



ACT[®] Test

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Printed in the United States of America

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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.

If you are teaching another Cambridge program that does not include explicit pre-assessment item references, such as the *Non-Negotiable Skills* program, keep the pre-assessment items in mind as you teach. You can refer back to the pre-assessment items periodically throughout your course and incorporate the skills and strategies you have been teaching using the pre-assessment items as examples.

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 and connect them to the *Victory* text.** Each item in this Navigator packet includes a category path that corresponds to the course concept outline in the *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. You can also use the online index on the Teacher Resource Center (the URL is found in the introduction of your *Victory* teacher's guide) to look up items in the *Victory* text in a specific category.

TEST 1—ENGLISH

1. **(C) English/Usage and Mechanics/Sentence Structure/Fragments.** The problem with the first word group is that it lacks a verb. A word group without a conjugated verb is a sentence fragment. To correct this problem, you need an answer choice that gives the group a main verb, and (C) does this. (B) and (D) are verb forms, but the “-ing” signals a participle. By itself, a participle cannot be a main verb for a complete sentence.
2. **(H) English/Rhetorical Skills/Strategy/Appropriate Supporting Material.** This item asks you to choose a word that will suggest that the number of people trying to save old barns is *increasing*. So, you need a word like “increasing,” “rising,” or “growing,” (H). The original is wrong not only because it fails to respond to the question but also because “reasonable number” doesn’t connect with the development of the selection. (G) is wrong for substantially the same reason. Finally, as for (J), leaving the sentence without a quantifier simply makes a neutral statement: some people are doing this. But the question would remain: “How many people?”
3. **(A) English/Usage and Mechanics/No Change.** The original correctly expresses the comparison being made: this as much *as* that. The other choices are wrong because the words represent improper usage.
4. **(J) English/Rhetorical Skills/Strategy/Effective Transitional Sentence.** The question here is whether a transition is needed to introduce a contrast between the efforts by the trust and those being made by states. And the answer is “no.” The trust and the states are both working to accomplish the same goal, so the phrase “on the other hand,” which is used to signal the reader that a contrast is coming, is misleading. The same reasoning applies to (H): “though” introduces a contrast. (G) is wrong because, even though the trust and the states are on the same side, so to speak, the efforts of the trust do not cause and are not logically connected to those of the states. So, the “thus” is misleading. The best approach is to let the order of the sentences show the reader that the trust began working on the issue, followed by the states. (J) does this by omitting the underlined material.
5. **(A) English/Usage and Mechanics/No Change.** The general rule is that a pair of commas should be used to set off an aside or parenthetical expression. Therefore, the original is correctly punctuated. When the test-writers prepare the wrong answers to this kind of item, they usually use variations such as a comma at the start of the expression but not one to close it, a comma to close but not to open, or a comma in the middle that disrupts the logical flow of the sentence. (B) is wrong because the second comma is missing: the reader won’t know that the aside is finished. (C) is wrong because the first comma is missing: the reader won’t know that the aside has started. (D) is wrong because the second comma disrupts the logical flow of the sentence.

 This item type will appear on about every ACT test and maybe more than once.
6. **(H) English/Rhetorical Skills/Style/Idiomatic Expression.** The original is simply not idiomatic. There is no other explanation, no rule, no list, no pattern to memorize. A fluent English speaker would not use the phrases in the original, (G), or (J). (H) is the proper way to phrase the sentence: “for a variety of reasons.”
7. **(D) English/Usage and Mechanics/Sentence Structure/Misplaced Modifiers.** The problem with the original is that the adverb “often” is incorrectly placed. In addition to disrupting the logical flow of the sentence, “often” is so far removed from the word it is intended to modify that the reader cannot easily make the connection. (D) is the better choice: by putting “often” between “repair” and “costs,” the sentence clearly states that “costs” occurs “often.” (B) and (C) are wrong for the same reasons as the original.
8. **(G) English/Rhetorical Skills/Style/Clarity of Meaning and Usage and Mechanics/Sentence Structure/Problems of Coordination and Subordination and Faulty Parallelism.** There is not anything grammatically wrong with the original. However, the coordinate conjunction “and” implies to the reader that the second clause will support or add to the idea in the first clause. But the content makes clear that the author intends to contrast two possible uses for the barn: you can use it as a farm building or you can use it for a store or home. That’s an “either/or” analysis, so the correct coordinate conjunction to use is “or.” Furthermore, there is a second problem that needs to be tidied up. In order for the second clause to parallel the first, the verb should be “can be.” Therefore, (G) is the correct

choice. (H) and (J) both fail to make the needed correction and imply a causal connection between the first idea and the second. The author does not intend such an implication.

9. **(B) English/Usage and Mechanics/Grammar and Usage/Diction.** The original is wrong because “additional,” while it does mean “extra” or “plus,” is not the correct word choice here. The author means to use “also,” (B). The original, (C), and (D) all try to convey the idea of “and what is more” but fail because they are not the correct word choice in this context.
10. **(F) English/Usage and Mechanics/No Change.** The original is correct. The test-writer apparently intends to test pronoun agreement. The pronoun “its” refers to “landscape,” and it agrees in number. The possessive pronoun of “it” is “its.” As for (G), “it’s” is the contraction for “it is.” (H) confuses “there” with “their.” (J) is incorrect because replacing “its” with “the” changes the intended meaning of the sentence.
11. **(B) English/Rhetorical Skills/Style/Clarity of Meaning and Usage and Mechanics/Grammar and Usage/Verb Tense.** The original does not convey correctly what the author intends to say. The verb “were settling” is the past progressive tense and so the original implies that the farms were doing the settling. What the writer means to say is that the farms were being settled by people—this is the passive voice. When the passive voice is used, the subject of the sentence receives the action while the action is initiated by some other agency. For example:

Active: Mary wrote the book.

Passive: The book was written by Mary.

Active: The farmer plants corn every spring.

Passive: Every spring corn is planted by the farmer.

Therefore, (B) is the correct construction: “farms were first settled...” (C) and (D) are wrong because they fail to make clear the relationship between the farms and the people who settled on them.

12. **(H) English/Usage and Mechanics/Punctuation/Apostrophes.** The problem with the original is that “generation’s” is possessive (e.g., “The previous generation’s contribution was substantial.”). Here, the author wants the ordinary plural: “generations,” (H). (G) inserts a comma between the subject and the verb, thereby disrupting the logical flow of the sentence. (J) fails to solve the problem of the superfluous apostrophe.
13. **(B) English/Usage and Mechanics/Grammar and Usage/Sequence and Verb Tense.** One way of understanding the issue here is to see that “was making” is a past tense verb, while the sentence immediately before it looks to the future. So, instead of “was making,” the correct verb tense is “can make,” (B). (C) and (D) are also past tense forms of the verb.
14. **(J) English/Rhetorical Skills/Organization/Sentence-Level Structure.** This sentence asks about the organization of the final paragraph. The problem with the original location of Sentence 3 is that it separates the idea of “building of a barn that announced” in Sentence 2 from the “make a similar statement” of Sentence 4. Since the “similar” refers to the “statement” in Sentence 2, it would be better to bring those two ideas closer together, so Sentence 3 should be moved to the end of the paragraph. Sentence 3 is really intended to be the last sentence, or conclusion, of the passage: future generations will thank us. That’s the stinger that the writer adds to put some punch into the closing.
15. **(B) English/Rhetorical Skills/Strategy/Main Idea.** This item asks you to define more precisely the main theme of the selection by adding a subtitle. (B) is the best choice: “Saving Old Barns Is Worth the Effort” echoes the discussion about restoring the barns and makes the affirmative statement that saving barns is worth it. This is an accurate summary of the author’s position. (A) is wide of the mark because the selection does not discuss the Midwestern economy. (C) is also wide of the mark because the passage never mentions any of the contents found in the barns. (D) is too narrow: while the author would likely allow that old barns are beautiful, the passage is not about the beauty of barns.


16. (H) *English/Usage and Mechanics/Punctuation/Commas*. Sometimes, the superfluous comma is added between the verb and the object of the verb. For example:

When they were ready, Guillo lifted, the heavy timber into place and Marlene nailed it. ✘

Or, sometimes you'll see it in the predicate:

After closing the lid, Tito picked up his rifle, and walked to the barn. ✘

There are other variations as well. In the original, the superfluous comma appears between the subject and the verb. (H) correctly eliminates the comma. (G) is wrong because it simply relocates the unnecessary mark. (J) is wrong because the apostrophe incorrectly signals a possessive.

 A favorite trick of the test-writers is to add a comma where one doesn't belong.

17. (B) *English/Usage and Mechanics/Sentence Structure/Fragments*. The original contains a word group that doesn't have a main or conjugated verb. "Growing" is a participle—a verb form that functions here as an adjective. The following are some other examples of participles used as adjectives:

...long-lasting flavor.
The teacher grading the papers....
...an animal grazing in the meadow.

In the first case, "long-lasting" describes the "flavor"; in the second, "grading" tells which "teacher"; and in the third, "grazing" identifies the "animal." But don't confuse the adjective use with the main verb use. In the following, the verb forms are main verbs showing action:

The flavor lasts a long time.
The teacher is grading the papers.
An animal was grazing in the meadow.

Now, the test-writers will put a participle verb form in a word group that lacks a main verb so that you think there is a verb. In the original, "growing" is not a main verb. There are a couple of different ways to solve the problem. You could solve it by adding a main verb to the fragment group:

One of the country's fast-growing sports is scuba diving.

But that is not one of the choices given. Or, you could somehow connect the fragment word group with a main sentence, and this is what (B) does: it makes the fragment a part of the preceding sentence. Technically speaking, what (B) does is create an appositive. An appositive is a noun that is placed in "ap-position" to another noun. (Think: In position opposite of, like a building opposite another one on the street.) The appositive has the same grammatical function as the word it is in apposition to; you might say that its grammatical function is parasitic upon that word. The proper way to punctuate an appositive is to signal it with a comma, which (B) does. (C) is wrong because it uses a semicolon. (D) is wrong because the coordinate conjunction "and" is not an acceptable replacement for the comma.

 Another favorite testing point of the test-writers is fragments.

18. (F) *English/Usage and Mechanics/No Change*. The original is correct. (H) and (J) are wrong because they change the singular "country's" to the plural "countries," a word that doesn't fit with the logic of the sentence. (G) is incorrect because there is no word in English such as "fastly."
19. (C) *English/Usage and Mechanics/Grammar and Usage/Subject-Verb Agreement*. Notice that the test-writers have cleverly tried to fool your ear into thinking that the subject is plural, requiring the verb "have." The

proximity of “Keys,” a plural noun, makes it easy for your ear to approve of “Keys have.” But analysis of the sentence shows that “Keys” is not the subject. The subject of the sentence is the singular “center,” but the verb is the plural “have.” To achieve agreement between the subject and verb, the singular “has” is needed, (C). (B) fails to correct the subject-verb agreement problem. (D) provides the correct verb, but the other change completely disrupts the logical structure of the sentence: “the Florida Keys has boats that equip to take divers....”

20. **(F) English/Rhetorical Skills/No Change.** The item stem asks for the alternative that best conveys the idea that scuba diving is a participation sport, not a spectator sport. Therefore, you need a phrase that says something like “You’ll be doing it yourself” or “Don’t just watch it; go ahead and do it.” And that is what the original does: “join the fun.” As for (G), while it may be true that you don’t need to be a certified diver to “get the idea,” what does “get the idea” mean? It doesn’t say that you’ll actually be putting on the gear and diving, does it? And (H) is even further removed because it doesn’t even suggest that you, as an individual, are welcome to participate. Finally, (J) is perhaps the second best answer because it at least says that you might dive. But the original provides a much stronger statement—you’re invited to join in—and that is what the item stem asks for.

TIP For this item, you need to make sure that you respond to the question that is being asked. The wrong choices are not incorrect because they make grammatical mistakes. Instead, they are wrong because they fail to respond to the question being asked.

21. **(A) English/Rhetorical Skills/Style/Conciseness.** In good writing, you want to avoid unnecessary wordiness, and that is the problem with the wrong answers to this item. The original uses four words to say directly that the instructor will be the guide. (B) takes eight words and beats around the bush with “whose job” and so on. (C) uses six words, but it also slightly changes the meaning of the original. “Instructor” means teacher; the additional phrase in the original is intended to show that the instructor will also be acting as a guide. Finally, the six words in (D) are also indirect and needlessly awkward compared with the original.

22. **(H) English/Rhetorical Skills/Strategy/Appropriate Supporting Material.** You’re looking for material that will convey the impression of the reef’s beauty and appeal. (G) is flat and not very interesting: some plants and some animals. (J) suffers from the same problem: you might see something. (H), however, tells you exactly what you might see: “brilliantly colored tropical fish,” some of them friendly. That’s pretty descriptive and exciting. Compared with the other choices, (H) is definitely the best rewrite of the original.

TIP As with item #20, this item, too, a lot depends on responding to the question asked.


23. **(B) English/Usage and Mechanics/Punctuation/Commas.** As with item #16, the problem here is that the comma after “learned” separates the verb from the rest of the sentence—the comma should be deleted. Just as a comma is incorrect, so is a semicolon, (C), which is a much stronger punctuation mark. (D) doesn’t solve the problem of the original.

24. **(F) English/Usage and Mechanics/No Change.** The original is correct. (G) and (H) both introduce a problem of subject-verb agreement: “a fish...are easy prey.” Furthermore, (H) incorrectly uses the adverb “easily” rather than the adjective “easy.” Finally, (J) destroys the sense of the sentence: “a fish...is easy to prey.”

25. **(B) English/Rhetorical Skills/Strategy/Effective Transitional Sentence.** The use of “on the other hand” in the original signals that the author is about to present a contrasting idea or point of view, but that is not the way the passage unfolds. Instead, the author is continuing the discussion of swimming with barracudas, so you need a transition that signals this continuation. “Therefore,” (B), is the correct choice.

26. **(H) English/Usage and Mechanics/Grammar and Usage/Pronoun Usage.** The problem with the original is that “you” is supposed to refer to “scuba divers.” But “you” is a second person pronoun. (H) corrects the problem by using “they,” a third person plural pronoun. (G) is wrong because “one” is singular, while “divers” is plural. (J) is wrong because “us” is the first person plural pronoun of the objective case. Here, you need the third person and the subjective (for the subject of “attract”) case.

27. **(D) English/Rhetorical Skills/Strategy/Appropriate Supporting Material.** Here, you're not asked whether the sentence is grammatically correct but whether it would be an appropriate addition to the passage. And the answer is "no." While it is true that "barracuda" is often used to refer to anyone who is aggressive, particularly in business, truth alone doesn't make the sentence a good addition. Is there anything else in the passage related to the topic of business? Is the sentence useful in telling the reader something about barracudas or other fish? If not, then the sentence is out of place, as (D) states. Watch out for (C): it also says that the sentence is not appropriate but gives a poor reason. The sentence may provide new information, but this doesn't mean that the information should be included. And, of course, both (A) and (B) are wrong because they state that the sentence should be included.

 With an item such as this, make sure to answer the question asked.

28. **(J) English/Rhetorical Skills/Strategy/Appropriate Supporting Material.** Ask yourself, "What is the topic of the paragraph?" It provides an explanation as to why it seems to novice divers that the barracuda is particularly dangerous: it has a bad rep; it's ugly; it'll stare you down. But the underlined sentence doesn't add anything to this discussion. In fact, it refers the reader to fish other than the barracuda, and for that reason distracts attention from the specific topic of this paragraph. Therefore, the sentence should be left out entirely, as (J) states. (G) is wrong because "this" doesn't seem to refer to anything and certainly doesn't refer to the preceding sentence: the "barracuda's appearance" has happened to many people? Finally, (H) is even more removed from the topic of the paragraph than (G).

29. **(C) English/Usage and Mechanics/Grammar and Usage/Pronoun Usage.** "Their" is a plural pronoun, so its antecedent must also be plural. However, the writer refers to "the barracuda" in the singular, so we have a failure of agreement. To correct the original, simply change "their" to the singular "its," (C). (B) is wrong and simply a homonym for "their." (D) is wrong because "it's" is the contraction for "it is," not the possessive.

30. **(J) English/Usage and Mechanics/Sentence Structure/Comma Splice.** The original is a comma splice: two independent clauses joined only by a comma. To join two independent clauses requires a comma plus a coordinate conjunction. (Occasionally a semicolon will do the trick, but not here.) (J) correctly uses this approach. (G) fuses the two clauses without the requisite comma. (H) completely disrupts the logic of the sentence.

31. **(B) English/Usage and Mechanics/Punctuation/Commas.** In the original, "geologist Walter Alvarez" is an appositive of "son" and should be set off by commas. Compare this item with item #17, where the appositive came at the end of the sentence, so only the first comma was required. (B) provides the correct punctuation. (C) is wrong because the comma following "geologist" illogically separates it from the name that it modifies. (D) is wrong because the start of the appositive is not properly signaled by the opening comma.

32. **(H) English/Usage and Mechanics/Sentence Structure/Misplaced Modifiers.** The problem with the original is a dangling modifier. The introductory modifier ("While analyzing...New Zealand") seems to modify the first important noun that follows it: "traces of iridium." So, the sentence appears to say that the "traces of iridium" were analyzing rocks—a nonsensical assertion. In general, there are several different ways of correcting this type of error. You can relocate the modifier to place it closer to the word group it is intended to modify, an option not available here because the implied object of the phrase, "Alvarez," doesn't appear. You could also insert the names: "While analyzing rocks, Alvarez and his son found traces of iridium." And this is essentially what (H) does with the pronoun "they." (G) doesn't solve the problem, because the modifier continues to dangle. (J) is wrong because "finding" cannot be a main verb. Consequently, (J) reduces the word group to a sentence fragment.

33. **(A) English/Rhetorical Skills/No Change.** The original is acceptable as written. The problem with the other choices is that these phrases don't make sense when the sentence is read in the greater context of the paragraph.

34. **(J) English/Rhetorical Skills/Organization/Sentence-Level Structure and Strategy/Appropriate Supporting Material.** Why would the reader need this information? Does the chemical symbol help the reader understand the Alvarezes' hypothesis? Does the date that the element was discovered make it easier to understand the theory about the meteorite? The answer is "no." So, the sentence has no useful role to play in the passage and should not be added, as (J) states.

TIP You might want to compare this item with item #27, for the answers are alike for similar reasons.

35. **(B) English/Rhetorical Skills/Style/Conciseness.** The problem with the original is that it is needlessly wordy and awkward. Compare the original with (B), which conveys the same information much more directly with fewer words. (C) is also wordy and introduces yet another error: “since” is a subordinate conjunction that implies a cause-and-effect, or logical, connection. But neither of those uses is appropriate here. Finally, (D) is even more wordy and indirect than the original.
36. **(F) English/Usage and Mechanics/No Change.** “Lying” is the present participle (“-ing”) form of the verb “to lie,” which means to be located somewhere (e.g., “The islands lie to the west of the city.”). In the original, the participle “lying” is correctly used as an adjective to modify “rocks,” indicating where the rocks lie or are to be found (a mile underground). Both (G) and (H) are wrong because they use the participle form of the verb “to lay.” Furthermore, “lying” is an adjective modifying “rocks,” so the possessive “rocks” in both (H) and (J) is wrong.
37. **(B) English/Rhetorical Skills/Strategy/Appropriate Supporting Material.** This item stem asks about the suitability of an additional bit of information. The statement to be added defines the term “‘shocked’ quartz,” explaining that it occurs when the quartz is hit with something. This would be an important addition to the passage because it adds evidence to the writer’s thesis that a meteorite strike caused the condition. Thus, (B) is correct in both approving the addition and explaining its usefulness. (A) reaches the right conclusion but for the wrong reason: the additional information says nothing about Penfield’s career. (C) is wrong because the additional information supports the theory that there was a violent impact and so should be included. (D) is wrong because the information is not already contained in the selection and so should be included.

TIP Remember that it is important to answer the specific question asked.

38. **(G) English/Rhetorical Skills/Strategy/Appropriate Supporting Material.** This item is really just an extension of item #37. In the original, the “only” is a word that narrows the possible explanations for the appearance of the quartz to a large impact such as one caused by a meteorite. (G) nicely summarizes this point. (F) has some intriguing language, and it sounds like something the test-writers might use for a right answer, but there is no connection between the two geologists other than the coincidence of their independent studies. (H) wrongly interprets the significance of “only” in the original. Compare the following two statements:

The evidence is that only a missing screw could have caused the breakdown.
The only evidence of a breakdown is a missing screw.

Finally, as we’ve established, the detail suggested by “only” is not meaningless, so (J) is wrong.

39. **(A) English/Rhetorical Skills/No Change.** This item tests the overall structure of the passage. The passage is written to convey the idea that the meteorite strike is only one possible theory, albeit a particularly promising one. This is the reason for the phrases such as “provided strong evidence” and “many scientists believe.” To preserve this sense, it is better to not change the original. All of the other choices would clearly undermine the author’s goal of offering the meteorite as one likely explanation by claiming that the theory has been definitely proved.
40. **(H) English/Usage and Mechanics/Sentence Structure/Faulty Parallelism.** The problem with (H) is that it destroys the parallelism of the sentence: “creating” needs to have the same form as “crashed” (the “asteroid crashed...and created”). (J) would be an acceptable way of preserving the parallelism. (F) and (G) would also be acceptable, though they take different approaches. (F) creates another independent clause (this event created) joined to the first independent clause by a comma and coordinate conjunction. (G) creates a relative clause using the relative pronoun “which.”

TIP As we repeatedly stress, it is important to answer the question asked, and here you have a thought-reverser: EXCEPT. Thus, the correct answer is the unacceptable alternative to the underlined portion.

41. **(B) English/Usage and Mechanics/Punctuation/Commas.** Again, an important use of commas is to mark off an aside in a sentence to help the reader understand that the aside is not part of the main flow of the logic of the sentence but an additional bit of information. The commas inserted by (B) correctly mark the aside “many scientists believe.” Without the commas, the meaning of the sentence is not immediately clear. With the commas in place, the sentence makes sense (“Such an impact [pause] many scientists believe [pause] would have blanketed the planet with debris...”). (C) and (D) are wrong because they do not include both of the needed commas.
42. **(H) English/Rhetorical Skills/Style/Conciseness.** “Happened” and “took place” have the same meaning, so using both is redundant. (H) simplifies things even more by eliminating both phrases. As can be seen by reading the newly constructed sentence, both “happened” and “took place” are not needed in the first place. Thus, (H) has the advantage of economy of wording. (G) is extremely awkward. (J) is as wordy as the original.

TIP One error included on almost every ACT is that of needless repetition.

43. **(C) English/Usage and Mechanics/Grammar and Usage/Diction.** Prepositions are a difficult part of English because they are highly specific. In a particular instance, one preposition is acceptable while another is not, as in the following examples:

We gave the book to the librarian. ✓
We gave the book toward the librarian. ✗

Write the word on a note card. ✓
Write the word in a note card. ✗

She was second out of 43 contestants. ✓
She was second out 43 contestants. ✗

The difference between the correct and incorrect versions of these examples is not a matter of grammar; rather, the difference is the choice of preposition. In this item, the correct preposition is “of”: “the evolution of another life form.” Thus, (C) is the correct choice.

44. **(F) English/Rhetorical Skills/Organization/Passage-Level Structure.** The last paragraph is already in the correct position. The essay has the following structure:

Paragraph 1: The Alverezes found iridium that seems to come from a meteorite.
Paragraph 2: The search for a crater led to the Yucatán and interesting quartz patterns.
Paragraph 3: These discoveries (the ones in Paragraph 2) suggest a meteorite struck the Earth.
Paragraph 4: If so, this may explain the extinction of the dinosaurs.

Changing the order of the paragraphs would completely distort the logical structure of the essay, so the correct choice is (F).

45. **(D) English/Rhetorical Skills/Strategy/Main Idea.** The summary of the passage (see item #44) shows that this essay is not a good response to an assignment to write about the geography and geology of the Yucatán region. The only mention of that idea is found in Paragraph 2, and it is mentioned there as just one element, albeit an important element, of the author’s discussion about the possibility of a meteorite. (D) makes this point. (C) reaches the right conclusion but gives the wrong reason: the essay does not focus “on the extinction of the dinosaurs.” That idea is found only in Paragraph 4. Finally, (A) and (B) are both incorrect because the essay is not an appropriate response to the prompt.
46. **(J) English/Usage and Mechanics/Punctuation/Apostrophes.** This item is a straightforward test of possessives. The possessive is needed here because the sentence refers to the police department “of the city.” And the possessive is formed by adding the apostrophe before the “s”: “city’s,” (J). (Note that “citys” is not an English

word.) (G) is wrong because “cities” is the plural of “city,” not the possessive. (H) is wrong because while “cities” is the possessive form of the plural, the sentence is referring to a single city, Atlanta, not several cities.

47. **(A) English/Usage and Mechanics/No Change.** One use of the colon is to bring the main part of a sentence to an end and signal the start of clarifying material or material adding specification. In the original, the colon correctly signals that additional clarifying material will follow. And the material does add detail by describing the “unusual way” in which Harvard started her career. (B) is wrong because a semicolon is used to join two independent clauses, and the additional material, lacking a main verb, is not an independent clause. (On occasion, semicolons can be used to punctuate series, but that is an unusual usage.) (C) is wrong because it lacks any punctuation at all. (D) at least has the merit of trying to change its structure to avoid punctuation altogether, but the resulting construction would make the additional material a prepositional phrase (of something) modifying “way,” and that is not the sense of the sentence.
48. **(H) English/Usage and Mechanics/Sentence Structure/Misplaced Modifiers.** There are different ways to describe the error in the original. One is to say it is a dangling modifier: the introductory phrase seems to be a modifier intended to modify the first important noun phrase following the comma (“A woman her size, the applicant...”). Or, you could say that the initial word grouping is a fragment because it reads as a defective independent clause. Or, you might think it is a case of a double subject (e.g., “John Adams, he was the second president.”). In any case, (H) solves the problem by incorporating the orphaned word group into the main clause by creating a noun clause to be the object of “think” (a woman her size had the strength). No matter how you categorize the original error, neither (G) nor (J) solves the problem.
49. **(D) English/Usage and Mechanics/Grammar and Usage/Pronoun Usage.** The problem with the original is that “whom,” an objective case pronoun, is trying to function as the subject of a clause: “whom (subject) held (verb) a master’s degree (direct object).” However, this requires the subjective (nominative) case of the pronoun: “who held a masters’ degree.” (B) fails to correct the original error. (C) distorts the intended meaning of the original beyond recognition.
50. **(F) English/Usage and Mechanics/No Change.** The original is correct: “and” is a coordinate conjunction that joins the two elements of the compound verb (“could pass and signed”), and “then” makes it clear that “signing” followed “passing” in the sequence of events. (G) is wrong because the subordinate conjunction “where” is used to signal a location, and that meaning is out of place in this sentence. In (H), “in that” destroys the logical coherence of the sentence. As for (J), “signing” destroys the parallelism between the parts of the compound verb.
51. **(D) English/Usage and Mechanics/Grammar and Usage/Pronoun Usage.** The original contains a grammatical error. The singular pronoun “it” incorrectly refers to the plural noun “ways.” A plural pronoun is needed here to agree with the plural noun. (D) is the correct choice: “them.” (B) doesn’t eliminate the error in the original; plus, it needlessly changes the sentence from the active voice (“suggested”) to the passive voice (“was suggested”). (C) makes the needed correction but, like (B), needlessly and awkwardly introduces the passive voice.

In general, the active voice is likely to be clearer and more direct than the passive voice. To be sure, many people use the passive voice in writing because they mistakenly believe that it makes writing more formal:

Active: Jennifer painted the room teal.

Passive: The room was painted teal by Jennifer.

As you can see, the passive voice is not more formal, just stilted.

TIP As a matter of strategy for the test, while the passive voice is not categorically wrong, it is better to choose an answer that uses the active voice.

52. **(J) English/Rhetorical Skills/Style/Conciseness.** There is nothing grammatically wrong with the original; it is just needlessly wordy. Compare the original with (J). As we noted in the discussion of item #51, don’t confuse

needless formality or stilted language with effective writing. (G) is also wordy; plus, “one” is used without a clear antecedent. In this case, the noun should be used. (H) is wordy as well as awkward.

TIP Often, the most effective version of a sentence is the shortest—and that’s a pretty good test-taking strategy. “Choose the shortest” is not without exception, but it is a good rule of thumb.

53. **(B) English/Usage and Mechanics/Sentence Structure/Fragments.** The problem with the original is that the sentence following the period in the underlined portion is a fragment: it lacks a main verb. As noted in the discussion of item #17, there are different ways to correct this sort of error. In this case, (B), the correct answer, turns everything following the period (“...each one leading to a higher level of command”) into an appositive where “each one” refers to the “doors” that were opened. (C) is wrong because “which,” a relative pronoun, signals the beginning of a dependent clause; every dependent clause must have a main verb, though, and there is no main verb provided by answer choice (C). (D) is wrong because it creates a run-on sentence that would require at least two corrections. First, a comma would be needed after “department” to correctly divide the two clauses of the sentence. Second, the participle “leading” in the second clause would need to be changed to “lead” so the second clause would have a main verb.
54. **(J) English/Rhetorical Skills/Strategy/Appropriate Supporting Material.** The third paragraph is about the early phase of Harvard’s career; the fourth paragraph is about her appointment as police chief. In order to understand the writer’s points, do you need to know the name of the previous police chief? The answer is “no,” so the correct answer cannot be (F) or (G). (H) reaches the right conclusion but for the wrong reason. Knowing the name of the previous chief does not necessarily undermine Harvard’s achievement. After all, the mere mention of the name does not constitute a comparison. For all we know, the writer thinks that Bell was a terrible chief, so the mention would actually make Harvard all the more impressive. This is not to say that the writer does this, only that we have no basis for the adopting the explanation provided by (H). Thus, the correct answer must be (J).
55. **(D) English/Rhetorical Skills/Style/Conciseness.** Compare this item with item #52, as they both exhibit the same pattern. In this item, the phrase “helped assist in the coordination of” is needlessly wordy because “assist” means “help.” (D) corrects the original redundancy without introducing additional errors. (B) uses a non-idiomatic pronoun. (C) has the same weakness of the original.
56. **(F) English/Usage and Mechanics/No Change.** The original version is correct. (B) is wrong because the singular verb “has” does not agree with the plural subject (“efforts”). (H) changes the meaning of the sentence. The writer uses the imperfect “have been praised” to make it clear that the praise began sometime in the past and continues into the present. The past tense “was praised” says that the praise began and ended in the past and did not continue into the present. As for (J), “would have been” implies a contingency or “iffy” state of affairs: it would have happened, but it didn’t. This is not the meaning intended by the writer.
57. **(C) English/Rhetorical Skills/Style/Clarity of Meaning.** The problem with the original—and this is a fairly subtle point—is that “admiring” seems to be an adjective modifying “leaders.” This implies that the praise came from the subgroup of leaders who admired Harvard’s style as opposed to the subgroup of leaders who did not admire it. But that is not what the writer intends. The author means to say that those who praised her efforts were those people who admired her style and that there was a connection between the two. (C) correctly conveys this idea. (B) is wrong because “by” implies that the leaders praised her efforts by means of admiring her style, and that is not what the writer means to say. (D) is low-level usage.
58. **(G) English/Usage and Mechanics/Grammar and Usage/Adjectives versus Adverbs and Faulty or Illogical Comparisons.** The problem with the original is that the phrase (“any easier”) intended to modify the verb (“does not come”) is an adjective rather than an adverb. (G) corrects this problem by using the adverb “easily.” Additionally, the original implies a comparison that is not intended by the writer, and (G) also takes care of this problem. (H) also implies comparison but does not use the correct comparative form. (J), like the original, is an adjective rather than an adverb.

59. **(D) English/Usage and Mechanics/Grammar and Usage/Pronoun Usage.** The pronoun “them” is plural, but it refers to “praise,” a singular noun. (D) corrects the original by replacing it with the singular pronoun, “it.” (B), like the original, is plural (“these”) and therefore wrong. (C) uses the possessive form of the singular pronoun (“its”) where an objective case pronoun is needed.

60. **(H) English/Rhetorical Skills/Strategy/Main Idea.** In this item, the stem asks us to assume that the assignment was to write an essay about how police departments are trying to offer better career opportunities for women. But this essay is not about such practices; it is mostly biographical and about one police officer’s experience. (H) correctly notes this very important point in explaining why this essay would not be a good response to the hypothetical assignment. (J) reaches the right conclusion but by incorrect reasoning. The essay doesn’t really highlight the opportunities created by physical and mental demands in the police academy. To be sure, the second paragraph makes a passing reference to something like this, but that mention is hardly the main idea of the essay. (F) is a correct observation (the essay is about Harvard), but it doesn’t answer the question asked. (G) is not an accurate description of the essay.

TIP This item reminds us of the importance of carefully reading the item stem and answering the question asked.

61. **(B) English/Rhetorical Skills/Strategy/Appropriate Supporting Material.** This item asks you to find an appropriate word to replace “chunk” in order to convey the idea of a “length of land extending along the river for a considerable distance.” The answer simply depends on the meanings of the answer choices. A “chunk” is a part of a larger whole that lacks any definite shape. (B), “ribbon,” which implies a long and narrow strip of land, is a good replacement choice. (C) is wrong for the same reason as the original; in short, a nugget does not have a definite shape. (D) is wrong because, while a bundle has a definite shape (i.e. several items gathered together in a bunch), its shape is not similar to a long stretch of land that runs alongside a river.

62. **(J) English/Usage and Mechanics/Sentence Structure/Misplaced Modifiers.** The problem with the original is that the placement of the phrase “for a six-week rest” makes the sentence difficult to understand. The phrase is intended to modify the verb “gather,” but the placement of the phrase after “during their long journey” makes it seem as though the birds gather on the strip of land on their journey rather than that they interrupt their journey there. (J) clears this up by moving the underlined portion to after “here.” (G) is wrong because repositioning the phrase at the start of the sentence leaves the phrase too far from the verb for the reader to make the connection easily. And the same is true of (H): the sentence is easier to understand if the phrase appears after the verb it’s supposed to modify.

63. **(A) English/Usage and Mechanics/No Change.** The writer makes a statement about the trip from “Texas and New Mexico to the Arctic Circle.” The phrasing is clear and doesn’t need any punctuation. The commas suggested by (B), (C), and (D) fragment the phrasing, making it more difficult to understand.

TIP A favorite test-writers’ trick is to put commas where they don’t belong. This is true of all three wrong answers here.

64. **(J) English/Usage and Mechanics/Grammar and Usage/Sequence and Verb Tense.** The problem with the original is that the verb “brought” is in the past tense, describing action that has already been completed, while the rest of the passage is written in the present tense (the annual migration continues to occur). So, the present tense “brings,” (J), is needed. (G) is wrong because “had brought” is the past perfect tense and is used to describe action that belongs entirely in the past and usually is completed before some other action that occurred from the past. For example: “Elaine had finished the painting two days before the violent storm took place.” In this example, the violent storm took place in the past, and even before that event, Elaine finished the painting. Finally, (H) is also a verb form referring to the past, specifically to an action that occurred repeatedly in the past.

65. **(B) English/Rhetorical Skills/Strategy/Appropriate Supporting Material.** Compare this item with item #61. “Heap” usually refers to a pile of things, but the cranes are not arranged in a pile. So, a more precise word is needed. (B) is a good choice because “concentration” refers to a dense and compact gathering, and the word seems particularly descriptive of a group of birds that are densely gathered. (C), “bunch,” is perhaps the second best

choice, but it doesn't suggest a particularly large or dense grouping, as does (B). Finally, (D) is incorrect because "supply" has the unwanted implication of something that has utility, such as a supply of nails.

66. **(J) English/Rhetorical Skills/Strategy/Effective Opening Sentence.** In order to find an effective opening sentence for this paragraph, you need to be clear on what the main idea is. The paragraph follows the discussion of the annual migration of the cranes. Then, the second paragraph continues the discussion by talking about the birds' preparation for the continuing migration towards the end of the harsh Nebraska winter. This continuity is an important feature that is reinforced by (J): every year, the birds return, bulk up, and fly on. The original is not as good as (J) because the original does not provide a useful transition from the first to the second paragraph. (G) is a pretty weak response, as nothing in the second paragraph refers to the size of the cranes. (H) is perhaps the second best response because there is the mention of the changing river habitat. But this is a minor point and not the focus of the paragraph. This particular item may be vexing because none of the answer choices is very compelling. You simply have to pick the best choice, (J), even if it is not particularly exciting.
67. **(D) English/Rhetorical Skills/Style/Conciseness.** The problem with the original is that the phrase doesn't have a role to play in the sentence. "Thus" implies a logical transition, but there is no such transition. "In reality" is used to provide a contrast, but no contrast is introduced. So, the entire underlined part doesn't belong in the sentence, as (D) states. (B) doesn't correct anything: "thus" is still there, and "in fact" functions very much like "in reality." (C) adds redundancy to the original since "shrunk" and "lessen" mean the same thing.
68. **(F) English/Usage and Mechanics/No Change.** The original is correctly punctuated. The first part of the sentence is a dependent clause introduced by "though," and the dependent clause is then correctly separated from the independent clause that follows it by a comma. (G) is wrong because a semicolon is not used for this purpose. (H) is wrong because starting a new sentence would result in a complete sentence created from the independent clause begun by "each," but the dependent clause introduced by "though" would be reduced to a fragment. Finally, (J) destroys the logical relationship between the dependent and the independent clauses. The relationship is one of subordination—the dependent clause, as the name implies, "depends" on the independent clause. But using a comma and a coordinate conjunction makes the two equal when that is not the meaning intended by the writer.
69. **(D) English/Rhetorical Skills/Organization/Sentence-Level Structure.** The original sentence is wrong because the underlined word ("therefore") suggests that the second sentence in the paragraph is a logical and necessary consequence of the first sentence. However, no logically necessary relationship exists between the two sentences. The appearance of the birds (the first sentence) does not necessarily mean they have been on earth for millions of years (the second sentence). (D) provides the meaning intended by the writer: "indeed" is used to provide emphasis, sort of like saying, "Here's the proof." (B) and (C) are wrong because both are phrases used to introduce a contrast, but the writer does not intend a contrast. Rather, the writer intends for the second idea to underscore and help prove the first idea.
70. **(H) English/Usage and Mechanics/Sentence Structure/Problems of Coordination and Subordination.** In this item, "EXCEPT" signals a thought-reverser, so the correct answer is the one that is unacceptable. (H) is unacceptable because a comma without a coordinate conjunction would result in the fusion of the two independent clauses. You could use a semicolon in this way, as (J) does, but not a comma. (F) correctly joins the second sentence to the first, making one complete sentence. (G) correctly uses a comma and a coordinate conjunction. Finally, (J) correctly uses a semicolon to join the two independent clauses.

TIP You must remember to pay careful attention to the wording of the question asked.

71. **(A) English/Rhetorical Skills/Strategy/Appropriate Supporting Material.** This item stem asks you to comment on the writer's use of language. The three words, "haunting," "eerie," and "primeval," add richness to this part of the passage. They are a lot more effective than, say, "weird," "creepy," and "old." And they do a nice job of helping the reader understand that cranes are an ancient species. (A) is the correct answer choice here because it summarizes these two main points. (B) has some merit, in that it is related to the topic at hand, but it is wrong because the words don't provide any proof that the cranes are the oldest surviving bird species. (C) is wrong

because the words do suggest that the cranes are noisy. Finally, (D) is wrong because the words do not convey anything humorous.

72. **(H) English/Usage and Mechanics/Grammar and Usage/Pronoun Usage.** Compare this item with item #49: the explanations for the correct answers are essentially the same. (H) is correct because a subjective personal pronoun (“who”) must be used to refer to subjective personal nouns (“growing number of visitors”). (G) is wrong because “who” and “whom” are used to refer to people; “which” is used for everything else. (J) is wrong for the same reason as the original.
73. **(D) English/Rhetorical Skills/Style/Conciseness.** The original is needlessly wordy, as is seen by comparing it with (D); furthermore, the phrase “take in an observation” is not idiomatic. (B) is wrong because “view” and “witness” mean the same thing, making the revised sentence needlessly repetitious. And (C) is wrong for the same reason because “annual” and “every year” mean exactly the same thing.
74. **(F) English/Usage and Mechanics/No Change.** This item primarily tests the proper use of verb tense and your understanding that tense needs to remain consistent throughout the passage. This passage uses primarily present tense verbs to describe activity that takes place currently: it is repeated every year. And “says” in the underlined part is a present tense verb. (G) is also a present tense verb, more precisely the present progressive tense, but “is saying” is usually used to convey the idea that something is happening at that very moment, rather than repeatedly. (H) is incorrect because “will say” points to the future, but the writer intends that the commentator says this in the present timeframe. (J) is wrong because “would say” is the subjunctive and implies a contingency upon which this statement depends, but no such contingency is mentioned by the writer.
75. **(C) English/Rhetorical Skills/Strategy/Appropriate Supporting Material.** The quotation should be left in the essay: it has a meaning that is appropriate because it contrasts the period during which the cranes are present on the river with the period after they have left. And the quotation is a nice touch: the “silence” is a bit dramatic and provides a nice close to the essay, underscoring the importance of the annual migration to the area. (A) is wrong both because it reaches the wrong conclusion and because its reasoning is faulty: the quotation is not more formal in tone than the rest of the passage. (D) reaches the right conclusion but gives a wrong reason: the quotation simply does not emphasize that the sounds made by the cranes are annoying. Finally, (B) also reaches the wrong conclusion, and incorrectly suggests that the writer intends for the commentator to represent all Nebraskans.

TEST 2—MATHEMATICS

1. (A) **Mathematics/Algebra/Manipulating Algebraic Expressions/Evaluating Expressions.** This item asks you to evaluate an expression using given values. Make the appropriate substitutions and do the calculations: $(r + b - g)(b + g) = [7 + 4 - (-8)][4 + (-8)] = (11 + 8)(4 - 8) = (19)(-4) = -76$, (A).

TIP Notice for this item you can use a calculator (especially in the last step), though you may find it faster to work it out by hand.

2. (H) **Mathematics/Arithmetic/Solving Complicated Arithmetic Application Items.** Story problems require you to apply arithmetic skills to real life situations. There are different approaches to the sequence of calculations; we'll follow the most intuitive. First, find how much Tasha earns for the regular 40-hour week:

40 hours $\square \frac{\$12.00}{\text{hour}} = \480.00 . Second, find Tasha's hourly rate for the hours she worked in excess of 40:

$1\frac{1}{2}$ $\square \frac{\$12.00}{\text{hour}} = \frac{\$18.00}{\text{hour}}$. Third, calculate the amount of overtime pay Tasha receives for the extra 9 hours:

9 hours $\square \frac{\$18.00}{\text{hour}} = \162.00 . Finally, add together the two totals: $\$480.00 + \$162.00 = \$642.00$, (H).

TIP In this item, a calculator may be useful, though not necessarily faster.

3. (B) **Mathematics/Algebra/Manipulating Algebraic Expressions/Creating Algebraic Expressions.** This item asks for an algebraic expression that states the information given in the stem. The best strategy for an item like this is to take it one step at a time. First, 100 member tickets at \$40 per ticket produces $40(100)$ in revenue. Second, n tickets at \$50 per ticket produces $50n$ in revenue. Thus, the total revenue is $50n + 40(100)$, (B).

Notice that depending on your particular approach to the item, your final result might be in a slightly different form than the correct choice. For example, you might have added differently: $40(100) + 50n$. But this is equivalent to the expression in (B). Or, you might have multiplied \$40 by 100 to get \$4,000, in which case your answer might have been $50n + 4,000$. But again, this is the same as (B). You simply have to be flexible and able to recognize equivalent expressions.

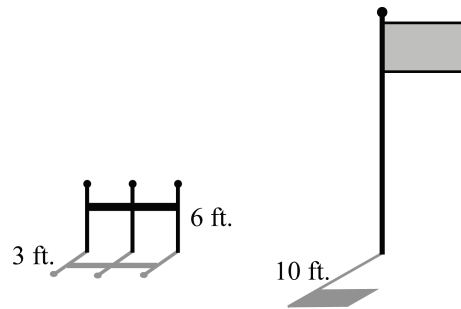
4. (G) **Mathematics/Arithmetic/Common Arithmetic Items/Properties of Numbers.** Just count the numbers between 9 and 59 that are evenly divisible by 5: 10, 15, 20, 25, 30, 35, 40, 45, 50, and 55. That's a total of 10 integers, (G).

TIP The test-writers love to ask questions about the properties of integers, prime numbers, and so on. The simplest and fastest approach is to avoid formal proofs.

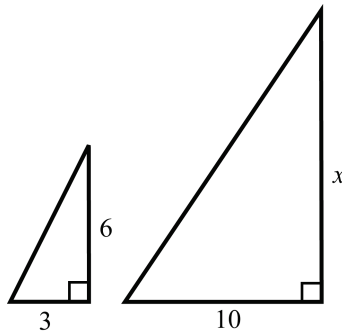
5. (D) **Mathematics/Arithmetic/Solving Complicated Arithmetic Application Items and Common Arithmetic Items/Percents.** As with all story problems, be careful to answer the question asked. In this case, "How many nonhandicapped spaces are suitable for noncompacts?" Begin by finding the number of nonhandicapped spaces: $\#_{\text{nonhandicapped}} = (100\% - 4\%) \text{ of } 200 = 0.96(200) = 192$ (this last step is a good one for calculators). Since 12 of these spaces are suitable for compact cars only, this leaves $192 - 12 = 180$ suitable for noncompact cars, (D).

Again, you might have taken a slightly different approach. For example, 4% of 200 is 8 handicapped spaces, so 192 are nonhandicapped spaces, of which 12 are for compacts, leaving 180 for noncompacts. But the result is still the same.

6. (H) **Mathematics/Arithmetic/Common Arithmetic Items/Proportions and Direct-Inverse Variation and Geometry/Triangles/Working with Triangles.** First, translate the given situation into a picture:

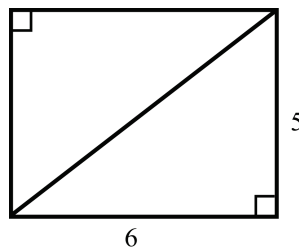


Since the sun's rays are, for all practical purposes, parallel, and the stem stipulates that the post and pole are both perpendicular to the ground, we have two similar right triangles:



Therefore, set up a proportion and solve for x : $\frac{6}{3} = \frac{x}{10} \Rightarrow 3x = 60 \Rightarrow x = 20$, (H).

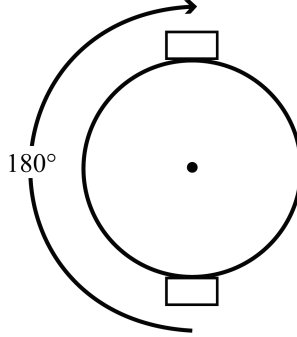
7. **(B) Mathematics/Arithmetic/Common Arithmetic Items/Absolute Value.** Perform the indicated operations, in which the “|” brackets indicate absolute value: $-5(|-3+8|) = -5(|5|) = -5(5) = -25$, (B).
8. **(J) Mathematics/Geometry/Triangles/Working with Triangles and Rectangles and Squares.** Again, since no picture is provided, sketch one based on the given information:



Each of the triangles formed from cutting the rectangle in half has an altitude of 5 and a base of 6. Therefore, the area of each triangle is: $\frac{1}{2}bh = \frac{1}{2}(5)(6) = 15$, (J).

Another approach is to reason that the diagonal cuts the rectangle in half. The area of the rectangle is $wl = (5)(6) = 30$, so half is equal to the area of one triangle: $\frac{30}{2} = 15$.

9. (D) *Mathematics/Geometry/Circles.* The Ferris wheel makes 1 revolution every minute, so in $\frac{1}{2}$ minute, it makes $\frac{1}{2}$ revolution:



Since the degree measure of a circle, or 1 revolution, is 360° , the degree measure of half of a circle, or $\frac{1}{2}$ revolution, is 180° , (D).

10. (H) *Mathematics/Geometry/Rectangles and Squares.* For this item, don't make the common mistake of solving for the perimeter when the question asks for the area, or vice versa. Remember for items like this, wrong answers correspond to incorrect methods or calculations. In this case, we want the area of the square: $s^2 = 8 \times 8$, (H).

TIP This is a simple item, as long as you are careful to answer the question asked.

11. (A) *Mathematics/Arithmetic/Common Arithmetic Items/Proportions and Direct-Inverse Variation.* Set up a

direct proportion: $\frac{1 \text{ loaf of bread}}{3\frac{3}{4} \text{ cups of flour}} = \frac{x \text{ loaves of bread}}{12\frac{3}{8} \text{ cups of flour}}$. Now, solve for x : $x = \frac{12\frac{3}{8} \cdot \frac{99}{99}}{3\frac{3}{4} \cdot \frac{15}{4} \cdot \frac{15}{1}} = \frac{8}{15} = \frac{2}{3} = \frac{99}{30} = 3$ plus a

remainder of 9. Therefore, 3 whole loaves of bread can be made from one bag of flour, (A).

12. (H) *Mathematics/Algebra/Manipulating Algebraic Expressions/Basic Algebraic Manipulations.* Simply perform the indicated operations, using the FOIL (First, Outer, Inner, Last) method: $(3c - 2d)(2c + d) = 6c^2 + 3cd - 4cd - 2d^2 = 6c^2 - cd - 2d^2$, (H).

TIP You can use the "plug-and-chug" strategy. Pick numbers for c and d , say $c = 1$ and $d = 2$. Evaluate the given expression: $(3c - 2d)(2c + d) = [3(1) - 2(2)][2(1) + 2] = -4$. Now, evaluate the answer choices to find the match:

F. $6c^2 - 7cd - 2d^2 = 6(1)^2 - 7(1)(2) - 2(2)^2 = -16$ ✗

G. $6c^2 - 7cd + 2d^2 = 6(1)^2 - 7(1)(2) + 2(2)^2 = 0$ ✗

H. $6c^2 - cd - 2d^2 = 6(1)^2 - (1)(2) - 2(2)^2 = -4$ ✓

J. $6c^2 - cd + 2d^2 = 6(1)^2 - 1(2) + 2(2)^2 = 12$ ✗

K. $6c^2 - 2d^2 = 6(1)^2 - 2(2)^2 = -2$ ✗

Of course, this second method is more time-consuming than the first, but it's effective as a last resort approach.

13. **(E) Mathematics/Coordinate Geometry/The Coordinate System.** This item tests basic knowledge of the coordinate system. The question asks for which point $x < 1$ and $y \geq 2$. Check the coordinates of the points given in the answer choices:

A: $x = 1$ ✗
 B: $x = 2$ ✗
 C: $x = -1$ ✓
 $y = -2$ ✗
 D: $x = -1$ ✓
 $y = 1$ ✗
 E: $x = -1$ ✓
 $y = 2$ ✓

Only E, (E), has an x -coordinate less than 1 and a y -coordinate of at least 2.

14. **(F) Mathematics/Arithmetic/Solving Complicated Arithmetic Application Items and Simple Manipulations.** This apparently complicated story problem is really just asking a simple question: “What is the change in temperature between t_1 (28°F) and t_2 (–15°F)?” Do the calculation: $t_2 - t_1 = -15 - 28 = -43^\circ\text{F}$, (F). The negative sign makes sense since the temperature dropped, that is, it got colder during the night.

TIP This is an easy enough item. However, the answer choices are designed to coincide with simple, common mistakes, such as adding rather than subtracting, switching t_1 and t_2 , or leaving off the negative sign. For items like this, remember to double-check your methods and calculations, since simple mistakes are incorporated in the wrong answer choices, making an incorrectly derived answer seem correct.

15. **(E) Mathematics/Algebra/Manipulating Algebraic Expressions/Manipulating Expressions Involving Exponents.** This item tests knowledge of the rules for working with exponents. To raise a power to a power, multiply the exponents: $(a^6)^{24} = a^{(6)(24)} = a^{144}$, (E).

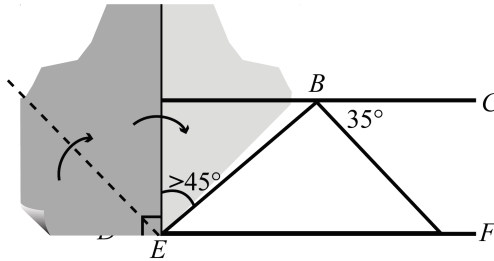
TIP Notice that the “plug-and-chug” strategy using substitution isn’t a viable approach: you don’t want to get involved in substituting a number with exponents this large. However, not all is lost. You can help yourself remember the rule by checking on a situation with smaller exponents, say 2 and 3: $(x^2)^3 = (x \square x)(x \square x)(x \square x) = x^6 = x^2 \square 3$. This is enough to remind you that when raising a power to a power, multiple the exponents (as opposed to adding, subtracting, dividing, etc.)

16. **(H) Mathematics/Algebra/Solving Algebraic Equations or Inequalities with One Variable/Simple Equations.** At first glance, this appears to be a complicated story problem involving an equation with three variables. In fact, the stem gives values for two of the variables and asks for the third: “Given $I = \frac{E}{R}$, if $R = 34$ and $I = 7$, what is E ?” Therefore, solve for E : $E = I \square R = 34 \square 7$, (H).

17. **(E) Mathematics/Geometry/Lines and Angles and Triangles/Working with Triangles.** There are several approaches to solving this item. Perhaps the simplest is to recognize that $\triangle EBF$ is isosceles with $\overline{EB} \cong \overline{FB}$, so $\angle ABE = \angle CBF = 35^\circ$. Furthermore, since $\overline{AC} \parallel \overline{DF}$, we can apply the “big angle/little angle” theorem: $\angle ABE = \angle BEF = 35^\circ$. Finally, $\angle DEB + \angle BEF = 180^\circ$, so $\angle DEB = 180^\circ - \angle BEF = 180^\circ - 35^\circ = 145^\circ$, (E).

TIP You can also apply the strategy of “guesstimation.” Remember, even if the figures are not drawn to scale, angles and lengths will be approximately equal to the intended values. Therefore, since $\angle DEB$ looks larger than 120° , you can safely eliminate (A) and (B). Furthermore, if you position the corner of a scratch piece of

paper at E , with the bottom edge parallel to \overline{DF} , and then fold the corner in half and flip it over vertically, you can see that $\angle DEB$ is greater than $90^\circ + 45^\circ = 135^\circ$:



This also eliminates (C) and (D). Therefore, the answer must be (E), 145° . Granted, this approach isn't mathematically elegant, but it gets the job done.

18. (G) *Mathematics/Algebra/Manipulating Algebraic Expressions/Basic Algebraic Manipulations*. The terms of an arithmetic sequence are related by a common difference; the terms of a geometric sequence are related by a common ratio. Letting n_5 be the last number of the sequence and n_1 the first number, we have:

$$n_5 = 32$$

$$n_4 = ?$$

$$n_3 = ?$$

$$n_2 = ?$$

$$n_1 = 6$$

Since the numbers get smaller from the last number to the first, the common ratio of 2 in the geometric sequence of the last three terms refers to a division by 2 when working backwards:

$$n_5 = 32$$

$$n_4 = \frac{32}{2} = 16$$

$$n_3 = \frac{16}{2} = 8$$

$$n_2 = ?$$

$$n_1 = 6$$

The only possible value for n_2 is 7. Therefore, the common difference among the first three terms is 1, (G).

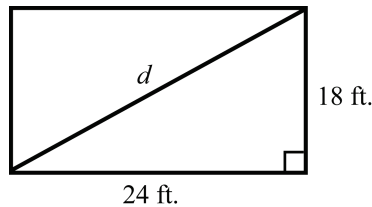
TIP You can also use the “test-the-test” strategy. Start with (F): 0 cannot be the common difference between the first three terms, because they would all be 6 and the last two terms would be 12 and 24, which contradicts the given information. Next, try (G): with a common difference of 1, the first three terms would be 6, 7, and 8 and the last two terms would be 16 and 32, which matches the given information. Thus, (G) is correct.

19. (E) *Mathematics/Algebra/Manipulating Algebraic Expressions/Creating Algebraic Expressions* and *Solving Algebraic Equations or Inequalities with One Variable/Simple Inequalities*. This item asks for an algebraic expression that represents the given information: water is frozen at temperatures, T , at or below 0°C , that is, $T \leq 0$, (E).

TIP You can also use the “plug-and-chug” strategy of testing the answer choices with a chosen value. Based on the given information, we know that at $T = -10^\circ\text{C}$, the water is frozen, so -10 must satisfy the correct

expression. Since both (D) ($T < 0$) and (E) ($T \leq 0$) hold true, try another value: $T = 0$. This eliminates (D), so the correct choice must be (E). Obviously, this approach is time-consuming, especially as it required two test values, but again, it is effective in a pinch.

20. **(G) Mathematics/Geometry/Triangles/Pythagorean Theorem and Working with Triangles.** Since a figure isn't provided, draw one based on the given information:



Now, apply the Pythagorean theorem to find d : $d^2 = (18)^2 + (24)^2 = 324 + 576 = 900$, so $d = \sqrt{900} = 30$, (G).

Alternatively, notice that this is a 3-4-5 triangle in which the sides are multiples of 6 ($3 \square 6 = 18$ and $4 \square 6 = 24$). Thus, the hypotenuse is: $5 \square 6 = 30$.

21. **(D) Mathematics/Algebra/Solving Algebraic Equations or Inequalities with One Variable/Simple Inequalities.** Since a , b , c , and d are all positive, taking the 10th root of the variables does not effect the direction of the inequalities: $(a^{10})^{\frac{1}{10}} < (b^{10})^{\frac{1}{10}} < (c^{10})^{\frac{1}{10}} < (d^{10})^{\frac{1}{10}} \Rightarrow a < b < c < d$. Therefore, d is the greatest, (D).
22. **(G) Mathematics/Algebra/Solving Algebraic Equations or Inequalities with One Variable/Simple Equations.** Solve the given equation for x : $7x - 3(2x - 4) = 10 \Rightarrow 7x - 6x + 12 = 10 \Rightarrow x = 10 - 12 = -2$. Therefore, the correct choice is (G).

TIP You can also apply the “test-the-test” strategy: substitute the answer choices into the given equation to find the value that holds true:

$$\text{F. } 7(-12) - 3[2(-12) - 4] = 10 \Rightarrow -84 + 72 - 4 = 10 \Rightarrow -16 \neq 10 \quad \times$$

$$\text{G. } 7(-2) - 3[2(-2) - 4] = 10 \Rightarrow -14 + 12 + 12 = 10 \Rightarrow 10 = 10 \quad \checkmark$$

23. **(A) Mathematics/Algebra/Solving Simultaneous Equations.** This item asks for the solution to a system of simultaneous equations. There two ways to solve simultaneous equations: substitution or combination. We'll take the first approach: (1) solve the first equation for x in terms of y ; (2) substitute that expression into the second equation and solve for the value of y ; (3) use that value in either equation to solve for the value of x .

$$(1) \quad x + 2y = 5 \Rightarrow x = 5 - 2y$$

$$(2) \quad -2x + y = 10 \Rightarrow y = 10 + 2x = 10 + 2(5 - 2y) = 10 + 10 - 4y = 20 - 4y \Rightarrow 5y = 20 \Rightarrow y = 4$$

$$(3) \quad x = 5 - 2y = 5 - 2(4) = 5 - 8 = -3$$

Therefore, the solution is $(-3, 4)$, (A).

24. **(F) Mathematics/Algebra/Manipulating Algebraic Expressions/Basic Algebraic Manipulations.** The question stem contains the thought-reverser “NOT,” so the correct answer will be the one expression that is not equivalent to $\frac{-x}{y}$. Test each choice:



$$\text{F. } \frac{-x}{-y} = \frac{x}{y} \neq \frac{-x}{y} \quad \checkmark$$

$$\text{G. } \frac{x}{-y} = \frac{-x}{y} \quad \times$$

$$\text{H. } -\frac{x}{y} = \frac{-x}{y} \quad \times$$

$$\text{J. } \frac{-\pi x}{\pi y} = \frac{-x}{y} \quad \times$$

$$\text{K. } -\frac{1}{\frac{y}{x}} = -\frac{x}{y} = \frac{-x}{y} \quad \times$$

Therefore, the correct answer is (F).

TIP You can reach the same conclusion by using the strategy of “plug-and-chug”: pick values for x and y to evaluate the given expression; then, test each answer choice until you find the one that does NOT match. In

this case, don't use $x=1$ or $y=1$, since $1 \square 1 = 1$ and $\frac{1}{1} = 1$. Instead, try $x=2$ and $y=3$: $\frac{-x}{y} = \frac{-2}{3}$. Now,

test (F): $\frac{-x}{-y} = \frac{-2}{-3} = \frac{2}{3}$, which is NOT equal to $\frac{-2}{3}$, so (F) is the correct answer.

25. **(D) Mathematics/Arithmetic/Common Arithmetic Items/Percents.** The area of each small square is $1^2 = 1$; the area of the large square is $5^2 = 25$. There are 17 shaded small squares, so the percent of the interior of the large square that is shaded is: $\frac{\text{Total Shaded Area}}{\text{Total Area}} = \frac{17(1)}{25} = \frac{17}{25} = \frac{17 \square 4}{25 \square 4} = \frac{68}{100} = 68\%$, (D).

26. **(J) Mathematics/Algebra/Evaluating Sequences Involving Exponential Growth.** The equation for exponential growth is: $a_n = a_0 r^{t/T}$, where a_n is the amount after time t , a_0 is the amount at t_0 , r is the proportionality constant, t is the total period of growth ($t_n - t_0$), and T is the time per cycle of growth. Based on the information given in the table, $a_0 = 100$, $T = 1$ day, and $t = t_n - t_0 = n - 1$ days. Furthermore, since the number of cells in the colony increase by a factor of approximately 3 every day, $r \approx 3$. Therefore: $a_n \approx (100)(3)^{\frac{n-1}{1}} = 100 \square 3^{n-1}$, (J).

TIP You can also solve this item using the “test-the-test” strategy and the values given in the table. Pick a day, say $n=2$: the number of cells on Day 2 was 295. Thus, the correct answer choice will return a value of approximately 295 for $n=2$:

$$\text{F. } 100(2) = 200 \quad \times$$

$$\text{G. } 300(2) = 600 \quad \times$$

$$\text{H. } 300 \square 3^2 = 2,700 \quad \times$$

$$\text{J. } 100 \square 3^{2-1} = 300 \quad \checkmark$$

$$\text{K. } 300 \square 3^{2-1} = 900 \quad \times$$

27. **(D) Mathematics/Coordinate Geometry/Graphs of Linear Equations and Algebra/Expressing and Evaluating Algebraic Functions/Functions as Models.** One approach to this item is to read the information directly from the graph. Smiley gets \$10 just for showing up, so his line begins at \$10; Happy gets \$0 initially, so his line begins at

\$0. The two lines intersect at two hours ($h = 2$), when the two clowns have earned the same amount. After $h = 2$, Happy’s wages increase faster because he earns a higher hourly rate. Therefore, Happy makes as much or more than Smiley for $h \geq 2$.

Alternatively, you can create equations to model the situation:

$$\text{wages}_{\text{Smiley}} = \$10 + \frac{\$5}{\text{hour}}(h \text{ hours}) = 10 + 5h$$

$$\text{wages}_{\text{Happy}} = \$0 + \frac{\$10}{\text{hour}}(h \text{ hours}) = 10h$$

To find the point at which the two clowns make the same amount, set the two equations equal to one another and solve for h : $10 + 5h = 10h \Rightarrow 10 = 5h \Rightarrow h = 2$. Since Happy gets a higher hourly rate than Smiley, Happy makes as much or more than Smiley for $h \geq 2$.

28. **(G) Mathematics/Coordinate Geometry/Slope-Intercept Form of a Linear Equation.** This item asks for the equation of a line passing through two points, $(1, -2)$ and $(4, 7)$. The answer choices indicate that we should solve for the slope-intercept form of the linear equation, $y = mx + b$, where m is the slope and b is the y -intercept. First, find m from the “rise-over-run” formula: $m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - (-2)}{4 - 1} = \frac{9}{3} = 3$. Next, find b by substituting one set of coordinates, say $(1, -2)$, into the slope-intercept form of the equation: $y = mx + b = 3x + b \Rightarrow -2 = 3(1) + b \Rightarrow b = -5$. Therefore, the linear equation is: $y = 3x - 5$, (G).

TIP You can also use the “test-the-test” strategy: substitute one of the given sets of coordinates into the answer choices until you find the one that holds true. Only two choices need testing before we find the correct one:

$$\text{F. } y = x - 2 \Rightarrow -2 = 1 - 2 \Rightarrow -2 \neq -1 \quad \times$$

$$\text{G. } y = 3x - 5 \Rightarrow -2 = 3(1) - 5 \Rightarrow -2 = -2 \quad \checkmark$$

$$y = 3x - 5 \Rightarrow 7 = 3(4) - 5 \Rightarrow 7 = 7 \quad \checkmark$$

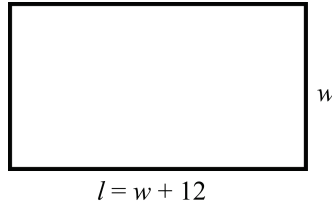
29. **(E) Mathematics/Geometry/Lines and Angles.** There are several equally correct approaches to solving this item, but we’ll develop just one. We can find p from $180^\circ = 2p^\circ + 64^\circ + \angle ACB$ if we first determine $\angle ACB$. In fact, since $180^\circ = \angle ACB + 2(55^\circ)$, $\angle ACB = 180^\circ - 110^\circ = 70^\circ$. Therefore, $p = \frac{180 - 64 - \angle ACB}{2} = \frac{180 - 64 - 70}{2} = \frac{46}{2} = 23$, (E).

TIP Notice for this item that the “guesstimation” strategy is just as effective and much faster. Remember, even if the figures are not drawn to scale, angles will be approximately equal to the intended values. A quick glance at the figure is enough to eliminate (A), (B), (C), and (D), since $\angle p$ is obviously much less than 45° .

30. **(G) Mathematics/Geometry/Circles.** This question is straightforward enough: “What is the circumference?” Since the diameter is equal to twice the radius, the circumference of the circle is: $2\pi r = \pi d = 10\pi$, (G).

TIP Make sure to answer the question asked and don’t confuse radius with diameter.

31. **(B) Mathematics/Geometry/Rectangles and Squares.** It might help to draw a figure based on the given information:



The perimeter of the fence is to be 160 feet: $160 = 2w + 2l = 2w + 2(w + 12) = 4w + 24$, and so $w = \frac{160 - 24}{4} = \frac{136}{4} = 34$. Therefore, the play area dimensions will be width by length: 34 by 34 plus 12, or 34 by 46, (B).

TIP You can also solve this item by testing the answer choices. First, eliminate those choices for which the difference between the dimensions is not 12: (C) and (D). Next, eliminate those choices for which the perimeter will not equal 160: (A) and (E). Therefore, the correct answer must be (B).

32. **(F) Mathematics/Trigonometry/Trigonometric Relationships and Definitions of the Six Trigonometric Functions.** The question asks, “If $\sin \alpha = \frac{24}{25}$ and $\tan \alpha = \frac{24}{7}$, what is $\cos \alpha$?” The simplest solution is to

remember the trigonometric relationship, $\tan \alpha = \frac{\sin \alpha}{\cos \alpha}$. Therefore, $\cos \alpha = \frac{\sin \alpha}{\tan \alpha} = \frac{\frac{24}{25}}{\frac{24}{7}} = \frac{7}{25}$, (F).

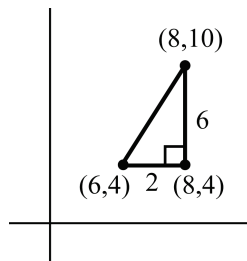
Now, even if you couldn’t remember this particular relationship, you can derive it from the three basic trigonometric functions using the mnemonic device: “SOH-CAH-TOA”; that is, Sine = $\frac{\text{Opposite}}{\text{Hypotenuse}}$, Cosine =

$\frac{\text{Adjacent}}{\text{Hypotenuse}}$, and Tangent = $\frac{\text{Opposite}}{\text{Adjacent}}$. Therefore, cosine = $\frac{\text{adjacent}}{\text{hypotenuse}} = \frac{\frac{\text{opposite}}{\text{tangent}}}{\frac{\text{opposite}}{\text{sine}}} = \frac{\text{sine}}{\text{tangent}} = \frac{\frac{24}{25}}{\frac{24}{7}} = \frac{7}{25}$.

33. **(C) Mathematics/Coordinate Geometry/Distance Formula and Geometry/Triangles/Pythagorean Theorem.**

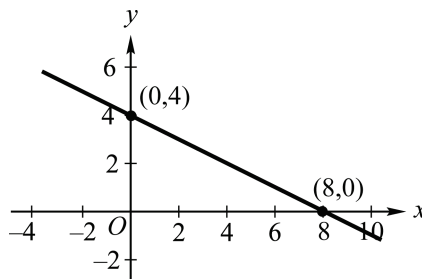
Solve for the distance between two points using the distance formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(8 - 6)^2 + (10 - 4)^2} = \sqrt{2^2 + 6^2} = \sqrt{4 + 36} = \sqrt{40}$, (C).

Alternatively, use the Pythagorean theorem (which, incidentally, is the foundation for the distance formula):



Therefore, $d^2 = 2^2 + 6^2 = 4 + 36 = 40$, so $d = \sqrt{40}$, (C).

34. **(G) Mathematics/Coordinate Geometry/Slope of a Line.** From the given figure, determine the coordinates of the two points to use in the “rise-over-run” formula for slope:



Therefore, the slope is: $m = \frac{\Delta x}{\Delta y} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 4}{8 - 0} = \frac{-4}{8} = -\frac{1}{2}$, (G). Notice that this is the same as simply counting the change in units: move down 4 units (-4) and to the right 8 units ($+8$), so the slope is $-\frac{4}{8} = -\frac{1}{2}$.

TIP This item can also be solved by eliminating answer choices. Since the line runs from the upper left of the diagram to the lower right, the line has a negative slope. This eliminates (H), (J), and (K). Next, the slope of the line is “gentler” (or less) than that of a line that intersects the axes on a 45° angle, so the absolute value of the slope is less than 1. This eliminates (F), leaving the correct answer: (G).

35. **(E) Mathematics/Algebra/Manipulating Algebraic Expressions/Basic Algebraic Manipulations.** At first glance, this item appears to be about trapezoids. However, the question really just asks you to solve the equation

$$A = \frac{1}{2}(b_1 + b_2)h \text{ for } h: h = \frac{A}{\frac{1}{2}(b_1 + b_2)} = \frac{2A}{b_1 + b_2}, \text{ (E).}$$

TIP Now, if you were unable to solve this item directly, you can use the “plug-and-chug” strategy. Pick some values for b and h , solve the given expression for A , and then compare that value to each answer choice evaluated using the same values for b and h until you find a match. Again, this strategy is not as fast as the direct solution, but it is effective as a method of last resort.

36. **(G) Mathematics/Algebra/Manipulating Algebraic Expressions/Creating Algebraic Expressions and Arithmetic/Common Arithmetic Items/Proportions and Direct-Inverse Variation.** This item doesn’t involve any calculations. Instead, it requires you to identify which equation varies directly with T^2 and indirectly with V .

Direct variation has the form $y = kx$ and indirect variation has the form $y = \frac{k}{x}$. Therefore, the correct equation will have the form $P \propto \frac{kT^2}{V}$. This matches (G): $P = \frac{10T^2}{V}$.

Notice that for this item the incorrect answer choices correspond to mistakes in reading the question stem. For example, (K) describes a relationship in which P varies inversely with the square of V^2 —not V . Remember to always read the question carefully.

37. **(A) Mathematics/Algebra/Manipulating Algebraic Expressions/Factoring Expressions.** This simple factoring item includes the thought-reverser “NOT,” so the correct answer is the one expression that is NOT a factor of $z^5 - 16z$. Begin by factoring z from both terms: $z^5 - 16z = z(z^4 - 16)$; z is a factor, so eliminate (D). Next, $z^4 - 16$ is the difference of two squares: $z^4 - 16 = (z^2 - 4)(z^2 + 4)$; $z^2 - 4$ is a factor, so eliminate (B). Finally,

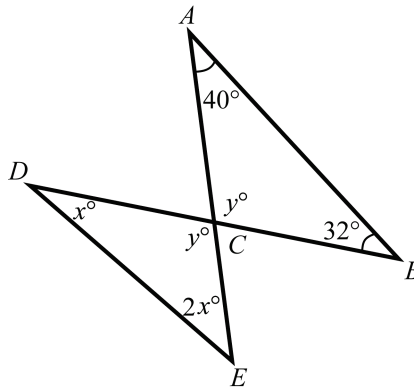
$z^2 - 4$ is also the difference of two squares: $z^2 - 4 = (z-2)(z+2)$; both $z-2$ and $z+2$ are factors, so eliminate (C) and (E). Therefore, (A) is the only choice that is NOT a factor of $z^5 - 16z$.

38. (F) *Mathematics/Trigonometry/Definitions of the Six Trigonometric Functions* and *Geometry/Triangles/Pythagorean Theorem* and *Working with Triangles*. This item tests knowledge of the definition of the sine function. Remember the mnemonic device “SOH-CAH-TOA,” the first part of which stands for Sine = $\frac{\text{Opposite}}{\text{Hypotenuse}}$. Thus, for this item, $\sin \alpha = \frac{\text{length of side opposite } \angle \alpha}{\text{length of hypotenuse}} = \frac{5}{h}$. Find h from the Pythagorean theorem:

$$h^2 = 12^2 + 5^2 = 169, \text{ so } h = \sqrt{169} = 13. \text{ Therefore, } \sin \alpha = \frac{5}{13}, \text{ (F).}$$

TIP Notice that there is a valuable time-saving shortcut to this item. Just as with 3-4-5 triangles, 5-12-13 triangles are a common Pythagorean multiple, allowing you to immediately see that the hypotenuse of the triangle given with sides 5 and 12 must be 13.

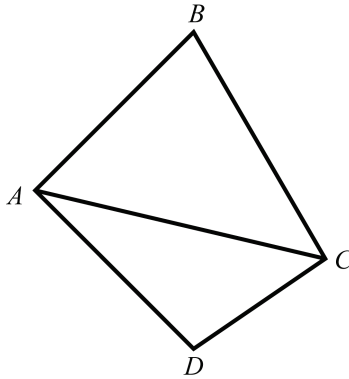
39. (C) *Mathematics/Geometry/Triangles/Working with Triangles*. For items like this, the best approach is to add any available and deducible information to the figure. According to the stem, $\angle E = 2\angle D$, so label $\angle D$ with x° and $\angle E$ with $2x^\circ$. Furthermore, $\angle ACB = \angle DCE$ since they are vertical, so label these two angles with y° :



From the upper triangle: $180^\circ = 40^\circ + 32^\circ + y^\circ$, so $y^\circ = 180^\circ - 72^\circ = 108^\circ$. From the lower triangle: $180^\circ = y^\circ + x^\circ + 2x^\circ = 108^\circ + 3x^\circ$, so $x^\circ = \frac{180 - 108}{3} = 24^\circ$. Therefore, since $\angle E = 2x^\circ$, $\angle E = 2(24^\circ) = 48^\circ$, (C).

TIP You can also apply the strategy of “guesstimation.” Since $\angle E$ looks to be about 45° , eliminate (A), (D), and (E). While you can’t distinguish between (B) and (C) by “guesstimating” since both are very close to 45° , this strategy still gives you a 50-50 chance of getting the right answer. Not bad for an approach of last resort.

40. (J) *Mathematics/Geometry/Triangles/Working with Triangles*. This is an unusual item in that it cannot be solved by applying geometric principles. You might expect the solution to turn on a principle such as “In a given triangle, the larger the angle, the longer the side,” but the angles here do not belong to the same triangle. The best approach to this item is to re-sketch the figure to clearly illustrate that $\angle BAC > \angle DAC$, while keeping $\overline{AB} = \overline{AD}$. For example:



Now, test the answer choices. Obviously, \overline{AB} is not larger than \overline{BC} , so eliminate (F). Next, \overline{BC} is not smaller than \overline{DC} , so eliminate (G). Since $\overline{BC} \neq \overline{DC}$, eliminate (H). (J) seems true ($\overline{BC} > \overline{DC}$), but to make sure, let's check (K). We know $\overline{AB} + \overline{BC}$ cannot equal \overline{AC} , since $\triangle ABC$ is a triangle (if $\overline{AB} + \overline{BC} = \overline{AC}$, it would be a straight line), so eliminate (K). Therefore, (J) is indeed the correct answer.

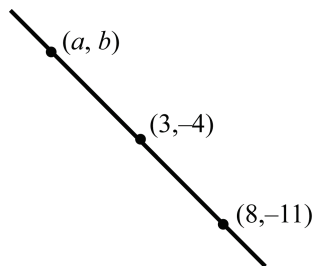
41. (C) **Mathematics/Statistics and Probability/Averages.** To express the given information in an equation for finding an average (Average Test Score = $\frac{\text{Sum of Test Scores}}{\text{Total \# of Tests}}$), let x equal the number of tests with a score of 88:

$91 = \frac{100 + 97 + 88x}{2 + x}$. Now, solve for x : $91(2 + x) = 197 + 88x \Rightarrow 91x - 88x = 197 - 182 \Rightarrow 3x = 15 \Rightarrow x = 5$. Thus, the total number of tests is: $x + 2 = 5 + 2 = 7$, (C).

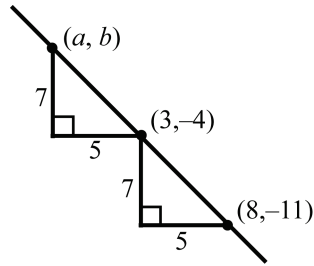
TIP You can also use the “test-the-test” strategy. Start with the middle value, which in this case is (B) or (C), since (E) is “Cannot be determined.” Let's start with (B): if the total number of tests equals 5, then $\frac{100 + 97 + 88(5 - 2)}{5} = 92.2$. Since this average is too high, the number of tests must be more than 5. Try the next larger value, 7: $\frac{100 + 97 + 88(7 - 2)}{7} = 91$. Thus, (C) is correct.

42. (H) **Mathematics/Coordinate Geometry/Graphs of Quadratic Relations.** The standard form of the equation for a circle in the coordinate plane is $r^2 = (x - h)^2 + (y - k)^2$, where r is the radius and (h, k) represent the coordinates of the center of the circle. Comparing the standard form of the circle equation to the equation given in the stem, $(x - 3)^2 + y^2 = 10$, we see that $r^2 = 10$, $h = 3$, and $k = 0$. Therefore, the radius is $\sqrt{10}$ and the center is at $(3, 0)$, (H).

43. (A) **Mathematics/Coordinate Geometry/The Coordinate System.** Since a figure is not provided, draw one:

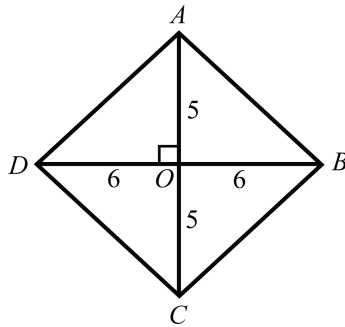


Notice that while the question stem gives no information about the specific location of the line in the coordinate plane, none is required. Since $(3, -4)$ is the midpoint, we have:



Therefore, $a = 3 - 5 = -2$ and $b = -4 + 7 = 3$, so (a, b) is $(-2, 3)$, (A).

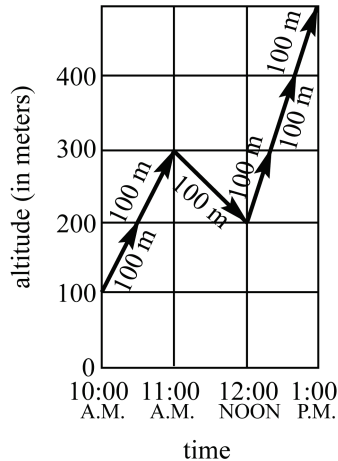
44. (J) *Mathematics/Geometry/Complex Figures* and *Triangles/Working with Triangles*. The rhombus consists of four congruent right triangles, each with sides of $\frac{12}{2} = 6$ and $\frac{10}{2} = 5$:



Since each triangle has an altitude of 5 and a base of 6, the area of each triangle is: $\frac{1}{2}bh = \frac{1}{2}(5)(6) = 15$.

Therefore, the area of the entire figure is: $4(15) = 60$, (J).

45. (B) *Mathematics/Geometry/Complex Figures* and *Triangles/Working with Triangles* and *Rectangles and Squares*. The trick to calculating the volume of any three dimensional shape is to multiple the area of two dimensions by the third dimension. In this case, this means multiplying the area of the triangle end of the prism by the length of the prism. Therefore, the volume of the prism is: $\left[\frac{1}{2}(b)(h) \right] \square l = \frac{1}{2}(3)(4)(10) = 60$, (B).
46. (H) *Mathematics/Statistics and Probability/Data Representation/Bar, Cumulative, and Line Graphs*. In this case, there is a real potential for misreading the graph. Although the line runs from left to right, the graph does not describe any lateral motion. All motion, as the introductory material laboriously explains, is vertical. Add up the 100-meter intervals traveled by the balloonist between 10:00 a.m. and 1:00 p.m.:



Therefore, between 10:00 a.m. and 1:00 p.m. the balloonist traveled a total of 600 meters, (H).

TIP This item underscores the importance of carefully reading graphs and any associated information.

47. **(D) Mathematics/Statistics and Probability/Data Representation/Bar, Cumulative, and Line Graphs.** The balloon first rose above 200 meters at 10:30 a.m. and stayed above that altitude until the final descent, crossing 200 meters shortly after 1:30 p.m. So, the balloon was above 200 meters from 10:30 a.m. to shortly after 1:30 p.m., or a little more than 3 hours. Therefore, the correct answer must be (D): 3 hours and 6 minutes.
48. **(F) Mathematics/Algebra/Manipulating Algebraic Expressions/Evaluating Expressions and Statistics and Probability/Data Representation/Bar, Cumulative, and Line Graphs.** The question stem states that velocity is defined as meters per hour. Calculate the velocity of the balloon for each one-hour period:

$$8:00 \text{ a.m.} - 9:00 \text{ a.m.: } \frac{100 \text{ meters}}{1 \text{ hour}} = 100 \text{ meters/hour}$$

$$9:00 \text{ a.m.} - 10:00 \text{ a.m.: } \frac{0 \text{ meters}}{1 \text{ hour}} = 0 \text{ meters/hour}$$

$$11:00 \text{ a.m.} - 12:00 \text{ noon: } \frac{200 \text{ meters}}{1 \text{ hour}} = 200 \text{ meters/hour}$$

$$12:00 \text{ noon} - 1:00 \text{ p.m.: } \frac{300 \text{ meters}}{1 \text{ hour}} = 300 \text{ meters/hour}$$

$$1:00 \text{ p.m.} - 2:00 \text{ p.m.: } \frac{500 \text{ meters}}{1 \text{ hour}} = 500 \text{ meters/hour}$$

Therefore, (F) must be the correct graph.

Notice that if you were alert to the information provided in the introductory material, no calculations are necessary to solve this item. There it says, “When the balloon is in motion, it moves...at a constant speed within each hour-long interval.” Therefore, (F) is the only possible choice, as the other four graphs show changing velocities within the hour-long intervals.

49. **(E) Mathematics/Statistics and Probability/Data Representation/Bar, Cumulative, and Line Graphs.** As the graph shows, between 10:30 a.m. and 12:00 noon the balloon rose 100 meters in 30 minutes and then descended the same 100 meters over the next hour. Therefore, the descent was slower than the ascent, (E).

50. (J) *Mathematics/Coordinate Geometry/Transformations and Their Effects on Graphs of Functions.* To find the coordinates of the result of the translation, just add 3 to each x -coordinate and subtract 2 from each y -coordinate:

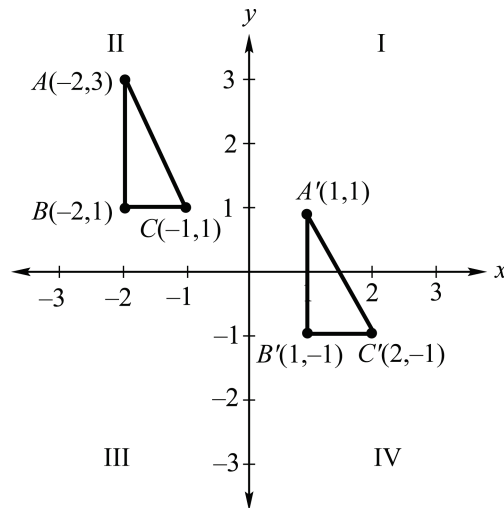
$$A(-2,3) \rightarrow (-2+3,3-2) \rightarrow A'(1,1)$$

$$B(-2,1) \rightarrow (-2+3,1-2) \rightarrow B'(1,-1)$$

$$C(-1,1) \rightarrow (-1+3,1-2) \rightarrow C'(2,-1)$$

A' is in Quadrant I while B' and C' are in Quadrant IV, (J)

Notice that the fastest solution to this item may be to sketch the translation:



51. (E) *Mathematics/Geometry/Triangles/Working with Triangles.* In order to establish congruency using the Side-Angle-Side (SAS) congruency theorem, the angle used must be created by the intersection of the congruent sides of each triangle and the side shared by the triangles. In this item, $\overline{AB} \cong \overline{CD}$ and \overline{DB} is the shared side, so, the angles needed are $\angle 1$ and $\angle 4$, (E).

52. (K) *Mathematics/Trigonometry/Definitions of the Six Trigonometric Functions.* First, determine which ranger station is closer to Site C: it must be Ranger Station A since \overline{AC} is the side of the right triangle, \overline{BC} is the hypotenuse, and by definition, the hypotenuse of any triangle must be longer than the sides. Therefore, solve for \overline{AC} , the distance between Ranger Station A and Site C. Remember the mnemonic “SOH-CAH-TOA” (Sine = $\frac{\text{Opposite}}{\text{Hypotenuse}}$; Cosine = $\frac{\text{Adjacent}}{\text{Hypotenuse}}$; Tangent = $\frac{\text{Opposite}}{\text{Adjacent}}$), where the angle in question is 57° . Thus, $\tan 57^\circ = \frac{\overline{AC}}{6}$, so $\overline{AC} = 6 \tan 57^\circ$, (K).

53. (E) *Mathematics/Geometry/Circles.* Since the radius of a circle is equal to half the circle’s diameter, the original area of the circle is: $\pi r^2 = \pi \left(\frac{d}{2}\right)^2 = \frac{\pi}{4} d^2$. After increasing the diameter to 3 times its original size, the new area is: $\frac{\pi}{4} (3d)^2 = 9 \left(\frac{\pi}{4} d^2\right)$. Therefore, the new area is 9 times the original, (E).

54. (G) *Mathematics/Arithmetic/Common Arithmetic Items/Ratios* and *Statistics and Probability/Probability*. One way to approach this item is to treat the ratios (86:255 and 18:51) as fractions ($\frac{86}{255}$ and $\frac{18}{51}$). These two fractions, plus the fraction that represents the ratio of twelfth-graders to the total population, must equal 1: $\frac{86}{255} + \frac{18}{51} + x = 1$. Now, solve for x : $x = 1 - \frac{86}{255} - \frac{90}{255} = \frac{255}{255} - \frac{86}{255} - \frac{90}{255} = \frac{79}{255}$. So, the ratios of the number of students in the tenth, eleventh, and twelfth grades are $\frac{86}{255}$, $\frac{90}{255}$, and $\frac{79}{255}$, respectively. Since the largest class is the eleventh grade, a student chosen at random from the entire school is most likely to be from the eleventh grade, (G).

55. (E) *Mathematics/Algebra/Solving Algebraic Equations or Inequalities with One Variable/Equations Involving Absolute Value*. Given that x and y are not zero, $|x|$ is positive and $-x$ is positive, so x is negative. Since $|y|$ must be positive, y must be also be positive. Given that x is negative and y is positive, (A) is not necessarily true because a negative number raised to an odd power will be negative. (B) is not true since xy is a negative number times a positive number. (C) and (D) are not necessarily true since the sign of the expressions will depend on the relative absolute values of x and y . (E), however, must be true because subtracting a negative number is equivalent to adding the absolute value of that number. Therefore, (E) is the correct choice.

TIP Alternatively, you can solve this item using the “plug-and-chug” strategy. Pick some numbers, say $x = -3$ and $y = 3$, and plug them into the answer choices:

- A. $-3^3 = -27$ (Negative.)
- B. $(-3)(3) = -9$ (Negative.)
- C. $-3 - 3 = -6$ (Negative.)
- D. $-3 + 3 = 0$ (Zero.)
- E. $3 - (-3) = 6$ (Positive.)

Of course, this one positive result for (E) does not prove that (E) is always positive, but we’ve eliminated (A) through (D), so that’s enough to prove that (E) is the correct choice.

56. (H) *Mathematics/Algebra/Manipulating Algebraic Expressions/Evaluating Expressions*. Whenever a stem presents an equation and asks for a unique value or even the ratio of two values, the direct approach is to manipulate the given information until the target expression emerges: $\frac{2x - y}{x + y} = \frac{2}{3} \Rightarrow 3(2x - y) = 2(x + y) \Rightarrow$

$$6x - 3y = 2x + 2y \Rightarrow 4x = 5y \Rightarrow \frac{x}{y} = \frac{5}{4}. \text{ Therefore, (H) is the correct choice.}$$

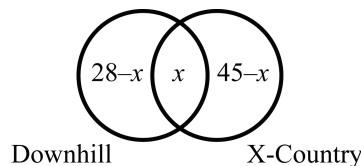
TIP You can also solve this item using the “test-the-test” strategy: substitute the answer choices into the given equation to find the one that holds true:

- F. $\frac{1}{2}$: $x = 1, y = 2$
 $\frac{2x - y}{x + y} \stackrel{?}{=} \frac{2}{3} \Rightarrow \frac{2(1) - 2}{1 + 2} \stackrel{?}{=} \frac{2}{3} \Rightarrow 0 \neq \frac{2}{3}$ ✗
- G. $\frac{2}{3}$: $x = 2, y = 3$
 $\frac{2x - y}{x + y} \stackrel{?}{=} \frac{2}{3} \Rightarrow \frac{2(2) - 3}{2 + 3} \stackrel{?}{=} \frac{2}{3} \Rightarrow \frac{1}{5} \neq \frac{2}{3}$ ✗

H. $\frac{5}{4}$: $x = 5$, $y = 4$

$$\frac{2x - y}{x + y} = \frac{2}{3} \Rightarrow \frac{2(5) - 4}{5 + 4} = \frac{2}{3} \Rightarrow \frac{6}{9} = \frac{2}{3} \Rightarrow \frac{2}{3} = \frac{2}{3} \checkmark$$

57. (E) *Mathematics/Algebra/Manipulating Algebraic Expressions/Creating Algebraic Expressions* and *Arithmetic/Common Arithmetic Items/Sets: Union, Intersection, and Elements*. One approach to this item is to use a Venn diagram to show the overlapping sets:



The three regions are for “Downhill but not X-Country,” “X-county but not Downhill,” and “Both.” Since the total number of respondents was 65: $(28 - x) + x + (45 - x) = 65 \Rightarrow 73 - x = 65 \Rightarrow -x = -8 \Rightarrow x = 8$. Therefore, the correct answer is (E).

Notice that while the Venn diagram may help to visualize the situation, it is not necessary. The same people who answered “yes” to Questions 2 and 3 were the same people who answered “yes” to Question 1. In other words: Downhill + Cross-country = Either + Both. Therefore, $(28 + 45) - 65 = 8$, (E).

58. (J) *Mathematics/Trigonometry/Trigonometric Relationships* and *Geometry/Triangles/Pythagorean Theorem*. The question stem states that the right triangle has legs of length $25 \sin \theta$ and $25 \cos \theta$. Therefore, apply the Pythagorean theorem to find the length of the longest side, the hypotenuse: $h^2 = (25 \sin \theta)^2 + (25 \cos \theta)^2$, so $h = \sqrt{25^2 \sin^2 \theta + 25^2 \cos^2 \theta} = \sqrt{25^2 (\sin^2 \theta + \cos^2 \theta)}$. Since $\sin^2 \theta + \cos^2 \theta = 1$, $h = \sqrt{25^2} = 25$, (J).
59. (D) *Mathematics/Algebra/Manipulating Algebraic Expressions/Basic Algebraic Manipulations*. The direct approach to an item like this is to manipulate the given expression until you obtain the desired result. Obviously, since $x = yz$, multiply both sides by y to get $xy = y^2z$. However, this is not an answer choice, so keep working. Since $x = yz$, try substituting $\frac{x}{z}$ for y : $xy = \left(\frac{x}{z}\right)^2 z = \frac{x^2}{z}$. And this matches (D).

TIP Notice that for this item, the “plug-and-chug” strategy is more effective, since the direct approach is so hit or miss. Pick three values for x , y , and z that satisfy the given equation ($x = yz$), say $x = 6$, $y = 2$, and $z = 3$. Now, plug these values into the answer choices to find the one that returns a value equal to $xy = (6)(2) = 12$:

A. $\frac{z}{x} = \frac{3}{6} = \frac{1}{2}$ ✗

B. $yz^2 = (2)(3)^2 = 18$ ✗

C. $yz = (2)(3) = 6$ ✗

D. $\frac{x^2}{z} = \frac{6^2}{3} = \frac{36}{3} = 12$ ✓

E. $\frac{x}{y} = \frac{6}{2} = 3$ ✗

60. (F) *Mathematics/Algebra/Solving Algebraic Equations or Inequalities with One Variable/Simple Inequalities.*
The question asks for the minimum value of $x - y$. This occurs when x is its smallest possible value ($x = -3$) and y is its largest possible value ($y = 2$). Therefore: $x - y = -3 - 2 = -5$, (F).

TEST 3—READING

Passage I: Let's begin with an abstract of the passage. In the opening sentence, the author states that her mother had some kind of connection with caves. Then, the rest of the first paragraph tells the story of the author's mother falling into a storm drain. The second paragraph goes on to explore this theme, noting that the mother had an affinity for the unusual and bizarre. In the third and fourth paragraphs, the author describes her mother's house and the way she ran it. The mother was thrifty except on occasion, had a dark and crooked kitchen filled with old utensils, and was an accomplished cook. Next, we learn about the dietary preferences of the grandparents. And finally, the author reflects on the mother's personality as it was embodied in her attitude toward food. It's a nice little story, and these are its most important points.

1. **(C) Reading/Prose Fiction/Voice.** This item asks what can be learned from the passage about the author, specifically, the author's point of view, making this a Voice item. One of the striking features about the passage is that it is narrated in the past tense, so the author is looking back at events. Furthermore, the tone in which the passage is written suggests an adult perspective. It is reflective and mature, not immediate and immature. So, (C), which describes an adult looking back, is the best description. (A) is wrong both because the passage is written in the past tense and because the author is speaking in a mature voice. (B) is incorrect because the voice is not that of a young child and also because the author does not intrude on the private thoughts of others. When the author speaks of her mother's attitudes and feelings, it is always with a phrase such as "perhaps" (line 16) or with a remark about observable behavior. Finally, (D) is wrong because the author is writing about her mother, not her own experiences as a mother.
2. **(G) Reading/Prose Fiction/Application.** The word "reasonably" marks this item as an Application item; the "EXCEPT" makes it a thought-reverser. Therefore, the correct answer will be the one choice not implied by the selection. In lines 31–35, the author writes that her mother valued thrift and avoided extravagance—except for Sunday dinners. So, (F) is implied by the selection and cannot be the right answer. (H) is also implied by the selection: mending clothes rather than buying new ones is a good example of thriftiness. And in lines 44–45, the author mentions that her mother made jelly and chocolate syrup, that is, sweets, so (J) is implied. (G), however, is inconsistent with what the author writes about her mother, saying in line 55 that she was "suspicious of any new introductions." Therefore, the author's mother would not likely have embraced a dishwasher.
3. **(B) Reading/Prose Fiction/Implied Idea.** The phrase "reasonably be inferred" clearly marks this as an Implied Idea item. The second paragraph (lines 16–30) tells us that, though the mother was otherwise subdued and even prudish, she was titillated by stories of the grotesque. The author speculates that this was due to the traumatic event of her childhood. This is the only explanation offered in the passage, so (B) must be correct. Now, even if you don't think (B) is the best possible answer, the other choices are worse. As for (A), the mother does not want to change people's perceptions of her. In fact, the author specifically states that the mother attempted to conceal her interest but would "give herself away." (C) is wrong because the mother is titillated by the stories. (D) is wrong because the incident of falling into the storm drain was real, not a dream. (The dreams mentioned in the fourth paragraph belong to the writer, not the mother.)
4. **(H) Reading/Prose Fiction/Explicit Detail.** In the fourth paragraph (lines 48–57), the author describes the odd collection of old, even "ugly," kitchen tools used by her mother and emphasizes her mother's preference for them over "new introductions," that is, new gadgets. This point is summarized by (H). (F) and (J) are clearly wrong because the tools are neither new nor laid out like a picture in a magazine. As for (G), while some of the tools were inherited by the author's grandmother, there is no mention of their having been created by the author and her mother. (In this context, "new inventions" refers to "modern gadgets" not found in the mother's kitchen.)
5. **(A) Reading/Prose Fiction/Application.** This item asks you to draw a conclusion about the grandparents, making it an Application item. The grandfather always wanted a certain meal on weekends before hunting, and the grandmother loved clabbered milk and insisted on food purity. A fair conclusion is that these two were inflexible in their dietary preferences, as (A) states. (B) must be wrong because there is no suggestion that they were willing to try new foods. In fact, the grandmother made a year-long issue out of the margarine. As for (C), while the author learned about her family, she does not state that the grandparents themselves were interested in creating a

family history. Finally, nothing in the passage suggests that the grandparents thought about food in the way described by (D).

6. **(G) Reading/Prose Fiction/Implied Idea.** The word “suggest” identifies this item as an Implied Idea item. The passage states that the author’s mother loved both the regularity and the surprises in nature, as (G) states. The raw material for food exhibits both these characteristics. (F) and (H) can be safely eliminated because these topics (family’s eating habits and traditional kitchen practices) are not discussed in lines 75–78. Finally, (J) represents a confused mixture of some of the ideas found in different parts of the passage and does not answer the question.
7. **(D) Reading/Prose Fiction/Implied Idea.** The word “inferred” clearly flags this item as an Implied Idea item. As we noted in the discussion of item #4, the mother’s preference was for old and ready-to-hand cooking tools, so the kitchen did not look at all like a magazine display. Additionally, in lines 35–39, the author notes that the mother’s kitchen was long and dark—not a picture from *Better Homes and Kitchens*. (D) is a good description: dark, not neat, and less convenient. The other choices, which are variations on these three variables, are all wrong.
8. **(F) Reading/Prose Fiction/Development.** Though this item uses “inferred,” it is actually a Development item because it asks why the author does something. In line 30, the author is relating the mother’s reaction, and the tell-tale intake of breath marks the statement as describing some shocking event or news. So, the author adds emphasis to make it clear that the mother considers this gossip detail particularly significant and the italics serve to convey the idea of shock, (G); sympathy toward those affected, (H); and a willingness to gossip, (J). There is no suggestion, however, that the mother is angry, (F).
9. **(D) Reading/Prose Fiction/Application.** This is an Application item, as indicated by the phrase “most reasonably.” The key phrase is “near sublimity.” “Sublime” means “exalted, pure, or near perfect,” so the author believes that her mother manages to take the imperfect raw materials of nature and transform them into dishes that are nearly perfect. (D) seems to strongly support this point. (A) is wrong because the results are not undesirable—they are sublime. (B) is simply not supported by the text, and you should be able to eliminate it once you understand the meaning of “sublime.” (C) at least has the merit of being in the ballpark, and the word “fine” is pretty good. But “restaurant” is not part of the description provided by the author.
10. **(F) Reading/Prose Fiction/Implied Idea.** In lines 85–87 of the last paragraph, the author notes that when her mother praised gristle, she and her brother groaned, meaning that they did not particularly enjoy that part of the meat. Additionally, line 85 of the last paragraph says specifically that “others disdained” the connective tissue. So, it appears that the mother was pretty much alone in her opinion, as (F) states. Since the other choices just change one or another of these points, they are definitely wrong.

Passage II: The author of Passage II opens by stating that the feeling that leisure time is disappearing is not an illusion but a fact. The first paragraph goes on to explore this idea. According to the author, work, and the time required to commute back and forth, is increasingly filling up the hours of the day, taking away from time that used to be for family and other activities. Additionally, leisure is broken up into smaller and smaller pieces. The author then goes back over these two points in the first paragraph to add proof: an extra month of time spent working and leisure is “containerized.”

In the second paragraph, the author says that it is a mistaken belief that humans have always worked as hard and as long as we do now. The author explains that in America and Europe in the eighteenth and nineteenth centuries, people worked the longest hours in history. And, according to one theorist, this became necessary because time came to be a measured commodity to be bought and sold: one hour for \$2.50, or whatever. Before then, work followed the seasons, and people actually worked less.

In the third paragraph, the author explains how the industrial revolution contributed to this trend. The fourth paragraph notes that in the twentieth century the conception of leisure changed so that time-off was considered by workers to be a right, yet leisure time continued to shrink.

Finally, in the fifth paragraph, the author takes a philosophical look at the phenomenon of leisure. The passage notes that leisure is viewed almost like fuel for the engine of the worker: yes, from time to time you need to stop to refuel, but that’s only so that you can keep on trucking.

11. **(C) Reading/Social Science/Main Idea.** This is a Main Idea item that asks about the primary purpose of the first paragraph. As noted above, the first paragraph introduces the idea of leisure time and then goes on to talk about how limited it is becoming. The best choice is (C): the word “describe” is a pretty good description of the author’s approach, and the “current state of leisure time” is the topic of the first paragraph. (A) is wrong for at least two reasons. First, the first paragraph does not cover “several centuries.” Second, the passage focuses on leisure, not on the workplace. (B) is wrong for substantially the same two reasons: the first paragraph does not discuss “several centuries,” and it generally focuses on leisure, not labor. The second best choice may be (D), but it is wrong because the author specifically states that the impression that leisure time is shrinking is not an illusion but a fact.
12. **(F) Reading/Social Science/Explicit Detail.** The phrase “according to the passage” clearly marks this item as an Explicit Detail item. Since the stem contains the thought-reverser “EXCEPT,” the correct answer will be the one item, according to the passage, that is not characteristic of the second half of the twentieth century. The correct answer is (F): the only mention of legislation is in lines 66–71, where the author notes that this legislation was proposed and rejected in the first half of the century. (G), however, is mentioned in the final paragraph, where the author argues that leisure is important only because it revitalizes workers so they can be productive. (H) is mentioned in lines 21–22. (J) is mentioned in line 8.
- TIP** The “EXCEPT” is a thought-reverser, and a thought-reverser turns the ordinary question inside-out. The correct answer is the one that is NOT mentioned in the passage. The three that are mentioned are wrong answers. You should always circle thought-reversers in your test booklet so that you don’t overlook them.
13. **(D) Reading/Social Science/Development.** The wording of this item stem asks you to explain why the author includes the second paragraph (lines 24–42), making it a Development item. As our summary of the passage reminds us, the author begins by explaining that leisure time is evaporating. Then, in the second paragraph, the author explains that this was not always true: the loss of leisure time really began with the industrial revolution. So, the reason for the second paragraph is given by (D): to show that the erosion of leisure did not begin in the twentieth century but much earlier. (A) is an intriguing thesis, but it is not one the author discusses. Yes, the author mentions “capitalism” and “technology,” but the bare mention doesn’t count as an argument. As for (B), the second paragraph does contrast two historical periods, but the contrast is between the eighteenth and nineteenth centuries and the period before that. To the extent that you find implicit a contrast between the eighteenth and nineteenth centuries and the twentieth century, (D) is, by comparison, a better choice because the second paragraph provides “historical evidence.” Finally, the same reasoning applies to (C). To the extent that the second paragraph does include the idea that leisure increased in the first half of the twentieth century (but declined during the second half), (D) is still better because the main idea of the paragraph, as (D) notes, is the contrast between the eighteenth and nineteenth centuries and earlier periods.
14. **(F) Reading/Social Science/Explicit Detail.** In the last paragraph, the author quotes Adam Smith as saying that leisure is like sleep, that is, it is natural refreshment after exertion. But the main purpose of life is the exertion that makes humans productive workers. So, the contrast is between leisure and production or economic priorities, (F). (G) just throws out a concept mentioned in the paragraph that has no relevance to the contrast. (H) is probably the second most attractive choice because sleep is mentioned in the paragraph and connected with leisure, but that is the problem with (H): leisure and sleep are alike; Smith does not contrast them. As for (J), sleep, and with it the need to relax, is a “call to nature” not contrasted with nature.
15. **(A) Reading/Social Science/Voice.** The nature of Smith’s opinion is philosophical: he speaks of the meaning of human existence. Thus, (A) is the best description of those remarks. (B) is incorrect because there is no “medical diagnosis”: “therapeutic” simply means corrective action and does not imply a medical opinion. (C) is wrong because there is no mention of any supporting evidence for Smith’s theory. The author simply says that this is what Smith thought but does not elaborate on how Smith arrived at the conclusions. Finally, (D) is wrong because the author specifically allows that Smith’s description is a “principle” of American society, not a false description.
16. **(G) Reading/Social Science/Implied Idea.** Begin by noting that, according to the author, the “current state of leisure” is one in which the time for leisure has been shrinking since the middle of the twentieth century because

people are working longer and longer hours. Additionally, leisure time has become increasingly fragmented, available only in bits and pieces, such as a day off, a long weekend, or an annual vacation. What caused this? Not the end of the industrial revolution, (F), because that’s history. And not labor-saving technology, (H), because that would make more leisure time available. (J) is perhaps the second most interesting response because it explains why we take vacations, but not why we have so little vacation time. (G), however, does provide the explanation: everybody is busy to make money.

TIP Remember that the correct answer to an Implied Idea item will be inferable from the text.

17. **(B) Reading/Social Science/Explicit Detail.** The phrase “according to” in this item marks it as an Explicit Detail item, so look for the right answer in the cited lines. Just before lines 52–55, the author says that the ability of employers to measure time (and base compensation on hours) made it possible for employers to control workers’ time. Before this development, workers naturally enjoyed leisure time without thinking about how much of it they had. Instead, they were task-oriented: need to plant, hoe, harvest, store, and then I’ll take a nap. How long of a nap? I have no idea; I guess until I have to plant again. But with the industrial revolution, workers were required to report to the job everyday and put in the requisite number of hours set by the employer. So, the shift in the idea of leisure from an open-ended free time to a quantified period occurred with the shift from agriculture to factory work, as (B) states. (A) is wrong, because while the peasants became something other than peasants, they became factory workers, not land owners. (C) is wrong because employees were now employees and on the clock, but they were not industrialists. (D) is perhaps the second best choice because workers are consumers, but then everyone has always been a consumer—we have to eat. So, (D) is not an explanation for the shift mentioned in the stem. In fact, to the extent that workers became defined primarily as consumers, this was an outcome, not a cause, of the shift.
18. **(J) Reading/Social Science/Development.** This Development item is asking why the author quotes Russell in lines 60–63 as saying that leisure had become a right for all, not just the elite. (J) best describes this move: the author wants to introduce an authority (well-known philosopher) to make the point that during the first part of the twentieth century, leisure was widespread and even considered a right. (F) is incorrect for a couple of reasons. First, while it is true that the author mentions the proposed 1933 legislation in lines 67–71, the author doesn’t draw a connection between Russell and the proposal. Second, the author is recounting history, not “press[ing] for...legislation.” (G) is also wrong for a couple of reasons. First, there is nothing in the passage that can properly be called “the theory of the social distribution of labor.” Second, to the extent which those words do appear (lines 56–58), they are used to describe not a theory but a fact: that leisure was redistributed to cover everyone. Finally, as for (H), the author doesn’t “praise” anything. The passage simply recites that leisure became universal.
19. **(D) Reading/Social Science/Voice.** Since the item stem specifies “after World War II,” you’ll find information useful for answering the item near that language in the fourth paragraph. In lines 63–67, the author writes that “people virtually stopped fighting for” leisure as a right after World War II. Match this notion with the descriptions provided by the answer choices. The passage indicates that people did not value leisure as a right, so positive attitudes such as “hopeful,” (A), and “enthusiastic,” (B), are definitely wrong. Now, the choice is between two negative attitudes, one very negative, “hostile,” (C), and the other more like indifference, “unsupportive,” (D). “Stopped fighting for” doesn’t mean “fighting against,” so the best choice is (D).
20. **(H) Reading/Social Science/Application.** What does the author mean by the statement that “workers” became “consumers”? The passage is explaining that employees held jobs in order to make money so that they could buy the products produced during the manufactured boom. These are not two separate groups, but just different ways of describing the roles played by people (producers and consumers), so (F) is wrong. (G) is wrong because the passage never talks about “consumers” as having rights. (J) is wrong because the passage specifically states that people had less, not more leisure, after World War II. The correct answer is (H): the statement is supposed to help the reader understand that people came to be regarded more as buyers than producers.

TIP The phrase “most likely” is used for Application items, requiring you to draw a further conclusion but one that is more attenuated than a simple Implied Idea item.

Passage III: One of the stylistic quirks of this passage that may present difficulties is the reliance on somewhat whimsical turns of phrase. Some are direct quotations of the architect, but others are locutions employed by the author, such as “a rare one himself” and “innocent anarchists.” Couple this with a lack of clear logical structure, and it is a difficult passage to read.

The first paragraph, which ordinarily one would hope would contain a clear statement of purpose or main idea, doesn’t do much more than tell the reader that the topic has something to do with architecture. In fact, it seems to be the author’s purpose to lure the reader into the topic with dazzling language. The second paragraph continues in this vein, though it does become clearer that the author is trying to say something good about this architect.

The third paragraph gives the reader something concrete to stand on: the architect designed a building that is striking in appearance and function. The fourth paragraph continues the discussion of the building’s design and function, emphasizing that it is eco-conscious and efficient.

The fifth paragraph talks about the workspace, illustrating how the building implements the architect’s theories and ideas. The sixth paragraph returns to a more abstract discussion of the ideals and theories of the designer. And the final three paragraphs are devoted to further exploration of those ideas.

21. **(D) Reading/Humanities/Voice.** This item stem asks you about the author’s attitude toward the architect. By the time you’ve finished the passage, you should have the impression that the author wants you to come away with warm-and-fuzzy feelings about the architect: he’s a visionary and a poet, he loves children and birds, he hates ugliness, and he designs nice buildings. That is most certainly a positive point of view, which eliminates both (A) and (B). (C) perhaps has some merit because a teacher is the kind of person who might embody those characteristics (and the architect is also a professor), but when you compare the mundane description in (C) (a teacher who lectures) with the lofty phrasing of (D) (timeless, thoughtful), (D) is clearly the best choice.
22. **(H) Reading/Humanities/Explicit Detail.** This item stem includes a thought-reverser. So, three of the four choices will be mentioned in the passage; the correct choice will not be mentioned. (F), (G), and (J) are all mentioned in the fifth paragraph (lines 43–55), but the passage does not mention “designer furnishings,” (H).

TIP The answer to an Explicit Detail item is explicitly provided by the text, unless the item stem includes a thought-reverser. In that case, you are looking for the answer that is not provided by the text.

23. **(A) Reading/Humanities/Voice.** If you wonder whether the building is “lasting,” as stated in (B), you can eliminate that choice because you know the building is not “traditional.” If you’re unsure whether the author thinks the building is “visionary,” you can surely conclude that the author does not think it is “impractical,” and thereby eliminate (C). As for (D), while the building is “light-filled,” the passage does not mention that it cost a lot to build. The correct answer is (A): the building is both “inventive” and “environmentally responsible.”

TIP This Voice item is made easier by the use of paired attitudes.

24. **(J) Reading/Humanities/Explicit Detail.** The phrase “according to the passage” clearly marks this item as an Explicit Detail item and the “EXCEPT” makes it a thought-reverser. You know that the architect designs buildings that are environmentally responsible; in fact, the author says that the building described looks like an answer to the question, “What did you do for the environment on your summer vacation?” So, (F) is not the correct answer. (G) is also mentioned a couple of times, and that is the significance of the question about loving all children. And (H) is mentioned at several points. (J), however, is not characteristic of the building. If anything, the building is not likely to satisfy popular or widely accepted notions of beauty because it is so unusual.

TIP Remember that when you have an Explicit Detail item that is a thought-reverser, all the wrong answers are all mentioned in the text and the correct answer is not.

25. **(A) Reading/Humanities/Main Idea.** The phrase “main function” identifies this item as a Main Idea item; in particular, it focuses on the third and fourth paragraphs (lines 43–55). As noted in our summary of the passage, the

third and fourth paragraphs talk about the the design, appearance, and function of the building. This function is captured by (A). (B) reminds us of the importance of paying careful attention to every word in the choices. Much of the language in (B) is reminiscent of the passage (“external beauty” and “interior features”), but the word “overwhelm” makes the choice wrong. The cited paragraphs do not argue that the one element overpowers the others. (C) also has language that is attractive (“practical and environmentally safe”), but (C) is wrong in asserting that those two paragraphs are intended to “provide a contrast” with the architect’s other designs. As for (D), while we could speculate that workers like the design, those paragraphs were not written to discuss the reactions of the workers. Workers are not mentioned until line 44 in the fifth paragraph.

26. **(G) Reading/Humanities/Main Idea.** This Main idea item asks about the thesis or purpose of the fifth paragraph (lines 43–55). As our overview indicates, the fifth paragraph describes some of the important features of the building as they relate to people. According to the paragraph, there is a lot of light and a feeling of being outdoors with plenty of space for the workers. This topic is best summarized by (G). (F) is wrong because the paragraph does not discuss “state law standards.” (H) has some nice language (“roof grasses and courtyard greenery”), but the paragraph does not discuss the “process” used to grow these plants. As for (J), while the paragraph discusses some of the important features of the building, it does not discuss the “methods used” to build it. Notice that both (H) and (J) are wrong for similar reasons: both use language that is suggestive of the passage but both make untrue statements. The paragraph mentions the plants and their role in the functioning of the building (sound deadening and beauty) but not how they are grown, (H). And the paragraph mentions that the structure seems empty even when populated but not the “constructions methods” used to build it, (J).

TIP Remember to pay careful attention to what the answer choices actually say.

27. **(A) Reading/Humanities/Implied Idea.** The use of the word “inferred” tags this item as an Implied Idea item. You can probably infer a conclusion about McDonough’s attitude from the passage as a whole, since the author keeps describing the beautiful and eco-friendly design of the building, but for a specific reference, see lines 70–80. There it states that McDonough thinks that the world needs to be completely done over, and he specifically objects to existing buildings. So, the architect thinks that they belong to the past, as (A) states. (B) is wrong because McDonough would probably reject this notion: he believes that his buildings are a radical departure from past designs because they accommodate workers. (C) is wrong for the same reason: smoke-belching buildings are not environmentally sound. As for (D), McDonough apparently thinks that the days of existing, traditional structures are coming to an end.
28. **(H) Reading/Humanities/Explicit Detail.** The phrase “according to” signals an Explicit Detail item. In the first sentence, the author says that McDonough viewed the competition as a contest of ideas, (H). The other answer choices are certainly things that one would associate with a contract to design and build an office structure, but the author does not say that McDonough thinks these are important.
29. **(B) Reading/Humanities/Application.** The phrase “most likely” signals that this is an Application item. In line 20, the author explains that McDonough thinks that the environment must be considered an important element of architectural design. “Environment,” as used in this sentence, means to balance ecology, equity, and economy. So, certain “ecology,” or what (B) calls “natural environment,” must be considered. (A) is interesting because it uses the word “economic,” echoing “economy” in the cited line, but the passage is not referring to the “economic interests of industry.” (C) is probably a statement McDonough would reject since the building discussed is designed to blend in with its surroundings. Finally, McDonough would reject (D) for the reasons discussed in the explanation to item #27.
30. **(H) Reading/Humanities/Application.** The phrase “most nearly” identifies this as an Application item. In the last paragraph, the author specifically says the world is not a perfect place, but he is concerned that McDonough may not accept this since he seems to be a perfectionist. So, (H) nicely summarizes this ambivalence (revolutionary but unrealistic). (F) is good when it says “idealistic,” but fails with “humble,” since there is nothing in the passage to support this judgment. In fact, to the extent that he is a perfectionist, McDonough is probably not humble. The same reasoning applies to (G): McDonough has a positive outlook, and (G) is fine as far as that goes, but there is nothing to suggest that McDonough is “inconsistent.” Rather, he seems to be a thoroughly consistent dreamer.

Finally, as for (J), though the author may acknowledge that McDonough’s vision is limited because it overlooks realities, the author does not indicate that this is a source of disappointment.

Passage IV: This passage is filled with details; however, remember that you don’t have to memorize all the specific points. The details are right there to retrieve if you should need them. So, read the passage to get the overall sense of what is being said and pay careful attention to the organizing principles.

The first paragraph tells us the topic of the passage: bees. The second paragraph begins by telling us how the passage is organized: the stages of the bee’s life. It begins with the larval phase, during which the bee is fed by young workers. In six days, the larvae get big and fat and then spin cocoons. After the cocoons are capped, the larvae continue to grow, and on the twelfth day, they emerge from the cocoons as bees.

The third paragraph says that during the next three days, the little bee wanders around a part of the hive doing housekeeping chores, after which (when the hypopharyngeal glands are developed) it becomes a nurse bee. It also, according to the fourth paragraph, builds comb during this time. After 10 days, the glands have shrunk, and the bee begins a new phase.

The fifth paragraph says that the new phase lasts about 10 days. It starts with the job of ferrying product from the hive door back to the comb. The sixth paragraph adds detail to this description.

The seventh paragraph explains that the bee next starts to make short flights from the hive to do different things. The eighth paragraph talks about bees after they reach 20 days and begin to fly out to gather water, nectar, etc.

Given the organization of the passage, a good title might be: “The Life of a Honeybee.” The development is chronological (from birth to death) and filled with detail. Each detail belongs to a particular stage of the bee’s life story.

31. **(A) Reading/Natural Science/Explicit Detail.** This is an Explicit Detail item that asks about a sequence. The passage gives the order in which the stages occur: after three days, the bee acts as a nurse; after 10 days, the bee produces wax for comb; between 10 and 20 days, the bee receives nectar from foragers; after 20 days, the bee forages for nectar. (A) correctly describes the sequence; the other choices do not.
32. **(J) Reading/Natural Science/Explicit Detail.** This is an Explicit Detail item with a thought-reverser, so the correct choice is the one not mentioned in the passage. (F) is mentioned in lines 71–73: they use stingers. (G) is mentioned in lines 39–41: six to eight pounds for one pound of wax. And (H) is mentioned in line 80: stamens. The idea suggested by (J), however, is not mentioned. To be sure, at line 63, the passage mentions clover as a kind of flower that bees use, but the passage does not say that this is the type of pollen preferred for building new combs.
33. **(B) Reading/Natural Science/Explicit Detail.** This is a straightforward Explicit Detail item. Therefore, somewhere in the passage, the text mentions the weight gain of the bees. In fact, in line 14, the passage states the larvae grow to 500 times their original weight, (B).
34. **(H) Reading/Natural Science/Implied Idea.** This is an Implied Idea item, and the stem even tells you where to find the answer: lines 21–32. The text explains that the new nurse bee starts off feeding the older, larger larvae. Then, “as she becomes more skilled,” she feeds the younger larvae. What is the difference? The older nurse bee is more skilled, (H). (F) has a nice sound to it, but there is absolutely nothing in the text to suggest that the nurse bees get better at manipulating wax: the “wax” stage simply follows the “nurse” stage. (G) is wrong because the bee becomes a nurse when the glands are developed, but nothing is mentioned about them when the bee advances to nursing smaller larvae. (J) is wrong because the assistance from the other bees belongs to the “wax,” not the “nurse,” stage.
35. **(A) Reading/Natural Science/Explicit Detail.** The phrase “according to the passage” means this is an Explicit Detail item, so the answer is stated in the text. In fact, lines 42–43 state that the wax is manipulated by the legs and

then chewed; in other words, mouth and feet, (A). The other choices are wrong because these body parts are not mentioned as the ones used to manipulate the wax.

36. **(H) Reading/Natural Science/Explicit Detail.** This Explicit Detail item asks you to sort the various activities into the life stages described in the passage. The second stage of life is discussed in lines 48–56, and the text mentions collecting nectar from foragers and purifying it, disposing of dead bodies, and protecting the hive—the very activities described by (H). (F) is wrong because “producing royal jelly” is not possible for bees older than 10 days (lines 30–32). (G) is wrong because nurse bees are younger than 10 days. Finally, (J) is wrong because the cocoon belongs to the larval stage.
37. **(B) Reading/Natural Science/Explicit Detail.** This is a rather odd Explicit Detail item. It asks about a detail mentioned in the seventh paragraph (lines 66–73) but in a rather indirect manner. You might reinterpret the stem to ask “Which of the following details is mentioned in the seventh paragraph?” And the answer is clearly (B), for lines 69–70 state that the younger stage two bees move the corpses of other bees out of the hive. (A) would not drop out of the passage entirely, for line 56 in the fifth paragraph also mentions foraging. (C) is also found in the sixth (lines 57–59). Finally, (D) is also found in the eighth paragraph (lines 82–84).
38. **(G) Reading/Natural Science/Explicit Detail.** The phrase “passage states” makes this item a straightforward Explicit Detail item, so the correct answer will be found in the passage. In fact, (G), protein, is found in lines 12–13: “a protein-rich substance called bee milk.” The passage does not mention the other choices as being found in bee milk.
39. **(A) Reading/Natural Science/Explicit Detail.** This is another straightforward Explicit Detail item: somewhere in the passage, the author tells you when in the honeybee’s life she does the work of preparing cells for eggs. The relevant text is lines 21–25: the author says that for the first three days after emerging from the cocoon, the stage one bees prepare the comb for eggs. (B), (C), and (D) are wrong because they make statements that contradict the explanation given in the third paragraph.
40. **(J) Reading/Natural Science/Application.** The phrase “is likely” flags this as an Application item, which is one of the most difficult types. The item stem asks, in essence, why would the forager take honey with her when she leaves the hive? Look for the answer in the part of the passage that discusses foragers. Indeed, in the last paragraph, the passage explains that the forager “moistens the pollen with honey that she has brought from the hive.” (J) is the best description of this. (F) is wrong because the honey is used to moisten pollen, rather than for hiding. (G) is wrong because the passage says nothing about the foragers eating honey. (H) is wrong because the passage never suggests how bees learn directions or that scent plays a role.

TEST 4—SCIENCE

1. **(C) Science/Research Summary/Analysis.** This item stem asks for the activity in Experiment 2 if the temperature was 85°C, a value not listed in Table 2. However, 80°C and 90°C are listed, so the activity at 85°C must be between the activities at 80°C (60%) and 90°C (94%), (C).
2. **(F) Science/Research Summary/Analysis.** This item seems packed with scientific requirements, but in reality, it just asks: “In Table 2, is activity directly associated with temperature?” And the answer is “yes”: the higher the temperature, the higher the activity, (F).
3. **(A) Science/Research Summary/Comprehension.** It is important to focus on the question asked: “How does Experiment 2 differ from Experiment 1?” And the introductory note to Experiment 2 provides the answer: Co^{2+} was the only cofactor in Experiment 2 while Experiment 1 used three cofactors.
4. **(H) Science/Research Summary/Analysis.** This item refers specifically to Experiment 1, so the answer is likely to be in Table 1. The left column in Table 1 is “Ion concentration,” and the values increase from 0.0 mM to 2.0 mM. The third column corresponds to Mn^{2+} activity and shows an increase from 0% at 0.0 mM to 68% at 1.2 mM, and then a decrease to 57% at 2.0 mM. So, the activity of prolidase increases, then decreases, (H).
5. **(A) Science/Research Summary/Application.** This item requires application of the given information to a new situation. The item stem essentially asks, “Will prolidase function as an enzyme in human blood (pH 7.4, temperature 37°C)?” Table 3 suggests that the answer is “yes”: pH 7.4 is associated with activity between 94% and 24%. However, Table 2 indicates that the answer must be “no”: the temperature of human blood (37°C) is less than the lowest temperature (40°C), which has 0% activity in Table 2, and so by inference 37°C would have 0% activity. To summarize, while the pH seems within range, the temperature is definitely out of range for enzyme activity in human blood, (A).

TIP This is a good point to discuss the distinction between necessary and sufficient causes. A necessary cause is a factor or condition that is required for a certain outcome or event, but that by itself doesn’t guarantee it. For example, oxygen is a necessary cause or condition for combustion but is not by itself sufficient. The same is true for fuel and heat. While the three factors are not individually sufficient for combustion, they are sufficient when taken together.

6. **(F) Science/Research Summary/Analysis.** The introduction to Experiment 1 provides the needed explanation. According to the description of the tests, the red color is produced by the interaction between the added coloring agent and free proline, as (F) states.
7. **(D) Science/Data Representation/Comprehension.** This item simply requires you to read the table. The numbers in the first column are the identifiers for the simulations, and the answer choices to this item specify Simulations 1, 3, 4, and 5. The item stem is essentially asking, “For Simulations 1, 3, 4, and 5, which one had the largest population growth (from N_0 to N_{20})?” Check each answer choice:
 - A. Simulation 1: N increased from 8 to 1,187.
 - B. Simulation 3: N remained constant at 8.
 - C. Simulation 4: N increased from 8 to 1,187.
 - D. Simulation 5: N increased from 8 to 176,211

Therefore, the biggest increase was for Simulation 5, (D).

8. **(F) Science/Data Representation/Analysis.** To answer this item, look for simulations in which the population size stays constant. There are only two: Simulation 3 and Simulation 6. In both of these simulations, $b = d$, (F). This makes sense: population size is constant when birth rate equals death rate.

9. **(D) Science/Data Representation/Comprehension.** To answer this item, read the b and d values in the table for each simulation listed in the answer choices:

- A. Simulation 1: $b = 0.5$ and $d = 0.25$, so $b > d$
- B. Simulation 4: $b = 1.0$ and $d = 0.75$, so $b > d$
- C. Simulation 7: $b = 0.4$ and $d = 0.15$, so $b > d$
- D. Simulation 10: $b = 0.2$ and $d = 1.1$, so $b < d$

Thus, deaths were more frequent than births for Simulation 10, (D).

10. **(H) Science/Data Representation/Analysis.** As noted in the explanation to item #8, the difference between b and d determines the change in the population. Test the answer choices to find the one with the largest value for $b - d$:

- F. $b - d = 1.0 - 3.0 = -2.0$ ✗
- G. $b - d = 2.0 - 1.0 = 1.0$ ✗
- H. $b - d = 3.0 - 0.5 = 2.5$ ✓
- J. $b - d = 4.0 - 3.0 = 1.0$ ✗

Therefore, the largest population growth is for (H).

11. **(C) Science/Data Representation/Analysis.** This item requires interpolation of the data. The best approach is to find a simulation with similar birth and death rates. Simulation 4 has birth and death rates identical to the given values ($b = 1.0$ and $d = 0.75$). The N_0 and N_{10} values for Simulation 4 are 8 and 97, respectively. Therefore, we'd expect the N_{10} based on an N_0 equal to half of 8 (e.g., $N_0 = 4$) to be equal to half of 97, or $\frac{97}{2} \approx 48$, (C).

12. **(H) Science/Data Representation/Analysis.** This item requires analysis of the data in Table 1 to find the trend in egg production as a function of temperature for the Seattle strain from Race B. The Seattle strain from Race B is the final row of Table 1: egg production increased from 104 to 1,591 as temperature increased from 9°C to 19°C; then, egg production decreased to 75 at 20°C. To summarize, the egg production increased, then decreased, (H).

13. **(B) Science/Data Representation/Comprehension.** This item stem asks for the group with the greatest number of B chromosomes. Compare the answer choices:

- A. Group 4: 1 B chromosome
- B. Group 10: 7 B chromosomes
- C. Group 14: 5 B chromosomes
- D. Group 17: 4 B chromosomes

Therefore, the group with the greatest number of Race B chromosomes is Group 10, (B).


TIP Notice that for this item, you can stop comparing the answer choices immediately after checking (B): in Group 10, all of the chromosomes are B. Therefore, (B) must be the correct answer.

14. **(J) Science/Data Representation/Comprehension.** This item requires comparison of the egg production values in Table 1 for the strains and temperatures given in the answer choices in order to identify the largest producer. The largest entry is for the Humboldt strain from Race B at 19°C, (J): 1,697.

15. **(C) Science/Data Representation/Comprehension.** This item essentially asks for the group in Table 2 that matches the information given in the stem ($X = B$, No. 2 = BB, No. 3 = BB, and No. 4 = AB). Then, for that group, it asks you to identify the average testis length, as given in the last column of the table. Only Group 11 matches the given requirements, and the average testis length for this group is 480 μm , (C).

Notice that using the strategy of elimination makes the solution even faster. First, the X chromosome is B, so immediately eliminate Groups 1 through 9. Next, the No. 2 chromosome is BB, which further narrows the remaining choices to Groups 10 through 12. Finally, the No. 3 and No. 4 chromosomes are BB and AB, respectively, so the correct choice must be Group 11.

16. **(F) Science/Data Representation/Comprehension.** This item is basically a matter of bookkeeping; unfortunately, there is no way to avoid the detail work. Check Table 2 for each of the given answer choices. Start with (F): is there a row with AA in the column labeled “Number 2” and BB in the column labeled “Number 3”? The answer is “no.” The groups with AA in “Number 2” are 1, 2, 3, 5, and 18. But the groups with BB in “Number 3” are 9, 10, 11, 13, and 15. So, no single group has both No. 2 = AA and No. 3 = BB. Therefore, the correct answer is (F).

 Since the item stem includes the thought-reverser “NOT,” the correct choice will not be found in the table.

17. **(C) Science/Conflicting Viewpoints/Comprehension.** Both scientists agree that the descending rock remains cooler than would be expected and that significant change takes place deep beneath the surface; however, they differ on what this change is. Scientist 1 argues that the rapid descent of the plate prevents minerals, such as serpentine, from heating quickly, but that when they finally do, the minerals such as serpentine dehydrate and the rocks break. Scientist 2 agrees that the descent may be sufficiently rapid to prevent immediate heating but argues that once the plate reaches a certain temperature the relevant change is in the mineral olivine, which changes to spinel. Therefore, (C) correctly summarizes the two different viewpoints.
18. **(J) Science/Conflicting Viewpoints/Comprehension.** The illustration shows that the descending plate reaches slightly beyond 670 km, (J). Also, the last lines of both the opening paragraph and Scientist 1’s viewpoint imply that 670 km must be the maximum depth reached by a descending plate.
19. **(A) Science/Conflicting Viewpoints/Comprehension.** The first sentence of Scientist 1’s viewpoint states, “Common minerals in plate rocks, such as *serpentine*, contain water.” In other words, serpentine is an example of a water-containing mineral found in plate rocks, but it is not the only one, as (A) states. (B) is wrong because it contradicts this statement by Scientist 1. (C) is wrong because it represents a confusion of the two viewpoints: Scientist 2 argues that olivine changes to a denser mineral; Scientist 1 makes no such argument regarding serpentine. (D) is wrong because serpentine is a mineral found in plate rocks, which are composed of crust and upper mantle (see introductory paragraph and illustration).
20. **(F) Science/Conflicting Viewpoints/Analysis.** As noted in the explanation to item #17, both scientists agree that the plate rock descends rapidly and remains cooler than the surrounding mantle. Their viewpoints differ, however, on what finally occurs to cause deep earthquakes. This item stem asks you to reconcile the two viewpoints, and (F) does this: what Scientist 2 calls the transformation of olivine to spinel is what Scientist 1 calls dehydration. (G) gets the process described by Scientist 2 backwards: olivine changes to spinel, not the other way around. Both (H) and (J) confuse the two viewpoints.
21. **(B) Science/Conflicting Viewpoints/Comprehension.** The “according to” marks this item as a Comprehension item, so the answer will be explicitly stated in the passage. In fact, the first sentence of the introductory material states: “Earthquakes occur when rocks under stress suddenly fracture....” Therefore, stress on rocks, (B), is the most direct cause of the rock fractures that cause earthquakes. (A) is wrong because the rocks under stress are plate rocks, and even deep earthquakes occur above 760 km, not at the core. (C) is wrong because the deep earthquakes are caused by the heating, not the cooling, of plate rocks. Finally, (D) is not mentioned in the passage.
22. **(J) Science/Conflicting Viewpoints/Application.** Again, as noted in the explanations to items #17 and #20, both scientists agree that the subducted plate rocks heat relatively slowly. This is a key assumption in the viewpoints of both scientists. If, as this item stem stipulates, it were learned that this heating occurs instantaneously, then both viewpoints would be considerably weakened, as (J) states.

23. **(B) Science/Conflicting Viewpoints/Analysis.** The first sentence of Scientist 2’s viewpoint states that olivine “changes to a denser mineral called spinel...” Therefore, since spinel is denser than olivine, a spinel sample will have greater mass than an olivine sample of similar size and shape. Therefore, (B) is the correct answer.
24. **(G) Science/Research Summary/Analysis.** In Experiment 3, three different spring-loaded toys were dropped to see how high each one would bounce. (F) is incorrect, because, according to Table 3, the toys rebounded to different heights. Both (H) and (J) are incorrect, because, according to the description of the experiment, the three toys had “the same mass but springs with different stiffnesses.” Therefore, the correct answer must be (G): the springs stored different amounts of potential energy to be converted back into kinetic energy.
25. **(D) Science/Research Summary/Analysis.** This item asks us to assume that Point C is raised to the same height as Point A, and then asks, “Would a cart released from Point A reach Point C?” The answer is “no.” As the overview of the experiments states, friction causes objects in motion to lose total mechanical energy. Experiment 2 specifically states that the carts “were placed on a track in the presence of air.” At the very least, this experiment includes air resistance, so some energy would be lost from the system making it impossible for the cart to roll back to its original height in any of the trials, (D).
26. **(F) Science/Research Summary/Comprehension.** According to the overview of the experiments, total mechanical energy is the sum of PE (potential energy) and KE (kinetic energy). In Trial 4, at $h=1.0$ m, $PE + KE = 19.6 \text{ J} + 0.0 \text{ J} = 19.6 \text{ J}$, and at $h = 0.0$ m, $PE + KE = 0.0 \text{ J} + 19.6 \text{ J} = 19.6 \text{ J}$. Therefore, total mechanical energy is conserved in Trial 4, (F). Trial 6 in Experiment 2 shows a loss of 0.2 J. Trials 8 and 10 in Experiment 3 show losses of energy because the toys do not rebound to the original height of 1.0 m.
27. **(B) Science/Research Summary/Analysis.** According to Experiment 1, PE is greatest when the height is greatest and least when the height is least. So, the correct answer is a graph that shows PE increasing as the height increases. (B) correctly illustrates this linearly increasing relationship between PE and height. (A) incorrectly shows PE as constant regardless of height. (C) incorrectly shows PE decreasing as height increases. (D) incorrectly shows PE exponentially decreasing as height increases.
28. **(H) Science/Research Summary/Comprehension.** In Experiment 1, the students conducted three trials with a 1-kg sphere and a fourth trial with a 2-kg sphere. This suggests that the students wanted to investigate the impact of mass on total mechanical energy, as (H) states.
29. **(D) Science/Research Summary/Analysis.** As noted in the explanation to item #24, the toys lost energy. This is why they did not rebound to the original height of 1.0 m. If no mechanical energy were lost, then all the toys in Experiment 3, including Trial 9, would have rebounded to the original height of 1.0 m.
30. **(G) Science/Data Representation/Comprehension.** As Table 4 makes clear, the superscripts indicate how many electrons are present in each sublevel. Only (G), $1s^2 2s^2 2p^6 3s^1$, shows 11 electrons: $2 + 2 + 6 + 1 = 11$.
31. **(C) Science/Data Representation/Analysis.** Table 3 provides the order in which the sublevels are filled. Since sublevels must be filled in order, each successive sublevel must have 2 electrons before an electron is added to the next sublevel:

$$1s = 1 \times 2 = 2$$

$$2s = 1 \times 2 = 2$$

$$2p = 3 \times 2 = 6$$


$$3s = 1 \times 2 = 2$$

$$\underline{\hspace{1.5cm}} \quad 3p = 3$$

$$\text{Total} = 15$$

Therefore, an atom with 15 electrons has 3 electrons in the 3p sublevel.

32. **(G) Science/Data Representation/Analysis.** An atom with 3 electrons has 2 in sublevel $1s$ and 1 in sublevel $2s$. As electrons are added, sublevel $2s$ will be the first sublevel filled and will take one more electron. The other atoms will be distributed according to the order given in Table 3. So, the number of electrons in $1s$ remains constant at 2—(G) is correct and (F) is wrong. And the number in $2s$ increases—both (H) and (J) are wrong.
33. **(D) Science/Data Representation/Analysis.** While it is possible to use the first three tables to determine the answer to this item, Table 4 provides everything needed. The last line describes the distribution of electrons in an atom with 22 electrons. So, the only difference between the atom described in line four of Table 4 and the atom described in the item stem is a single electron in $3d$. According to the last line of Table 4: $2s$ has 2 electrons while $2p$ has 6—eliminate (A); $2p$ has 6 electrons while $3p$ has 6—eliminate (B); $3s$ has 2 electrons while $4s$ has 2—eliminate (C); and $4s$ has 2 electrons while $3d$ has only 1. Therefore, (D) is the correct choice.
34. **(G) Science/Data Representation/Application.** According to the stem, vanadium behaves normally, so with 23 electrons, it should have 2 electrons in $4s$ and 3 electrons in $3d$. Chromium deviates from this distribution by having 1 fewer electron in $4s$ and 2 additional electrons in $3d$. Therefore, chromium has an electron distribution best represented by the notation in (G): $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$.
35. **(D) Science/Research Summary/Comprehension.** The phrase “according to” makes this item a Comprehension item, so the answer will be explicitly stated in the passage. In fact, the stem tells you where to look: “Carbon content” in Table 1. The carbon content of leaf compost was 94 kg/m^3 ; the carbon content of straw was 31 kg/m^3 . Since 94 is about 3 times 31, the correct answer is (D).
36. **(G) Science/Research Summary/Comprehension.** This item asks you to convert to bar graph format the information contained in Figure 2 for a 40 cm column depth. The solution to this item is much faster if you use partial information to eliminate the wrong choices. In Figure 2, hay has a S^{2-} concentration of 0 at 40 cm depth, so eliminate both (F) and (J). In order to choose between (G) and (H), notice that the only difference between these two graphs is the leaf compost bar. In Figure 2, leaf compost has a S^{2-} concentration of less than 10, so (H) cannot be the correct graph. By process of elimination, (G) is the correct graph.

 The process of elimination (POE) is a powerful test-taking strategy and a useful way to reduce the time it takes to answer an item.

37. **(D) Science/Research Summary/Analysis.** The footnote to Table 1 gives the ratio of straw to manure and hay to manure as 1:2 by dry weight. This means that two-thirds of the straw and manure mixture dry density measurement (171 kg/m^3) would be manure and two-thirds of the hay and manure mixture dry density measurement (248 kg/m^3) would be manure. To summarize, the dry densities of the manure are as follows:

$$\text{Straw and manure} = 171 \text{ kg/m}^3, \text{ so manure} = \frac{2}{3}(171 \text{ kg/m}^3) = 114 \text{ kg/m}^3$$

$$\text{Hay and manure} = 248 \text{ kg/m}^3, \text{ so manure} = \frac{2}{3}(248 \text{ kg/m}^3) \approx 165 \text{ kg/m}^3$$

These values are not less than the dry density of straw (68 kg/m^3), so eliminate (A). These values are also more than the dry density of hay (92 kg/m^3), so eliminate (B) and (C). Therefore, the correct answer must be (D). And indeed, both of these values for the dry density of manure are greater than the dry density of hay.

38. **(H) Science/Research Summary/Analysis.** The hypothesis to be tested is whether or not the material with the highest carbon content, which is “leaf compost” (94 kg/m^3), generated the most S^{2-} by Day 50. Look to the first

column of Table 2: leaf compost actually has the lowest reading for S^{2-} . So, (H) is the correct choice. (J) is wrong because leaf compost has a higher carbon content than hay and manure. (F) is wrong because leaf compost had the smallest, not largest, reduction of SO_4^{2-} to S^{2-} . And (G) is wrong because, as noted, hay and manure did not have the highest carbon content of the materials tested.

39. **(A) *Science/Research Summary/Analysis.*** According to the introductory material, “oxygen poor conditions are required for the reduction process.” Therefore, circulating oxygen through the straw would retard the reduction process and result in lower S^{2-} readings. So, the S^{2-} concentration reading for straw at Day 100 would have been less than 60 ppm, (A).
40. **(J) *Science/Research Summary/Analysis.*** The design of Study 2 used an aqueous solution with a concentration of 100 ppm of S^{2-} and a pH of 6.5. The researchers evidently assumed that this conditions accurately reflected those found in acid mine drainage (AMD), (J).