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The Complete Explanation Guide to the Pre-Assessment

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English Language Arts and Reading Test

1. (**A**) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Main Idea.*** **T**he passage is about images of former presidents on coins, and more specifically about the significance of Franklin Delano Roosevelt's image being featured on the dime, as (A) states. (B) and (D) are wrong because they are too specific. While the passage mentions efforts to cure polio and Roosevelt's efforts to overcome paralysis, these are not the focus of the passage. (C) is wrong because it is too broad. The passage is about Roosevelt specifically, not all the presidents.

2. (**A**) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Implied Idea.*** There are several clues in the passage to let you know what the author's judgment is: "overloaded," "overburdened," "dire," and "desperate." Those words all suggest crisis, (A). (B) is incorrect because the most serious manifestations of the problem will come in the future. (C) is incorrect because while the problems are long-term, they are much worse than just a "challenge." And (D) is incorrect because the author does not regard the developments as "insoluble."

3. (**C**) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Vocabulary.*** The passage mentions a couple of details of the sedentary life: grooming and staying in burrows. The passage also mentions that the new life of the penguins involves a lot of swimming. Thus, "sedentary" must mean "inactive," (C). (A) and (B) pick themes from the passage (zoo and swimming), but they do not address the issue of what it means to be sedentary. Finally, as for (D), grooming and staying in burrows does not sound all that spontaneous.

4. (**D**) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Implied Idea.*** The author spends most of the passage explaining how cylinder locks work. Both the first and last sentences set up the implied conclusion: the ordinary cylinder lock is probably not going to deter a thief.

5. (**A**) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Implied Idea.*** The author states that neurons that die because of disease or injury are not usually replaced. Thus, serious injury to the brain is likely to be permanent.

6. (**A**) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Main Idea.*** The focus of the passage is on the US Marshals who protected James Meredith, (A). (B) and (C) are wrong because they are too specific. Both points are mentioned in the passage, but they are not the focus of the passage. (D) is wrong because it is too broad. The passage is about one person the US Marshals protected, not multiple people.

7. (**B**) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Implied Idea.*** The author divides the Park Service's actions into short-term and long-term strategies. In the long term, the Park Service plans to modify behavior by offering rewards for new technology. That's the strategy discussed in the second half of the passage. (A), (C), and (D) all refer to direct regulation of behavior rather than using incentives to reward change.

8. (**C**) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Main Idea.*** The author mentions three writing resources: dictionaries, an academy of scholars, and examples. The author then argues that the best alternative would be examples of good writing for others to follow, (C). (A) misstates the author's point: There are three resources, and a good example is the most useful. (B) is

not the central theme of the passage. (D) overstates the case: the author prefers the idea of good examples, but the passage does not say that this tool should be the only one available to writers.

9. (**B**) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Vocabulary.*** What does the author mean by "excessive nutrients"? Obviously, that phrase must refer to nutrients, and so (D) is incorrect. Then, "excessive" must refer to something above what is required. (A) suggests this idea, but (A) does not accurately describe how the author uses the phrase. Rather, (B) is correct: the "excess" is extra nutrients that find their way into surface water and "fatten up" the algae, which in turn suck up all the oxygen. Finally, (C) is incorrect because the excessive nutrients are absorbed by the algae.

10. (**C**) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Development.*** The author uses the weather as a symbol: the good weather with the sun shining represents good fortune in general (and the French are ecstatic and the English wary) while the cloud suggests the possibility of rain and unhappy times. As for (A), while weather is a natural phenomenon, that is not the importance of weather in this passage. (B) is close because it mentions the kind of contrast that the author is developing, but the contrast is between optimists and pessimists, not pleasant and unpleasant people. As for (D), there is no mention of measuring anything.

11. (**D**) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Development.*** Why does the author bother to mention those other problems? In order to emphasize the significance of the problem that is posed by tobacco. (A) directly contrasts with the author's reason for including the examples. (B) is incorrect because, while this statement may be true, it does not explain why the author mentions these problems in a passage on smoking. (C) is incorrect because not only does the list include problems that are not diseases (homicide and crashes, for example), but the purpose of the list is to illustrate the number of people affected, not the variety of causes of death.

12. (**A**) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Vocabulary.*** The "critical mass" mentioned by the author means a sufficient number to ensure that the language can be learned, preserved, and transmitted. The other choices are wrong because "critical mass" is not a fixed number but any minimum number that will accomplish the desired result.

13. (**A**) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Development.*** The passage says that there are two established theories: the arboreal model and the cursorial model. The newly discovered evidence supports a third explanation. As for (B), though the author does provide evidence, it is not adduced as a counterexample to a claim. As for (C), there is a new theory, but the author does not suggest that the existing theories are self-contradictory. (D) is the weakest response because there is nothing in the paragraph to support such a conclusion.

14. (**A**) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Explicit Detail.*** The author tells you why studies use the ratio proxy: it is impossible to know how much of a particular isotope was in the environment at the time. Therefore, (A) is the correct answer. (B) is incorrect because, while it could be true, it is not the reason given by the author. (C) is incorrect because this idea is inconsistent with the passage. Finally, (D) is incorrect because, while it seems to be a true statement, it does not respond to the question that is being asked.

15. (**B**) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Application.*** The word "likely" in the item stem signals that this is an Application item. The author states that words function to contribute to the growth of knowledge and art functions to improve human feelings. Words and art operate in different ways, but they share two characteristics: both are cumulative, in that they preserve and transmit the learning of previous generations to the next, and both are progressive, in that

they correct "mistakes." (A) is incorrect because art functions not to depict the world but to improve human feelings. (C) is incorrect because the first sentence of the passage states that both art and words are forms of communication. Finally, (D) is incorrect because the author neither states nor implies that art depends upon words. Indeed, the passage suggests that art, because it deals with feelings rather than facts, is supreme in its own sphere.

16. (D) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Voice.*** Looking at the first word of each answer choice, eliminate (B) and (C). The tone of the passage is scholarly or analytical, not passionate or angry. The first words of both (A) and (D) seem appropriate. The final choice depends, therefore, on the difference between "optimistic" and "concerned." The latter better describes the passage. The author is discussing a problem and concludes with the sobering thought that the process may already have gone too far. That is concern, not optimism.

17. (B) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Comparisons.*** The main idea of Passage 1 is that Shakespeare did not write the works normally attributed to him. The main idea of Passage 2 is that Bacon was the author of the works normally attributed to Shakespeare. The two do not share the opinion (so far as we learn from the passages) that Bacon wrote the works, but they do agree on the much more limited point that it was not Shakespeare.

18. (C) ***English Language Arts and Reading/Informational Text Analysis and Synthesis/Comparisons.*** This item asks you to identify details that are common to both passages. Both authors mention elements in the works that Shakespeare himself could probably not have written about effectively. Passage 1 mentions the ways of court, and Passage 2 mentions the references to the law.

19. (A) ***English Language Arts and Reading/Literary Text Analysis/Implied Idea.*** The setting makes it clear that Joe and Lily are not aware that their conversation is overheard. Joe explains that the attraction he and Lily feel cannot go anywhere because he intends to honor his promise to marry another woman. We get the first strong hint that the "woman" is Louisa, and this suggestion is confirmed the next evening when it is Joe who calls on Louisa, and Louisa breaks off the engagement.

20. (B) ***English Language Arts and Reading/Literary Text Analysis/Implied Idea.*** The final paragraph describes Louisa's feelings about the broken engagement. That evening she is a bit sad, though she was not certain why. The next morning, her ambivalence had been resolved and she felt relieved.

21. (D) ***English Language Arts and Reading/Literary Text Analysis/Implied Idea.*** The conversation between Joe and Lily makes it clear that something had happened the day before that was significant. Joe reveals it was that they "let on how [they] felt about each other." And the time frame is further clarified by his statement that that "it's just as well we knew." Joe and Lily did not know until they day before that they had strong feelings for one another.

22. (B) ***English Language Arts and Reading/Literary Text Analysis/Implied Idea.*** A key element of the setting is that Louisa at first thinks she might slip away "unobserved," but she stays in her place without revealing her presence. Then, the content of the conversation between Joe and Lily and the reference to the "woman" in the third person help to make it clear that Joe and Lily are not aware that there is a third person in the vicinity.

23. (C) ***English Language Arts and Reading/Literary Text Analysis/Implied Idea.*** Lily specifically says she would not marry Joe in the event that he broke off the engagement with Louisa. Joe adds, "I don't believe you would."

24. (C) ***English Language Arts and Reading/Essay Revision and Editing/Strategy/Appropriate Supporting Material.*** The two sentences as originally written do not contain any logical explanation as to their connection. It seems, however, that the second is intended to explain how the mistake mentioned in the first came to be made. So a good way of combining the two sentences is to use a word to show that connection: *because*. Choice (B) fails to provide a logical connection. So too does choice (A), which makes the additional error called the "comma splice" or "fused sentence" (two sentences jammed together with a comma but no conjunction). And (D) reverses the direction of the logical connection intended by the author.

25. (B) ***English Language Arts and Reading/Essay Revision and Editing/Organization/Sentence-Level Structure.*** The sentence to be added introduces a series of three elements, and the most likely candidate is the three versions of the medal developed in paragraph 2.

26. (D) ***English Language Arts and Reading/Essay Revision and Editing/Style/Conciseness.*** The problem with the original is that "who was a woman" is needlessly repetitive of "female." (D) is more concise. The wrong choices, in various ways, preserve the unnecessary wordiness.

27. (C) ***English Language Arts and Reading/Essay Revision and Editing/Strategy/Appropriate Supporting Material.*** This item asks for the best word or phrase to connect the last sentence of the paragraph to what has come before. In sentence 10 the author stresses that the medal is awarded for extreme bravery, which presumably often includes the risk of serious injury and even death. Then the author notes that the majority of the awards have been made posthumously, indicating that the recipient was killed performing the act of bravery. "In fact" is a phrase that provides emphasis to this point.

28. (D) ***English Language Arts and Reading/Essay Revision and Editing/Strategy/Appropriate Supporting Material.*** The paragraph cited provides a quick look at the "numbers" for the Medal of Honor, so the best choice here is a sentence that makes a statement about that topic. The total number of medals awarded would be an interesting addition to the paragraph.

29. (B) ***English Language Arts and Reading/Essay Revision and Editing/Style/Conciseness.*** The problem with the original is that the phrase "all of whom can start the process" is unnecessary. The edit provided by (B) makes the sentence more concise. You'll notice also that each of the wrong choices actually adds unnecessary verbiage, making the sentence more verbose.

30. (D) ***English Language Arts and Reading/Essay Revision and Editing/Style/Clarity of Meaning.*** The problem with the original is that "they" is a pronoun with no clear antecedent (or referent). Does it refer to "members of the uniformed services" or to "the recipients"? Although reading the next sentence makes it clear that the author is referring to "recipients," the initial ambiguity may leave the reader wondering. Eliminate the ambiguity by using a noun.

31. (B) ***English Language Arts and Reading/Sentence Revision, Editing, and Completion/Sentence Structure/Comma Splices.*** The problem with the original is that it contains a comma splice (two clauses jammed together and separated only by a comma). You can correct the problem in several ways:

    . . . Rockefeller Center. Rockefeller objected . . . . (Use a period to make two sentences.)
    . . . Rockefeller Center; Rockefeller objected . . . . (Use the "stronger" semicolon.)
    . . . Rockefeller Center, but Rockefeller objected . . . . (Insert an appropriate conjunction.)

    The only answer choice that offers one of these solutions is (B), which introduces an appropriate conjunction.

32. (C) ***English Language Arts and Reading/Sentence Revision, Editing, and Completion/Agreement/Verb Tense.*** This item tests logical use of verb tenses. The phrase "two weeks after" puts the surrender of the city before the release of the film, and the verb tense needs to reflect the sequence of events. "Had surrendered" is the past perfect tense, which is used to show that an action in the past was completed before another action that also took place in the past.

33. (C) ***English Language Arts and Reading/Sentence Revision, Editing, and Completion/Agreement/Subject-Verb Agreement.*** The sentence contains a failure of agreement between subject and verb. The subject of the sentence is "allegation" and the main verb is "pose." But "allegation" is singular and needs the singular verb "poses." The intervening phrase "of campaign finance irregularities" can be misleading. "Irregularities," despite its proximity to the verb, is not the subject of the sentence.

34. (C) ***English Language Arts and Reading/Sentence Revision, Editing, and Completion/Agreement/ Pronoun Usage.*** The problem with the original is a failure of agreement between the pronoun "you" and its referent "one." "You" is a second person pronoun while "one" is a third person pronoun. The problem can be corrected by changing "one" to "you," making both pronouns the same.

35. (D) ***English Language Arts and Reading/Sentence Revision, Editing, and Completion/Sentence Structure/Fragments.*** The original word grouping is not a sentence at all because the grouping lacks a main verb. "Marked by" seems to be a main verb, but "marked" is actually the past participle (*mark*, *marked*, *marked*) functioning as an adjective. (D) solves the problem by turning *marked* into a main verb.

36. (B) ***English Language Arts and Reading/Sentence Revision, Editing, and Completion/Sentence Structure/Diction.*** The problem with the original is that it uses "raise," a word that is often confused with "rise."

    raise: to lift or move something to a higher position or level; to increase the amount or strength of something
    rise: to get up, to get out of bed, to stand

    An easy way to remember the difference is that *raise* must come before an object (*raise the roof*) but *rise* does not (*All rise; Court is in session*.)

37. (A) ***English Language Arts and Reading/Sentence Revision, Editing, and Completion/Sentence Structure/Fragments.*** The original is correct as written. The problem with both (C) and (D) is that they eliminate the main verb "is" and turn the word grouping into a fragment. (B) is wrong because it changes the intended meaning of the of the original.

38. (B) ***English Language Arts and Reading/Sentence Revision, Editing, and Completion/Sentence Structure/Comma Splices.*** The sentence contains a structural defect: a comma splice. The error can be corrected by a change in punctuation or by the insertion of a conjunction. "But" is the appropriate conjunction to create the contrast needed between the first and second clause.

39. (B) ***English Language Arts and Reading/Sentence Revision, Editing, and Completion/Agreement/Subject-Verb Agreement.*** This sentence presents a problem of subject-verb agreement. The sentence has an inverted structure: the verb "was" comes before the subject "parents, brother, and friend." Since the subject is actually her parents, brother, and friend, the subject is plural. Therefore, the verb must also be plural.

40. (A) ***English Language Arts and Reading/Sentence Revision, Editing, and Completion/Agreement/Sequence and Verb Tense.*** The original correctly describes the sequence of events in the popping process. The water is heated, expands, and explodes the kernel. The wrong choices, in various ways, distort the sequence of events.

41. (C) ***English Language Arts and Reading/Sentence Revision, Editing, and Completion/Sentence Logic/Problems of Coordination and Subordination.*** The next word is a transition word. The original sentence explains a causal relationship, so "because" makes the most sense. The complete revised sentence is:

    It is likely that any remaining water will be found in the icy soil because the atmosphere on Mars is too thin for liquid water to exist on the surface for long.

42. (B) ***English Language Arts and Reading/Sentence Revision, Editing, and Completion/Sentence Logic/Misplaced Modifiers.*** The next word must be something that was published in 1845 in order for the sentence to make sense. Only (B), the holiday story, works. The complete revised sentence is:

    Published in 1845, the holiday story *The Cricket on the Hearth* by Charles Dickens quickly became a sensation among Victorian readers.

43. (D) ***English Language Arts and Reading/Sentence Revision, Editing, and Completion/Sentence Logic/Misplaced Modifiers.*** The next word must be the person who intended to strengthen the government's financial position. The original sentence explains that this is Hamilton, (D). The complete revised sentence is:

    Intending to strengthen the financial position of the new government, Treasury Secretary Alexander Hamilton proposed to incorporate a Bank of the United States modeled on the Bank of England.

44. (C) ***English Language Arts and Reading/Sentence Revision, Editing, and Completion/Sentence Logic/Misplaced Modifiers.*** The next word must be the noun being described as "three buildings, a memorial, a museum, and a transportation hub": the new World Trade Center. The complete revised sentence is:

    Consisting of three buildings, a memorial, a museum, and a transportation hub, the new world Trade Center was difficult to build, is hard to describe, and will always be a sight to behold.

45. (D) ***English Language Arts and Reading/Sentence Revision, Editing, and Completion/Sentence Logic/Misplaced Modifiers.*** The clearest continuation of this revision would be to mention the museum visitor by name. In this case, that is the implied "you." The complete revised sentence is:

    When visiting a museum, remember to bring along a sweater or light jacket since many museums have state-of-the-art climate control in order to better preserve their collections.

Math Test—No Calculator

1. (A) ***Math/Algebraic Reasoning/Solving Algebraic Equations or Inequalities with One Variable/Equations Involving Rational Expressions.*** Solve for *x*: $\frac{1}{x}+\frac{1}{x}=8 \Rightarrow \frac{2}{x}=8 \Rightarrow x=\frac{1}{4}$.

   Alternatively, you can reason that $\frac{1}{x}$ and $\frac{1}{x}$ are equal, and since their sum is 8, $\frac{1}{x}$ equals 4. Thus, $x=\frac{1}{4}$.

2. (C) ***Math/Quantitative Reasoning/Creating, Expressing, and Evaluating Algebraic Equations and Functions/Creating Algebraic Equations.*** Since *x* is the cost from New York to San Antonio and *y* the cost from San Antonio to Los Angeles, *x* – *y* is the difference.

3. (A) ***Math/Quantitative Reasoning/Manipulating Algebraic Expressions/Factoring Expressions.*** The easiest approach is to multiply the binomials given in the answer choices to find the one that is equivalent to the given expression:

   A. $(x-2)(x+6)=x^2+4x-12$ ✓

   B. $(x-4)(x+3)=x^2-x-12$ ×

   C. $(x-6)(x+2)=x^2-4x-12$ ×

   D. $(x+2)(x+6)=x^2+8x+12$ ×

4. (C) ***Math/Quantitative Reasoning/Common Word Problems/Percents.*** The balance on Jon's motorcycle after the 20% down payment was: \$6,000(0.80) = \$4,800. If he pays that off in 6 months, the monthly payment is: $\frac{\$4{,}800}{6}=\$800$.

5. (B) ***Math/Algebraic Reasoning/Manipulating Algebraic Expressions/Factoring Expressions.*** Simply factor the expression as the difference of two squares: $x^2-y^2=(x+y)(x-y)=3$. Since *x* – *y* = 3, then $(x+y)(3)=3 \Rightarrow x+y=1$.

6. (D) ***Math/Quantitative Reasoning/Manipulating Algebra Expressions/Basic Algebraic Manipulations.*** Isolate *C*. Begin by eliminating the denominator of the fraction on the right side of the equation:

$$A=\frac{190M+160W+70C}{8}$$
$$8A=190M+160W+70C$$

   Then subtract to isolate $70C$:

$$8A-190M-160W=70C$$

   And divide to obtain *C*:

$$C=\frac{8A-190M-160W}{70}$$

7. (C) ***Math/Algebraic Reasoning/Manipulating Algebraic Expressions/Manipulating Expressions Involving Exponents.*** Apply the rules for working with exponents to simplify the given fraction: $\frac{x^m}{x^n} = x^{m-n}$, $x^m(x^n) = x^{m+n}$, and $\left(x^m\right)^n = x^{m \cdot n}$. Therefore, $\frac{(x^2y^5)^2x^3}{x^2y^6} = \frac{x^{2(2)}y^{5(2)}x^{3-2}}{y^6} = \frac{x^4y^{10}x}{y^6} = x^{4+1}y^{10-6} = x^5y^4$.

8. (C) ***Math/Geometric and Spatial Reasoning/Unit Conversions.*** First, find the number of feet represented by 7 inches using a proportion: $\frac{1\text{in}}{12\text{ ft}} = \frac{7\text{in}}{x\text{ ft}} \Rightarrow x = 84\text{ft}$. Next, convert 84 feet into yards: $\frac{84\text{ ft}}{3\text{ ft/yd}} = 28\text{ yds}$.

9. (C) ***Math/Algebraic Reasoning/Creating, Evaluating, and Interpreting Algebraic Equations and Functions/Functions as Models.*** Clarify the meaning of the terms in the given equation by rewriting it with the given and implied units: $h(\text{inches}) = 24\left(\frac{\text{inches}}{\cancel{\text{year}}}\right)y(\cancel{\text{years}}) + 96(\text{inches})$. Translate the equation: a red oak that is over 5 years old is initially 96 inches tall and grows 24 inches each year thereafter.

10. (B) ***Math/Quantitative Reasoning/Manipulating Algebraic Expressions/Basic Algebraic Manipulations.*** If originally there were *n* students, the cost per student, *c*, was $\frac{\$120}{n}$. After the addition of one student, the new cost per student, *c*', was $\frac{\$120}{n+1}$, which was \$4 less than the original cost, *c*, or $\frac{\$120}{n} - 4$. Set the two equal and solve for *n*: $\frac{120}{n+1} = \frac{120}{n} - 4 \Rightarrow \frac{30}{n+1} = \frac{30}{n} - 1 \Rightarrow 30n = 30(n+1) - n(n+1) \Rightarrow 30n = 30n + 30 - n^2 - n \Rightarrow n^2 + n - 30 = 0$. Now, factor to find the possible values for *n*: $n^2 + n - 30 = 0 \Rightarrow (n+6)(n-5) = 0$, so $n = -6$ or $n = 5$. Since *n* refers to the original number of students, it can't be negative, so $n = 5$. Therefore, the original price per student was $\frac{\$120}{5} = \$24$.

Alternatively, test-the-test, starting with (C). If the original cost per student was \$30, then the number of students is $\frac{\$120}{\$30} = 4$. When another student joins the party, the new cost per student is $\frac{\$120}{5} = \$24$. This is a \$6 difference, so (C) is wrong.

Try (B) next. If the original cost per student was \$24, then the number of students is $\frac{\$120}{\$24} = 5$. When another student joins the party, the new cost per student is $\frac{\$120}{6} = \$20$. This is a \$4 difference, so (B) is correct.

11. (B) ***Math/Geometric and Spatial Reasoning/Volume.*** Note that the depth of the tub is irrelevant. The minimum required area is the area of a circle of diameter 6 feet and the maximum required area is the area of a circle of diameter 7 feet (6 feet plus 0.5 feet on each side):

Minimum Area: $\pi r^2 = \pi(\frac{d}{2})^2 = \pi(\frac{6}{2}ft)^2 = 9\pi\ ft^2 \approx 28.3\ ft^2$.

Maximum Area: $\pi r^2 = \pi(\frac{d}{2})^2 = \pi(\frac{7}{2}ft)^2 = \frac{49}{4}\pi\ ft^2 \approx 38.5\ ft^2$.

The only tarp that falls within these measurements is 36 square feet.

12. (**D**) ***Math/Quantitative Reasoning/Evaluating Sequences Involving Exponential Growth***. The total rise in the depth of the stream was 14 – 2 = 12 inches over a three-hour period (5 – 2 = 3). So the increase was $\frac{12 \text{ inches}}{3 \text{ hours}} = \frac{4 \text{ inches}}{\text{hour}}$.

13. (**C**) ***Math/Geometric and Spatial Reasoning/Triangles/Similar Triangles.*** Since $ABC \sim DEF$, corresponding sides will be proportional. Set up a proportion and solve:

$\frac{AB}{DE} = \frac{AC}{DF} \Rightarrow \frac{5}{10} = \frac{AC}{12} \Rightarrow 10AC = 60 \Rightarrow AC = 6.$

14. (**D**) ***Math/Geometric and Spatial Reasoning/Rectangles and Squares***. A rectangle has four sides, so the perimeter is length + length + width + width:

$P = 2L + 2W$

In this case, the width is 44 feet shorter than the length: $W = L - 44$. So the perimeter is:

$P = 2L + 2(L - 44) = 4L - 88$

Or you could substitute numbers for the variables into the choices, and it doesn't matter that you don't know the actual dimensions of a professional basketball court. Assume for working purposes that the length is 100 feet. (In fact, it is 94 feet, but that is irrelevant.) On the assumption that the length is 100 feet, the width is 56 feet, and the perimeter is:

$P = 100 + 100 + 56 + 56 = 312$

Substitute 100 for L into the choices, and the correct choice will return the value 312:

A. $L - 44 = 100 - 44 = 56$ ×
B. $2L - 44 = 200 - 44 = 156$ ×
C. $2L - 88 = 200 - 88 = 212$ ×
D. $4L - 88 = 400 - 88 = 312$ ✓

15. (**B**) ***Math/Algebraic Reasoning/Coordinate Geometry/Slope of a Line***. Put the equation into slope-intercept form:

$$\begin{aligned} 2y - 2x &= -6x + 3 \\ 2y &= 2x - 6x + 3 \\ 2y &= -4x + 3 \\ \frac{2y}{2} &= \frac{-4x + 3}{2} \\ y &= -2x + \frac{3}{2} \end{aligned}$$

So in the form $y = mx + b$, $m = -2$.

16. (D) ***Math/Probabilistic and Statistical Reasoning/Data Presentations/Bar, Cumulative, and Line Graphs.*** When S has enough fuel to run for another 90 minutes, it has already run for 30 minutes. At 30 minutes, T has 2.0 gallons of fuel remaining.

17. (D) ***Math/Probabilistic and Statistical Reasoning/Data Interpretation/Data Collection Methods.*** The problem with the survey is that it may not be fair. The survey targeted students who drive, and those students may have an interest in a plan to increase parking spaces. Students who don't drive or teachers who do may prefer to keep the number of student parking spaces the same.

18. (B) ***Math/Algebraic Reasoning/Creating, Expressing, and Evaluating Algebraic Equations and Functions/Function Notation*** and ***Coordinate Geometry/Slope-Intercept Form of a Linear Equation.*** Since this is a linear function, any two pairs of values will give you the information you need to create a slope-intercept form of the function. First, find the slope of the line:

$$m = \frac{2-(-4)}{2-0} = 3$$

Next, find the *y*-intercept:

$$f(x) = mx + b$$
$$-4 = 3(0) + b$$
$$b = -4$$

So the function is:

$$f(x) = 3x - 4$$

And the value for $x = 1$ is:

$$f(x) = 3(1) - 4 = -1$$

19. (D) ***Math/Algebraic Reasoning/Creating, Expressing, and Evaluating Algebraic Equations and Functions/Function Notation.*** Plug in the two functions and simplify:

$$g(f(x)) = g(x-1)$$
$$g(x-1) = (x-1)^2 + 2 = x^2 - 2x + 1 + 2 = x^2 - 2x + 3$$

20. (A) ***Math/Probabilistic and Statistical Reasoning/Probability/Arithmetic Probability.*** The chance that the first pick will be a blue marble is $\frac{12}{36} = \frac{1}{3}$. And of that $\frac{1}{3}$ chance, the possibility of picking a blue marble from the second jar is $\frac{24}{48} = \frac{1}{2}$. So the chance of picking two blue marbles is $\frac{1}{2}$ of $\frac{1}{3} = \frac{1}{6}$.

Math Test—Calculator

1. (B) ***Math/Quantitative Reasoning/Common Word Problems/Proportions and Direct-Inverse Variation.*** This problem can be solved by setting up a direct proportion:
$\frac{\text{data}_1}{\text{data}_2} = \frac{\text{charge}_1}{\text{charge}_2} \Rightarrow \frac{30}{45} = \frac{\$18}{x} \Rightarrow 30x = \$810 \Rightarrow x = \$27$.

2. (C) ***Math/Quantitative Reasoning/Multi-Step Word Problems.*** You could create an equation:

$$T + F = \$218$$
$$\$143 + F = \$218$$
$$F = \$75$$
$$B = \frac{\$75}{\$25} = 3$$

Or you can accomplish the same result by working step-by-step. The total charge was $218. If you subtract the cost of the ticket, the difference will be the baggage fees: $218 - $143 = $75. And since each bag costs $25, the number of checked bags was $75/ $25 = 3.

3. (D) ***Math/Algebraic Reasoning/Solving Simultaneous Equations.*** Create a system of simultaneous equations. If x equals the number of hats and y equals the number of scarves, the total sales is $\$250 = \frac{\$7}{\cancel{\text{hats}}}(x \ \cancel{\text{hats}}) + \frac{\$11}{\cancel{\text{scarf}}}(y \ \cancel{\text{scarves}}) \Rightarrow 250 = 7x + 11y$. Use the given ratio of hats to scarves, $x = 2y$, to eliminate one of the variables: $250 = 7(2y) + 11y = 25y \Rightarrow y = 10$. A total of 10 scarves plus 20 hats were sold, for 30 items.

4. (C) ***Math/Probabilistic and Statistical Reasoning/Counting Methods.*** Use the formula for finding the number of permutations: $3! = 3(2)(1) = 6$.

5. (D) ***Math/Quantitative Reasoning/Common Word Problems/Proportions and Direct-Inverse Variation.*** To solve this item, remember that a clock has 12 numbers around it and make ratios for each of the times (from 12 to 4 and from 6 to 11). Then create a proportion and solve:

$$\frac{\frac{1}{3}}{7 \text{ in}} = \frac{\frac{5}{12}}{x \text{ in}} \Rightarrow \frac{1}{3}x = \frac{35}{12} \Rightarrow x = \frac{35}{4} = 8.75.$$

6. (C) ***Math/Algebraic Reasoning/Solving Quadratic Equations and Relations.*** The test-writers want you to solve this problem by recognizing that the given expression is the difference of two squares: $(a+b)(a-b) = a^2 - b^2$. Therefore, $\left(\frac{2}{x} - x\right)\left(\frac{2}{x} + x\right) = \left(\frac{2}{x}\right)^2 - x^2 = \frac{4}{3} - 3 = -\frac{5}{3}$. If you missed the shortcut, you would use the FOIL method to get to the last step.

Suppose you didn't see the algebra solution. Use your calculator: $\sqrt{3} \approx 1.73$ and $\frac{2}{\sqrt{3}} \approx 1.15$, so $\left(\frac{2}{\sqrt{3}} - \sqrt{3}\right)\left(\frac{2}{\sqrt{3}} + \sqrt{3}\right) \approx (1.15 - 1.73)(1.15 + 1.73) = (-0.58)(2.88) = -1.67$. Evaluate the choices: only (C) matches: $-\frac{5}{3} \approx -1.67$.

7. (B) ***Math/Probabilistic and Statistical Reasoning/Measures of Center/Averages, Median,*** **and** ***Mode.*** You could always use the calculator to find exact values. But there is an easier way. First, recognize that 34 is the highest value listed in the table. The *median* is the middle number of the set (or the average of the middle numbers if there is more than one). Deleting the highest value isn't going to change the order of the rest of the list when it is arranged from lowest to highest value.

   As for the *mean* or *average*, since 34 is significantly higher than the other numbers, the mean will change when it is deleted. But remember, the average is calculated by dividing the total by 24 (or 23 when the correction is made), and 34/24 isn't a large value.

   As for the *range,* deleting 34 will reduce the range from 10 to 34 to 10 to 23, a change of 9. So (B) is correct.

8. (D) ***Math/Algebraic Reasoning/Manipulating Algebraic Expressions/Factoring Expressions.*** A manipulation shortcut is inherent in the design of this item: factor the numerator using the method for the difference of two squares: $\frac{x^2 - y^2}{x + y} = \frac{(x + y)(x - y)}{x + y} = x - y$.

   This item can also be solved using the "plug-and-chug" strategy. To use this strategy, choose a value for each variable and plug the values into the original equation, then into each answer choice until you find an answer choice that returns the same value as the original equation.

   For example, if $x = 2$ and $y = 1$, then $\frac{x^2 - y^2}{x + y} = \frac{2^2 - 1^2}{2 + 1} = \frac{3}{3} = 1$. Therefore, when $x = 2$ and $y = 1$, the correct answer choice must equal 1:

   A. $x^2 + y^2 : 2^2 + 1^2 \stackrel{?}{=} 1 \Rightarrow 5 \neq 1$ ✗

   B. $x^2 + y : 2^2 + 1 \stackrel{?}{=} 1 \Rightarrow 5 \neq 1$ ✗

   C. $x + y^2 : 2 + 1^2 \stackrel{?}{=} 1 \Rightarrow 3 \neq 1$ ✗

   D. $x - y : 2 - 1 \stackrel{?}{=} 1 \Rightarrow 1 = 1$ ✓

9. (A) ***Math/Algebraic Reasoning/Manipulating Algebraic Expressions/Evaluating Expressions.*** Evaluate the expression using 32 feet/second^2 for a and 100 feet for d: $v^2 = 2ad \Rightarrow$ $v^2 = 2\left(32 \text{ feet/second}^2\right)\left(100 \text{ feet}\right) = 6{,}400 \text{ feet}^2/\text{second}^2 \Rightarrow v = 80 \text{ feet/second}$.

10. (A) ***Math/Algebraic Reasoning/Solving Quadratic Equations and Relations.*** The function is a quadratic in the standard form $h(t) = at^2 + bt + c$. The c value represents the y-intercept for $t = 0$, which in this

scenario represents the height from which the goalie kicks the ball. Therefore, the 2 value indicates that the ball was at a height of 2 feet at $t = 0$, when the goalie's foot made contact with it.