5}{8}$ is bigger than $\frac{9}{18}$. This is the same for $\frac{7}{13}$, since half of 13 would be 6.5. Half of 23 would be 11.5, however, and 11 is less than this. So, $\frac{11}{23} < \frac{1}{2}$, making it the smallest fraction.

25. B. *Numbers & Operations – Word Problems*. Since his minivan can hold 6 friends, and he has 50 friends total he wants to drive, then he would need to make $50 \div 6 = 8\frac{1}{3}$ trips. Since he can only make whole trips, we must round up to 9. This is because after 8 trips, he would only have taken $8 \times 6 = 48$ friends. He would need a 9th trip to take the remaining 2.

26. D. *Measurement – Area & Perimeter of Polygons*. A regular polygon is equilateral. So, a regular pentagon would have 5 equally-long sides. Therefore, the length of each side, if the perimeter is $30z$, would be $30z \div 5 = 6z$.

27. B. *Data & Probability – Interpreting Data*. In 2017, the price of beans is \$11. \$3 less than this is $11 - 3 = \$9$.

28. C. *Algebraic Concepts – Creating Expressions & Equations*. To find the total number of pencils, we must multiply the number of pencils each student should get by the number of students in class. It doesn't make sense to add or subtract the number of students in class with the number of pencils per student.

29. C. *Measurement – Units*. If it is 12AM in NY, and 5AM in London, then London is 5 hours ahead. If a plane leaves NY at 10PM, we could say that it left at 3AM in London (11PM, 12AM, 1AM, 2AM, 3AM). 8 more hours would make this $3 + 8 = 11$AM.

30. C. *Algebraic Concepts – Solving Algebraic Equations*. Solve each equation separately. $x = 13$, and $y = 9$. Therefore, $13 – 9 = 4$.

31. D. *Algebraic Concepts – Functions.* Test several values of $m$ in each choice to see if the output is the same as predicted by the table. Doing so we find that only the last choice is true for multiple values of $m$.

32. B. *Numbers & Operations – Vocabulary & Properties*. The associative property tells us that when we are adding more than two numbers, we can add them in any order we like.

33. B. *Algebraic Concepts – Creating Expressions & Equations*. "2 less than the number" means $n – 2$, so we can rule out the first and third choices. "The difference of" means simply to subtract in the order given, or $4 – n$.

34. B. *Geometry – Coordinate Grids & Transformations*. We can see that points $K$ and $L$ are equally far from line $q$, so if we folded one over the other, we'd end up in the same place. We can't do that with the other choices.

35. D. *Geometry – Geometric Objects*. A rhombus has four equal sides. A cube and prism are three-dimensional, and a pentagon has 5 sides.

36. C. *Numbers & Operations – Estimation.* Round to the first place of each number: $80 \times 900 \div 30 = 2{,}400$.

37. A. *Numbers & Operations – Number Lines.* Since there are 3 spaces between 2 and 8, we know that each space represents a distance of $6 \div 3 = 2$ units. Counting left on the number line means we are decreasing in increments of 2. So, $2 – 2 = 0$, $0 – 2 = –2$, and $–2 – 2 = –4$.

38. B. *Data & Probability – Interpreting Data*. Find the cost of each pie. If terry bought 4 pies, but paid $6 for all 4, then he paid $6 \div 4 = \$1.5$ for each of them. This means Walter bought $3 \div 1.5 = 2$ pies, and Zoe bought $9 \div 1.5 = 6$ pies. This is $6 – 2 = 4$ more pies than Walter.

# Reading Comprehension

1. C. *Main Idea*. Choices A and B are only described in the last couple of paragraphs. There is no evidence in the passage of Emily Dickinson writing about the "horrors of war," so choice D is incorrect. Choice C more generally describes her writing, which is explored throughout the entire passage.

2. C. *Organization & Logic*. When we reread the second paragraph, we see that it is focusing on what she wrote about and why she wrote. The paragraph mentions neither her influences (choice A), nor her family (choice D). And it only touches on her character in the last sentence. We can conclude from this that the answer is D.

3. D. *Vocabulary*. When we read the context of the word "prolific," we learn that Emily was called "prolific" because she wrote hundreds of poems. There may be clues throughout the passage to support the other words as being characteristics of Emily, but the only word that works, in context, is "productive."

4. D. *Supporting Ideas*. The fifth paragraph describes Lavinia's refusal. When we reread the fifth paragraph, on line 37, we find our answer, "she discovered just how many poems Emily had written, and refused to burn them." The other choices do not have support in the passage.

5. C. *Supporting Ideas*. Throughout the passage we can support that Emily wrote in letters (line 25), on envelopes (line 45), and on blankets (line 17). There is a figure of speech in lines 12-15 comparing Emily's poems to paintings, but it does not explicitly say she wrote poems onto paintings.

6. C. *Main Idea.* The main purpose of the passage is to argue that one founding father, in this case Benjamin Franklin, was more important than all the others. The passage does not give the biographies of several founding fathers. Nor does it debunk a popular myth about a founding father. The passage does describe how a founding father came up with an impressive number of inventions, but this is a supporting detail, not the main idea of the passage.

7. C. *Supporting Ideas.* In lines 41-45, the author mentions the creation of the bifocals as well as fire departments. Lines 50-52 describe how Franklin was a publisher of a newspaper. The passage never describes how Franklin was involved in the war. In fact, this is directly contradicted by lines 23-24.

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8.  A. *Supporting Ideas.* Lines 28-36 go on to describe that while he was ambassador, Franklin persuaded the French to help the Americans, helping the Americans to defeat the British army. The passage does not mention whether he learned to speak French there. While he did invent the lightning rod and founded the University of Pennsylvania, these ideas are discussed later in the passage and are not related to him serving as ambassador to France.

9.  D. *Vocabulary.* The word prominent means famous, or well-known. This paragraph does not imply Franklin was controversial (debatable), wealthy, or elderly when he was an intellectual. Because of Franklin's many successes, it's no surprise he would be well-known at this point in his life.

10. B. *Organization & Logic* The concluding paragraph of the passage (lines 59-63) praises Benjamin Franklin as the most important founding father because he was an influential politician, author, diplomat, inventor, and scientist. The author's argument that Franklin is so important rests largely on the fact that Franklin was influential in a number of fields. Logically it makes sense that the author would agree that the most important founding father is one who achieved accomplishments in a variety of fields. The author would not agree that an important founding father is one who focused only on politics or stayed away from politics. Franklin had political experience as one of his many achievements. Franklin never was president, so it doesn't follow logically that the author would agree that the most important founder is the one who served as president for the longest time.

11. B. *Main Idea.* The passage describes how refereeing is a challenging yet rewarding job. The passage primarily focuses on the challenges of the job. It also notes in line 53-60 why the job is rewarding. The passage does not seek only to compare different participants in sports (fans, coaches, referees). It does mention them, but only as a way to explain the role of the referee. The passage does not give instructions on becoming a referee, only describing the qualities of a good referee. The passage says that refereeing can give people a different appreciation for their favorite sport (lines 1-4), but does not argue that it is more fun than playing that sport.

12. D. *Inference.* Lines 13-15 describe how "Referees need to be able to interpret rules on the go, in many different situations." The best answer choice is therefore "police officer" because of the explanation that "the job requires making many decisions on the spot." The passage does not describe referees as needing "bravery" or "lots of thinking and writing" so the options of "firefighter" and "professor" are not as consistent with the skills a referee needs according to the passage. The description of a doctor as a job that "helps sick people get healthy" has nothing to do with refereeing.

13. D. *Supporting Ideas.* Lines 15-22 describe refereeing as an exercise in balance between calling too many and too few calls. This paragraph also explains that a good referee does not necessarily need to call "every little infraction." On the other hand, it does not say that a referee's goal is to not call any penalties. The passage also emphasizes the importance of a referee communicating effectively with coaches and players throughout the passage. The importance of communication in refereeing is discussed in lines 46-52.

14. A. *Vocabulary.* The passage describes some more complicated rules as not being "apparent" or "easily understood" by the game's youngest players. We are given a clue to this in line 24, where certain rules are described as being "not as obvious." If something is obvious, then it is apparent. However, something not obvious, is not apparent, or not easily known. "Difficult to comprehend" is the opposite meaning of the correct answer, and following or taking care of something doesn't have to do with how well that thing (in this case, rules) is known.

15. C. *Organization & Logic.* The most logical answer choice is that fans are sometimes unhappy with referees because the fans support one particular point of view, while referees must be neutral in their point of view. The passage never says referees are not very good at their jobs, nor that yelling is important for fans because the referees can't hear them well. The passage also makes no comparison between hockey fans and fans of other sports. Much like players (lines 34-37) often feel their team is being treated unfairly by a referee, fans are similarly biased and want their team to win even if the referees make a fair call.

16. C. *Main Idea.* The entire passage details the adventures of three friends at the beach. We learn about what is left of the boat. However, the boat itself is only described in the final paragraphs. All of the

other answer choices – what was packed for the beach and Patrick's first experiences at the beach – are all mentioned to support the main purpose of the passage.

17. C. *Style*. The phrase "make their escape" implies that the friends are not doing something that they should be doing. The word "escape" is used to describe a situation where something or someone is trying to leave an unfavorable situation. We can assume that Teddy's mom would not let them leave, so she would not be encouraging the friends to explore. We don't have evidence to suggest that Teddy's mom sleeps heavily, or that she has an interest in the boat.

18. A. *Supporting Ideas*. According to the paragraph indicated, the sun is getting hotter and the ankle-deep water is not enough relief. We learn later that the friends reach the boat after swimming. However, there is no suggestion that they plan this as a shortcut. In fact, we're told that the friends "find" themselves by the boat. The fact that the passage mentions cracked plastic shovels and sand-crabs doesn't have to do with the reason why they went into the water.

19. D. *Vocabulary*. The context implies that Teddy feels refreshed and directs his action to Patrick. Because of the positivity and direction of the action, we can assume that he is smiling at Patrick. It doesn't make sense that Teddy can kick or shove Patrick, since the two are not close to one another. The word "sends" doesn't make sense in context, since there's no description of something being delivered.

20. C. *Organization & Logic*. The passage never describes why Teddy's mom is sleeping, the type of boat on the rocks, or the last time the friends were at the beach. The passage instead describes what the friends do along the way.

21. B. *Main Idea*. The primary purpose of this passage is to describe the functions of the various organelles inside a cell. While the passage compares animal and plant cells in the final paragraph, this is the only time animal and plant cells are compared, and is not the main purpose of this passage. The passage briefly describes the important role of the nucleus in the fourth paragraph, but it does not claim the nucleus is the most important organelle. The passage briefly mentions the digestive system in the first paragraph, but does not discuss it any further beyond this.

22. D. *Style*. The description of a cell as a "world of activity" indicates that there are many different things happening inside the cell. Only "cells contain many types of organelles performing many different functions" is consistent with this idea. The other statements are true but not consistent with the idea that a cell is a "world of activity."

23. C. *Vocabulary*. Mitochondria, "the powerhouse of the cell," generate or "produce" energy for the cell. A "powerhouse" would not "reduce" or "eliminate" energy from the cell. It does not make sense that the mitochondria would "cause" energy.

24. B. *Supporting Ideas*. Lines 66-67 state that "Lysosomes are basically the 'stomach' of the cell. They contain digestive substances that break down food particles that help keep the cell healthy." The best choice is therefore that "Lysosomes digest nutrients taken in by the cell." The remaining choices do not describe lysosomes. Mitochondria are the "powerhouse of the cell" (line 47). The golgi body is described as working with proteins (line 65), not as another name for lysosomes. The ER, described in lines 52-62, and not lysosomes can be either "smooth" or "rough."

25. D. *Inference*. Lines 70-78 explain that animal cells do not have chloroplasts but plant cells do. Sunflowers are the only answer choice that represents a plant. Butterflies, cats, and dolphins are all types of animals.

# Mathematics Achievement

1. A. *Numbers & Operations – Estimation*. We don't need to solve, just to round to the first digit. 528 rounds down to 500, and 67 rounds up to 70.

2. C. *Numbers & Operations – Estimation*. There are a total of $5 \times 4 + 3 = 23$ cups of mix (notice that one of the 3 cups of pretzels and 2 cups of bagel chips adds up to 5 cups, saving us a step). If we are spreading the 23 cups across 8 bowls, we must divide. 8 goes into 23 fully 2 times, for a total of 16

cups across 8 bowls, or 2 cups per bowl. However, this leaves 7 cups to spread across 8 bowls. This means we're adding $\frac{7}{8}$ of a cup to each bowl. This means that $\frac{7}{8} + 2 = 2\frac{7}{8}$, which is very nearly 3.

3. B. *Numbers & Operations – Word Problems with Fractions & Decimals*. Be sure to align place values. The sum gives us 1.06.

4. A. *Numbers & Operations – Word Problems with Fractions & Decimals*. We can see that we must take the difference between the two flights. To do so, the denominators must be the same in each fraction. If we multiply $\frac{3}{4}$ by 3, we get $\frac{9}{12}$. An easy way to subtract both fractions is to convert both into improper numbers. This gives us $\frac{73}{12}$ - $\frac{57}{12} = \frac{16}{12}$, or $1\frac{4}{12}$, which simplifies to $1\frac{1}{3}$.

5. A. *Numbers & Operations – Number Lines*. 6.3 – 4.2 = 2.1, which represents the total distance across the tickmarks between 4.2 and 6.3. 2.1 ÷ 3 = 0.7 (there are 3 spaces between the two points. This means the distance between each tickmark is 0.7. Going left along the number line means we must subtract 0.7 for each tickmark. From 4.2 to X there are 2 tickmarks, or a distance of 0.7 × 2 = 1.4. Thus, X is located at 4.2 – 1.4 = 2.8. There are 4 tickmarks from X to W, so the distance is 0.7 × 4 = 2.8. Thus, W is located at 2.8 – 2.8 = 0.

6. C. *Algebraic Concepts – Creating Expressions & Equations*. Benedict has $28 in total, so that belongs on one side of the equation. If there are 4 boxes of cereal, which each cost $4, we could express the total cost of cereal as 4 × 4, or 4(4). The remaining cost would be for *p*, the pot roast, which would be added to 4(4) to give us 28.

7. C. *Algebraic Concepts – Functions*. Try to find the equation used on the input number to obtain the output number. We can tell that the relationship is not simply plus or minus a number, so we can try multiplication. To get close to 36 from 21, multiply by 2 to get to 42, then subtract 6 to get 36. Test this with another input to find that it is true. So, if we multiply 19 by 2, we get 38. We can then subtract 6 to get 32. We can also reason that this is the correct choice, since we know the input could not be 11 or 23 since the outputs would be much lower or greater than 32. 32 is closest to the output 36, which has an input of 21. Of 15 or 19, 19 is closest to the input of 21.

8. B. *Numbers & Operations – Order of Operations*. Observe PEMDAS by resolving the expression in the parentheses first. This leaves us with 9 × 10 – 3 × 3. Then, multiply: 90 – 9. Subtract: 90 – 9 = 81.

9. A. *Algebraic Concepts – Solving Algebraic Equations*. Subtract *x* from both sides for 3*x* = 6 before dividing both sides by 3 for *x* = 2.

10. B. *Algebraic Concepts – Creating Expressions & Equations*. The sum of the boxes used and the boxes remaining must give us the total, or *b*. It doesn't make sense that the total be determined by subtracting the number of boxes used from the number of boxes remaining, as the last two choices do.

11. C. *Geometry – Coordinate Grids & Transformations*. The first unit in the coordinate pair is the *x*-coordinate, while the second is the *y*-coordinate. This means the *x*-coordinate value is –3, and the *y*-coordinate value is 3. Moving a point up or down affects the *y*-coordinate: moving up increases the value, while moving down decreases it. If we move the point 4 units down, we decrease 3 by 4, for 3 – 4 = –1. We don't need to check the impact to the *x*-coordinate, but we could: moving left or right affects the value of the *x*-coordinate (left decreases; right increases). If the point is shifted right 5 units, then we increase –3 by 5 for –3 + 5 = 2. The new point is at (2, –1).

12. C. *Measurement – Concerting Units*. Simply divide the number of feet in a mile by 3. We can see that only 1,760 is reasonable, as the other choices are too small or too large to be possibilities.

13. D. *Data & Probability – Interpreting Data*. The higher the bar, the farther Felicia ran; the lower the bar, the less Felicia ran. In week 3, Felicia ran 16 km, and in week 2, she only ran 4 km. So, the difference is 16 – 4 = 12.

14. B. *Algebraic Concepts – Patterns*. First, find out how much each number in the sequence changes by taking the difference between each term in the sequence. Doing so shows us that the increase between each term is 2 – 0 = 2; 6 – 2 = 4; 12 – 6 = 6; 20 – 12 = 8. Thus, the next increase after 20 should be 10, giving us 20 + 10 = 30.

15. C. *Numbers & Operations – Operations with Whole Numbers*. It may be tempting to round, but try long-division first, since the answer choices are all very close to one another. We only need to do two steps of the long-division to find that the first two digits of the quotient are 2 and 5.

16. C. *Geometry – Geometric Objects*. We can only draw one line (down the middle) through the first figure so that the figure lines up if we folded it over the line. We could do this 7 times in the second figure, and 5 times in the last figure. We can only do this 2 times (through the middle of each side) in the rectangle.

17. B. *Data & Probability – Interpreting Data*. 2020 is not on the chart, but we can see that the population of New Town increases by 1 million every 5 years. So, if in 2015 the population is 8 million, then in 5 years, the population should be 8 + 1 = 9 million.

18. B. *Algebraic Concepts – Proportions*. The best way to solve the question is to set up a proportion, where the numerator represents the number of cups of flower needed, and the denominator represents the proportional number of cupcakes those cups of flower could make. In this case, the proportion would look like $\frac{3}{12} = \frac{x}{30}$, where $x$ represents the number of cups of flower needed to make 30 cupcakes. Cross multiply for $12x = 90$, and divide both sides by 12. This gives us $x = 7.5$.

19. B. *Numbers & Operations – Operations with Whole Numbers*. Start subtracting and see how the result lines up with the answer choices. Since 4 is in the units digit in 3 of the answer choices, we know we must subtract to at least the tens place. Doing so shows us that only the second choice can be a possibility. Do not waste time finishing subtracting.

20. B. *Data & Probability – Probability*. There are 3 rows of cards arranged in 4 columns, or a total of 3 × 4 = 12 cards. 4 of these are hearts. Therefore, the chance of picking a heart out of the cards can be represented as $\frac{4}{12} = \frac{1}{3}$, or 1 out of 3.

21. C. *Numbers & Operations – Place Values*. Read each grouping of numbers between commas separately. The first set of numbers on the right takes us from ones to hundreds; the second set of numbers on the right takes us from thousands to hundred thousands; the third set of numbers on the right (the three numbers on the left) take us from millions to hundred millions. So, we have nine hundred fifty millions plus some other numbers. But, we can see that only the third choice shows this, so we know it must be correct.

22. C. *Numbers & Operations – Rules of Divisibility*. To see if a number is divisible by 3, add its digits together. If the sum of its digits is a multiple of 3, then it can be evenly divisible by 3. The question asks which potential number of pencils could NOT be evenly divisible by 3. 7 + 4 + 1 = 12, which is a multiple of 3. 8 + 5 + 2 = 15, which is also a multiple of 3. However, 8 + 6 + 3 = 17, which is NOT a multiple of 3.

23. A. *Numbers & Operations – Comparing Percents, Fractions, & Decimals.* If we have memorized that $\frac{1}{5} = 0.2 = 20\%$, then we could simply multiply these values by 2 to get $\frac{2}{5} = 0.4 = 40\%$. If not, use long division.

24. C. *Data & Probability – Interpreting Data.* Look for the students who received the two lowest number of votes. This is Ernest and Curtis.

25. D. *Measurement – Area & Perimeter of Polygons.* The area of a rectangle is the length × width, or 9 × 7 = 63.

26. B. *Numbers & Operations – Word Problems with Fractions & Decimals.* Make sure place values are aligned (line up the decimal points). 9.5 – 4.85 = 4.65. 0.65 represents sixty-five hundredths, or $\frac{65}{100}$. We could simplify this by dividing the numerator and denominator by some common factor, such as 5. Doing so gives us $\frac{13}{20}$. Thus, we have $4\frac{13}{20}$.

27. D. *Measurement – Area & Perimeter of Polygons.* The area of a rectangle is the length × width. We are given the width of 18, and the fact that the length is half as long as the width. The length is 18 ÷ 2 = 9. So, the area is 18 × 9 = 162 m$^2$.

28. B. *Geometry – Geometric Objects.* There are 9 small triangles inside 1 very large triangle. There are 3 medium sized triangles (each made up of 4 small triangles) to be found inside the very large triangle. So, we have 13 triangles.

29. C. *Data & Probability – Interpreting Data.* Simply count the number of circles for Smith, Tropic, and Grand. This is 17, which represents 17 × 2,000 = 34,000 oranges.

30. D. *Measurement – Volume & Surface Area.* Simply count how many small cubes long one length is. This is 6. Since we know a cube has equally long sides, and we are asked to find the volume of the large cube (since we are asked how many small cubes can be found in the large cube), then we must cube the length of a side. This is $6^3 = 6 \times 6 \times 6 = 216$.

# Final Practice Test (Form C)
## Verbal Reasoning

1. D. The word "realistic" contains the word "real." Something that is real is actual, or represents life accurately and correctly. So, the best word here is "true," as opposed to something made up ("pretend") or unrealistic or outlandish ("fantastic," or "idealistic").

2. B. The word "usual" is used to describe something customary, or something that is done all the time. We could say that something "usual" is also "typical," or "regular." We are looking for a word that means the opposite of this, since the word "usual" is preceded by the prefix "un-". Therefore, the opposite of something "typical" or "usual" or "regular" is "strange" (which is not necessarily unsafe.

3. D. Think of the word "provider." This is someone like a parent, who give children food, shelter, care, etc. Another word for "give" is "offer." To provide is not to invite, force ("compel"), or even necessarily to attack.

4. D. The word "desire" means to have strong feelings of want. This is different from the verb "love," since it is possible to desire something but not love it. For example, someone stranded on an island has a strong desire to be rescued. Or, someone lost in the desert has a strong desire for water.

5.  A. "Fury" relates to extreme anger, which is often used to describe people, or natural forces (like a storm). The fact that something is fast doesn't mean that it is full of anger. Similarly, something can be angry without being surprising.

6.  C. "Deposit" is made up of the root word "pos," which means to put, or place. Think of a bank deposit, which requires someone to "put" money into the bank. This isn't the same as collecting it, or distributing it. A deposit could be given to reserve something, but the two don't mean the same thing.

7.  C. "Acclaim" is a very positive word, meaning "public praise." The word comes from the root word "clam," which means "shout." If praise is shouted, then it is very public. This is different from making a demand, insisting on something, or receiving it.

8.  B. A rebel (noun) is someone who goes against authority. We could say that such a person refuses to listen, or "defies" authority. A rebel may or may not cause something, and may or may not politicize or scream in his or her defiance, but not necessarily so. Be careful not to confuse associated actions with the word itself.

9.  C. "Essential" is used to describe things that must be had – things that are extremely important, or necessary. This is the opposite of "pointless," or "excessive." Essential things may also be memorable, but they are not always so. Something could be essential without a person ever even knowing about it.

10. C. "Arrogant" is used to describe someone's attitude. A modest person is humble, and doesn't make a big deal about his or her accomplishments or victories. An immodest person doesn't do this, and is arrogant, or boastful. The person may be determined in something, but this is not necessarily the case. "Shy" would have almost an opposite meaning of "arrogant," as someone who is arrogant is probably not very bashful about his or her own level of knowledge or confidence.

11. D. To "eliminate" something is to get rid of it, or destroy it. People often talk about eliminating competition, which is to remove that competition. This is more than merely hiding (concealing) something.

12. B. "Unknown" contains the prefix "un-," which means "not," as well as the word "known," which means "understood." Together, this means that "unknown" refers to something that is "not understood." An example of this is something obscure, or not familiar to someone. Something that is distant or remote may not be well understood, but that's not always the case. There could be something nearby that is unknown, if someone is unaware of it, for example.

13. D. "Perspective" is used to describe a particular point of view. This can be literal, like a perspective from a certain place (maybe from a window, for example), or figurative, like one's point of view on a particular topic.

14. C. To oppose something is to disagree with it. As a noun, "opposition" describes a group of people or idea which disagrees with something else; the former could be said to be hostile to the latter. An opposition group would not be a defender of that which it opposes.

15. B. To persist is to last for a time, or to continue doing something throughout some period of time. "Persist" contains the root word "per," which means "through" (think "perennial," which means every year, or, through the years). Therefore, it doesn't mean "terminate" (stop). To persist could be a struggle, or it might not be. "Last" has several meanings, one of which is to persist.

16. C. The word "interpret" means to understand or explain something, for instance, a foreign language. An interpreter translates languages to help explain to someone something he or she might not otherwise understand. This is the opposite of "confuse," since the interpreter is making things easier for someone to understand.

17. B. To dispute something is to argue it, or fight over it. "Dispute" is made up of two frequently encountered root words: "dis," which means "apart" or "to the opposite" (think "distance") and "pute" or "think" (think "compute"). If we have a distance in thinking, we have a disagreement over it, which can lead to a conflict, or fight.

18. B. We can infer from the sentence that, since Jasmine is sniffing at the air, and doesn't know what the source of the smell is, that she is trying to find out where the smell is coming from. Another word for "find out" is "detect." It doesn't make sense to say that she is trying to do any of the other things listed as a possible answer choice.

19. B. One does not generally expect to do well on a test – let alone get a perfect score – if one does not study at all. To get a perfect score on a test that one hasn't studied for would be surprising, not upsetting in any way. It doesn't make sense to say that Nathan was reminded, since we're not told that he was reminded of anything in particular.

20. B. We're told that the parents wanted to make sure that their son would not be able to do something while they're away. We can infer that this would be something negative, not positive. The only negative word given as a choice is "mischief," as the other words are positive ("opportunities"; "options") or neutral ("appointments").

21. C. Since Makenzie expected to see only one blue mailbox, we can infer that she was only confused because she saw some number of mailboxes other than one. While "none" could be an option, it is not listed as an answer choice. Instead, "numerous" is the only word that makes sense. Makenzie wouldn't be confused to see a single mailbox (since this is what she was expecting). An "active" mailbox doesn't make much sense, and the fullness of the mailbox has nothing to do with Makenzie's expectations.

22. B. The sentence describes a process where the artist must "create." This is different from admiring or critiquing (looking, appreciating, or evaluating) the work. Selling a work of art may be difficult, but the rest of the sentence doesn't support this claim, instead describing how a piece is made.

23. D. A well-thought out plan is the definition of a strategy. While the other words may make sense, none of them are defined by the idea of a well-thought out plan.

24. A. The sentence describes how Erin was successful because of her friendly traits, which she maintained "even to" the more difficult diners. The only other positive trait described is "courteous," as the other choices all describe negative traits.

25. C. One of the purposes of a candle is to provide light, or brighten a dark place. The verb "illuminate" describes this very action. The candle would not blur a cave, but would instead make it more clear. The candle itself does not explore a dark cave, but could help make it happen. Candles melt, but caves do not.

26. B. Ordering something to happen is an example of exercising, or exerting, authority. The example of closing the park is an example of using power, not reducing it, giving it up (resigning), or limiting (containing) it.

27. D. The sentence describes how doing something to two different ingredients affects the taste of food and changes the dish. In context, we can infer that the sentence is describing substituting one ingredient for another, since the second half of the sentence uses the word "replacing."

28. A. If the tyrant was selfish, then he cared only about himself. He would oppose laws that would make it difficult to benefit himself, not "join," "launch," or "protect" those laws. "Abolish" means to get rid of, or end something.

29. B. "Like" tells us that two ideas are similar. In this case, the idea of an animal that only eats plants is described by the word "herbivore." We don't know that both the animals are endangered, only found in zoos, or very tall, just based on the information provided in the sentence.

30. C. If Sharon was "jealous," then she would not do positive things for Alan, like "promote," "his work. Instead, she would "undermine" Alan's reputation. We don't know that Sharon teaches, nor that she would necessarily or logically paint on larger canvases as a result of her jealousy.

31. B. The sentence begins with "unlike my cat" which indicates the behavior of the cat is somehow different than the behavior of the dog. The correct answer is that the dog loves new people because this contrasts the more fearful behavior of the cat. The choice stating that the dog is also afraid of strangers does not make sense because the sentence begins with "unlike," so the dog should have the opposite of the cat's behavior. While it's possible the dog does not get along with the cat or that it is only a puppy, these ideas do not follow from the first part of the sentence.

32. B. The answer is "she prefers to watch them play in person." The key word here is "although" which indicates a contrast from the first part of the sentence, which describes "how" Sara watches her favorite team ("on television"). While Sara loves watching her favorite team, she actually likes even more to see them play in person. The choices about the television and the championship do not logically provide any sort of contrast to the first part of the sentence. The choice about iced tea has no logical connection to this sentence.

33. B. With two fewer players, the team is at a disadvantage. There's no evidence or context to tell us that the referees forgave them (since they were penalized) or that the coach would forget the players' names, or that the rules would change as a result of this penalty.

34. D. If the book is literal and focuses on describing events, there is not much that needs to be interpreted. Another way of saying "interpret" is to say "read between the lines." The semicolon used tells us that the first and second parts of the sentence must be related to one another. In addition, "as such" tells us that something is a direct outcome of something else. In this case, "because" the book is literal, there is little room for one's own interpretation.

# Quantitative Reasoning

1.  B. *Numbers & Operations – Estimation.* Round to the nearest pound (the ones place). This gives us 10, 7, 8, 8, and 8. The sum of this is 41, which is between 40 and 45 pounds.
2.  B. *Geometry – Coordinate Grids & Transformations.* Trace down from the point to the $x$-axis to see that the $x$-coordinate (the first in the coordinate pair) should be –2. Trace right from the point to the $y$-axis to see that the $y$-coordinate (the second in the coordinate pair) should be 2. So, we have (–2, 2).
3.  B. *Numbers & Operations – Vocabulary & Properties.* The commutative property tells us that 2 or fewer values can be added or multiplied in any order that we like.
4.  A. *Algebraic Concepts – Functions.* Test two inputs to see which equations give us the output shown by the chart. Luckily, we need only test the first choice to see that this equation represents the relationship between the input and output. For example, $5(2) – 7 = 3$, and $5(6) – 7 = 23$.
5.  D. *Numbers & Operations – Word Problems.* When we see the words "each" and "in," we can infer that we are being told something that relates to division or multiplication. The words "less" and "more" tell us to subtract or add. If 16 is 8 more than something, to find that something, we subtract 8 from 16, or $16 – 8 = 8$.
6.  C. *Numbers & Operations – Word Problems.* We're looking for the number of students who rode the bus. From the total 255, remove the number of students who did not take the bus. This is 15, so $255 – 15 = 240$ students rode the bus. The question asks for the number of students on "each" of 4 busses, so we must divide: $240 ÷ 4 = 60$.
7.  A. *Geometry – Geometric Objects.* The question asks us to make a square, which means the sides must all have the same length (number of small squares). The original figure has 5 squares vertically,

but only 4 horizontally. So, we know we must add an extra column along the right. Only the first and last choices do this. The last choice does not fill in the interior of the square, however.

8.  D. *Numbers & Operations – Vocabulary & Properties.* The distributive property tells us to multiply each term inside a parentheses by the factor outside of it. This is only shown in the last choice, since we would keep the operations shown inside the parentheses.

9.  C. *Measurement – Area of Shaded Figures*. The total area of the rectangle is $11 \times 8 = 88$ units$^2$. The area of a triangle is $\frac{1}{2}$(base)(height). In this case, it is $\frac{1}{2}(9)(6) = 27$ units$^2$. The shaded area is equal to the area of the rectangle minus the area of the triangle, or $88 – 27 = 61$ units$^2$.

10. D. *Measurement – Volume & Surface Area*. The question is asking how many smaller cubes can fit inside the larger cube. We can see that the smaller cube would fit 9 times along the top layer, another 9 times along the middle layer, and again another 9 times along the lower layer. This is $9 + 9 + 9$, or 27.

11. C. *Algebraic Concepts – Solving Algebraic Equations*. Solve each equation separately first. We find that $c = 0$, and $d = 10$. So, $0 + 10 = 10$.

12. D. *Algebraic Concepts – Creating Expressions & Equations*. If the chef knows how many total eggs he will need, and he knows how many eggs are in a carton, he needs only divide the former by the latter to find $c$, the number of cartons he needs.

13. B. *Data & Probability – Interpreting Data*. We're asked what percentage 90 students represents of the 600. This is simple division; we can cancel one of the zeros in each number for $9 \div 60$. We could divide both numbers by 3 for $3 \div 20$. Long-division gives us 0.15, or 15%. Alternatively, we could multiply the answer choices by 600 to see which gives us 90.

14. C. *Data & Probability – Mean, Median, & Mode*. The number with the greatest number of votes would be the number of goldfish acquired for the tank. This describes the mode.

15. C. *Data & Probability – Probability*. If there are a total of 24 apples in the bucket, and there is a 3 out of 8 chance of picking a red apple out of the bucket, then we could multiply both numbers by 3 to find that 9 out of 24 of the apples are red. This means the difference, or $24 – 9 = 15$ apples are green.

16. C. *Data & Probability – Probability*. Since the chance of picking a rose from the vase is 3 out of 10, we know that we are looking for some combination where the proportion is the same. The 10 represents any given total of flowers, not a specific number of flowers. We must therefore find the specific number of total flowers in each choice by adding the number of roses and the number of other flowers. This is $3 + 10 = 13$, $6 + 13 = 19$, $9 + 21 = 30$, and $10 + 3 = 13$. From here, we can divide each number of roses by these totals to see which gives us 3 out of 10. Only the third choice does this, as 9 out of 30 is the same as 3 out of 10 (divide both the 9 and the 30 by 3).

17. D. *Measurement – Area & Perimeter of Polygons*. We know a square has four equally long sides, and since the perimeter is 144, then each side must be $144 \div 4 = 36$ cm long. The question asks for the area, or $36^2 = 36 \times 36 = 1,296$.

18. C. *Algebraic Concepts – Patterns*. Fill out the next row based on the pattern shown. We can see that each number is the sum of the two immediately above it and to the left and right. So, we get 1, 6, 15, 20, 15, 6, 1 as the 7th row.

19. D. *Data & Probability – Mean, Median, & Mode*. There are only 2 numbers, and one of them is 1. This is 8 less than 9, the mean. So, the other number must be 8 more than 9, or 17. As an equation we could express this as $\frac{1+x}{2} = 9$, where 9 is the mean, 2 is the number of values in the set, 1 is one of the known numbers in the set, and $x$ is the unknown number in the set. Solving for $x$ by multiplying both sides by 2 and subtracting 1 gives us 17.

20. D. *Algebraic Concepts – Creating Expressions & Equations*. The total amount of money earned mowing lawns would be the amount of money per hour multiplied by the number of hours, or $7h$. From this amount, we subtract 10, since Dale spent this on lunch. What's left is 32. So, we have $7h – 10 = 32$.

21. A. *Data & Probability – Interpreting Data*. The shaded part of the Venn diagram shows us toys with wheels that are NOT made of wood. A fire truck has wheels, but in this case, is made of plastic (not wood).

22. B. *Data & Probability – Mean, Median, & Mode.* The median is the middle number in a set. Write down all of the values in order, or eliminate high-low pairs from the graph. Doing so, we see that the set is {25, 30, 40, 45, 50, 50, 60, 70, 70, 75}. Eliminate high-low pairs (25 and 75, 30 and 70, etc.) to find that there are two numbers in the middle: 50 and 50. We take the average, which is simply 50 ($\frac{50+50}{2} = 50$).

23. D. *Numbers & Operations – Comparing Fractions*. First, eliminate anything equal to or greater than $\frac{1}{2}$. This rules out $\frac{9}{18}$ and $\frac{6}{10}$. We see that $\frac{2}{10} = \frac{1}{5}$, since $\frac{1}{5} \times \frac{2}{2} = \frac{2}{10}$. This leaves us with $\frac{1}{4}$.

24. D. *Data & Probability – Interpreting Data*. The price of corn went from 6 to 10 from 2012-2015, which is not doubling. The chart shows a period of time (2013-2014) where the price of corn decreased. The price of corn in 2015 is lower than the price of corn in 2017. This leaves us with the last choice, which we could test to be true.

25. D. *Algebraic Concepts – Proportions*. The question asks us to find how much money the farmer earned if he made $28 \div 4 = 7$ times as much as the information tells us, or $14 \times 7 = 98$. Alternatively, setup a proportion: $\frac{14}{4} = \frac{x}{28}$, which gives us $4x = 392$, and $x = 98$.

26. D. *Algebraic Concepts – Creating Expressions & Equations*. Let's have $c$ represent the weight of a chair, $t$ the weight of a table, and $d$ the weight of a desk. If the total is 40 pounds, then we could say that $c + t + d = 40$. We're also told that $t = 3c$, and $d = 4c$. Substitute this into the equation for $c + 3c + 4c$, or $8c = 40$. Solve for $c$ by dividing both sides by 8. Thus, $c = 5$. However, we're asked for the weight of a table, which is $3c$, or $3(5) = 15$.

27. B. *Algebraic Concepts – Proportions*. Set up a proportion where the distance on the model is the numerator, and the actual size of the ship is the denominator: $\frac{3.6}{4} = \frac{27}{x}$. Cross-multiplying leaves us with $3.6x = 108$, or $x = 30$. Alternatively, we could divide 27 by 3.6 and multiply the quotient by 4.

28. C. *Measurement – Irregular Shapes*. The area of a trapezoid is average base length times height. The average base length is $(6 + 9) \div 2 = 7.5$. So, the formula becomes $(7.5)(4) = 30$.

29. D. *Geometry – Geometric Objects*. The sequence shows that we add 2 small squares to the figure, filling each row from left to right.

30. D. *Measurement – Area & Perimeter of Polygons*. The choices give us possible lengths and widths of a rectangle whose perimeter is 30. We know that the perimeter of the rectangle is equal to $2l + 2w$, where $l$ and $w$ are the length and width of the rectangle. So, we must multiply each number in the answer choices by 2, and find the sum of each choice. Only in $2(7) + 2(8)$ do we get $14 + 16 = 30$.

31. D. *Numbers & Operations – Order of Operations*. Simplify inside parentheses first for $\frac{60 \times 40}{5} = d$. Multiply for $\frac{2,400}{5} = d$, or $d = 480$.

32. C. *Measurement – Converting Units*. If there were 2.5 pounds of chocolate, and each pound = 16 ounces, then there were $2.5 \times 16 = 40$ ounces of chocolate.

33. C. *Numbers & Operations – Estimation.* We must find the approximate value of one-fourth of the 486,295,561. We do not need to perform long division or even round to see that the first choice is far too large to be one-fourth of this number. The second choice is closer to half, and the last choice is closer to one-tenth.

34. C. *Numbers & Operations – Word Problems.* 9 fits into 482 evenly 53 times, meaning $53 \times 9 = 477$ cookies go into 53 bags. This leaves $482 - 477 = 5$ cookies remaining for the 54th bag. To fill the 54th bag with 9 cookies, Jerome would need to add $9 - 5 = 4$ cookies.

35. B. *Numbers & Operations – Comparing Fractions.* Use $\frac{1}{2}$ as a reference point. $\frac{4}{7}$ is more than $\frac{1}{2}$, since half of 7 is 3.5. $\frac{8}{15}$ is also more than $\frac{1}{2}$, since half of 15 is 7.5. $\frac{10}{19}$ is also more than $\frac{1}{2}$, since half of 19 is 9.5.

36. B. *Numbers & Operations – Number Lines.* There are two spaces between 8 and 12, which means the distance of $12 - 8 = 4$ should be divided by 2. Thus, each space represents 2 units. Counting left along the number line means we subtract. There are a total of 6 spaces from 8 to F, or 12 units. So, F is at $8 - 12 = -4$.

37. C. *Data & Probability – Interpreting Data.* First, find the cost per flower. Since we know that Wendy spent $2.50 on 2 flowers, then each flower cost $2.5 \div 2 = 1.25$. The question asks who much money Talia spent in all, not just on flowers. If she bought 3 flowers, she spent $3 \times 1.25 = 3.75$. Add 6, 6, and 5 to this to find a total of $20.75.

38. C. *Numbers & Operations – Estimation.* Tank 1 is divided into 8ths, while tank 2 is divided into 5ths. We could try to calculate the exact amount, but the question only asks for an approximation. Since each tank holds 4 gallons, and each tank is filled with more than half, we know that there is more than 2 gallons in each tank, or more than 4 gallons in total. This eliminates the first two choices. We know the answer can't be 8 gallons, since both tanks would have to be completely full for that to be the case.

# Reading Comprehension

1. B. *Main Idea.* The primary purpose of this passage is to describe an interest in vexillology, or the study of flags. In doing this, the author describes why flags are interesting. The passage does not compare and contrast the designs found on modern flags. The author describes different places where flags are flown, and how flags are still important even today, as per lines 56-59.

2. B. *Vocabulary.* The best answer here is to "tell apart from." The word "distinguish" is used in line 28 show how people use flags to "differentiate" themselves from other people, not the opposite, which would be the choice "become similar to" or "bond with." In context, "give abilities to" is too general, since "distinguish" is the ability to tell something apart from another.

3. A. *Supporting Ideas.* The best answer is "Humans have always used flags." The question asks for which of the choices is not true, and this is the only choice that is not true according to the passage. Lines 29-31 read, "Groups of people have always had the need to differentiate themselves from other groups. This was the case even before the very first flags." The paragraph goes on to describe how before humans used flags they used decorated shields and weapons to differentiate themselves from other groups. In other words, humans did not always use flags to differentiate themselves from other groups.

4. B. *Style.* The author views vexillology, the study of flags, with genuine interest. The author's attitude is most clear from the first two paragraphs and especially from lines 12-14. It's therefore not right to call the author's attitude "indifference," which would mean he doesn't care about flags. Similarly, the author doesn't dislike (have a disdain for) flags. While the author describes his interest as "unusual" (line 2), he does not indicate embarrassment about this.

5. C. *Organization & Logic.* The best answer is that Neil Armstrong planted a flag on the moon in order to celebrate his country's accomplishment. Lines 50-55 describe how Armstrong raised the flag of the United States as an example of how a country can fly a flag to "advertise one's presence on new territory." One reason a country may advertise its presence is to celebrate its accomplishment of landing on this new territory. While flags can be used in war or to differentiate one's group from other groups, the passage does not mention aliens or suggest that he desired to claim the land for himself.

6. A. *Main Idea.* The primary purpose of the passage is to explain the science behind why leaves change color in autumn. This purpose is stated in lines 6-9. The passage mentions chlorophyll, but also talks about other pigments, like carotenes and xanthophylls. The passage doesn't describe which leaf colors are the best, instead adopting a neutral tone. The passage talks briefly about the seasons, but only as an introduction to the passage.

7. C. *Organization & Logic.* Sunlight affects the amount of chlorophyll in leaves. Lines 10-11 explain that in warmer months, trees create food in their leaves. Lines 11-17 explain how chlorophyll is necessary for this process. Lines 26-32 then explain how some natural cues, like light, impact chlorophyll levels. The other choices represent different pigments that give the leaves various colors. However, these other pigments do not cause the amount of chlorophyll in leaves to change.

8. C. *Vocabulary.* The word "cue" as it's used in the passage means a signal. We can infer this from the fact that it "tells" trees to stop making food in their leaves. Though examples of these signals might have to do with temperature, other examples are given tell us that it's not just temperature (it could be light, for example). The color of leaves is affected by these cues, but the two words do not have the same meaning.

9. A. *Supporting Ideas.* Sugar cane is not mentioned in the passage. Red cabbage and eggplants are mentioned in lines 33-43, in the discussion about anthocyanins. Only carrots are mentioned in lines 18-25, in the discussion about carotenes and xanthophylls.

10. D. *Inference.* Evergreen trees are described in lines 55-57 as trees that do not change color at all. Because evergreens are green throughout the year and because chlorophyll gives trees their green color (lines 11-13), it follows that the amount of chlorophyll in evergreens remains relatively steady. Oak trees are not listed as examples of evergreens; their leaves are described as changing colors.

11. A. *Main Idea*. The author shares various reasons why people should take up biking to work. The increasing number of people doing so is a trend, but there are no other trends that are referenced in the passage. Pollution is mentioned as a problem that biking can help solve. Similarly, biking to work provides exercise to people, which is a solution to the problem of people not getting enough exercise. There's no mention of a national biking system – only ones in cities.

12. A. *Supporting Ideas*. The heart and lungs are mentioned in the third paragraph (lines 11-17). The immune system is mentioned in the fourth paragraph (lines 18-24). There is no evidence of biking strengthening eyes.

13. C. *Vocabulary*. Pollution is described as a bad thing, as we're told that it "makes the earth less habitable. The paragraph describes how cyclists can help reduce pollution by biking instead of taking cars or trains to work. Cyclists wouldn't take advantage of pollution (exploit). Recycling is an example of minimizing pollution, but isn't the right verb to use in context of cyclists.

14. D. *Organization & Logic*. Most paragraphs in the passage introduce new reasons why biking to work is a good idea. There are neither experiences nor viewpoints presented in the passage. The author never presents a specific event, but rather explains many different things.

15. D. *Style*. This passage argues the point that people should bike to work. It is the author's personal opinion, which he supports with some facts. The most appropriate place for this would be in the opinion section of the newspaper. In encyclopedias and history books, there usually aren't biases and people's personal opinions. Advertisements are usually trying to sell a product or service, neither of which are mentioned here.

16. A. *Main Idea.* The main purpose of this passage is to explain why humans need to colonize Mars. The other three answer choices all relate to supporting details in the passage, but do not by themselves constitute the majority of what the passage is about. The last paragraph summarizes well the author's intention: "the people of Earth must seriously consider building colonies on Mars."

17. C. *Supporting Ideas.* According to the passage, "Some scientists have found evidence to suggest that at some point, this water even flowed over the Martian landscape in liquid form." This implies that it no longer does. Lines 20-34 explain how Mars is similar to Earth. Lines 13-16 suggest that Earth is already too polluted and crowded. Lines 38-41 name valuable metals found on Mars that could be useful to humans if the colonize the planet.

18. A. *Organization & Logic*. The correct answer is that European explorers sought out new land for similar reasons that people today should explore Mars. These parallels are drawn in the first two paragraphs, lines 36-37, and the last paragraph. The author does not mention European explorers because they discovered Mars (the discovery of Mars is not mentioned at all). He also does not mention how the equipment will be the same (he in fact says that the technology needed for Mars does not yet exist). While it is true that the new colonies in the Americas eventually became very powerful, the author does not mention that the same might happen to Mars.

19. D. *Vocabulary.* The word "habitable" is used in line 48 to describe the amount of land on Mars that has the potential to be inhabited, or in other words, is suitable for living. Do not confuse "habitable" with "hostile" or "habit-forming" (which would be close to "repeatable").

20. A. *Style.* The tone of the passage is best described as persuasive, or convincing. The author provides information to persuade the reader that the time to colonize Mars is now. It does not attempt to deceive or speak in a sarcastic way (saying one thing but meaning another). The tone is not pessimistic about travel to Mars but is instead hopeful.

21. A. *Main Idea*. The primary purpose of this passage is to trace the history of checkers from ancient times to today. While the passage mentions different versions of checkers, it does not teach the reader how to play them. The passage briefly mentions chess in line 9 but does not claim that either game has a more interesting history than the other. In lines 24-37, the passage discusses how women were involved with checkers. Women's involvement, as with the mention of different versions of the game, are mentioned to show how the game has changed over time.

22. D. *Supporting Ideas*. Lines 24-37 discuss how in many non-English languages, checkers developed names related to the game's association with women. In England, the game was called "draughts" (line 42) not "checkers." Arthur L. Samuel (line 52) created the first checkers computer program. The passage says nothing about him creating the most popular version of checkers. The ancient Iraqi version of checkers is not identical to the modern American version (lines 10-13).

23. B. *Inference*. Lines 39-41 read: "In the 1500s, the rules of the game became more standardized as rules began to be written down." From this we can infer that as more books were written about the game, the rules became more standardized. It would logically follow that further standardization of the rules, at least in the English-speaking world, would be a result of the first English-language book being written about checkers. This is the only answer choice that deals with writings about checkers. The fact that alquerque was brought to Spain by the Moors is not relevant. The creation of new variations that including crowning or using pieces and boards from other board games does not tell us anything about whether these rules or other rules became standardized or whether these were just variations that existed at the time.

24. C. *Vocabulary*. The word "colorful" has multiple meanings. It can mean both "interesting" and "multicolored." In the context of this passage ("think of the game's colorful history"), it most nearly means "interesting." It is clear from lines 1-6 of the passage that the author finds the history of the game to be interesting: "What you might not know, however, is that this simple game has a long, fascinating history." The history is not literally "multicolored." While "bright" and "dreary" are words that are associated with colors, they are not synonyms for "colorful."

25. C. *Organization & Logic*. The correct answer is "alquerque, fierges, draughts, online checkers." Alquere is mentioned in line 19, fierges in line 28, draughts in 42, and online checkers in line 60. The passage discusses each version of the board game in chronological order. The other choices list the versions in sequences that are not consistent with the order the different versions are presented in the passage.

# Mathematics Achievement

1. B. *Numbers & Operations – Order of Operations*. Observe PEMDAS and multiply terms first before adding and subtracting *Numbers & Operations –*. This gives us 7 + 48 – 5 = 50.

2. C. *Geometry – Coordinate Grids & Transformations*. To get *J* to be where *K* is, we must reflect it over *q* and then over *r* (or vice versa). Notice that if we reflect it over *p*, it will end up somewhere around (3, 1).

3. C. *Numbers & Operations –Word Problems with Fractions & Decimals.* Subtract to find the difference. We only need to subtract the first few digits to find that the answer should be 3.519.

4. C. *Numbers & Operations – Number Lines.* There are 9 spaces between 0 and 1.8, which means each space is $1.8 \div 9 = 0.2$. Counting left from 1.8 means subtracting 0.2 for each space. There are 3 spaces from $Z$ to 1.8, so there is a distance of $0.2 \times 3 = 0.6$ between the two points. This means $Z$ is at $1.8 - 0.6 = 1.2$. We don't need to check $Y$, since there is only one choice with 1.2 in it.

5. C. *Algebraic Concepts – Creating Expressions & Equations.* If there are 200 rooms in total, and all rooms will either have a queen or king size bed, then we know that the number of king size beds will be $200 - 135$. If we let $k$ stand for the number of king size beds, then we have an equation like $200 - 135 = k$. This isn't shown as an answer choice, but an equivalent version is. By adding 135 to both sides, we end up with $200 = 135 + k$.

6. A. *Measurements – Units.* We know that a full 24-hour period is one day, so traveling for 24-hours starting at 6:00 AM in Miami would mean we stop traveling at 6:00 AM Miami time one day later. If we do this again, we've traveled for a total of 48 hours, and stop traveling at 6:00 AM Miami time two days later. However, Preston drove for an additional 2 hours, (making it a total travel time of $24 + 24 + 2 = 50$ hours), stopping traveling at 8:00 AM Miami time. However, the question asks for the time in Seattle when he arrives. If he arrived in Seattle at 8:00 AM Miami time, then it was 5:00 AM in Seattle (since Miami is 3 hours ahead of Seattle).

7. B. *Numbers & Operations – Word Problems.* Multiply the amount Scarlet earns per hour for a certain activity by the number of hours spent doing that activity. This gives us an equation $7 \times 6 = 42$ and $8 \times 12 = 96$. The difference of $96 - 42 = 54$ tells us how much more was earned mowing than babysitting.

8. C. *Data & Probability – Interpreting Data.* Each bar tells us how many blocks were run during a five-week period. We have $12 + 4 + 16 + 8 + 12 = 52$.

9. C. *Measurement – Area & Perimeter of Polygons.* A rectangle has a perimeter $2l + 2w$, where $l$ and $w$ are the length and width of a its sides. So, we have $2(13) + 2(5)$, or $26 + 10 = 36$.

10. C. *Data & Probability – Probability.* A dozen is 12, so 2 dozen is 24. Of these 24, 3 are daisies. So, the chance of picking a daisy is 3 out of 24. We can simplify this to 1 out of 8, since we could divide both numbers by 3.

11. C. *Measurement – Area & Perimeter of Polygons* The perimeter is the sum of all of the sides, or $8 + 8 + 4 + 4 + 6 = 30$.

12. C. *Data & Probability – Interpreting Data.* The milkweed increases by 3 each week. The table shows only the height after 4 weeks. So, we must estimate what the height will be 2 weeks later, at week 6. This would be $29 + 3 + 3 = 35$.

13. A. *Algebraic Concepts – Creating Expressions & Equations.* When we see "less than a number," we must subtract what comes before the phrase from what comes after. Here, we have before the phrase "two" and after the phrase "twice a number." The latter is $2a$, and the former is simply 2. So, we have $2a - 2$. On the other side of the equation, we have "4 times a number," or $4a$ and "1 more" than this, or $4a + 1$.

14. D. *Data & Probability – Interpreting Data.* First, notice that the chart title is "December Grapefruit Production." So, we see that Sutton Farm produced $5.5 \times 2{,}000 = 11{,}000$ grapefruits in December. We're told that they produced "twice as many in December than in November." This means the amount in December is twice as much as November. We should divide 11,000 by 2 to find the number in November, or 5,500.

15. D. *Algebraic Concepts – Patterns.* First, try to find or subtract a number to get from one term to the next. From left to right, we first subtract 9, then 7, then 5, then 3. The change between each term is 2 less than the change before it, so the next change should be to subtract 1. $76 - 1 = 75$.

16. D. *Numbers & Operations – Order of Operations.* Observe PEMDAS by dividing and multiplying first. This gives us $20 - 10 + 2 \times 2$, and then $20 - 10 + 4 = 14$ (be careful not to add $10 + 4$ first, as there are no parentheses here).

17. C. *Measurement – Volume & Surface Area.* The top layer has 3 cubes in it, the middle has 2 rows of 3, or 6 cubes, and the bottom layer has 3 rows or 3, or 9 cubes. This is $3 + 6 + 9 = 18$.

18. D. *Numbers & Operations – Comparing Percents, Fractions, & Decimals.* There is no need to perform long division. Half of 250 is 125. 123 is very close to 125, so we know that the fraction must be very close to 0.5.

19. B. *Numbers & Operations – Operations with Whole Numbers.* By subtracting the two numbers, we only need to check the ones and tens digit to see that only the second choice works.

20. D. *Numbers & Operations – Place Values.* The millions, ten million, and hundred million place values are all the same, so we need to check the thousands, ten thousand, and hundred thousand place values. "six hundred two thousand" is 602,000. This could only be the last choice.

21. C. *Geometry - Symmetry, Congruency, Similarity.* The rectangle has 2 lines of symmetry (a line drawn through the middle of the top and bottom sides, and right and left sides). A circle has an infinite number of lines of symmetry (that run through the center of the circle). The isosceles triangle only has 1 line of symmetry (vertically through the middle). The ribbon has no lines of symmetry.

22. D. *Numbers & Operations – Operations with Whole Numbers.* We must multiply the two numbers together. We can see that the ones digit would be 4, and the tens digit would be 0, so only the last choice could be the right choice.

23. D. *Numbers & Operations – Comparing Percents, Fractions, & Decimals.* Multiply the two numbers together to get 16.32. 0.32 is "thirty-two hundredths," which is the fractional equivalent of $\frac{32}{100}$, which we can simplify to $\frac{8}{25}$ by dividing both the numerator and denominator by 4. This means we have $16\frac{8}{25}$.

24. A. *Numbers & Operations – Word Problems with Fractions & Decimals.* We should subtract the amount of pizza eaten and given away from the total number of pizzas ordered. To make this easier, we should make sure both fractions have the same denominator. We can see that we could convert $6\frac{2}{3}$ to $6\frac{4}{6}$ by multiplying the numerator and denominator of the fraction by 2: $\frac{2}{3} \times \frac{2}{2} = \frac{4}{6}$. This lets us more easily add $4\frac{5}{6}$ for $4\frac{5}{6} + 6\frac{4}{6} = 10\frac{9}{6}$. This is an improper fraction, so we subtract 6 from the numerator, leaving us with $11\frac{3}{6} = 11\frac{1}{2}$. This means they gave away $11\frac{1}{2}$ pizzas, or have $12 - 11\frac{1}{2} = \frac{1}{2}$ a pizza left.

25. C. *Numbers & Operations – Estimation.* Find the total ounces of liquid in the punch: 12 + 12 + 6 + 4 + 4 + 3 + 3 = 44. If there are 12 mugs, and each received an equal amount of liquid, then there was $44 \div 12 = 3\frac{6}{12}$, or $3\frac{2}{3}$ in each cup. This is closest to $3\frac{1}{2}$.

26. B. *Data & Probability – Interpreting Data.* Each year, the number of tickets sold increases by 1,000. If there were 18,000 tickets sold in 2017, then one year later, in 2018, there should be 19,000 tickets sold.

27. B. *Algebraic Concepts – Solving Algebraic Equations.* Subtract $x$ from both sides then divide to isolate $x$: $4x = 12 + x$ becomes $3x = 12$, and $x = 4$.

28. D. *Algebraic Concepts – Functions.* We should try to find an equation that takes the input value and generates the output value. We can see that the output value increases rapidly, which more than simply adding or subtracting. We can see that getting from 5 to 15 would mean adding 10 or multiplying by 3. We can rule out adding 10, since this isn't the case for all of the other combinations. Multiplying by 3 comes close for a lot of combinations, but doesn't produce the exact relationship. Multiplying the input by 4 and subtracting 5, however, does. 50(4) – 5 = 195.

29. D. *Algebraic Concepts – Solving Algebraic Equations*. Multiply both sides by 3 for $c = 3c - 12$. Combine like terms for $12 = 2c$, and $c = 6$.

30. D. *Geometry – Geometric Objects*. The entire figure is a rectangle (1). The top row of rectangles is another, as is the bottom row (2). The first, second, and third columns are all rectangles (3). Each individual small rectangle also counts (6). So too do 2 by 2 blocks of small rectangles (2). Groups of two in each row also make rectangles (4) This gives us $1 + 2 + 3 + 6 + 2 + 4 = 18$.