CAMBRIDGE
EDUCATIONAL SERVICES

AMERICA'S PREMIERE TESTING READINESS PROGRAM

SAT®
(Form Code C)

Cambridge Navigator Plus:
The Complete Explanation Guide
to the Retired Test

5 Ways to Increase Score Gains Using Cambridge's *Navigator Plus*

Navigator Plus is Cambridge's complete explanation guide to a previously administered test. It includes explanations for each item on the test, categorization for each item, an answer key, and more.

The following list provides suggestions for implementing the Navigator into your program to increase score gains.

1. **Simulate test day as much as possible when proctoring tests.** Students will benefit from a testing experience that closely simulates what they will experience on test day. They will feel more confident if they know what to expect.

2. **Follow up when you receive your data.** Use the reports you receive from Cambridge to cover the items your class struggled as a group to answer (see the Error Analysis report). Taking this step within two weeks of administering the test will ensure that your students haven't forgotten the items you cover and will be able to learn from their testing experiences.

3. **Use the Pre-Assessment Item references in the *Victory* lesson to illustrate key points.** Your teacher's guide includes references to items on your pre-assessment that you can use as additional examples. Keep a copy of your pre-assessment test booklet handy so that you can cover these items with your students. Using pre-assessment items as additional examples helps students connect the concepts you are teaching with their test-day experiences.

4. **Don't forget to review the wrong answers.** Many explanations in this Navigator packet include references to each wrong answer choice. Students will benefit from reviewing why each wrong answer is wrong so that they can recognize what makes the right answer correct and use the process of elimination to eliminate similar wrong answers in the future.

5. **Pay attention to item categories.** Each item in this Navigator packet includes a category path that corresponds to the course concept outline in your *Victory* text as well as the categories listed in the Item Index of your *Victory* text. Use the Item Index to identify items students can use for further practice.

Category Paths

Throughout these explanations, each item includes a **Cambridge Category Path** which links the item to the Course Concept Outline in Cambridge's *Victory* series. For example:

> *Math: Multiple-Choice/Geometry/Triangles/Pythagorean Theorem*

An item with this particular category path is found in the Math Test (these items have a Level 1 label of "Math: Multiple-Choice" or "Math: Student-Produced Response") and tests students' knowledge of geometry (Level 2 of the category path), more specifically of triangles (Level 3), and even more specifically of the Pythagorean theorem (Level 4). The *Victory* Math Lessons include a section on the Pythagorean theorem, which you can find by referencing the Course Concept Outline at the beginning of the mathematics section in the *Victory* book. Additionally, you can find items testing geometry, triangles, or the Pythagorean theorem using the Item Index at the end of the *Victory* Student Text and Teacher's Guide.

Answer Key

DIRECTIONS: For items answered <u>correctly</u>, circle the answer, then check any corresponding shaded box(es). Total the number of circled answers to determine the raw score for the test section. Total the number of checkmarks for each of the subscores and cross-test scores to determine each raw subscore and raw cross-test score.

Section 1: Reading

		Subscores		Cross-Test Scores	
		WC	CE	S	H/S
1.	A				
2.	C	▓			
3.	B				
4.	B				
5.	C		▓		
6.	D				
7.	A				
8.	A				
9.	A				
10.	C	▓			
11.	C			▓	
12.	B			▓	
13.	B	▓		▓	
14.	B			▓	
15.	B			▓	
16.	A	▓		▓	
17.	A			▓	
18.	B			▓	

		Subscores		Cross-Test Scores	
		WC	CE	S	H/S
19.	D			▓	
20.	B		▓	▓	
21.	B		▓	▓	
22.	B				▓
23.	B		▓		▓
24.	B				▓
25.	B		▓		▓
26.	B	▓			▓
27.	D				▓
28.	B				▓
29.	B	▓			▓
30.	C				▓
31.	A				▓
32.	D			▓	
33.	C	▓		▓	
34.	D			▓	
35.	B			▓	
36.	A			▓	

		Subscores		Cross-Test Scores	
		WC	CE	S	H/S
37.	A	▓		▓	
38.	D		▓	▓	
39.	B			▓	
40.	D		▓	▓	
41.	C				
42.	B				▓
43.	C				▓
44.	B				▓
45.	B				▓
46.	D		▓		▓
47.	C				▓
48.	B	▓			▓
49.	D				▓
50.	C		▓		▓
51.	A	▓			▓
52.	D				▓

Raw Score: _____ /52

Section 2: Writing and Language

		Subscores		Cross-Test Scores	
		WC	CE	S	H/S
1.	B				
2.	C				
3.	C		▓		
4.	A	▓			
5.	A				
6.	B				
7.	D				
8.	B				
9.	C				
10.	D	▓			
11.	A		▓		
12.	B		▓		
13.	D	▓			
14.	C				
15.	D				

		Subscores		Cross-Test Scores	
		WC	CE	S	H/S
16.	C				
17.	A				
18.	C	▓			
19.	C				
20.	B				
21.	A				
22.	C				
23.	D				
24.	C				
25.	C				
26.	C				▓
27.	B				
28.	B				
29.	D		▓		▓
30.	B	▓			▓

		Subscores		Cross-Test Scores	
		WC	CE	S	H/S
31.	A				▓
32.	D	▓			▓
33.	D		▓		▓
34.	C	▓		▓	
35.	D				
36.	C				
37.	A		▓	▓	
38.	A				
39.	A				
40.	B				
41.	B	▓		▓	
42.	B		▓	▓	
43.	B			▓	
44.	D		▓	▓	

Raw Score: _____ /44

Evidence-Based Reading and Writing Subscores

Words in Context (WC): _____/18   Command of Evidence (CE): _____/18

Section 3: Math—No Calculator

		Cross-Test Scores				Cross-Test Scores				Cross-Test Scores	
		S	H/S			S	H/S			S	H/S
1.	A			**8.**	A			**15.**	D		
2.	B			**9.**	A			**16.**	16		
3.	D			**10.**	B			**17.**	60		
4.	A			**11.**	B			**18.**	14		
5.	C			**12.**	B			**19.**	11		
6.	B		�	**13.**	C	▓		**20.**	7/2, 3.5		
7.	D	▓		**14.**	C	▓					

Section 4: Math—Calculator

		Cross-Test Scores				Cross-Test Scores				Cross-Test Scores	
		S	H/S			S	H/S			S	H/S
1.	D			**14.**	B			**27.**	D		
2.	B			**15.**	C			**28.**	D		▓
3.	C			**16.**	B			**29.**	A		▓
4.	B			**17.**	D			**30.**	D		
5.	A		▓	**18.**	C			**31.**	125	▓	
6.	B			**19.**	A			**32.**	63		
7.	A			**20.**	C	▓		**33.**	240		▓
8.	C			**21.**	C			**34.**	18	▓	
9.	D			**22.**	D		▓	**35.**	20		
10.	C		▓	**23.**	B			**36.**	45		
11.	A			**24.**	B	▓		**37.**	250		▓
12.	A	▓		**25.**	A			**38.**	5		
13.	D			**26.**	B						

Math Raw Score (total of calculator and no-calculator sections): _____/58

Cross-Test Scores (All four test sections)

Science (S): _____/35   History/Social Studies (H/S): _____/35

Explanations

Section 1: Reading

Passage 1

1. **(A)** *Reading/Literary Fiction/Implied Idea.* The two sisters are living in a cabin near a mansion that has fallen into disrepair. The text tells us "when the war began," the mansion was majestic. Although the author does not specifically say the mansion was destroyed during the war, that is a fair inference from the text.

Certainly, the other choices are not supported by the text. As for (B), we know that the mansion was built by the father, not the sisters. And Petite's father is Léandre, brother of the sisters, and son of the man who designed the mansion. And as for (D), the text indicates that the mansion cost a lot of money to build and, in fact, stood on the Cote Joyeuse.

2. **(C)** *Reading/Literary Fiction/Vocabulary.* The meaning of "picayunes" is not obvious from the context, but careful attention to verbal clues coupled with the process of elimination gets you the correct answer. The most powerful verbal clue is the juxtaposition of "picayunes" and "dollars," strongly suggesting a contrast and pointing to "coins" as the best response. As for the other choices, while they have meanings associated with the theme of the paragraph, none of them describes something that the sisters would be accumulating over the years to rebuild their home.

3. **(B)** *Reading/Literary Fiction/Implied Idea.* The text strongly implies that the mansion was destroyed during the war and tells us specifically that the sisters live an impoverished life in a cabin nearby. In the picture painted by the author, the sisters are having afternoon coffee in a space that once had a roof but now is covered only by the sky.

4. **(B)** *Reading/Literary Fiction/Implied Idea.* This is an implied idea question and explores the relationship between Pelagie and Pauline. The text indicates that Pauline defers to her sister's judgment ("Yes, Sesoeur.") It is Pelagie who sets out the details of the plan to rebuild the house; Pauline simply agrees. Pelagie is the moving force.

5. **(C)** *Reading/Literary Fiction/Textual Evidence.* When we read about the plan to rebuild, every detail comes from Pelagie. The only thing we hear from Pauline is "Yes, Sesoeur" and "No, Sesoeur." Clearly, Pelagie is the driving force in the household and of the plan to rebuild. (A) is perhaps the second best answer because it helps to establish Pelagie's dominance in the situation, and Pelagie's dominance helps to explain the relationship between the sisters. But (A) does not really address the point of the plan to rebuild, while (C) does. (D) is weaker still, though it does put Léandre above Pauline in the pecking order. But Léandre is absent and not really involved in the big plan.

6. **(D)** *Reading/Literary Fiction/Implied Idea.* The final paragraph describes the arrival of La Petite. The author indicates that the sisters are not quite sure what to expect but hope that she could be accommodated. The "between" acknowledges that until this point these sisters have largely kept to themselves with no one else in their lives, a kind of unit bound each to the other. When La Petite arrives, they can no longer be absorbed in each other's company but must make room for the new arrival.

7. **(A)** *Reading/Literary Fiction/Implied Idea.* Paragraph 7 tells us that the younger sister always answers her older sister with a remark such as "as you please," implying that the younger sister agrees with whatever opinion the older sister expresses. "Condescendingly" might be a good description of the older sister's attitude toward her younger sibling but not vice versa.

8. **(A)** *Reading/Literary Fiction/Vocabulary.* Just before using the phrase "a true Valmet," Pelagie tells Pauline that La Petite is already familiar with the sisters' lifestyle and understands their frugality, the end of which is, of course, rebuilding the house. To the extent La Petite embraces the dream, Pelagie will consider her a "true" (or "real") Valmet.

9. **(A)** *Reading/Literary Fiction/Implied Idea.* Pauline expresses her disquiet in a series of questions put to her sister: What will we do with her? Where will she sleep? How will we amuse her? She is not comfortable with the idea and expresses misgivings about the arrangement.

10. **(C)** *Reading/Literary Fiction/Vocabulary.* The context in which the word "determination" is used makes it clear that Pelagie stood up with a clear plan in mind. She wanted to saddle the horse and look over the property. One might say that she has thought about her move and determined to go. A reasonable synonym for this attitude is "resolve," which suggests also that she considered her options, made a decision, and took action.

Passage 2

11. **(C)** *Reading/Natural Sciences/Main Idea.* This is a main idea that asks about the theme of Passage 1. Passage 1 begins by defining CCD, then the author explicitly cites the main conclusion of Lu's research followed by a description of the methodology used. The fourth paragraph provides the results of the experiment, and then in the last paragraph the author draws the conclusion explicitly that the neonicotinoids caused the CCD. (C) best describes this development. (A) goes beyond the scope of the passage. To be sure, the idea promoted by (A) is one that the author (or another writer) might go on to make using Passage 1, but it does not describe Passage 1 *as written.* The same is true for (D). The author may admire Dr. Lu for his work and think that the research deserves recognition, but the author does not take on that burden in the passage as written. Finally, (B) is a minor point mentioned in the passage, not the main theme.

12. **(B)** *Reading/Natural Sciences/Main Idea.* This is a main idea type question that asks about a specific part of the passage. As noted above, the five paragraphs of Passage 1 can be described as CCD defined, preview of conclusions, description of the experiment, results of the experiment, and some implications of the results. Therefore, the correct answer is (B).

13. **(B)** *Reading/Natural Sciences/Vocabulary. Under the auspices of* means under the guidance or sponsorship of. The phrase does not imply that the sponsor has direct control of the project but only that the sponsor has authorized the project be undertaken and associated with its name. The sponsor may also provide funding for the project. Therefore, the only correct answer is (C).

14. **(B)** *Reading/Natural Sciences/Explicit Detail.* This an explicit detail question asking about the specific information contained in paragraph four of Passage 1. According to that part of Passage 1, a decline in the bee population with the onset of cold winter is expected. Normally, the population would then increase. Therefore, the correct answer is (B).

15. **(B)** *Reading/Natural Sciences/Application.* The definition of CCD provided in the first paragraph includes the following ideas: (1) few adult bees, (2) live queen, (3) honey, and (4) immature bees. The results of Dr. Lu's research, as reported by Passage 1, showed few adult bees (the bees either had died or fled). That is only the first element of the definition of CCD. In other words, Dr. Lu's research is relevant to the question of whether CCD affected the hives, but does not indicate CCD as the cause of the problems of the hives studied. Therefore, (B) is correct.

16. **(A)** *Reading/Natural Sciences/Vocabulary.* The context in which *sub-lethal* appears makes it clear that the word means "not deadly," which is answer (A). The passage, for example, specifically states that the dosage adversely affected various functions such as memory but did not kill the bees.

17. **(A)** *Reading/Natural Sciences/Voice.* This is a tone question that asks for a description of the author's attitude toward the publications mentioned. The author's voice, or position, is seen in the verbal clues given in the passage. For example, the author notes that the media coverage is not scholarly, that Dr. Lu is not himself an expert, and that the journal *Insectology* is not widely respected. Also, it is noted that the author made a "rush to judgment" and used sarcasm in the phrase "smoking gun." Therefore, (A) is the correct answer.

18. **(B)** *Reading/Natural Sciences/Main Idea.* This is a main idea question that asks about the final paragraph of the two passages. The opening sentence of the paragraph tells you the main point. The methodology was fatally flawed.

19. **(D)** *Reading/Natural Sciences/Main Idea.* Both authors state at the opening of their passages that honey bees are important to agriculture and that bee colonies have been hit by CCD. While passage 2 attacks the motivation of the reporters who prepared the article, passage 1 is silent on that article. The authors,

however, have differing views about the validity of the research. Author 1 regards the research as conclusive and author 2 considers it weak.

20. **(B)** *Reading/Natural Sciences/Textual Evidence.* This is the second half of the evidence question; it asks for text excerpts that support the conclusion.

21. **(B)** *Reading/Natural Sciences/Data Presentations.* The graph shows that imidacloprid was introduced in 1994. From that year until 2003, the use of the chemical increased dramatically, but the number of managed honey bee colonies remained just about constant. This strongly suggests that there was no connection between the use of the chemical and the health of the bees.

Passage 3

22. **(B)** *Reading/Social Studies/Implied Idea.* The author states that the fabled mineral wealth of the region turned out to out to be just that, a fable. The Spanish Crown continued to maintain the colony primarily as a means of converting native peoples to the Catholic faith, so the correct answer is (A), and not agriculture, (B). Grazing lands and population are not mentioned in the text as reasons the Spanish government was originally interested in the Northern New Mexico and southern Colorado region, therefore (C) and (D) cannot be correct answers.

23. **(B)** *Reading/Social Studies/Textual Evidence.* As noted above, the mineral wealth of the area turned out to be a myth. In lines 5–7, the text uses the word "fable" to describe the wealth of the area.

24. **(B)** *Reading/Social Studies/Implied Idea.* The author makes it clear that members of the *Penitentes* were not ordained priests. The few priests who were sent to the region were assigned to the Pueblos or more populated areas.

25. **(B)** *Reading/Social Studies/Textual Evidence.* The distinction required by this question is between an ordained member of the formal priesthood and the status of members of the *Penitentes* as members of a lay organization. The excerpt cited makes this distinction clear.

26. **(B)** *Reading/Social Studies/Vocabulary.* You can determine the meaning of this vocabulary word by the context in which it appears. You can infer that *sodalities* has a meaning similar to *confraternities* and *religious volunteer associations*, the other two concepts that appear in the list.

27. **(D)** *Reading/Social Studies/Application.* The author uses the phrase "over-zealous" to describe the Franciscan friars, implying that they were abusive of the population.

28. **(B)** *Reading/Social Studies/Implied Idea.* The author mentions the confraternities of similar name to suggest that the Brotherhood originated in Spain and later spread to the New Mexico province.

29. **(B)** *Reading/Social Studies/Vocabulary.* In the paragraph in which the word appeared, the author describes how the settlers attended to their own needs because the central authority was relatively remote. Since the settlers relied on their own abilities and efforts, *resources* and *resourceful* are good synonyms.

30. **(C)** *Reading/Social Studies/Implied Idea.* In describing the political functions of the Brotherhood, the author mentions specifically that it was involved in decisions regarding the allocation of water. From this, you can infer that water allocation was a sensitive and important issue and draw the further conclusion that water must have been relatively scarce.

31. **(A)** *Reading/Social Studies/Application.* In the second paragraph, the author describes how the Hispanos provided for themselves in the absence of assistance from the centralized authority of the Spanish Crown.

Passage 4

32. **(D)** *Reading/Natural Sciences/Main Idea.* This is a main idea question. The author begins the passage by providing a simple definition of drought but then immediately says that definition is an oversimplification. The author spends the rest of the first paragraph clarifying in exactly what sense a drought is a lack of moisture. The second paragraph explains that "drought" can also be understood in ecological terms—as the effect of a relative lack of moisture on an area. The third paragraph talks about identifying dry period using meteorological tools. And the fourth explains that, in the final analysis, what we call a drought is largely dependent on human needs. Drought is the lack of sufficient water to meet human needs. (A) is an interesting response because the author does provide a correction. But the wording of (A) just doesn't describe very precisely what the author does, which is to make a <u>definition</u> more precise. As for (B), while the author takes a position, the standard definition of "drought" is not treated as a discovery. And (C) is perhaps the weakest response as "correcting" is not "refuting."

33. **(C)** *Reading/Natural Sciences/Vocabulary.* The author begins with a very direct statement: drought is a lack of water. But then the author quickly states that this definition obscures various complexities. So the definition has been simplified: it is correct so far as it goes, but it is not the final word.

34. **(D)** *Reading/Natural Sciences/Development.* The author states that droughts are a function of time, not place. Any area on earth can experience drought condition so long as there is sufficient time without water. To dramatize the point, the author states that even a desert (which is pretty much dry all the time) can have a drought. (A) is wrong because a seasonal or usual dry spell is simply part of the baseline climate for the area and not an aberration that could be called a drought. (B) goes way beyond the text. Though the author would agree that dry conditions are not necessarily a drought, the author would probably not subscribe to the view that a drought could occur without a lack of water. (C) represents a misreading of the text. The point the author makes is that dry conditions do not necessarily constitute a drought, but the author would surely use "dry" as part of the definition of "desert."

35. **(B)** *Reading/Natural Sciences/Explicit Detail.* This is a detail question that asks the reader to show an understanding of the causal explanation provided in paragraph two. The passage explains that the extreme wet spell provides extra water for plants, so they grow. In particular, non-native plants that require more water than normally available take advantage of the wet spell. With native plants this is not true. Then when things return to normal, native plants are fine, but the invasive species dry up and pose a fire hazard.

36. **(A)** *Reading/Natural Sciences/Explicit Detail.* This is a detail question, and the answer is explicitly given in the first sentence of the third paragraph.

37. **(A)** *Reading/Natural Sciences/Vocabulary.* This is a vocabulary-in-context item. When the author says that weather is a "driver" in the calculation, the author means "cause" or "determinant."

38. **(D)** *Reading/Natural Sciences/Textual Evidence.* As the previous explanation lays out, the author defines drought in terms of human use, making (D) the strongest support for the answer to the previous question. Notice that (A) explains that various other types of drought such as hydrologic or agricultural drought highlight how meteorological drought impacts humans, pointing to the answer to the previous question. But it is not as directly supportive as (D).

39. **(B)** *Reading/Natural Sciences/Application.* This is an application question that asks for reading at the deepest level. In clarifying the definition of drought, the author eventually states that various terms that define "drought," such as hydrologic, agricultural, and socioeconomic, actually reflect determinations about human needs rather than objective measurements. And this is true of the underlying concept of meteorological drought. "Drought" is not whether the recorded precipitation is n milliliters less than c, the long-term average, but whether conditions are such that humans needs go unsatisfied, that is, there is not enough corn or the water level in the lake is too low to launch a boat.

40. **(D)** *Reading/Natural Sciences/Data Presentations.* This is a "pie chart," and pie charts typically show shares of a total. You can think of an actual pie: the larger the central angle of the slice, the bigger the portion. In

this case, "Water Supply & Quality" accounts for 24.2% of the impacts reports, the largest of all the categories.

41. **(C)** *Reading/Natural Sciences/Data Presentations.* Remember that a pie chart provides information about the relative size of the slices. In order to know how much "pie" you have, you need to know how large the pie is. In this case, the note "Total Impacts: 218" tells you the size of the pie. So the number of "Society & Public Health" impacts is about 10% of 218 or 20.

Passage 5

42. **(B)** *Reading/Social Studies/Explicit Detail.* The author argues that the friendship coupled with prevailing attitudes about Dutch origins of New York institutions helps to explain the Dutch influences in "A Visit," thereby dating it to the time of "Dutch Revival" around 1822.

43. **(C)** *Reading/Social Studies/Main Idea.* The passage provides an overview of the debate concerning the authorship of "A Visit." The author of the passage presents evidence on both sides and offers analysis and even rebuttal to the evidence. The overall objective is to weigh the evidence and draw a conclusion as to which side of the debate is more persuasive.

44. **(B)** *Reading/Social Studies/Development.* This is a command of evidence item that asks about the function of the detail in the debate. One problem with attributing the poem to Moore is that Moore did not make such a claim himself at the time the poem was first published. Why didn't he? He wasn't aware the poem had been made public.

45. **(B)** *Reading/Social Studies/Voice.* After rehearsing the arguments for Livingston's authorship, the author of the passage presents a counterargument that the poem includes features pointing to Moore's authorship, and while Livingston seems likelier to have written in anapestic form, there is no evidence that Moore never wrote in that form. The best word to describe the evidence then is inconclusive.

46. **(D)** *Reading/Social Studies/Textual Evidence.* The author states at the end of the third paragraph that the likelihood of Livingston's using anapestic verse does not conclusively prove he is the author. This final sentence concisely summarizes the author's point in the third paragraph.

47. **(C)** *Reading/Social Studies/Implied Idea.* The author considers the significance of the names in paragraphs four and five. Scholars who support Livingston's authorship see the Dutch names used in the original publication as evidence that the author knew Dutch. The author of the passage rejects this theory, holding that Moore, who actually wrote the poem, used the German equivalents. This counter-theory is supported by the fact that in anticipation of a reprint Moore changed the originally printed version back to the German. Where did the original Dutch names come from? According to the passage, they were inserted by an editor at the newspaper.

48. **(B)** *Reading/Social Studies/Vocabulary.* The test clearly indicates that the "emendations" involved a change of the names, so *emendations* means *changes* or *corrections*.

49. **(D)** *Reading/Social Studies/Voice.* The author is generally skeptical of the Livingston claim, emerging as it does so many years after the poem's original publication and reprint in anthology form. Additionally, the main support for the claim is the recollections of Livingston's heirs, many years removed.

50. **(C)** *Reading/Social Studies/Textual Evidence.* This item asks for evidence to support the conclusion reached by the previous item. The author's attitude toward the heirs' claim to have once been in possession of an "original" of the poem is skepticism, and two words in the third sentence of paragraph two strongly point to this attitude: "claimed" and "allegedly."

51. **(A)** *Reading/Social Studies/Vocabulary.* The author is being generous to the Livingston family in trying to explain how it could, in good faith, have claimed authorship of the poem when so much evidence points to

Moore. The author theorizes that Livingston's children may have made an honest mistake. The holiday poems written and read by their father would quite naturally have been similar to "A Visit," so it is forgivable that they would combine or confuse the two.

52. **(D)** *Reading/Social Studies/Main Idea.* This is a main idea question that asks about the final paragraph. The author's goal in that paragraph is to explain how the Livingston family could have make their claim when so much evidence points to Moore as the poet. The passage states that the similarity between the Moore poem and Livingston holiday tradition would have made it easy to think that "A Visit" was one of those holiday poems written by Livingston.

Section 2: Writing and Language

Passage 1

1. **(B)** *Writing and Language/Standard English Conventions/Grammar and Usage/Subject-Verb Agreement.* The problem with the original is the failure of the verb "is" to agree with the plural subject "jobs." This problem may be a little difficult to spot because of the inverted structure of the sentence, that is, the verb comes before the subject. The problem, once identified, is easily corrected by substituting the plural verb "are."

2. **(C)** *Writing and Language/Expression of Ideas/Style/Tone.* This item asks you to choose a phrase that is consistent with the overall tone of the passage. The author writes in a serious manner and avoids the use of slang. (C) is the phrase most consistent with the tone.

3. **(C)** *Writing and Language/Expression of Ideas/Strategy/Appropriate Supporting Material.* The value of the median salary is that it helps readers to understand how compensation is distributed in professional sports. Though the highest-paid athletes earn $190,000 a year, fully half earn less than $40,000 a year. Also, 40 percent earn between $40,000 and $190,000. So the median is an important number.

4. **(A)** *Writing and Language/Expression of Ideas/No Change.* The "even" provides a logical connection between the previous sentence and the following and dramatizes a point. The previous sentence says that a major injury can end an athlete's career. Then to dramatize the risk that athletes face, the author says that even a minor injury can end a career. The effect of the word "even" is to add special emphasis to the second sentence.

5. **(A)** *Writing and Language/Standard English Conventions/No Change.* The author means for the first sentence to identify the cause and the second to identify the effect in a cause-effect sequence: the intense competition causes the athletes to train constantly. A good way of joining the two sentences is to use "because" to express the connection. (B) and (D) create illogical connections. As for (B), the second idea is the effect of the first; the second is not contrary to the first. As for (D), the "when" reverses the connection. Finally, in (C), the "so" would require the first part of the sentence to be a clause, but the first part lacks a main verb.

6. **(B)** *Writing and Language/Standard English Conventions/Grammar and Usage/Verb Tense.* The problem with the underlined original is the verb tense. "Competed" is past tense, but all the other verbs in the paragraph are present tense. (B) solves the problem by changing the past tense to the present tense.

7. **(D)** *Writing and Language/Expression of Ideas/Style/Clarity of Meaning.* The problem with the original is the syntax of the sentence. The sentence, as written, defines group lessons as gymnastics or tennis and does

not clearly say what the author means to say. The author intends to say that non-team sport athletes learn their skills by taking lessons. Examples of such sports are gymnastics and tennis.

8. **(B)** *Writing and Language/Standard English Conventions/Sentence Structure/Faulty Parallelism.* The problem with the original is a lack of parallel structure between "few" and "another." Both should have the same number. (B) solves the problem by substituting a plural form to parallel the plural "few."

9. **(C)** *Writing and Language/Standard English Conventions/Sentence Structure/Comma Splices.* The original contains a comma splice, that is, two independent clauses jammed together, separated only by a comma. (C) corrects the problem by adding the coordinate conjunction "and" and properly sets off the phrase "in turn" with commas.

10. **(D)** *Writing and Language/Expression of Ideas/Style/Conciseness.* The problem with the original is that it is needlessly wordy. A comparison of the various options will show how (D) eliminates the excess verbiage.

11. **(A)** *Writing and Language/Expression of Ideas/No Change.* The point of the final paragraph is that job prospects for the aspiring professional athlete are pretty grim. The author cites the example of men's basketball: only one in 12,000 candidates will make the grade. (A) summarizes this point.

Passage 2

12. **(B)** *Writing and Language/Expression of Ideas/Strategy/Effective Opening Sentence.* The first sentence establishes that the narrator was born in 1847, and the narrator says that he worked with circuses for sixty years. Allowing that the narrator was a young man when he first began, say 20 years old, his involvement with circuses would have covered the period 1867 to 1927, or thereabouts. So when the narrator contrasts the circus of "his time" with circuses of an earlier period, he is comparing those during that period with those that came earlier in the 1800s. This helps the reader appreciate references to "vaudeville," "horses," and "tallow dips." Without that first sentence, the reader knows only that the narrator's work spanned sixty years but does not know what era.

13. **(D)** *Writing and Language/Expression of Ideas/Style/Tone.* The problem with "was itchy" is that its use here amounts to slang. While the tone of the passage is not academic, it is a bit more formal than a dialect where "itchy" would be acceptable. Also, idiomatically it would be more appropriate to say "had an itch" or "was itching." For both reasons, (D) is the best answer.

14. **(C)** *Writing and Language/Standard English Conventions/Grammar and Usage/Pronoun Usage.* The underlined part of the sentence is followed twice by the pronoun "they," which must be intended to refer to "someone else." The problem is that "someone else" is singular while "they" is plural. The plural "others" solves the problem.

15. **(D)** *Writing and Language/Standard English Conventions/Sentence Structure/Faulty Parallelism.* The problem with the original is faulty parallelism. The first two elements in the series are –ing (gerund) forms while the third is a "to" (infinitive) form. All three elements need to have the same form. The problem with both (B) and (C) is that though the forms are parallel, the series uses a single object, "things," which means that one element asserts to be doing things or to do things. (D) avoids this problem. Additionally, (D) is better because the sequence of the elements parallels that of the preceding sentence.

16. (C) *Writing and Language/Standard English Conventions/Grammar and Usage/Faulty or Illogical Comparisons.* The original makes a false comparison. As written, the sentence seems to compare the modern "circus" with the "past," when, of course, it means to compare the circuses of the two different eras. (C) makes it clear that the comparison is between a modern circus and a past circus.

17. (A) *Writing and Language/Standard English Conventions/No Change.* The original is correct as written. The writer apparently means to distinguish between two types of promotion: the advance billing (presumably posters and other ads that announce the coming of the circus) and the advertising done while the circus is in progress. Thus, there are two main categories with the second being a series of three elements. You do not want a comma following "billing" because there are only two elements in the overriding series: billing and the others.

18. (C) *Writing and Language/Expression of Ideas/Style/Precision.* Admittedly, the terms in this sentence are technical industry terms, but that does not mean that they are out of place. They seem to be the descriptive terms that people associated with a circus would use with great precision. A reader might wish that they had been defined, but one can understand from the context that these people were given the responsibility for stimulating interest in the circus.

19. (C) *Writing and Language/Expression of Ideas/Strategy/Main Idea.* The underlined part is a rhetorical question. The author does not intend to answer it; instead, the author believes that the answer is obvious: it's impossible to put anything that large indoors.

20. (B) *Writing and Language/Expression of Ideas/Strategy/Appropriate Supporting Material..* The aerial acrobat is obviously a highly skilled performer. One can imagine many workers being able to handle horses or raise the tent, but acrobatics requires special skills. So the "except" in the original is the author's way of saying to the reader that "jack-of-all-trades" does have limits. But the revision would make an exception to the exception by acknowledging that a handful of extremely talented people could even substitute as acrobats.

21. (A) *Writing and Language/Expression of Ideas/No Change.* The main point of the paragraph is that circuses were adaptable, taking advantage of new inventions and technology. The paragraph, as written, provides two examples: calcium flares and gaslights. (A) would provide a third example: railroads.

22. (C) *Writing and Language/Standard English Conventions/Grammar and Usage/Diction.* This item tests the proper choice of phrasing for making a comparison. The correct phrasing is "as . . . as," not "as . . . than."

Passage 3

23. (D) *Writing and Language/Standard English Conventions/Sentence Structure/Misplaced Modifiers.* The problem with the original is the placement of the introductory modifier. "One" will be attached by the reader to the first free-standing noun in the sentence, which in the original is "citizens." The other nouns such as "First Amendment" are objects of prepositions. But "citizens" is not "one of the group." (D) solves this problem by making it clear that it is the First Amendment that is one of the group of amendments called the Bill of Rights.

24. (C) *Writing and Language/Standard English Conventions/Punctuation/Dashes.* The material following "media" is an aside that provides further explanation or illustrates the concept. Since it is not an integral part of the logical structure of the sentence, it has to be punctuated so that the reader understands its

secondary nature. A writer has two choices here. The material can be set aside using either commas or dashes, but not a mixture of both. And there must be one comma or dash to open the aside and another to close it.

25. (C) *Writing and Language/Standard English Conventions/Sentence Structure/Comma Splices.* The original contains a comma splice, that is, two independent clauses (each with its own subject and verb) jammed together and separated only by a comma. The commas splice can be eliminated by adding a conjunction, by substituting a semicolon for the comma, or by creating two sentences:

. . . speaker, and it . . . .

. . . speaker; it . . . .

. . . speaker. It . . . .

(C) uses the first approach. Note: Since the clauses are so short, a writer might choose to go with just a conjunction and omit the comma.

26. (C) *Writing and Language/Expression of Ideas/Style/Precision.* The syntax of the original is unnecessarily complex and makes the author's meaning unclear. The underlined portion needs to be rewritten so that it states the point directly, and (C) does this. (B) is wrong because "the government may do limited speech" is not idiomatic, and (D) is wrong because its passive voice obscures meaning.

27. (B) *Writing and Language/Standard English Conventions/Grammar and Usage/Pronoun Usage.* This item tests pronoun form. "It's" is the contraction for "it is," which is not what the author intends here. Instead, the author wants the possessive third person, singular pronoun: "its." "Its" signifies possession of "conclusion" and has as its antecedent "Court."

28. (B) *Writing and Language/Standard English Conventions/Sentence Structure/Fragments.* The problem with the original is that the word group lacks a main verb. (B) is the only choice that provides a main verb.

29. (D) *Writing and Language/Expression of Ideas/Strategy/Appropriate Supporting Material.* The case of *Schenck* dealt with speech that encouraged men to resist the draft during wartime. The Court ruled that such speech could be curbed because the interference with the government's ability to defend the nation constituted a clear and present danger.

30. (B) *Writing and Language/Expression of Ideas/Style/Conciseness.* The problem with the original is excess verbiage. "Popular" implies that the saying is used frequently and that the usage is widespread. (B) eliminates the redundancy and leaves a nice, succinct expression.

31. (A) *Writing and Language/Expression of Ideas/No Change.* This item asks you to choose the appropriate logical transition for the final sentence. Here the author intends to contrast the idea that the government may place some restrictions on speech with the idea that free speech is nonetheless an essential part of our system of government. "Despite" nicely signals that contrast.

32. (D) *Writing and Language/Expression of Ideas/Style/Conciseness.* The problem with the original is needless repetition. Anything that is critical is necessarily important, so the word "important" is unnecessary. Then, if something is "critical," it is of the utmost importance, so the "very" can be eliminated.

33. **(D)** *Writing and Language/Expression of Ideas/Organization/Sentence-Level Structure..* The new sentence provides an example of government regulation that does not ban speech but does restrict the way in which it can be presented. This is the topic of the final paragraph, and the sentence provides an example of the general idea set forth in the first sentence.

Passage 4

34. **(C)** *Writing and Language/Expression of Ideas/Style/Conciseness.* The original is needlessly wordy. "Subsequently" means later or following, so there is no reason to use both "subsequently" and "after that date."

35. **(D)** *Writing and Language/Standard English Conventions/Grammar and Usage/Adjectives versus Adverbs.* "Quickly" and "cheaply" modify the verb "built," so both must have the form of the adverb. You need to add –ly. Then, "relatively" modifies the two adverbs, so it must also be an adverb.

36. **(C)** *Writing and Language/Standard English Conventions/Grammar and Usage/Pronoun Usage.* The problem with the original is that the pronoun "it" refers to "gas plants," but "plants" is plural while "it" is singular. The error is easily corrected by changing "it" to "they" and conforming the verb.

37. **(A)** *Writing and Language/Expression of Ideas/No Change.* The first sentence of paragraph 2 is a topic sentence, and the author announces that gas plants are fast and cheap. The paragraph then develops the comparison between gas and coal plants on those two bases. First, the author provides some details about how long it takes to build the two different types of plant. Then the author talks about cost. (Smaller is cheaper.) The underlined sentence provides information about cost, so the best position is where it is in the original.

38. **(A)** *Writing and Language/Standard English Conventions/No Change.* The main problem with the original is the confusion between *less* and *few*. With count nouns, ones that can have a singular and plural, the correct choice is fewer, e.g., fewer pills and fewer cars. When the noun refers to a mass quantity, the correct choice is *less*, e.g., less water and less corn. But fewer quarts of water and fewer kernels of corn. In this case, "effects" refers to a mass quantity so the appropriate word is less, (A).

39. **(A)** *Writing and Language/Standard English Conventions/No Change.* The original is correct. The first part of the sentence is a dependent clause introduced by the subordinate conjunction "because." Its end should be signaled by a comma. (B) is incorrect because the comma is missing; the reader will have difficulty determining where the subordinate clause ends and the independent clause begins. (C) is wrong because this is a job for the comma, not the semicolon. And (D) is wrong because it creates a sentence fragment of the dependent clause.

40. **(B)** *Writing and Language/Standard English Conventions/Sentence Structure/Faulty Parallelism.* The author intends an elliptical construction here. The phrase "elliptical" derives from "ellipsis," which refers to the series of dots that signal that an element of the sentence has been intentionally omitted but is inferable or recoverable from the context. In this case, the author means: emits only about 40% as much as a typical coal plant does. For the construction to work, therefore, the word "does" is required.

41. **(B)** *Writing and Language/Expression of Ideas/Style/Idiomatic Expression.* The problem with the original is the use of the gerund "growing" with the definite article "the." While "growing" can be a noun form ("Growing corn requires extensive fertilization."), as used in this sentence the form is not idiomatic. The

author does not mean that nuclear plants are "growing" in the same sense as a crop. Instead, the author is referring to the <u>increase</u> in capacity, and "growth *of*" is more precise for that purpose.

42. (B) *Writing and Language/Expression of Ideas/Strategy/Effective Concluding Sentence.* The main points of the passage are that technology has made gas a relatively cheap and benign energy source for generating electricity and that there is considerable underutilized capacity. In other words, gas-generated electricity is good and it's available. The conclusion naturally flows that it would be a wise idea to shift to gas—exactly what (B) concludes.

43. (B) *Writing and Language/Expression of Ideas/Strategy/Data Presentation*. The percentages given are:

Natural Gas   19%

Coal   42%

Nuclear   14%

All Other   15%

Therefore, (B), coal, is correct.

44. (D) *Writing and Language/Expression of Ideas/Strategy/Data Presentation.* The question stem suggests that the author might use the graph to make a claim about electricity *generated*, but the graph provides information about *capacity*. Indeed, in the final paragraph, the author is careful to draw this distinction: natural gas plants had greater *capacity*; coal plants produced more *electricity.*

Section 3: Math, No Calculator

1. (A) *Math: Multiple-Choice/Algebra/Creating, Expressing, and Evaluating Algebraic Equations and Functions.* This is a simple translation item: translate the English words into "algebrese." The product of 4 and *x* is written as $4x$, and 3 less than that is written as $4x-3$.

2. (B) *Math: Multiple Choice/Algebra/Manipulating Algebraic Expressions/Manipulating Expressions Involving Exponents.* Given the item's place in the test (it is an easy item), look for an escape route rather than performing the indicated calculations. Cancel and factor: $\dfrac{10^3\left(10^5+10^5\right)}{10^4}=\dfrac{10^3\left[2\left(10^5\right)\right]}{10^4}=\dfrac{2\left(10^8\right)}{10^4}=2\left(10^4\right)$.

3. (D) *Math: Multiple-Choice/Algebra/Solving Algebraic Equations or Inequalities with One Variable/Simple Inequalities.* This item can be solved by reasoning abstractly about the properties of the terms used. A negative number cubed is negative, but squared it is positive. Thus, *x* is not less than 0. A positive fraction grows smaller each time it is multiplied by itself. For example: $\left(\dfrac{1}{2}\right)^2=\dfrac{1}{4}\Rightarrow\left(\dfrac{1}{4}\right)^2=\dfrac{1}{16}$. Thus, the fewer times it is multiplied by itself, the larger it is. Therefore, *x* cannot be a positive number less than 1. Finally, *x* cannot be 1, because $x^3>x^2\Rightarrow\left(1^3\right)>\left(1^2\right)\Rightarrow 1>1$, which is false. Therefore, (D) must be the correct choice.

A much more elegant approach to this item is to notice that x^2 is positive regardless of whether *x* is negative or positive. Furthermore, *x* cannot be zero or the original inequality would not hold true. Therefore, it is

permissible to divide each side of the quantity by x^2: $x^3 > x^2 \Rightarrow \dfrac{x^3}{x^2} > \dfrac{x^2}{x^2} \Rightarrow x > 1$. Of the given choices, the only possible value for x is (D).

4. **(A)** *Math: Multiple-Choice/Algebra/Problem Solving and Advanced Arithmetic/Common Advanced Arithmetic Items/Properties of Numbers.* If n is the least of the three consecutive, even integers, then the other two can be represented as $n+2$ and $n+4$, so the sum of the three integers must be: $n+(n+2)+(n+4)=156 \Rightarrow 3n+6=156$.

5. **(C)** *Math: Multiple-Choice/Algebra/Manipulating Algebraic Expressions/Basic Algebraic Manipulations.* Perform the indicated operations: $(-3x^2 y - xy^2 + 2xy) - (-3xy + 2x^2 y - 5xy^2) =$
$-3x^2 y - 2x^2 y - xy^2 + 5xy^2 + 2xy + 3xy = -5x^2 y + 4xy^2 + 5xy = xy(-5x + 4y + 5)$.

6. **(B)** *Math: Multiple-Choice/Algebra/Creating, Expressing, and Evaluating Algebraic Equations and Functions.* This item asks you to interpret the given inequality. The inequality $|s - 28,600| \le 3,500$ means that the absolute value of the difference between a new bus driver's starting salary, s, and \$28,600 must be equal or less than \$3,500. In other words, $-3,500 \le s - 28,600 \le 3,500$, which is the same as $-3,500 + 28,600 \le s \le 3,500 + 28,600 \Rightarrow 25,100 \le s \le 32,100$. So, \$28,600 is the average possible starting salary, not the minimum, as stated in (B).

7. **(D)** *Math: Multiple-Choice/Coordinate Geometry/Graphs of Polynomial Functions* and *Algebra/Manipulating Algebraic Expressions/Factoring Expressions.* The zeros are those values of x for which the function equals to zero. Set each factor of the polynomial equal to zero and solve for x: $x = 0$, $2x + 3 = 0 \Rightarrow x = -\dfrac{3}{2}$, $x - 1 = 0 \Rightarrow x = 1$, and $x^2 - 1 = 0 \Rightarrow x = \pm 1$. The given polynomial has four distinct roots, or zeros: $-\dfrac{3}{2}$, -1, 0, and 1. Thus, the correct answer is (D).

8. **(A)** *Math: Multiple-Choice/Coordinate Geometry/The Coordinate System* and *Algebra/Creating, Expressing, and Evaluating Algebraic Equations and Functions/Creating Algebraic Expressions.* The coordinates establish that this figure is a rectangle. The width of the rectangle is a, and the length is $b - a$. So, the area is $a(b - a)$.

   Alternatively, assume values, such as $a = 2$ and $b = 4$. The rectangle has a width of 2, a length of $4 - 2 = 2$, and an area of $2 \cdot 2 = 4$. Substitute 2 for a and 4 for b into the formulas given in the answer choices and the correct formula will yield a value of 4.

9. **(A)** *Math: Multiple-Choice/Algebra/Solving Algebraic Equations or Inequalities with One Variable/Equations Involving Rational Expressions.* Solve the given equation for x:
$\dfrac{6}{(x+3)(x-3)} = \dfrac{1}{x-3} + \dfrac{1}{x+3} \Rightarrow 6 = \dfrac{(x+3)(x-3)}{x-3} + \dfrac{(x+3)(x-3)}{x+3} \Rightarrow 6 = x+3 + x-3 \Rightarrow 2x = 6 \Rightarrow x = 3$. However, 3 cannot be the solution to the original equation because it would make the denominator of two of the fractions equal to zero, and division by zero is undefined. Therefore, 3 is an extraneous solution and the solution set is empty, $\{\ \}$.

10. **(B)** *Math: Multiple-Choice/Coordinate Geometry/Graphs of Linear Equations.* Create an equation in the form $y = mx + b$, in which m is the slope of the line and b is the y-intercept. Begin by calculating the slope:

$m = \dfrac{(-2)-(4)}{(2)-(-1)} = \dfrac{-6}{3} = -2$. Therefore, $y = -2x + b$. (B) is the correct answer since it is the only equation with slope of –2. To further verify that (B) is correct, use one of the pairs of coordinates provided in the graph: $4 = -2(-1) + b \Rightarrow b = 2$. Therefore, the equation is indeed $y = -2x + 2$.

11. **(B)** *Math: Multiple-Choice/Algebra/Creating, Expressing, and Evaluating Algebraic Equations and Functions/Concepts of Domain and Range.* To be a function, a relation can have only one output for each input. In other words, for all ordered pairs (x, y), for any value x there can be only one y. Inspecting the relation defined by the given set, either $(0,3)$ or $(0,5)$ must be eliminated to make the relation a function. Only $(0,3)$ is given as a possible answer.

12. **(B)** *Math: Multiple-Choice/Coordinate Geometry/Graphs of Quadratic Equations and Relations.* First, determine what the graph of $y = x^2 - 3$ looks like. This equation is a parabola since the power of x is 2, and the parabola opens upward since the coefficient of x^2 is positive (+1). The axis of symmetry is $x = h$ and the vertex is k for $y = (x - h)^2 + k$. Therefore, the axis of symmetry is $x = 0$ and the vertex is $y = -3$. So, the graph of $y = x^2 - 3$ is as follows:
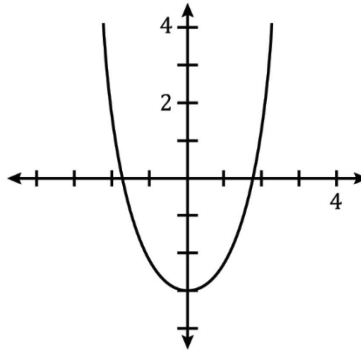
Now, the actual graphical representation in question is of an absolute value: $y = \left| x^2 - 3 \right|$. Therefore, the graph of this equation is the same as that of $y = x^2 - 3$ but with any negative values transposed across the x-axis:
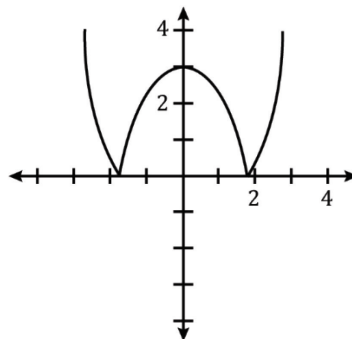
Alternatively, note that the graph of $y = \left| x^2 - 3 \right|$ must always be positive since the absolute value is always positive. The only graph that does not depict negative y-values is (B).

13. **(C)** *Math: Multiple-Choice/Coordinate Geometry/Graphs of Quadratic Equations and Relations.* A graph relating kinetic energy as a function of velocity would have kinetic energy on the y-axis and velocity on the x-axis: $KE = \frac{1}{2}mv^2 \Rightarrow y \propto x^2$. Therefore, the correct graph will be a positive, upright (half) parabola representing a quadratic equation. Only (C) matches this requirement.

14. **(C)** *Math: Multiple-Choice/Algebra/Creating, Expressing, and Evaluating Algebraic Equations and Functions/Functions as Models.* KE is measures in joules, J, equivalent to $\frac{\text{kg} \cdot \text{m}^2}{\text{s}^2}$. For KE to equal $\frac{1}{2}mv^2$, m needs to have the unit kg and v needs to have the unit $\frac{\text{m}}{\text{s}}$. First, convert 2,000 grams to kilograms:

$2{,}000 \; \cancel{\text{grams}} \times \dfrac{1 \text{ kilogram}}{1{,}000 \; \cancel{\text{grams}}} = 2 \text{ kg}$. Solve the given equation for velocity:

$KE = \dfrac{1}{2}mv^2 \Rightarrow v = \sqrt{\dfrac{2KE}{m}} = \sqrt{\dfrac{2(120 \text{ kg} \cdot \text{m}^2 / \text{s}^2)}{2 \text{ kg}}} = 2\sqrt{30} \text{ m/s}$.

15. **(D)** *Math: Multiple-Choice/Trigonometry/Right Triangles/Trigonometric Ratios.* The length of the side opposite the angle is 6 feet, so use the relation for the sine of an angle:
$\sin\theta = \dfrac{\text{side opposite } \theta}{\text{hypotenuse}} \Rightarrow \sin 35° = \dfrac{6 \text{ feet}}{x} \Rightarrow x = \dfrac{6}{\sin 35°}$ feet. Therefore, subtract the ramp's length from the purchased board: $12 - \dfrac{6}{\sin 35°}$.

16. **(16)** *Math: Student-Produced Responses/Algebra/Solving Algebraic Equations or Inequalities with One Variable.* If $\dfrac{3}{4}$ of x is 36, then $\dfrac{3}{4}(x) = 36 \Rightarrow x = 36\left(\dfrac{4}{3}\right) = 48$, and $\dfrac{1}{3}$ of 48 is 16.

17. **(60)** *Math: Student-Produced Responses/Geometry/Lines and Angles.* Label the other two angles in the triangle:
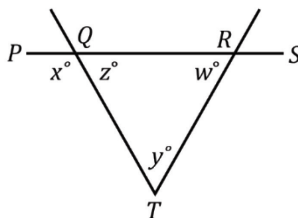
The angle measure of a straight line is 180°, so $x + z = 180 \Rightarrow 120 + z = 180 \Rightarrow z = 60$. Next, $z + w + y = 180$. And since $\overline{QT} = \overline{QR}$, $y = w$. Therefore, $60 + y + y = 180 \Rightarrow 2y = 120 \Rightarrow y = 60$.

18. (**14**) *Math: Student-Produced Responses/Algebra/Solving Algebraic Equations or Inequalities with One Variable/Equations Involving Absolute Value.* Solve using absolute value conventions. $|x-2|=6$, so either $x-2=6$ or $x-2=-6$; $x=8$ or $x=-4$ $|y+8|=10$, so either $y+8=10$ or $y+8=-10$. Thus, $y=2$ or $y=-18$. Since x and y are both negative, $x=-4$, $y=-18$, and $x-y=-4-(-18)=14$.

19. (**11**) *Math: Student-Produced Responses/Problem Solving and Advanced Arithmetic/Common Advanced Arithmetic Items/Complex Numbers.* Since $i=\sqrt{-1}$, $i^2=(\sqrt{-1})(\sqrt{-1})=-1$ and $i^4=(i^2)(i^2)=(-1)(-1)=1$. Simplify the expression: $3i^4+2i^2+10=3(1)+2(-1)+10=3-2+10=11$.

20. (**7/2, 3.5**) *Math: Student-Produced Responses/Algebra/Creating, Expressing, and Evaluating Algebraic Equations and Functions.* To determine for what value x the function k is undefined, set the denominator of the fraction equal to zero and solve for x: $(x+2)^2-\dfrac{x+2}{2}-3=0$. To make the algebra simpler, let $x'=x+2$, so $(x')^2-\dfrac{x'}{2}-3=0$. To determine the possible values of x', factor the left side of the equation:

$x'^2-\dfrac{x'}{2}-3=(x'+\dfrac{3}{2})(x'-2)$. (Note: if the factor pattern is not immediately evident, the quadratic formula can be used to determine x'.) Thus, $x'=-\dfrac{3}{2}$ or $x'=2$, so $x+2=-\dfrac{3}{2}\Rightarrow x=-\dfrac{7}{2}$ or $x+2=2\Rightarrow x=0$. Therefore,

$m-n=0-\left(-\dfrac{7}{2}\right)=\dfrac{7}{2}$.

Alternatively, solve for x directly. Set the denominator of the fraction equal to zero and solve for x, as above. Now, multiply both sides by 2 and expand: $(x+2)^2-\dfrac{x+2}{2}-3=0\Rightarrow 2(x+2)^2-(x+2)-6=0$, so

$2x^2+8x+8-x-2-6=0\Rightarrow 2x^2+7x=0$. Factor to find the solutions:

$2x^2+7x=0\Rightarrow x(2x+7)=0\Rightarrow x=0$ and $x=-\dfrac{7}{2}$. Thus, $m-n=0-\left(-\dfrac{7}{2}\right)=\dfrac{7}{2}$.

Section 4: Math, Calculator

1. (**D**) *Math: Multiple-Choice/Problem Solving and Advanced Arithmetic/Common Advanced Arithmetic Items/Properties of Numbers* and *Algebra/Solving Simultaneous Equations.* Reason through each of the answer choices:

A) $2+n$ cannot be a multiple of 3. Since n is a multiple of 3, when $2+n$ is divided by 3, there will be a remainder of 2;
B) $2-n$ cannot be a multiple of 3 for the same reason that $2+n$ cannot be a multiple of 3;
C) $2n+1$ cannot be a multiple of 3 for the same reason that $2n-1$ cannot be a multiple of 3; and finally,
D) $2n+3$ is a multiple of 3. $2n$ is a multiple of 3; 3 is a multiple of 3; so, $2n+3$ is a multiple of 3.

Alternatively, use the "Plug-and-Chug" method. Select a value for n and test the answer choices. Let $n=9$.

A) $2+9=11$ ✗
B) $2-9=7$ ✗

C) $2(9)+1=19$ ✗

D) $2(9)+3=21$ ✓

2. **(B)** *Math: Multiple-Choice/Problem Solving and Advanced Arithmetic/Common Problem Solving Items/Percentages.* Use the "is-over-of" equation for percents. The "of," which is the denominator of the fraction, is the total quantity of the mixture. How much of the mixture is there? $2.5+12.5=15$ kilograms. The word "is," which is the numerator of the fraction, is the 2.5 kilograms of gravel. Thus:

$$\frac{\text{is}}{\text{of}}=\frac{\text{gravel}}{\text{mixture}}=\frac{2.5}{15}=\frac{1}{6}=0.1\bar{6}=16\frac{2}{3}\%.$$

3. **(C)** *Math: Multiple-Choice/Algebra/Solving Simultaneous Equations.* Set up a system of equations to solve this problem: $T+H=22$; $H+B=17$; and $B+T=15$. Using the first two equations:

$$\begin{aligned}
T+H&=22\\
-(H+B&=17)\\
\hline
T-B&=5
\end{aligned}$$

Couple the result with the third equation:

$$\begin{aligned}
T-B&=5\\
+(B+T&=15)\\
\hline
2T=20&\Rightarrow T=10
\end{aligned}$$

Since $T+H=22$ and Tom is 10, Herb must be 12.

4. **(B)** *Math: Multiple-Choice/Problem Solving and Advanced Arithmetic/Common Advanced Arithmetic Items/Properties of Numbers.* The trick to this item is that since both x and y are negative, xy, (B), is the only expression that generates a positive result. Therefore, (B) must be the greatest.

5. **(A)** *Math: Multiple-Choice/Algebra/Creating, Expressing, and Evaluating Algebraic Equations and Functions.* The formula will be x, the cost for the first ounce, plus some expression to represent the additional postage for each additional ounce over the first ounce. The postage for the additional weight is y cents per ounce, and the additional weight is w minus the first ounce, or $w-1$. Therefore, the additional postage is $y(w-1)$, and the total postage is $x+y(w-1)$.

Alternatively, assume some numbers. For ease of calculations, assume that the first ounce costs 1 cent and every additional ounce is 2 cents. If $x=1$ and $y=2$, then a letter, of say, 3 ounces ($w=3$) will cost $1+2(2)=5$ cents. Substitute these values for x,y, and w into the answer choices, and the correct choice will return the value 5:

A) $x+y(w-1)=1+2(3-1)=1+2(2)=5$ ✓

B) $x(w-y)=1(3-2)=1(1)=1$ ✗

C) $x(w-1)+y(w-1)=1(3-1)+2(3-1)=1(2)+2(2)=6$ ✗

D) $x+wy=1+3(2)=7$ ✗

6. **(B)** *Math: Multiple-Choice/Geometry/Complex Figures* and *Coordinate Geometry/The Coordinate System.*
This is a shaded area problem: $\text{area}_{\text{shaded portion}} = \text{area}_{\text{square}} - \dfrac{\text{area}_{\text{circle}}}{4}$. The area of the square is
$s^2 = 2^2 = 4$, and the area of the circle is $\pi r^2 = \pi(2)^2 = 4\pi$. Therefore, the area of the shaded portion is
$4 - \dfrac{4\pi}{4} = 4 - \pi$.

7. **(A)** *Math: Multiple-Choice/Algebra/Solving Algebraic Equations or Inequalities with One Variable.* Since
$2^x = 16$, $x = 4$. Therefore, $4 = \dfrac{y}{2} \Rightarrow y = 8$.

Alternatively, "test-the-test" with the answer choices. If $y = 8$, then $x = 4$, and since $2^4 = 16$, (A) must be the correct choice.

8. **(C)** *Math: Multiple-Choice/Algebra/Manipulating Algebraic Expressions/Basic Algebraic Manipulations.*
Rewrite the equation so that it is in the form the question asks for, $x + y$: $12 + x = 36 - y \Rightarrow$
$x + y = 36 - 12 = 24$.

9. **(D)** *Math: Multiple-Choice/Problem Solving and Advanced Arithmetic.* One way of analyzing this item is to reason that the larger square has four sides and each guard requires 10 minutes to walk the distance of a
side (400 yards). In $3.5 \; \cancel{\text{hours}} \times \dfrac{60 \text{ minutes}}{1 \; \cancel{\text{hour}}} = 210 \; 3.5 \; \cancel{\text{hours}} \times \dfrac{60 \text{ minutes}}{1 \; \cancel{\text{hour}}} = 210$ minutes, each guard will
walk $210 \text{ minutes} \div 10 \text{ minutes/side} = 21$ sides. So, each guard will make five complete trips around the lot
plus one more side ($21 \text{ sides} \div 4 \text{ sides/trip} = 5 \text{ trips}$, remainder 1 side), bringing each back to his or her
original starting point, *P*, and then one side further. This puts both guards at the opposite side of the square:
Jane at *Q* and Ed at *S.* Therefore, they are $400 + 400 = 800$ yards away from each other, as measured along
the perimeter of the fence.

10. **(C)** *Math: Multiple-Choice/Statistics/Measures of Center and Spread/Averages* and *Median* and *Mode.*
Adding the twelve temperatures and dividing by twelve gives an average slightly greater than 54°F, so (I) is
true. Arrange the values in order: 30, 30, 35, 35, 35, 50, 55, 65, 65, 80, 80, and 90. The central values are 50
and 55, so the median (52.5°F) is greater than 50°F, so (II) is true. The mode is 35°F because it is the
temperature that appears with the greatest frequency, so (III) is false.

11. **(A)** *Math: Multiple-Choice/Algebra/Manipulating Algebraic Expressions/Factoring Expressions.* Notice that
$x^2 - y^2$ is the difference of two squares, so $x^2 - y^2 = (x + y)(x - y)$. Since $x - y = 3$, $(x + y)(3) = 3$, so
$x + y = 1$.

12. **(A)** *Math: Multiple-Choice/Problem Solving and Advanced Arithmetic/Common Problem Solving
Items/Proportions.* Panel A stores 40 kilowatts per hour and Panel B stores 50 kilowatts (kW) per hour in
full sun. The panels are exposed to 12 hours of full sun. The energy credit in this problem is 2 cents per kW.
Panel A's credit is $40\dfrac{\text{kW}}{\text{hr}} \cdot 12\text{hr} \cdot 0.02\dfrac{\text{dollars}}{\text{kW}} = \$9.60$. Panel B's credit is $50\dfrac{\text{kW}}{\text{hr}} \cdot 12\text{hr} \cdot 0.02\dfrac{\text{dollars}}{\text{kW}} = $
$\$12.00$. The difference in solar credit between the two panels is $\$12.00 - \$9.60 = \$2.40$.

13. **(D)** *Math: Multiple-Choice/Algebra/Creating, Expressing, and Evaluating Algebraic Equations and Functions.*
Eliminate (A) and (B) because whether they are odd or even depends on whether $3n$ is odd or even, which depends on whether n is odd or even. As for (C) and (D), n^2 could be odd or even. If n^2 is even, then the expression $n^2 + 1$ is equal to an odd number. And if n^2 is odd, the expression is equal to an even number. Therefore, (D) must be the correct choice: if n is odd, n^2 is odd, and an odd number plus an odd number is even; if n is even, n^2 is even, and an even number plus an even number is always even.

14. **(B)** *Math: Multiple-Choice/Problem Solving and Advanced Arithmetic/Multi-Step Problem Solving Items.*
Create an expression to convert mils to centimeters, making sure that similar units cancel leaving the answer in units of mil: $0.2 \text{ mils} \times \dfrac{.0001 \text{ inch}}{1 \text{ mil}} \times \dfrac{2.54 \text{ centimeters}}{1 \text{ inch}} = .05 \text{ centimeters}$.

15. **(C)** *Math: Multiple-Choice/Problem Solving and Advanced Arithmetic/Multi-Step Problem Solving Items* and *Algebra/Creating, Expressing, and Evaluating Algebraic Equations and Functions.* This item can be solved using a Venn diagram:

Hats = 18   Sweaters = 24
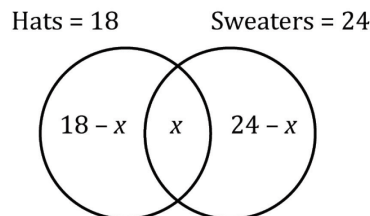
$18 - x$ x $24 - x$

The twist here is that the diagram is not intended to represent all 36 people in the group. 6 of the 36 have neither hats nor sweaters on, so the total represented by the diagram is $36 - 6 = 30$. Therefore, $30 = (18 - x) + x + (24 - x) = -x + 42 \Rightarrow x = 12$.

16. **(B)** *Math: Multiple-Choice/Statistics/Measures of Center and Spread/Median.* Find the cost per meter for the four wires:

A) $\dfrac{\$6}{2 \text{ meters}} = \$3$ per meter

B) $\dfrac{\$10}{4 \text{ meters}} = 2\dfrac{1}{2} = \$2.50$ per meter

C) $\dfrac{\$7}{5 \text{ meters}} = 1\dfrac{2}{5} = \$1.40$ per meter

D) $\dfrac{\$10}{8 \text{ meters}} = 1\dfrac{1}{4} = \$1.25$ per meter

Since there are four values, the median value is the average of the two middle values when arranged in order. The two middles values are $1.40 and $2.50, so the median price per meter is $\dfrac{\$1.40 + \$2.50}{2} = \dfrac{\$3.90}{2} = \$1.95$.

17. **(D)** *Math: Multiple-Choice/Algebra/Solving Simultaneous Equations.* To find b in terms of x and y, set b equal to x and equal to y:

$$x = b + 4 \qquad \text{and} \qquad y = b - 3$$
$$b = x - 4 \qquad\qquad\qquad b = y + 3$$

Now, combine the two equations by adding:

$$
\begin{aligned}
& b = x - 4 \\
+\, & (b = y + 3) \\
\hline
& 2b = x + y - 1 \\
& b = \frac{x + y - 1}{2}
\end{aligned}
$$

Alternatively, substitute some numbers. Let $b = 1$, so $x = 1 + 4 = 5$ and $y = 1 - 3 = -2$. Substitute 5 for x and -2 for y into the choices; the correct choice will yield the value 1.

18. **(C)** *Math: Multiple-Choice/Algebra/Creating, Expressing, and Evaluating Algebraic Equations and Functions/Function Notation.* This is a defined function item. First, do "Δ" to 3 and "∇" to 5: $\Delta(3) = 3 + 1 = 4$ and $\nabla(5) = 5 - 1 = 4$. So, $\Delta(3) \cdot \nabla(5) = 16$. Now, evaluate each answer choice to find the one that equals 16:

A) $\Delta(12) = 12 + 1 = 13$ ✘
B) $\Delta(14) = 14 + 1 = 15$ ✘
C) $\nabla(17) = 17 - 1 = 16$ ✓
D) $\nabla(20) = 20 - 1 = 19$ ✘

19. **(A)** *Math: Multiple-Choice/Problem Solving and Advanced Arithmetic/Common Advanced Arithmetic Items/Absolute Value.* Since $\left|-3\right| = 3$, $\left|-3\right| \cdot \left|2\right| \cdot \left|\frac{1}{2}\right| + (-4) = 3 \cdot 2 \cdot \frac{1}{2} - 4 = 3 - 4 = -1$.

20. **(C)** *Math: Multiple-Choice/Statistics/Measures of Center and Spread/Averages* and *Data Interpretation/Bar, Cumulative, and Line Graphs.* Write an equation for the average well quality (sum of the quality scale points for all 22 wells/the total number of wells), in which $x, y,$ and z represent the quality of the three new wells:

$$4 \leq \frac{2(1) + 0(2) + 6(3) + 4(4) + 8(5) + 2(6) + x + y + z}{25} \leq \frac{2 + 18 + 16 + 40 + 12 + x + y + z}{25} \leq \frac{88 + x + y + z}{25} \Rightarrow$$

$x + y + z \geq 4(25) - 88 = 12$. Therefore, the sum of the water quality for the three new wells must be at least 12. Since the item stem asks about the lowest quality that all three new wells can have that maintains an average well quality of at least 4, the three scores are the same: $x = y = z \Rightarrow 3x \geq 12 \Rightarrow x \geq 4$. Therefore, the lowest water quality that each of the new wells must have is 4.

21. **(C)** *Math: Multiple-Choice/Algebra/Manipulating Algebraic Expressions/Evaluating Expressions.* An expression is undefined when its denominator has a zero value. For $x = 1$, $x - 1 = 0$, so the entire expression is undefined. Similarly, for $x = -2$, $x + 2$ is 0, and the expression is undefined. For $x = -3$, $x + 3$ is equal to 0, so the value of the expression is 0 and that is perfectly allowable.

22. **(D)** *Math: Multiple-Choice/Coordinate Geometry/Graphs of First-Degree Inequalities.* First, determine the equations of the functions shown in the graph. The upright parabola corresponds to a quadratic equation, $y = x^2 + b$, where b is the y-intercept. In this case, $y = -2$ for $x = 0$, so the equation for the parabola is $y = x^2 - 2$. The other line is a constant value for y, $y = 4$. The shaded area represents the overlap for the y-values greater than the parabola $\left(y > x^2 - 2\right)$ and the y-values greater than the line $\left(y > 4\right)$.

23. **(B)** *Math: Multiple-Choice/Coordinate Geometry/The Coordinate System* and *Geometry/Triangles/ Properties of Triangles.* The base of the triangle is: $3k - k = 2k$. The height of the triangle is: $4k - k = 3k$. Therefore, $\text{area}_{\text{triangle}} = \dfrac{\text{base} \cdot \text{height}}{2} = \dfrac{3k \cdot 2k}{2} = 12 \Rightarrow 3k^2 = 12 \Rightarrow k^2 = 4 \Rightarrow k = 2.$

24. **(B)** *Math: Multiple-Choice/Coordinate Geometry/Graphs of Linear Equations.* According to the graph, the time it takes each ball to fall from the drop height to ground level increases as the drop heights increase in an almost constant manner. Only (B) shows a linearly increasing function (positive slope).

25. **(A)** *Math: Multiple-Choice/Probability/Arithmetic Probability.* For $xy = 0$, either x or y must be zero. If the first tile drawn is zero, it does not matter which tile is drawn next; the product of the two tiles will always be zero. The probability of drawing a zero in the first draw is $\dfrac{5}{9}$. Now, suppose that the first tile drawn is not a zero. The probability that the first tile is not a zero is $\dfrac{4}{9}$. With that tile gone, there are only eight tiles left to draw from. The probability that the second tile drawn is a zero is $\dfrac{5}{8}$. Thus, the probability that the first tile is not a zero and the second tile is a zero is $\dfrac{4}{9} \cdot \dfrac{5}{8} = \dfrac{5}{18}$. The question asks for the probability that one or the other of these events occur, so we add the probabilities: $\dfrac{5}{9} + \dfrac{5}{18} = \dfrac{15}{18} = \dfrac{5}{6}$.

Alternatively, count the number of times the product of x and y is zero in the table below. Then, divide that quantity by the total number of combinations of tiles: $\dfrac{\text{\# combinations with } xy = 0}{\text{total \# of combinations}} = \dfrac{60}{72} = \dfrac{5}{6}$.

First tile drawn	REMAINING TILES POSSIBLE FOR SECOND TILE								
	0	1	0	2	0	3	0	4	0
0		0	0	0	0	0	0	0	0
1	0		0	2	0	3	0	4	0
0	0	0		0	0	0	0	0	0
2	0	2	0		0	6	0	8	0
0	0	0	0	0		0	0	0	0
3	0	3	0	6	0		0	12	0
0	0	0	0	0	0	0		0	0
4	0	4	0	8	0	12	0		0
0	0	0	0	0	0	0	0	0	

26. **(B)** *Math: Multiple-Choice/Problem Solving and Advanced Arithmetic/Multi-Step Problem Solving Items.* The item stem states that the baker added 3 cups of flour instead of 2 cups, and then removes $\frac{1}{3}$ of the mix of dry ingredients to correct her error. Assuming she removes $\frac{1}{3}$ of each ingredient, she removes $\frac{1}{3}(3 \text{ cups}) = 1$ cup of flour, $\frac{1}{3}(3 \text{ teaspoons}) = 1$ teaspoon of sugar of sugar, and $\frac{1}{3}(2\frac{1}{4} \text{ teaspoons}) = \frac{1}{3}\left(\frac{9}{4}\right) = \frac{3}{4}$ teaspoon of salt. Therefore, to correct her error, she must add back to the dry ingredient mix 1 teaspoon of sugar and $\frac{3}{4}$ teaspoon of salt.

27. **(D)** *Math: Multiple-Choice/Coordinate Geometry/Graphs of Linear Equations.* First, expand the equation: $3(x+2) = 3x + 6$. So, the correct graph is of the equation $y = 3x + 6$, which has a positive slope of 3 and a y-intercept of 6. Therefore, (D) is the correct graph: a line with positive slope of 3 that crosses the x-axis at $y = 6$. Alternatively, eliminate answer choices. We can eliminate (A) since it is nonlinear. We can also eliminate (B) and (C) since they have negative slopes. Thus, (D) must be the correct answer.

28. **(D)** *Math: Multiple-Choice/Problem Solving and Advanced Arithmetic/Common Problem Solving Items.* To determine the number of people in the group insurance plan that are expected to visit a doctor, multiply together the two matrices: $\begin{bmatrix} 125 & 75 & 150 \end{bmatrix} \begin{bmatrix} 0.60 \\ 0.40 \\ 0.90 \end{bmatrix} = (125)(0.6) + (75)(0.4) + (150)(0.9) = 75 + 30 + 135 = 240$.

29. **(A)** *Math: Multiple-Choice/Algebra/Creating, Expressing, and Evaluating Algebraic Equations and Functions.* The family has one child in elementary school, one child in middle school, and one child in high school. The family buys breakfasts, lunches, and milks for each child. Each child eats twice as many lunches as breakfasts. Additionally, each child drinks milk with each meal. Now, create equations representing the total cost for each child. The cost for the child in elementary school is represented by $x + 4.20x + 1.5x = 6.70x$. The cost for the child in middle school is represented by $1.25x + 5.20x + 1.5x = 7.95x$. Finally, the cost for the child in high school is represented by $1.50x + 6.00x + 1.5x = 9.00x$. The total cost for all three children, in dollars: $6.70x + 7.95x + 9.00x = 23.65x$.

30. **(D)** *Math: Multiple-Choice/Probability/Arithmetic Probability* and *Geometry/Circles* and *Rectangles and Squares.* No figure is provided, so sketch one:
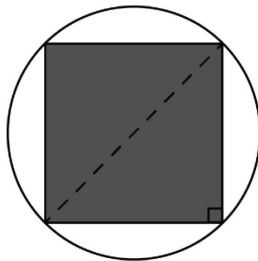
In the figure above, the unshaded area represents the favorable outcomes. The probability of the dart landing in the unshaded area is equal to the number of favorable outcomes divided by the number of total

outcomes: $\dfrac{\text{area of circle} - \text{area of square}}{\text{area of circle}}$. Since the square has an area of 16, it has a side of 4 and a diagonal of $4\sqrt{2}$ (the diagonal forms the hypotenuse of a 45°-45°-90° triangle, so the diagonal is equal to the length of a side times $\sqrt{2}$). The diagonal of the square is also the diameter of the circle, so the circle has a radius of $2\sqrt{2}$ and an area of $\pi\left(2\sqrt{2}\right)^2 = \pi(8) = 8\pi$. Therefore, the probability is $\dfrac{8\pi - 16}{8\pi} = 1 - \dfrac{2}{\pi}$.

31. (**125**) *Math: Student-Produced Responses/Problem Solving and Advanced Arithmetic/Common Problem Solving Items/Proportions and Direct-Inverse Variation.* Let x denote the number of people to look at in order to find 50 with blue eyes. Recall that $\dfrac{2}{5}$ of the population has blue eyes. The number of people to look at, x, must contain 50 people with blue eyes, where the 50 people with blue eyes constitutes two-fifths of the population. To solve for x, set up a direct proportion and solve for the missing value:

$\dfrac{2}{5} = \dfrac{50}{x} \Rightarrow 2x = 250 \Rightarrow x = 125$.

32. (**63**) *Math: Student-Produced Responses/Statistics/Measures of Center and Spread/Averages.* Use the method for finding the missing element of an average. The smallest possible sum for six different positive integers is $1 + 2 + 3 + 4 + 5 + 6 = 21$. The sum of all seven integers is $7 \cdot 12 = 84$. So, with the average of the seven numbers still being 12, the largest the number could be is $84 - 21 = 63$.

33. (**240**) *Math: Student-Produced Responses/Problem Solving and Advanced Arithmetic/Common Problem Solving Items/Percentages.* This is a simple problem with multiple steps. You know that Company *A* has 800 employees, and Company *B* has half that, or 400 employees. Of those at Company *A*, 50 percent are women: $0.50(800) = 400$ women. At Company *B*, 40 percent are women: $0.40(400) = 160$ women. The difference is $400 - 160 = 240$.

34. (**18**) *Math: Student-Produced Responses/Probability/Arithmetic Probability.* The item asks for the minimum number of snakes that need to be removed from a tank in order to guarantee that two of each type of snake had been removed. The key word is guarantee. It is possible that the first ten snakes removed from the tank are unmarked and that the next six snakes removed are all striped. The next two snakes would both be spotted snakes, and, at that point, at least two of each type of snake would have been removed. Thus, the minimum number of snakes that need to be removed is $10 + 6 + 2 = 18$.

35. (**20**) *Math: Student-Produced Responses/Geometry/Triangles/Properties of Triangles.* Since $\overline{PQ} \parallel \overline{ST}$, $x = y$ because the alternate interior angles of parallel lines cut by transversal $\overline{QS}$ are equal. Furthermore, the sum of angles in $\triangle PRQ$ is 180°, so $75 + 65 + x + x = 180 \Rightarrow 2x + 140 = 180 \Rightarrow 2x = 40 \Rightarrow x = 20$ and $y = 20$.

36. (**45**) *Math: Student-Produced Responses/Data Interpretation/Tables* and *Problem Solving and Advanced Arithmetic/Multi-Step Problem Solving Items.* Multiply the rate given for each room by the number of rooms to determine the total time spent cleaning each type of room:

ESTIMATED TIME OF CLEANING			
Room	Number x	Time per Room =	Total Time
Bedroom	4	20 minutes	80 minutes
Bathroom	2	30 minutes	60 minutes
Kitchen	1	t minutes	t minutes
Living Area	4	25 minutes	100 minutes
Garage	1	75 minutes	75 minutes
TOTAL			$315 + t$ minutes

The entire house takes 6 hours to clean, or $6 \text{ hours} \times \dfrac{60 \text{ minutes}}{1 \text{ hour}} = 360$ minutes. Therefore,

$t = 360 - 315 = 45$ minutes.

37. (250) *Math: Student-Produced Responses/Algebra/Creating, Expressing, and Evaluating Algebraic Equations and Functions.* The payout for the first policy is $m = \dfrac{\$400,000}{(0.8)(\$500,000)} L - \$2,000 =$

$\dfrac{\$400,000}{\$400,000}(\$150,000) - \$2,000 = \$130,000$. The payout for the second policy is

$n = \dfrac{\$350,000}{(0.8)(\$500,000)} L - \$1,000 = \dfrac{\$350,000}{\$400,000}(\$150,000) - \$1,000 = \$131,250 - \$1,000 = \$130,250$. The

difference is $\$130,250 - \$130,000 = \$250$. The final answer, in dollars, is 250.

38. (5) *Math: Student-Produced Responses/Coordinate Geometry/Slope-Intercept Form of a Linear Equation* and *Slope of a Line* and *The Coordinate System.* To determine the x-intercept—the point at which the line crosses the x-axis ($y = 0$)—determine the equation for the line, $y = mx + b$, where m is the slope and b is the y-intercept, –10. Since the y-intercept is the point where the line crosses the y-axis, that is, the value of y for $x = 0$, the item stem actually gives two points: $(0, -10)$ and $(3, -4)$. Using these two points, calculate the

slope of the line: $m = \dfrac{\text{rise}}{\text{run}} = \dfrac{\Delta y}{\Delta x} = \dfrac{-4 - (-10)}{3 - 0} = \dfrac{6}{3} = 2$, so $y = 2x - 10$. Finally, to determine the x-intercept,

substitute $y = 0$ and solve for x: $0 = 2x - 10 \Rightarrow x = 5$.

Section 5: Essay

Sample Essay Responses and Analyses

Above Average Response

Due to Teddy Roosevelt's pioneering of conservation, the US has known a hundred years of environmental awareness. At the turn of the century, he called Americans to patriotism and responsible management of US natural resources in his speech, "Conservation as a National Duty," given in 1908 to the Conference of Governors. In response to increasing depletion of natural resources, President Roosevelt effectively argues that resources must be both protected and wisely used. Through his use of statistics, appeals to logos and pathos, and vivid imagery, which appeal both to his countrymen's minds and to their hearts, he persuades Americans to prioritize the conservation of natural resources.

Roosevelt reasons that the dramatically higher use of resources in the last century in comparison to the previous six millennia reveals the need for conservation. In order to increase the impact of this sharp contrast, he has his audience imagine the early life on the Nile and Euphrates, which was slow in progress, in juxtaposition to the hum of discovery and innovation in the 1800s. He notes that coal, water, and wood were used primitively until our discovery of their power, which resulted in a "hundred-fold" increase. Roosevelt includes this quantity, and several others ("more space...covered...than during the preceding six thousand years," "the mere increase...during 1907 over 1906 exceeded the total consumption in 1876," etc.) to awe the audience and compel them to agree that the large increase is tangible and to earn their support for an urgent response to it. This method is effective because the numbers offer solid factual evidence for Roosevelt's argument and combat counter-arguments that suggest that he is exaggerating about the gravity of the issue. He drives home the point with an ominous observation: "rapid development" of resources will result in "rapid destruction."

Roosevelt appeals to both pathos (emotion) and logos (logic) to further increase the impact of his message. He connects the value of the natural resources to the continuation of the human population, saying that foresight will result in the "assurance of well-being for himself and his children." This is meant to invest the audience in the cause personally; it is effective because he picks up on a broad human desire and even instinct (protection of future generations) in order to earn the support of a huge portion of the audience for contributing to the cause at least for the sake of their children. Roosevelt also appeals to logos by referring to one of our Constitution's original purposes, which was to help unite the people to wisely use our national resources. Roosevelt observes that we are now seeing "enormous consumption" of resources which would result in the "threat of imminent exhaustion" of them due to "reckless and wasteful use," and he urges us to pursue the kind of wise conservation promoted in the document at the foundation of our nation once again. In citing the Constitution, he ties the need for conservation to our nation's very identity, making the audience realize that it is indeed against our very principles as a people to ignore the issue. This point is effective because it presents abuse of resources as irrational and unpatriotic to those in the audience invested in their national identity.

Through the use of vivid imagery, Roosevelt makes a strong case for conservation using an emphatic description of a world minus its resources. He has us imagine sobering sensory details such as depleted soils that are "washed into the streams," eliminated forests, and polluted rivers, details meant to make us prematurely nostalgic for a lush environment that we are urgently at risk for losing. These details are effective because they make us picture and appreciate those things that we already have and compel us to imagine losing them, fostering a sense of attachment to and gratitude for these precious natural resources. Roosevelt also creates an allegorical character whom he calls the "prudent man." His man, a metaphor of wisdom, learns to exercise "foresight in conserving and wisely using" the earthly resources. This imagery of the man conveys the importance and tangibility of conservation by showing that we as individuals each have the incentive (protecting ourselves and our children) and potential (through exercising foresight) to contribute to the cause.

Having used dramatic statistics, appeals to pathos and logos, and vivid imagery, Roosevelt clinches the deal at the conclusion of his speech when he specifically asks the people to prioritize the conservation of natural resources. Because he has shown the imminence of the approaching exhaustion of non-renewable resources such as coal, oil, gas, and metals, and because he has induced aversion to this exhaustion, Roosevelt can appeal to the nation to "guard its own future in the essential matter of natural resources."

Analysis of Above Average Response

This writer's use of textual evidence in both paraphrasing and direct quotation demonstrates a high level of comprehension and understanding of the central themes. The writer provides three relevant aspects and supports claims with logical and persuasive elements. The writer's development of several rhetorical devices, such as statistics, pathos, logos, and imagery, reveals an intuitive grasp of the author's intention and impact. The response is well-organized, logically developed, and free of distracting errors. The writer has mastered proper grammatical structure and usage, including spelling, punctuation, and word choices that strengthen the thesis.

Below Average Response

Roosevelt gives a very persuasive speech on the topic of conservation in America. He uses several points to make his argument about conservation. Roosevelt uses American history, facts, and patriotism to make his argument more persuasive.

One of the things that Roosevelt uses in his speech is logic. He talks about American history and how natural resources help America become great. I think that that his points about how far Americans have come since the early days shows how essentel natural resources are. America's growth is dependent on its natural resources.

Roosevelt also discusses facts in his speech. He talks about how conservation is important because Americans need to make sure that there are natural resources for the next generations. I believe that helped his speech be more persuasive because it appeals to people's emotions because everyone wants the best for their kids. Roosevelt talks about a man who uses foresight to take care of his children and their future, I think that he means that by conserving natural resources, America will be like that man.

Another point Roosevelt uses to make his argument about conservation is American patriotism. I think that this is Roosevelt's strongest point in his speech. He uses American history to remind people about how important natural resources were to the Founding Fathers. Roosevelt also says that it is the duty of every American citizen to strive to be better and to conserve natural resources for America's future.

I think that Roosevelt's speech is very convincing and well done. He uses logical reasoning, facts, and American history to make his point about the importance of conservation to America's present and future success. This makes his speech more persuasive and likeable.

Analysis of Below Average Response

This writer demonstrates some understanding of the source text. This response illustrates that the writer understands Roosevelt's argument for the importance of conserving America's natural resources. The writer conveys understanding of the text and the details that contribute to the persuasiveness of Roosevelt's argument. However, the writer misspells words and misuses them, which distracts from the response itself. The writer starts to explain Roosevelt's argument but is not cohesive in his/her explanation. The writer also does not support his/her argument with evidence from the text source.