ACT®
(Form Code 1165D)

Cambridge Navigator Plus:
The Complete Explanation Guide
to the ACT, Inc. ACT Practice Exam

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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.

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

5. **Pay attention to item categories.** Each item in this Navigator packet includes a category path that corresponds to the course concept outline in your *Victory* text as well as the categories listed in the Item Index of your *Victory* text. Use the Item Index to identify items students can use for further practice.
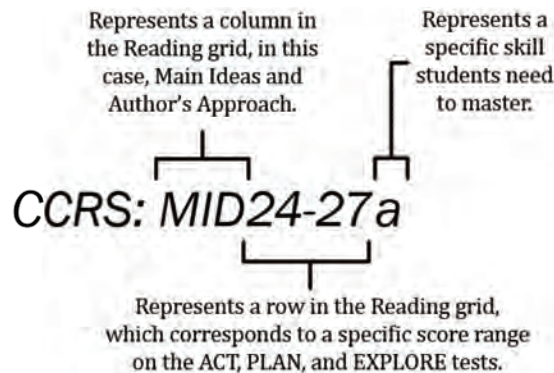
Category Paths, College and Career Readiness Standards, and Common Core State Standards

Throughout these explanations, each item is categorized in three ways.* First, each explanation includes a **Cambridge Category Path** which links the item to the Course Concept Outline in Cambridge's *Victory* series. For example:
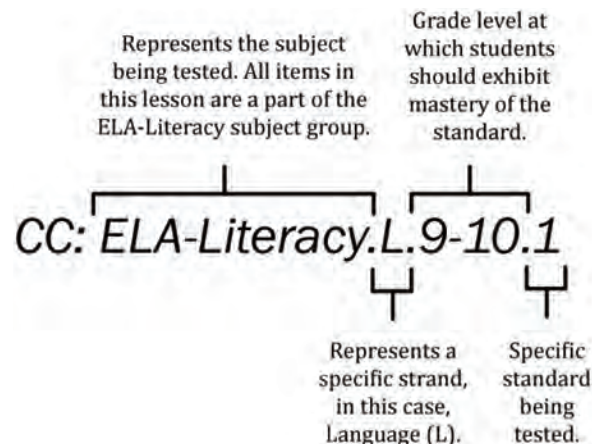
Mathematics/Geometry/Triangles/Pythagorean Theorem

An item with this particular category path is found in the Mathematics Test (based on Level 1 of the category path, mathematics) and tests students' knowledge of geometry (Level 2 of the category path), more specifically of triangles (Level 3), and even more specifically of the Pythagorean theorem (Level 4). The *Victory* Mathematics Lesson includes a section on the Pythagorean theorem, which you can find by referencing the Course Concept Outline at the beginning of the mathematics section in the *Victory* book. Additionally, you can find items testing geometry, triangles, or the Pythagorean theorem using the Item Index at the end of the *Victory* Student Text and Teacher's Guide.

Second, each explanation includes a **College and Career Readiness Standard (CCRS)** that references a specific standard in the College and Career Readiness Standards grid. College and Career Readiness Standards were developed by ACT, Inc. to indicate the skills represented within given score ranges. See the tables on the next page for an outline of the entire test sorted into the College and Career Readiness Standards. Here is an example of a College and Career Readiness Standard reference:

Represents a column in the Reading grid, in this case, Main Ideas and Author's Approach.

Represents a specific skill students need to master.

CCRS: MID24-27a

Represents a row in the Reading grid, which corresponds to a specific score range on the ACT, PLAN, and EXPLORE tests.

Third, most explanations include a **Common Core Skill (CC)** which references a specific standard in the Common Core State Standards Initiative that the item tests.* Here is an example of a Common Core skill reference:

Represents the subject being tested. All items in this lesson are a part of the ELA-Literacy subject group.

Grade level at which students should exhibit mastery of the standard.

CC: ELA-Literacy.L.9-10.1

Represents a specific strand, in this case, Language (L).

Specific standard being tested.

*Not every item corresponds directly to a Common Core State Standard. In such cases, a Common Core State Standard will not be listed.

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NOTE: Some of the items do not have an equivalent Common Core State Standard. Only the College and Career Readiness Standard will be listed for such items.

Test 1: English

1. **(B)** *English/Rhetorical Skills/Strategy/Appropriate Supporting Material.* **CCRS: WC 20–23b. CC: ELA-Literacy.L.9–10.3.** Since the item asks for the alternative to the underlined portion that would be LEAST acceptable, you know right away that the underlined portion and three of the four alternatives would be acceptable in this particular context.

   TIP Remember to read the item stem carefully. You may find it a good idea to circle thought-reversers such as "NOT" and "LEAST."

   When the author says that he or she is on the hunt for morel mushrooms at "every free moment," this expression is intended in a very non-specific and all-consuming sense. So, the answer choice that would be LEAST acceptable in this case is (B), which refers to "vacation time slots." Such available time is specific to and contingent upon the author's work schedule, but that is irrelevant to the topic of discussion.

   As for the remaining answer choices, the ideas of "free time, " "leisure time," and "time…set aside" all capture the author's intended meaning.

2. **(F)** *English/Usage and Mechanics/No Change.* **CCRS: COP 20–23b. CC: ELA-Literacy.L.9–10.2.** This item tests comma usage, as indicated by the answer choices. Notice that each of the three alternative constructions is worded in exactly the same way as the original, with the only difference being that each of the alternative constructions inserts one or more unnecessary commas.

   In (G) and (H), inserting a comma between "about" and "imaginary" disrupts the logical flow of the sentence, and also in (H), inserting a comma between "creatures" and "but" is inappropriate when the conjunction introduces a dependent clause ("about deliciously real morel mushrooms"). Remember that a comma should be used before a coordinate conjunction when that conjunction joins together two independent clauses. Finally, in (J), setting off a coordinate conjunction with a pair of commas is simply incorrect punctuation. Thus, (F) is the only choice without an error and so is correct.

3. **(D)** *English/Rhetorical Skills/Strategy/Appropriate Supporting Material.* **CCRS: TOD 20–23b. CC: ELA-Literacy.L.9–10.3.** Stating that each of the answer choices is true, this item then asks you to choose the option that provides the most specific information describing the *appearance* (key word) of a morel mushroom. Of all the answer choices, (D) provides three adjectives that do just that: "sand-colored," "cone-shaped," and "spongelike."

   (A) and (C) are wrong because the adjectives "edible" and "odorless" do not describe appearance. Additionally, the descriptors "funny-looking," "textured," and "unusually shaped" are vague.

   As for (B), while the appearance of a mushroom could be described as "earthy," "oddly amusing," and "interesting-looking," these adjectives do not provide very specific details that are helpful to the reader.

4. **(H)** *English/Usage and Mechanics/Grammar and Usage/Pronoun Usage.* **CCRS: COU 24–27a. CC: ELA-Literacy.L.11–12.1.** The original suffers from a shift in pronoun usage. The author uses the second-person pronouns "you" and "your" (possessive) in the first part of the related sentence, so the third-person noun "person" in the underlined portion creates an inconsistency. The only way to solve the

problem of the original is to maintain the use of the second-person pronoun throughout the sentence. So, (H) is the correct answer choice.

As for (G), the third-person noun "morel hunter" fails to address the issue of the original.

And (J) is wrong because deleting the underlined portion would result in a sentence fragment.

5. **(A)** *English/Rhetorical Skills/No Change.* **CCRS: TOD 20–23b. CC: ELA-Literacy.L.9–10.3.** Just as with item #3, this item states that each of the answer choices is true and then asks you to choose the option that provides the most specific information relevant at the given point in the passage. Of all the answer choices, the original best satisfies this condition by specifically describing the nature of the materials that the author read to learn more about morel hunting. As for the remaining answer choices, they fail to detail *what* the author read but instead describe *when* ("between trips to and from the woods"), *why* ("to gain…expertise"), and *how* ("very carefully") he or she read.

6. **(J)** *English/Rhetorical Skills/Style/Conciseness.* **CCRS: WC 16–19a. CC: ELA-Literacy.L.9–10.3.** The problem with this item is that the phrase "to get ready" is redundant of the noun "preparation." (J) addresses the problem of redundancy by simply omitting the underlined portion. As for (G) and (H), not only do these options fail to eliminate the redundancy of the original but they are also needlessly wordy and awkward.

7. **(D)** *English/Rhetorical Skills/Strategy/Effective Transitional Sentence.* **CCRS: ORG 20–23c. CC: ELA-Literacy.L.9–10.3.** This item asks for an effective transitional sentence that offers the most logical connection between the third and fourth paragraphs. In the third paragraph, the author discusses what he or she learned about morel hunting from firsthand experience and reading informative field guides. Then, in the fourth paragraph, the author goes on to say that he or she is going to join a morel hunting contest. So, the idea that the author could apply his or her recently acquired knowledge to such an activity, (D), would be the best way to begin the fourth paragraph.

(A) is wrong because any mention of field guide selection would neither be appropriate at this point in the passage nor provide an effective transition between the two paragraphs. Such a statement might work in the middle of the third paragraph immediately following the sentence that mentions field guides.

(B) is wrong because the only mention of morel mushrooms as a food occurs in the second paragraph ("edible fungi" and "fry up for dinner").

As for (C), this reference to outdoor activities may relate to the morel hunting contest, but it is really too general a remark and does not contribute to the flow of the passage.

8. **(H)** *English/Usage and Mechanics/Sentence Structure/Comma Splices.* **CCRS: SSF 16–19a. CC: ELA-Literacy.L.9–10.1.** The original is wrong because a comma cannot be used to join two independent clauses. In such a situation, either the independent clauses would need to be joined by a semicolon or the complete construction in question would need to be broken up into two separate sentences. (H) is the correct answer choice because it fulfills the latter of these two options.

(G) is wrong because having no punctuation at all results in a run-on sentence.

As for (J), the conjunction "because" introduces a logical relationship between the first and second parts of the sentence that is inappropriate in this context.

9. **(B)** *English/Usage and Mechanics/Sentence Structure/Unintended Meanings.* **CCRS: SSF 20–23a. CC: ELA-Literacy.L.9–10.1.** When reviewing a sentence, remember that you should always ask yourself if the ideas or actions being described are logically accurate and/or possible. As written, the sentence in

question seems to be saying that 3,000 morels became the author's hero. This is obviously not the author's intended meaning. Instead, he or she means to say that the participant who found the 3,000 morels became the author's hero. (B) solves the problem of the original by creating two sentences, the latter of which clearly makes this point.

(C) is wrong because it results in a comma splice.

(D) suffers from the same problem as the original.

10. **(J)** *English/Usage and Mechanics/Punctuation/Commas.* **CCRS: COP 20–23b. CC: ELA-Literacy.L.9–10.2.** The original is wrong because the comma interrupts the logical flow of the sentence. Since the gerund phrase "Keeping silent about your favorite spots" is the subject of the verb "is," these two elements of the sentence should not be separated by a comma. (J) addresses this issue by eliminating the comma. As for (G) and (H), both of these options place undue emphasis on simply "keeping silent" when it is "keeping silent about your favorite spots" that is of specific significance.

11. **(C)** *English/Rhetorical Skills/Strategy/Appropriate Supporting Material.* **CCRS: TOD 20–23b. CC: ELA-Literacy.L.9–10.3.** Stating that each of the answer choices is true, this item then asks you to choose the option that provides the most specific information regarding two requirements for finding morel mushrooms. Of all the answer choices, (C) is the only option that provides two very specific requirements: "patience" and "concentration."

(A) and (B) are wrong because they are both general and vague, referring only to "two things" and "two skills."

As for (D), while finding morels may require a certain degree of skill approaching "expertise," this option does not describe those specific skills that are needed.

12. **(H)** *English/Usage and Mechanics/Grammar and Usage/Diction.* **CCRS: COU 16–19b. CC: ELA-Literacy.L.9–10.1.** The original is wrong because it suffers from wrong word choice. The phrase "paler then" is non-idiomatic or not acceptable standard written English. Instead, the conjunction "than" must be used with the comparative adjective "paler" to introduce the comparison between a morel and an average pinecone. So, (H) is the correct answer choice.

(G) is wrong because it fails to address the issue of the non-idiomatic expression.

And (J) is wrong because the adjective "pale" by itself does not satisfy the comparative construction.

13. **(A)** *English/Usage and Mechanics/No Change.* **CCRS: COU 28–32a. CC: ELA-Literacy.L.11–12.1.** This item deals with pronoun usage. The original is correct because the singular possessive pronoun "its" refers to the singular antecedent "morel."

(B) is wrong because "it's" is the contraction for "it is," which is grammatically incorrect in this context. Remember that the contraction "it's" and the possessive pronoun "its" are commonly confused words.

(C) is wrong because the plural possessive pronoun "their" does not agree in number with the singular noun "morel."

And (D) suffers from the same problem as does (B); the adverb "there" and the pronoun "their" are commonly confused words, and neither of them are appropriate in this context.

14. **(G)** *English/Rhetorical Skills/Strategy/Effective Transitional Sentence.* **CCRS: ORG 24–27a. CC: ELA-Literacy.L.11–12.3.** At the beginning of a sentence, the adverb "however" is used to introduce an idea that contrasts with what is expressed in the previous sentence. In this case, though, the related sentence *reinforces* the idea of camouflage that is expressed in the previous sentence ("blends perfectly into its

natural surroundings" and "you can look right at one and not see it"). (G) solves the problem of the original by simply removing the transitional term altogether.

(H) suffers from the same problem as the original; the transitional phrase "on the other hand" introduces a reversal of thought.

As for (J), the phrase "back and forth" not only fails to set up a logical transition but also does not make sense in this context.

15. (B) *English/Usage and Mechanics/Sentence Structure/Comma Splices.* CCRS: SSF 16–19a. CC: ELA-Literacy.L.9–10.1. Just as with item #8, this item is wrong because a comma cannot be used to join two independent clauses. In such a situation, either the independent clauses would need to be joined by a semicolon or the complete construction in question would need to be broken up into two separate sentences. (B) is the correct answer choice because it fulfills the latter of these two options.

(C) does absolutely nothing to address the issue of the comma splice.

As for (D), while this option removes the offending comma, replacing the contraction "that's" with the conjunction "and" fails to sustain the author's intention of expressing two independent clauses.

16. (G) *English/Usage and Mechanics/Sentence Structure/Fragments.* CCRS: SSF 20–23a. CC: ELA-Literacy.L.9–10.1. The original is wrong because it results in a construction that lacks a main verb and therefore is a sentence fragment. Remember that nonrestrictive phrases or clauses are set off with two commas. While the pronoun "which" (referring to "monarch butterfly") suggests that it is meant to introduce a nonrestrictive element, you will notice that this element is set off with only one comma and is in fact essential to the meaning of the sentence. (G) solves the problem of the original by making "is" the main verb of the sentence.

(H) fails to address the issue of the main verb.

(J) is wrong because the comma disrupts the logical flow of the sentence, separating the subject from the verb.

17. (D) *English/Usage and Mechanics/Grammar and Usage/Adjectives versus Adverbs.* CCRS: COU 16–19a. CC: ELA-Literacy.L.9–10.1. The original is wrong for two reasons: the phrase "most easiest" is a redundant and incorrect superlative adjective, and an adjective cannot be used to modify the adjective "recognized." (D) is the only answer choice that addresses these issues; it provides the adverb phrase "most easily" to modify the adjective "recognized." As for (B) and (C), they offer incorrect variations on the superlative adjective that is suggested in the original.

18. (H) *English/Rhetorical Skills/Style/Conciseness.* CCRS: WC 16–19a. CC: ELA-Literacy.L.9–10.3. The problem with this item is that the phrase "an extended flight" is redundant of "long journey." (H) addresses the problem by eliminating the redundant phrase and then ending the sentence with a period.

As for (G) and (J), "far-reaching" and "encompasses many miles," respectively, are synonymous with "long journey" and therefore fail to eliminate the redundancy.

19. (D) *English/Usage and Mechanics/Punctuation/Commas.* CCRS: COP 16–19b. CC: ELA-Literacy.L.9–10.2. The original is wrong because the comma disrupts the logical flow of the sentence, separating the subject ("monarchs") from its verb ("migrate"). (D) solves the problem of the original by simply eliminating the offending comma.

(B) suffers from the same problem as the original.

And (C) is wrong because it makes nonrestrictive the clause "of the Rocky Mountains," which is essential to the meaning of the sentence.

20. **(F)** *English/Usage and Mechanics/No Change.* **CCRS: SSF 13–15a. CC: ELA-Literacy.L.8.2.** This item deals with the use of correct subordination. As written, the conjunction "where" properly designates location as it relates to the monarchs' migration destination.

    (G) is wrong because replacing the conjunction with the adverb "there" creates a second independent clause and results in a comma splice.

    (H) is wrong because it does not make sense to say that monarchs migrate at the very same time ("while") that they overwinter in eucalyptus groves.

    And (J) is wrong for the same reason that (G) is wrong; deleting the underlined portion results in a comma splice.

21. **(B)** *English/Rhetorical Skills/Strategy/Effective Transitional Sentence.* **CCRS: ORG 24–27a. CC: ELA-Literacy.L.11–12.3.** The original is wrong because the adverb "besides" does not provide the appropriate logical transition in this context. The adverb "besides," meaning "in addition to," is used to introduce an idea that reinforces what is expressed in the previous sentence. In this case, however, there is a *contrasting* of ideas between the two relevant sentences. The sentence in question describes the behavior of *most* monarchs, and the previous sentence describes the behavior of those monarchs west of the Rocky Mountains. (B) solves the problem of the original by replacing "besides" with "however," an adverb that sets up the correct relationship between these two ideas. (C) and (D) are wrong because these adverbs do not provide the needed transition; "finally" suggests the last in a sequence of events, and "therefore" is used to introduce a consequence.

22. **(G)** *English/Usage and Mechanics/Punctuation/Dashes.* **CCRS: COP 24–27a. CC: ELA-Literacy.L.11–12.2.** Remember that dashes can be used like commas to set off an explanatory group of words. The difference is a matter of emphasis. Dashes mark a more dramatic shift or interruption of thought. Do not, however, mix dashes and commas. The original is wrong for this very reason. (G) solves the problem of the original by replacing the comma with a dash in order to complete the pair.

23. **(B)** *English/Usage and Mechanics/Grammar and Usage/Diction.* **CCRS: COU 16–19a. CC: ELA-Literacy.L.9–10.1.** The original is wrong because "insufficiently…than" is a non-idiomatic expression. The correct idiomatic expression is "less…than": "Monarchs have smaller bodies and less developed nervous systems than migratory birds." So, (B) is the correct answer choice. (C) and (D) are wrong because the issue is not one of adjectives versus adverbs but one of choosing the correct adverb to complete the idiomatic expression. The adjectives "insufficient" and "inadequate" cannot be used to modify the adjective "developed."

24. **(F)** *English/Usage and Mechanics/No Change.* **CCRS: WC 13–15a. CC: ELA-Literacy.L.8.3.** This item deals with parallelism. As written, the elements in the series are presented in parallel noun form: "design," "vision," and "ability."

    (G) is wrong because it interferes with the parallelism by introducing a verb ("regulating") into the series, obscures the author's intended meaning with regard to birds' ability, and results in an awkward sentence.

    (H) is wrong because it disrupts the series of features by replacing the conjunction "and" with the preposition "with" and results in an awkwardly passive construction.

    As for (J), not only is the resulting construction awkward but it is "the ability to regulate body temperature" and not "the regulation of body temperature" that is a feature of birds. The latter is not the feature itself but the result of having this feature.

25. (C) *English/Rhetorical Skills/Organization/Paragraph-Level Structure.* CCRS: ORG 28–32b. CC: ELA-Literacy.L.11–12.3. This item asks you to determine at what point the paragraph should be divided so that the author may signal the shift in focus from monarchs' migrating habits to differences between monarchs and migratory birds. The first mention of migratory birds is in the fourth sentence, which makes explicit reference to two differences between monarchs and migratory birds. So, (C) is the correct answer choice.

26. (F) *English/Usage and Mechanics/No Change.* CCRS: COP 24–27c. CC: ELA-Literacy.L.11–12.2. This item tests apostrophes and comma usage, as indicated by the alternatives to the original. As written, the plural noun "sites" describes to where the researchers hiked on the Mexican Plateau.

(G) and (H) are wrong because they offer singular and plural possessive forms of the noun "site" in a situation where possession is inappropriate.

And (J) is wrong because the comma immediately following "sites" makes nonrestrictive an element of the sentence that is restrictive ("on the Mexican Plateau").

27. (C) *English/Rhetorical Skills/Strategy/Effective Transitional Sentence.* CCRS: WC 20–23c. CC: ELA-Literacy.L.9–10.5. This item requires that you choose the subordinating conjunction that expresses the appropriate logical relationship between the first and second parts of the sentence. Since the sentence describes the difference between the duration of non-migratory and migratory monarch life cycles ("only four to six weeks" versus "at least eight months"), a subordinating conjunction that indicates a contrast must be used. (C), "while," is the only answer choice that satisfies this condition. As for the remaining answer choices, they all provide subordinating conjunctions that indicate a logical extension.

28. (J) *English/Usage and Mechanics/Punctuation/Semicolons.* CCRS: COP 24–27d. CC: ELA-Literacy.L.11–12.2. The original is wrong because a semicolon cannot be used between a dependent clause and an independent clause. Remember that semicolons are used between two independent clauses that are closely related. Instead, a comma must be used between a dependent clause and an independent clause. So, (J) is the correct answer choice. As for (G) and (H), both of these options result in incomplete sentences, the former consisting of a long dependent clause and the latter consisting of two dependent clauses joined together by a coordinating conjunction. In both cases, the resulting constructions lack an independent clause and therefore a main verb.

29. (C) *English/Usage and Mechanics/Sentence Structure/Faulty Parallelism.* CCRS: SSF 24–27a. CC: ELA-Literacy.L.11–12.3. Just as with item #24, this item deals with parallelism. The original is wrong because the noun "migration" is not parallel with the verbs "hatch" and "feed" that make up the other elements in the series. (C) addresses this issue by using the verb "continue" to maintain parallelism while still expressing the author's intended meaning. As for (B) and (D), the present participle verb form ("continuing") is inconsistent with the already used root verb forms ("hatch" and "feed"); additionally, these two options result in awkward constructions.

30. (H) *English/Rhetorical Skills/Strategy/Main Idea* and *Effective Concluding Sentence.* CCRS: ORG 24–27c. CC: ELA-Literacy.L.11–12.3. This item deals with identifying the main idea of the passage because it asks you to conclude the passage with a statement that supports one of the author's main points. (H) is the only answer choice that addresses one of the main points, which is that researchers hope to solve the mysteries of the monarch migration. This central theme can be confirmed in the last sentence of the first paragraph: "Monarchs are particularly fascinating because they are one of the few migratory butterfly species in North America."

As for (F), while the idea that researchers are ready to move ahead is suggestive of a promising outlook, it serves as a concluding thought to the passage and nothing more.

(G) and (J) are wrong because the ideas of using new research tools and sharing knowledge are merely supporting details mentioned in the final paragraph to the author's main concern.

31. **(D)** *English/Rhetorical Skills/Style/Conciseness.* **CCRS: TOD 16–19b. CC: ELA-Literacy.L.9–10.3.** The original is wrong because the material that follows the comma is unnecessary information that makes the sentence needlessly wordy. Historians believe that the yo-yo is one of the world's oldest toys, and the passage proceeds to elaborate on its history. That researchers know for certain that the doll is in fact the world's oldest toy is irrelevant to what is discussed in the passage. (D) solves the problem of the original by eliminating the superfluous material and then ending the sentence with a period.

While (B), too, is needlessly wordy, it is also unnecessary to say that "it is hard to know for sure" whether the yo-yo is one of the world's oldest toys since it has already been established earlier in the sentence that historians speculate this to be true.

And as for (C), this option is not only needlessly wordy but also introduces a statement about ancient terra cotta yo-yos that seems out of place and has no real logical connection to the author's intended meaning.

32. **(J)** *English/Rhetorical Skills/Style/Clarity of Meaning.* **CCRS: WC 24–27c. CC: ELA-Literacy.L.11–12.6.** The original is wrong because it is not clear as to what types of drawings adorn ancient Greek vases and the walls of Egyptian temples. Such a non-specific statement seems to have no relationship at all to what has been mentioned in the first sentence of the paragraph and as a result is ambiguous. Notice also that the author makes reference to "written mention of yo-yos" later in this sentence. Since the topic of discussion is yo-yos, it would make sense that these drawings of objects resemble the toy. So, (J) is the correct answer choice. As for (G) and (H), both of these options are awkward and unnecessarily wordy. Additionally, (G) results in a change of voice that is inconsistent with the rest of the passage, and (H) includes a phrase that is exceptionally redundant ("almost slightly resemble").

33. **(B)** *English/Rhetorical Skills/Strategy/Effective Transitional Sentence.* **CCRS: WC 20–23c. CC: ELA-Literacy.L.9–10.5.** The original is wrong because the conjunction "if" expresses a conditional relationship that is inappropriate in this context. Instead, the coordinating conjunction "and" is required to join together the two independent clauses because they are of equal importance (pictorial and written examples of the yo-yo). So, (B) is the correct answer choice. As for (C) and (D), the conjunctions "since" and "because" both suggest a causal relationship that is out of place here.

34. **(F)** *English/Rhetorical Skills/No Change.* **CCRS: TOD 20–23b. CC: ELA-Literacy.L.9–10.3.** This item deals with identifying appropriate supporting material. To say that yo-yos "have been a national pastime for centuries" is certainly evidence of the long history of enthusiasm for the yo-yo in the Philippines.

While (G) seems like a viable option, years do not provide nearly as effective evidence of a long history as do centuries.

(H) is wrong because the materials from which yo-yos were carved say nothing about their longtime popularity in the Philippines.

Finally, as for (J), that yo-yos in the Philippines resembled a toy from ancient China says nothing about their enduring place in Filipino history.

35. **(A)** *English/Usage and Mechanics/No Change.* **CCRS: COU 20–23a. CC: ELA-Literacy.L.9–10.1.** This item deals with diction, specifically with regard to preposition use. Remember that choosing the right preposition to use comes as a result of daily conversation and writing in standard written English. In this case, the correct idiomatic expression is "translates as 'come back'," with the preposition "as" indicating that something is described in a particular way. As for the remaining answer choices, each of them fails to function appropriately in this context.

36. (J) *English/Usage and Mechanics/Sentence Structure/Run-On Sentences.* **CCRS: SSF 16–19a. CC: ELA-Literacy.L.9–10.1.** Since the item asks for the alternative to the underlined portion that would NOT be acceptable, you know right away that the underlined portion and three of the four alternatives ARE acceptable.

TIP Remember to read the item stem carefully. You may find it a good idea to circle thought-reversers such as "NOT" and "EXCEPT."

In this case, the only answer choice that does <u>NOT</u> work is (J) because having no punctuation in this context results in a run-on sentence. As for the remaining answer choices, they all convey the author's intended meaning without resulting in an error of sentence structure.

37. (D) *English/Rhetorical Skills/Style/Conciseness.* **CCRS: WC 24–27a. CC: ELA-Literacy.L.11–12.6.** The original is wrong not only because it is awkward and needlessly wordy but also because the idea of substantially progressing is redundant of "a leap forward." (D) solves the problem of the original by eliminating the redundancy. (B) and (C) suffer from the same problem as does the original; "advanced…progressively making" and "jumped ahead" are redundant of "a leap forward." Additionally, (B) is as awkward and wordy as the original.

38. (F) *English/Usage and Mechanics/No Change.* **CCRS: SSF 16–19b. CC: ELA-Literacy.L.9–10.1.** This item deals with verb tense. Remember that the same verb tense should be used within a sentence or paragraph. The underlined portion is the past tense of "begin" ("began") and is consistent with the past tense verb "saw" that is used later in the sentence. In fact, events are described in the past tense throughout the entire passage.

(G) is wrong because the present tense verb "begins" is inconsistent with the already established past tense.

TIP When first reading an item, be alert to any opportunity to use the process of elimination as a way to help expedite the test-taking process.

Notice that only one of the answer choices is a correct verb form: "begins." (H) is wrong because the correct verb form is "had begun," not "begun." And (J) is wrong because the correct verb form is "began," not "had began."

39. (A) *English/Usage and Mechanics/No Change.* **CCRS: COU 28–32a. CC: ELA-Literacy.L.11–12.1.** This item deals with pronoun usage. More specifically, this item demands that you have an understanding of the difference between the subject and the object in a sentence. "Who" is a subject pronoun, while "whom" is an object pronoun. As for the original, the pronoun in this context needs to function as the subject of the verb "watched." So, the underlined portion is correct as written.

TIP If you are confused as to whether "who" or "whom" is the correct pronoun to use in a clause or sentence, test the material in question by replacing the given pronoun with alternative subject and object pronouns (e.g., "he/him" or "she/her"). Substituting pronouns that are easier to work with should make clear whether "who" or "whom" is appropriate. In this case, the clause "she watched" is correct, while the clause "her watched" is not.

(B) is wrong because, as already discussed, the object pronoun "whom" is inappropriate in this context.

(C) is wrong because "whose" is a possessive pronoun, and the situation does not call for possession.

As for (D), "who's" is the contraction for "who is," which is grammatically incorrect in this context. The contraction "who's" would change the author's intended meaning; the large crowd was not the object of observation but instead was observing the yo-yo demonstration.

40. **(J)** *English/Usage and Mechanics/Sentence Structure/Fragments.* **CCRS: SSF 28–32a. CC: ELA-Literacy.L.11–12.2.** Just as with item #36, pay attention to the thought-reverser "NOT," which in this case indicates that all but one of the answer choices are correct. The only answer choice that would <u>NOT</u> be acceptable is (J) because it results in a free-standing participle phrase and is therefore a sentence fragment. As for the remaining answer choices, they all convey the author's intended meaning without resulting in an error of sentence structure.

41. **(A)** *English/Usage and Mechanics/No Change.* **CCRS: SSF 20–23a. CC: ELA-Literacy.L.9–10.1.** This item deals with verb tense. As written, the present participle verb "demonstrating" is used correctly to introduce the descriptive participle phrase that is set off by the comma. While (B) and (C) offer viable phrasings, the comma that precedes the underlined portion would disrupt the logical flow of the sentence in both cases. And (D) is wrong because the conjunction "yet" suggests a reversal of thought that simply does not make sense.

42. **(H)** *English/Rhetorical Skills/Strategy/Appropriate Supporting Material.* **CCRS: TOD 16–19a. CC: ELA-Literacy.L.9–10.3.** This item asks you to identify what would be lost with the deletion of certain material. The sentence in question describes how Duncan demonstrated the yo-yo by having professionals perform tricks and hold contests around the country. Duncan did this as another way to promote the toy. So, (H) is the correct answer choice.

    (F) is wrong because that Duncan used more than one strategy does not at all suggest that he doubted his national advertising campaign or was uncertain in any way about how to promote the yo-yo.

    As for (G), while the sentence that follows ("Millions of the toys were sold.") might suggest that Duncan's use of professionals was an effective strategy, the sentence in question does nothing to suggest that the demonstrations were necessarily popular; it simply states that Duncan held them to promote the toy.

    (J) is wrong because the sentence states *that* (not *how*) professionals were chosen for the job of promoting the toy.

43. **(B)** *English/Usage and Mechanics/Punctuation/Commas.* **CCRS: COP 20–23b. CC: ELA-Literacy.L.9–10.2.** The original is wrong because the comma interrupts the logical flow of the sentence. Since the noun phrase "this most ancient of toys" is the subject of the verb "went," these two elements of the sentence should not be separated by a comma. (B) addresses this issue by eliminating the comma.

    (C) is wrong because the correct verb forms are "went" or "had gone," not "had went."

    As for (D), it fails to solve the problem of the original.

44. **(F)** *English/Usage and Mechanics/No Change.* **CCRS: COP 24–27b. CC: ELA-Literacy.L.11–12.2.** This item deals with when and when not to use certain punctuation. All of the alternatives to the original insert unnecessary punctuation that disrupts the logical flow of the sentence. A comma should not separate the noun "space shuttle" from its name ("*Discovery*"), and neither a comma nor a semicolon should be inserted immediately after "*Discovery*" because each results in separating the subject of the sentence ("Astronauts") from its verb ("demonstrated").

45. **(D)** *English/Rhetorical Skills/Organization/Passage-Level Structure.* **CCRS: ORG 24–27b. CC: ELA-Literacy.L.11–12.3.** This item demands that you have a grasp of the passage's overall structure, specifically as it relates to the chronological history of the yo-yo. The fourth paragraph begins with "The American craze for the toy began" and proceeds to reference Duncan's purchase of Flores's yo-yo company in 1932. The third paragraph describes events in the 1970s and in 1980. And the fifth paragraph begins by stating that the yo-yo went into space in 1985. So, the third paragraph should be placed between the fourth and fifth paragraphs, (D). As for (B) and (C), these relocations do not maintain the chronological order.

46. **(G)** *English/Usage and Mechanics/Grammar and Usage/Diction.* **CCRS: COU 24–27b. CC: ELA-Literacy.L.11–12.2.** The original is wrong because the phrase "would of" is a non-idiomatic expression or not acceptable standard written English. The correct verb form is "would have," but that is neither one of the answer choices nor appropriate in this context. Instead, the past perfect verb tense "had been" should be used to satisfy the description of Cox's training. So, (G) is the correct answer choice.

   (H) is wrong because the plural present perfect tense "have been" neither correctly places the action in time nor agrees in number with the singular pronoun "she."

   As for (J), just as with the original, the phrase "had to of" is a non-idiomatic expression.

47. **(B)** *English/Usage and Mechanics/Grammar and Usage/Pronoun Usage* and *Sentence Structure/Problems of Coordination and Subordination.* **CCRS: SSF 20–23a. CC: ELA-Literacy.L.9–10.1.** The original is wrong because the pronoun "which" does not have a clear referent and is inappropriate in joining together the two independent clauses in the sentence. As written, the sentence seems to say that Cox hoped that her preparations would pay off her training; and this neither makes sense nor is the author's intended meaning. Instead, the coordinating conjunction "and" is required to join together the two independent clauses because they are of equal importance. So, (B) is the correct answer choice. As for (C) and (D), both of these options result in a comma splice.

48. **(F)** *English/Usage and Mechanics/No Change.* **CCRS: COP 16–19b. CC: ELA-Literacy.L.9–10.2.** This item tests comma usage, as indicated by the answer choices. Notice that each of the three alternative constructions is worded in exactly the same way as the original, with the only difference being that each of the alternative constructions inserts one or more unnecessary commas. So, (F) is the correct answer choice.

   In (G), inserting a comma between "cold" and "lakes" separates the adjective from the noun that it describes; in (H), inserting a comma between "lakes" and "of" alienates the noun from the prepositional phrase that describes it; and in (J), inserting a comma between "New Hampshire" and "and" interferes with the compound object of the preposition "of."

49. **(B)** *English/Usage and Mechanics/Punctuation/Apostrophes.* **CCRS: COP 24–27c. CC: ELA-Literacy.L.11–12.2.** This item tests apostrophes and comma usage, as indicated by the alternatives to the original. The context calls for the plural form of the noun in question and not the possessive form; in this case, the plural form refers to more than one record for swimming the English Channel held by men and women. So, (A) and (C) can be eliminated. As for (D), the comma immediately following "records" separates the noun from the prepositional phrase that describes it ("for swimming the English Channel"). So, (B) is the correct answer choice.

50. **(J)** *English/Rhetorical Skills/Strategy/Appropriate Supporting Material.* **CCRS: TOD 28–32a. CC: ELA-Literacy.L.11–12.3.** This item asks whether the addition of certain material is appropriate at this point in the passage. The related paragraph begins by discussing how Cox grew up swimming in the cold lakes of New Hampshire and Maine and then goes on to say that she competed in the twenty-seven-mile English Channel swim. The additional sentence proposed by the author mentions that the English Channel spans 150 miles at its widest, which is not relevant to the description of Cox's swimming accomplishments. So, (J) is the correct answer choice.

   As for (F), the proposed sentence does not reinforce the point that Cox swam a great distance across the English Channel because she swam twenty-seven miles, not one hundred and fifty miles.

   (G) is wrong because the proposed sentence does not relate in any way to the rest of the paragraph, which goes on to describe other bodies of water in which Cox swam before going to Antarctica.

As for (H), the proposed sentence does not establish that Cox swam the English Channel but simply states a fact about its width.

51. **(B)** *English/Rhetorical Skills/Strategy/Appropriate Supporting Material.* **CCRS: TOD 20–23b. CC: ELA-Literacy.L.9–10.3.** This item asks you to determine Cox's attitude toward swimming. The original is wrong because it simply states that she was able to swim in open water. Of the alternatives to the original, (B) is the only option that captures how Cox actually felt about the activity: "She loved the challenge of open water…."

As for (C), the fact that Cox "had racked up many miles in" open water does not convey her attitude toward swimming.

Do not be distracted by (D); while being "astounded" could be considered an attitude, it describes the reaction of others who have observed Cox's accomplishments and not the attitude of Cox herself.

52. **(J)** *English/Usage and Mechanics/Sentence Structure/Comma Splices.* **CCRS: SSF 28–32a. CC: ELA-Literacy.L.11–12.2.** The original is wrong because it results in a comma splice. Remember that a comma splice results from the incorrect use of a comma to separate two or more independent clauses. (J) is the only alternative to the original that does not result in a comma splice; it changes the second part of the sentence into a dependent clause that provides additional information about the "twelve pounds" that Cox gained.

53. **(A)** *English/Rhetorical Skills/No Change.* **CCRS: ORG 24–27b. CC: ELA-Literacy.L.11–12.3.** This item deals with sentence-level structure, asking you to put the sentences in the paragraph in the most logical order. The original sequence of sentences is correct. The first sentence mentions that Cox required serious preparation in order to swim the Antarctic. The second sentence goes on to refer to "this athlete" (Cox) and how she studied Antarctic animals in order to prepare for the freezing temperatures. The third sentence describes how Cox grew her hair long to mimic the penguins' insulating double layer of feathers, and the fourth sentence describes how she gained twelve pounds to resemble the seals who rely on body fat to stay warm.

Notice that there is another logical sequence of sentences (1, 2, 4, 3), but it is not one of the given answer choices. What is most important in this paragraph is that the first two sentences remain just as they appear. As for the third and fourth sentences, since they both describe actions that Cox took in order to mimic Antarctic animals so as to prepare for the cold, they are potentially interchangeable.

54. **(H)** *English/Usage and Mechanics/Sentence Structure/Unintended Meanings.* **CCRS: SSF 20–23a. CC: ELA-Literacy.L.9–10.1.** The original is wrong because it results in an illogical construction that seems to describe "November 2002" as "a crew of physicians, sailors, and expedition experts." The author's intended meaning, however, is to say that Cox was joined by a crew on her journey to the Antarctic Peninsula. (H) solves the problem of the original by changing the nonrestrictive element into a prepositional phrase: "with a crew of…." (G) and (J) fail to address the issue of the personification of time.

55. **(C)** *English/Rhetorical Skills/Strategy/Appropriate Supporting Material.* **CCRS: TOD 24–27c. CC: ELA-Literacy.L.11–12.3.** Stating that each of the answer choices is true, this item then asks you to choose the option that offers a physical detail emphasizing that Cox was in a harsh environment. (C) is the only answer choice that satisfies this condition: "Bits of ice brushed against her arms and legs."

Do not be distracted by the original; while the underlined portion references "peril," no physical detail is mentioned.

As for (B) and (D), neither of these options makes reference to Cox's environment or a physical detail about the swim.

56. (G) *English/Rhetorical Skills/Style/Conciseness.* CCRS: WC 16–19a. CC: ELA-Literacy.L.9–10.3. The original is wrong because "fatigue" and "exhaustion" are a redundant pair of words. (G) addresses the issue of redundancy by simply changing the compound subject into the single noun "exhaustion." As for the remaining answer choices, not only do they fail to address the issue of redundancy but they also suffer from awkwardness and wordiness.

57. (C) *English/Usage and Mechanics/Grammar and Usage/Diction.* CCRS: COU 13–15a. CC: ELA-Literacy.L.8.1. The original is incorrect because it suffers from wrong word choice. The phrase "blue as" is non-idiomatic or not acceptable standard written English. The correct way to compose this comparative construction would be "as blue as," but this phrasing is not one of the given answer choices. Of the alternatives to the original, (C) is the only option that provides a grammatically correct construction. The conjunction "than" must be used with the comparative adjective "bluer" to introduce the comparison between different bodies of water. (B) and (D) both suffer from the common mistake of confusing the words "then" and "than."

58. (F) *English/Rhetorical Skills/No Change.* CCRS: WC 20–23b. CC: ELA-Literacy.L.9–10.3. This item deals with conciseness. The best way to approach this particular sentence is to read it aloud to yourself without including the explanatory material that is set off by dashes. By doing so, you will be able to recognize whether "back to normal" is the most accurate and concise description in this context:

"Cox knew, however, that the longer she stayed in the water, the longer it would take <u>to bring her body temperature…back to normal</u>."

After reading the abridged sentence, you should notice right away that (G) and (H) offer unnecessarily wordy versions of the original. (H) is also wrong because the phrase "in other words" suggests that the idea expressed in this sentence is referred to in some other way in the passage. As for (J), "bring…which" is a non-idiomatic expression.

59. (B) *English/Usage and Mechanics/Sentence Structure/Run-On Sentences.* CCRS: SSF 16–19a. CC: ELA-Literacy.L.9–10.1. Remember that you should be aware of sentences that carelessly run main clauses together without appropriate punctuation or connectors. In this case, end-stop punctuation is needed to divide the run-on sentence into two complete sentences. So, (B) is the correct answer choice. A clue to notice here is that the main clause "A mile was good enough" by itself has a clear connection to what is described in the previous sentence: the longer Cox stays in the frigid water, the longer it will take her to bring her body temperature back to normal. As for (C) and (D), both of these options result in a comma splice.

60. (J) *English/Rhetorical Skills/Strategy/Appropriate Supporting Material* and *Effective Concluding Sentence.* CCRS: TOD 20–23b. CC: ELA-Literacy.L.9–10.3. This item is similar to item #55. Stating that each of the answer choices is true, this item then asks you to choose the option that emphasizes the location and indicates the completion of Cox's feat. As a result, the last sentence in this final paragraph will effectively conclude the passage. The key words to focus on in this item stem are "location," which would be the Antarctic Peninsula, and "completion," which would refer to Cox finishing her swim.

As for (F), while it suggests location ("penguins"), the fact that Cox was a "great athlete" does not indicate that she completed the swim.

(G) fails to indicate completion ("toward the goal of the entire expedition"), and its reference to "birds" does not provide enough detail to suggest location.

(H), like (G), fails to indicate completion ("waters that truly tested Cox's ability to meet her goal"), and its reference to "wildlife" is equally vague as to location.

So, (J) is the correct answer choice: location ("penguins") and completion ("the last thrilling strokes").

61. **(C)** *English/Rhetorical Skills/Strategy/Appropriate Supporting Material.* **CCRS: WC 33–36a. CC: ELA-Literacy.L.11–12.4.** This item asks you to identify what would be lost with the deletion of certain material. After reading the entire first paragraph, you should notice right away that the phrase in question ("over some six decades") is redundant of the phrase "more than sixty years" found in the first sentence. Since redundancy is an error of concision, the phrase in question should be deleted. (C), therefore, is the correct answer choice.

    As for (D), while the length of Withers's career is not the focus of the passage, this is not the reason why the redundant phrase should be deleted.

    And as for (A) and (B), while the reference to the length of Withers's career is suggestive of his longevity and when he started working as a photojournalist, the phrase in question is nonetheless superfluous.

62. **(H)** *English/Usage and Mechanics/Sentence Structure/Fragments.* **CCRS: SSF 20–23a. CC: ELA-Literacy.L.9–10.1.** The underlined portion is unacceptable because it results in a free-standing participle phrase and is therefore a sentence fragment. (H) solves the problem of the original by correctly joining an introductory participle phrase ("Using the hometown as his base") to an independent clause ("the key people and events of….") with a comma. (G) suffers from the same problem as the original, and (J) results in two participle phrases joined together by a comma without a main verb to be found anywhere.

63. **(B)** *English/Rhetorical Skills/Strategy/Appropriate Supporting Material.* **CCRS: TOD 20–23b. CC: ELA-Literacy.L.9–10.3.** Stating that each of the answer choices is true, this item then asks you to choose the option that provides the most effective and specific support for the statement made in the preceding sentence. That sentence makes reference to the facts that Withers was an African American and familiar with the geography and people of the South. (B) is the only answer choice that provides specific details that are effectively supportive of these facts ("Memphis," "Negro Leagues," and "civil rights movement"). As for the remaining answer choices, they make very non-specific references to the significance of "[Withers's] world" and "this place" (referring to his hometown) without providing any descriptive details whatsoever.

64. **(H)** *English/Rhetorical Skills/Strategy/Effective Opening Sentence.* **CCRS: WC 20–23c. CC: ELA-Literacy.L.9–10.5.** Since this item asks for the alternative to the underlined portion that would be LEAST acceptable, you know right away that the underlined portion and three of the four alternatives would be acceptable in this particular context. The original and (J) use conjunctions to accurately indicate a sequence of events ("when" this happened, that happened and "after" this happened, that happened). (G) uses a conjunction to appropriately describe a causal relationship ("since" this happened, that happened). (H), however, uses the conjunction "as if" to make an awkward and illogical connection, suggesting that Withers taking the camera to school to photograph his classmates is "as [it would be] if" the boyfriend showed no interest in using the camera. So, (H) is NOT acceptable as an opening sentence to the paragraph.

65. **(A)** *English/Usage and Mechanics/No Change.* **CCRS: COU 20–23a. CC: ELA-Literacy.L.9–10.1.** This item deals with diction, specifically with regard to preposition use. In this case, the correct idiomatic expression is "in his youth," with the preposition "in" indicating *when* (the author's intended meaning) Withers started taking pictures. As for the remaining answer choices, each of them fails to function appropriately in this context: "with" suggests *what* Withers used to take pictures or *who* accompanied Withers when he took pictures; "of" suggests that Withers's youth was the object of his picture-taking; and "at" is simply an example of wrong word choice.

66. **(H)** *English/Rhetorical Skills/Style/Conciseness.* **CCRS: WC 16–19b. CC: ELA-Literacy.L.9–10.3.** The original is wrong because it results in an unnecessarily awkward and wordy construction. Instead, the underlined portion should be replaced with the preposition "as," which introduces Withers's employment role: self-employed photographer. So, (H) is the correct answer choice.

    (G) is wrong because "for himself as" is redundant of "self-employed."

As for (J), deleting the underlined portion results in a grammatically incorrect construction. The expression "he began working a new job" would be acceptable, but to specify the job role without using the preposition "as" would not be acceptable.

67. **(B)** *English/Rhetorical Skills/Organization/Sentence-Level Structure.* **CCRS: ORG 24–27b. CC: ELA-Literacy.L.11–12.3.** This item deals with sentence-level structure. In this case, the item asks you where the third sentence should be placed in the paragraph for the sake of logic and coherence. After reading the paragraph, you should notice that it offers historical details describing when and/or under what circumstances Withers took pictures over the years. Since the third sentence says that "Withers started taking pictures in his youth," it should be obvious that this sentence belongs at the beginning of the paragraph, (B). With this change, all of the sentences fall nicely into chronological order: started taking pictures as a youth, then as a student, then as a soldier in World War II, and then as a profession after leaving the Army in 1946.

68. **(J)** *English/Usage and Mechanics/Sentence Structure/Comma Splices.* **CCRS: SSF 24–27a. CC: ELA-Literacy.L.11–12.3.** The original is wrong because it results in a comma splice. (J) is the only answer choice that addresses this issue and does so by changing the first part of the sentence into an introductory past participle phrase ("Well known and well liked"). As for (G) and (H), both of these options also result in a comma splice.

69. **(C)** *English/Usage and Mechanics/Grammar and Usage/Diction.* **CCRS: COU 20–23a. CC: ELA-Literacy.L.9–10.1.** Since this item asks for the alternative to the underlined portion that would NOT be acceptable, you know right away that the underlined portion and three of the four alternatives would be acceptable in this particular context. Since "historic" and "historical" are both acceptable adjectives and the preposition "like" is synonymous with the idiomatic expression "such as," (A), (B), and (D) can be eliminated. So, (C) is the correct answer choice; this option fails to complete the aforementioned idiomatic expression.

70. **(J)** *English/Rhetorical Skills/Strategy/Effective Transitional Sentence.* **CCRS: ORG 24–27a. CC: ELA-Literacy.L.11–12.3.** At the beginning of a sentence, the phrase "for instance" is used to introduce an example of what is expressed in the previous sentence. In this case, however, a transitional term is unnecessary at the beginning of the sentence and should simply be removed, (J).

As for (G), it does not make sense to say that the subjects of Withers's jazz and blues photos were selected "as a result" of his having traveled with and photographed particular historical figures.

(H) is wrong because the adverb "however" suggests that the author intends to in some way contrast Withers's photographs of historical figures with his photographs of jazz and blues musicians. This, however, is not the author's intention.

71. **(D)** *English/Usage and Mechanics/Grammar and Usage/Subject-Verb Agreement.* **CCRS: COU 20–23b. CC: ELA-Literacy.L.9–10.1.** The original is wrong because it results in a lack of subject-verb agreement. As written, the singular verb "includes" does not agree with the plural subject "photos." Instead, the plural verb "include" should be used. So, (D) is the correct answer choice.

(B) is wrong because the singular verb "does" does not agree with the plural subject.

And (C) is wrong because it results in a sentence fragment.

72. **(G)** *English/Usage and Mechanics/Punctuation/Colons.* **CCRS: COP 24–27d. CC: ELA-Literacy.L.11–12.2.** The original is wrong because the colon disrupts the logical flow of the sentence. (G) solves the problem of the original by simply removing the colon. Remember that a colon can be used to precede a series of three or more elements. This sentence does in fact include such a list, but the verb "photographed"

would require a direct object for the colon to function properly. The following is an example of the same sentence in which the colon is used correctly:

"In addition to capturing many public personages on film, Withers also photographed common folk: waitresses, church congregations, nightclub audiences, and Little League baseball games."

(H) suffers from the same problem as the original and removes the comma that is needed to separate the first two elements in the series.

(J) is wrong because it too removes the comma that is needed between "waitresses" and "church congregations."

73. **(B)** *English/Rhetorical Skills/Style/Idiomatic Expression.* **CCRS: WC 24–27c. CC: ELA-Literacy.L.11–12.6.** This item asks you to choose the idiomatic expression that best captures the fact that Withers is *still taking* photographs at the time that the passage was written. The only option that suggests this idea that the activity was at the time ongoing is "at last count," which indicates that the process of counting the photographic images was ongoing. So, (B) is the correct answer choice. As for the other three options, these phrases are all suggestive of finality ("at long last" means "finally"; "to sum up" means "in summary"; and "all in all" means "after everything has been considered").

74. **(H)** *English/Rhetorical Skills/Organization/Sentence-Level Structure.* **CCRS: ORG 28–32c. CC: ELA-Literacy.L.11–12.3.** This item provides a sentence that the author wants to include in the passage and then asks for you to determine at the end of which paragraph it would most logically be placed. The key words to focus on in this additional sentence are "performances" and "backstage." Of the four paragraphs in the passage, only the third paragraph concludes with a description that is relevant to those words: Withers's photos of famous jazz and blues musicians. So, (H) is the correct answer choice.

75. **(A)** *English/Rhetorical Skills/Strategy/Main Idea.* **CCRS: TOD 24–27a. CC: ELA-Literacy.L.11–12.3.** This item deals with identifying the main idea of the passage because it asks whether the author was successful in accomplishing his or her goal in writing the passage. As you have learned from the previous explanations, the author does indeed create "a biographical sketch" of Ernest Withers ("a photojournalist") "in the context of the world he…photographed" (his hometown of Memphis and the South). So, (A) is the correct answer choice.

As for (B), while the author does succeed in his or her goal, how Withers first developed his interest in photography and photojournalism makes up only a very small part of the biographical sketch.

(C) is wrong because, as already established, the author *does* make a connection between Withers and the world that he photographed (his hometown of Memphis and the South).

And as for (D), while the author does not mention Withers's honors and awards, it is not for this reason that he or she would not succeed in accomplishing his or her goal; in fact, the author does succeed.

English — Common Core State Standards

Standard	Description
ELA–Literacy.L.8.1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
ELA–Literacy.L.8.2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
ELA–Literacy.L.8.3	Use knowledge of language and its conventions when writing, speaking, reading, or listening.
ELA–Literacy.L.9–10.1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
ELA–Literacy.L.9–10.2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
ELA–Literacy.L.9–10.3	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.
ELA–Literacy.L.9–10.5	Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
ELA–Literacy.L.11–12.1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
ELA–Literacy.L.11–12.2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
ELA–Literacy.L.11–12.3	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.
ELA–Literacy.L.11–12.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, choosing flexibly from a range of strategies.
ELA–Literacy.L.11–12.6	Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

English — College Readiness Standards

Standard	Description
Topic Development in Terms of Purpose and Focus	
TOD 16–19a	Determine the basic purpose or role of a phrase or sentence.
TOD 16–19b	Delete an obviously irrelevant clause or sentence in an essay.
TOD 20–23b	Determine the relevancy of a variety of sentence-level details.
TOD 24–27a	Apply knowledge of the focus of a simple essay to add a sentence that sharpens that focus or to determine if an essay has met a specified goal.
TOD 24–27c	Add a sentence to accomplish a fairly straightforward purpose.
TOD 28–32a	Determine the suitability of a phrase or sentence and its rhetorical effect by applying an awareness of the focus and purpose of a fairly involved essay.
Organization, Unity, and Coherence	
ORG 20-23b	Identify the most logical place to add a sentence in an essay.
ORG 20-23c	Add a sentence to introduce a simple paragraph.
ORG 24-27a	Decide if conjunctive adverbs or phrases are needed to create subtle logical connections between sentences (e.g., *therefore, however, in addition*).
ORG 24-27b	Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic.
ORG 24-27c	In a fairly straightforward essay, add a sentence to introduce or conclude the essay or to provide a transition between paragraphs.
ORG 28-32b	Rearrange sentences in a complex paragraph to improve the logic and coherence of the paragraph.
ORG 28-32c	Add a sentence to introduce or conclude a paragraph that is fairly complex.
Word Choice	
WC 13-15a	Revise sentences to correct confusing and awkward arrangements of the sentence elements.
WC 16-19a	Delete material in a sentence that is synonymous and wordy.
WC 16-19b	Revise expressions that do not match the style of an essay.
WC 20-23b	Choose the word or phrase most consistent with the style and tone of a straightforward essay.
WC 20-23c	Determine the clearest and most logical conjunction to link clauses.
WC 24-27a	Revise a phrase that is redundant based on the meaning and logic of the entire sentence.
WC 24-27c	Determine the word or phrase that is most appropriate in terms of the content of the sentence and tone of the essay.
WC 33-36a	Delete subtly redundant material or material that is redundant in terms of the paragraph as a whole.
Sentence Structure and Formation	
SSF 13-15a	Join simple clauses using conjunctions or punctuation to join simple clauses.
SSF 16-19a	Use punctuation and conjunctions to avoid awkward-sounding sentences.
SSF 16-19b	Decide the appropriate verb tense and voice by using knowledge of the meaning of the entire sentence.
SSF 20-23a	Identify and correct disturbances of sentence flow and structure (e.g., participial phrase fragments, missing or incorrect relative pronouns, dangling or misplaced modifiers).
SSF 24-27a	Revise to avoid faulty coordination and subordination of clauses and faulty placement of phrases in sentences with structural problems.
SSF 28-32a	Use sentence-combining techniques, especially in sentences containing compound subjects or verbs, to effectively avoid comma splices, run-on sentences, and sentence fragments.
Conventions and Usage	
COU 13-15a	Solve basic grammatical problems such as how to form the past and past participle of common irregular verbs and how to form comparative and superlative adjectives.
COU 16-19a	Solve grammatical problems such as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and determine which preposition to use in simple contexts.

COU 16-19b	Use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead.*
COU 20-23a	Select prepositions, especially in combination with verbs, to create idiomatic phrases (e.g., long for, appeal to).
COU 20-23b	Ensure subject-verb agreement where there is some text between the subject and verb.
COU 24-27b	Identify the correct past and past participle forms of irregular and infrequently used verbs.
COU 28-32a	Use reflexive pronouns, the possessive pronouns *its* and *your*, and the relative pronouns *who* and *whom* correctly.
Conventions of Punctuation	
COP 16-19b	Delete commas that disturb the sentence flow such as between a modifier and the modified element.
COP 20-23b	Remove unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause).
COP 24-27a	Use punctuation to set off a complex parenthetical phrase.
COP 24-27b	Identify and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or a compound verb joined by *and*).
COP 24-27c	Indicate simple possessive nouns by using apostrophes.
COP 24-27d	Identify incorrect uses of colons and semicolons.

Test 2: Mathematics

1. **(D)** *Mathematics/Algebra/Manipulating Algebraic Expressions/Evaluating Expressions.* **CRS: XEI 20–23a. CC: 6.EE.A.2c.** Simply substitute the given values, $m = 4$, $n = -5$, and $p = 9$, into the given expression and evaluate, $mp - mn$: $(4)(9) - (4)(-5) = 36 + 20 = 56$, (D).

2. **(G)** *Mathematics/Arithmetic/Complicated Arithmetic Application Items.* **CRS: BOA 20–23a. CC: 6.RP.A.3b.** Determine how many gallons each vehicle requires to travel 1,406 miles:

   Vehicle A: $\dfrac{1,406 \text{ miles}}{19 \text{ miles/gallon}} = 74$ gallons

   Vehicle B: $\dfrac{1,406 \text{ miles}}{37 \text{ miles/gallon}} = 38$ gallons

   Therefore, Vehicle A would require 74 – 38 = 36 more gallons of gasoline than Vehicle B to travel 1,406 miles, (G).

3. **(E)** *Mathematics/Arithmetic/ Common Arithmetic Items/Ratios.* **CRS: XEI 16–19a. CC: 6.EE.B.7.** The stem asks for $\dfrac{z}{x}$, so solve $\dfrac{x}{y} = \dfrac{1}{9}$ for x and $\dfrac{y}{z} = \dfrac{9}{8}$ for z:

   $$\frac{x}{y} = \frac{1}{9} \Rightarrow \left(\frac{x}{y}\right)(y) = \left(\frac{1}{9}\right)(y) \Rightarrow x = \frac{y}{9}$$
 $$\frac{y}{z} = \frac{9}{8} \Rightarrow \left(\frac{y}{z}\right)(z) = \left(\frac{9}{8}\right)(z) \Rightarrow y = \frac{9z}{8} \Rightarrow 8y = \left(\frac{9z}{8}\right)(8) \Rightarrow 8y = 9z \Rightarrow \frac{8y}{9} = \frac{9z}{9} \Rightarrow z = \frac{8y}{9}.$$

   Therefore, $\dfrac{\dfrac{8y}{9}}{\dfrac{y}{9}} = \left(\dfrac{8y}{9}\right)\left(\dfrac{9}{y}\right) = 8$, (E).

4. **(K)** *Mathematics/Algebra/Solving Algebraic Equations or Inequalities with One Variable/Simple Equations.* **CRS: XEI 20–23c. CC: 7.EE.B.3.** Solve the given equation for x:

   $$12(x - 7) = -11 \Rightarrow 12x - 12(7) = -11 \Rightarrow 12x = -11 + 84 = 73 \Rightarrow x = \frac{73}{12}, \text{ (K)}.$$

5. **(B)** *Mathematics/Geometry/Triangles/Pythagorean Theorem.* **CRS: PPF 24–27b. CC: 8.G.B.7.** The quickest way to solve this item is to recognize that the right triangle described in the item stem is a 3–4–5 right triangle, in which the multiplier for each side is 6:
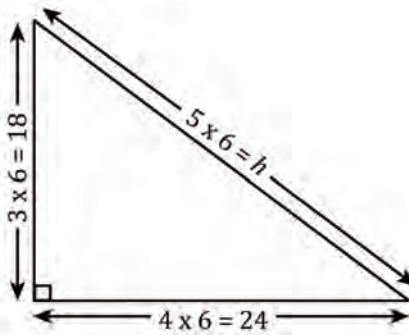
Thus, the length of the hypotenuse is (5)(6) = 30, (B).

Alternatively, apply the Pythagorean Theorem, $\left(x^2 + y^2 = h^2\right)$:

$h^2 = x^2 + y^2 \Rightarrow 24^2 + 18^2 = 900 \Rightarrow h = \sqrt{900} = 30$.

6. **(K)** *Mathematics/Statistics/Probability.* **CRS: PSD 20–23d. CC: HSS-CP.A.1.** Use the product rule for combinations to determine how many different combinations are possible: (4)(2)(2)(2) = 32, (K).

Another approach is to reason through the process. For each choice of sandwich, there are two possible soups, or 8 combinations. Then, for each of these 8 combinations, there are 2 possible salads, or 16 combinations. Similarly, for each of these 16 combinations, there are 2 possible drinks, or 32 possible lunch combinations in all.

7. **(D)** *Mathematics/Arithmetic/Common Arithmetic Items/Percents.* **CRS: BOA 16–19b. CC: 7.NS.A.3.**

Translate the given information into an expression: $\frac{1}{9}$ of 63% of 6,000 is $\frac{1}{9}\left(0.63\left(6,000\right)\right) = 420$, (D).

TIP Alternatively, reason through the problem to form an estimate: 63% of \$6,000 will be greater than half of \$6,000, and $\frac{1}{9}$ of this can be approximated by using $\frac{1}{10}$ instead. Thus, half of \$6,000 is \$3,000 and $\frac{1}{10}$ of \$3,000 is \$300. The only choice close to this estimate is (D), \$420.

8. **(K)** *Mathematics/Algebra/Manipulating Algebraic Expressions/Creating Algebraic Expressions.* **CRS: XEI 24–27b. CC: 7.EE.A.1.** The total number of DVD players, *d*, and VCRs, *v*, produced together, or *d+v*, is less than or equal to 250. Thus, $d + v \leq 250$, (K).

9. **(A)** *Mathematics/Geometry/Triangles/Properties of Triangles.* **CRS: PPF 24–27a. CC: 7.G.B.5.** A straight line is 180°, so $\angle ACD = 180° - 65° = 115°$, and the sum of the interior angles of a triangle is 180°, so $\angle DAC = 180° - 50° - 115° = 15°$. Therefore, since $\angle BAC = 90°$, $\angle BAD = 90° + 15° = 105°$, (A).

10. **(G)** *Mathematics/Manipulating Algebraic Expressions/Basic Algebraic Manipulations.* **CRS: XEI 20–23e. CC: 7.EE.B.4.** Use the FOIL method (First, Outside, Inside, Last) to multiply the binomials:

$\left(2x + 3\right)\left(x - 7\right) = 2x^2 - 14x + 3x - 21 = 2x^2 - 11x - 21$, (G).

TIP Alternatively, apply the "plug-and-chug" strategy. Select a value for *x* that is easy to work with, but

not 1, 0, or –1. For example, let $x = 2$: $(2x+3)(x-7)=(2(2)+3)(2-7)=(4+3)(-5)=(7)(-5)=-35$.

Now, determine which answer choice yields –35:

F. $2x^2-21 \Rightarrow 2(2^2)-21=8-21=-13$ ✗

G. $2x^2-11x-21 \Rightarrow 2(2^2)-11(2)-21=8-22-21=-35$ ✓

11. **(D)** *Mathematics/Arithmetic/Common Arithmetic Items/Proportions and Direct-Inverse Variation.* **CRS: BOA 20–23a. CC: 6.RP.A.3d.** Since each cake requires $\frac{1}{2}$ cup of sugar and $4\frac{2}{3}$ cups = $4\frac{1}{2}$ cups plus change, no more than 9 whole cakes can be made, (D).

Alternatively, set up a direct proportion, grouping like terms, and solve for the missing value:

$$\frac{\frac{1}{2} \text{ cup of sugar}}{4\frac{2}{3} \text{ cups of sugar}}=\frac{1 \text{ cake}}{x \text{ cakes}} \Rightarrow x=\frac{(1)\left(4\frac{2}{3}\right)}{\frac{1}{2}}=\frac{14(2)}{3}=\frac{28}{3}=9\frac{1}{3}.$$

Therefore, 9 whole cakes can be made, (D).

12. **(J)** *Mathematics/Expressing and Evaluating Algebraic Functions/Function Notation.* **CRS: FUN 20–23a. CC: 8.F.A.1.** For this item, substitute the given value for x into the function and evaluate:
$f(x)=6x^2+4x-11 \Rightarrow f(-5)=6(-5)^2+4(-5)-11=6(25)+(-20)-11=119$, (J).

13. **(A)** *Mathematics/Algebra/Manipulating Algebraic Expression/Factoring Expressions.* **CRS: XEI 24–27e. CC: HSA-REI.B.3.** Factor the expression: $-x^2-x=-x(x+1)$, (A).

TIP Alternatively, use the "plug-and-chug" strategy. For example, let $x = 2$:
$-x^2-x=-(2)^2-2=-(4)-2=-6$. Now determine which one of the answer choices yields –6:

A. $-x(x+1)=-2(2+1)=-2(3)=-6$ ✓

14. **(H)** *Mathematics/Arithmetic/Common Arithmetic Items/Ratios.* **CRS: BOA 20–23a. CC: 6.RP.A.1.** The ratio of sophomores to juniors to seniors is 2:3:4, so the number in each group is $2x$; $3x$; and $4x$, respectively. Since there are 15 juniors, $3x=15 \Rightarrow x=5$. So, the number of sophomores is 2(5) = 10 and the number of seniors is 4(5) = 20. Therefore, the total number of students is 10 + 15 + 20 = 45, (H).

Alternatively, recognize that the total number of students is 2 + 3 + 4 = 9 times the multiplier, x. Again, determine the multiplier using the number of juniors: $15=3x \Rightarrow x=5$. So, the total number of students is (9)(5) = 45.

15. **(B)** *Mathematics/Arithmetic/Simple Manipulations.* **CRS: NUM 20–23a. CC: 5.OA.B.3.** According to the stem, the arithmetic sequence is x, -14, -34. Since the difference between the second and third item is -20, $x=-14-(-20)=6$, (B).

16. **(K)** *Mathematics/Algebra/Manipulating Algebraic Expressions/Creating Algebraic Expressions.* **CRS: XEI 20–23d. CC: 6.NS.B.2.** The take-home pay, T, is equal to the difference between the salary, S, and taxes, D: $T = S - D$. Thus the fraction of the salary that is the take-home pay is $\dfrac{(S-D)}{S}$, (K).

    🔵 Alternatively, apply the "plug-and-chug" strategy. For example, if S = \$100 and D = \$10, the take-home pay would be \$90, which is $\dfrac{9}{10}$ of \$100. Now, determine which of the answer choices yields $\dfrac{9}{10}$:

    F. $\dfrac{D}{S} : \dfrac{\$10}{\$100} = 0.1$ ✗

    G. $\dfrac{S}{D} : \dfrac{\$100}{\$10} = 10$ ✗

    H. $\dfrac{D-S}{D} : \dfrac{\$10-\$100}{\$10} = \dfrac{-90}{10} = -9$ ✗

    J. $\dfrac{D-S}{S} : \dfrac{\$10-\$100}{\$100} = \dfrac{-90}{100} = -\dfrac{9}{10}$ ✗

    K. $\dfrac{S-D}{S} : \dfrac{\$100-\$10}{\$100} = \dfrac{90}{100} = \dfrac{9}{10}$ ✓

17. **(B)** *Mathematics/Arithmetic/Common Arithmetic Items/Proportion and Direct-Inverse Variation.* **CRS: BOA 16–19a. CC: 6.RP.A.3d.** Set up an expression for time using cancellation of units:
    $\dfrac{200 \text{ feet}}{1{,}120 \text{ feet/second}} \approx 0.18 \approx 0.2$, (B).

18. **(G)** *Mathematics/Coordinate Geometry/Slope of a Line.* **CRS: GRE 24–27b. CC: 8.F.B.4.** The easiest solution method is to convert the given equation to the slope-intercept form of a linear equation, $y = mx + b$, where m is the slope and b is the y-intercept: $6y - 18x = 6 \Rightarrow y - 3x = 1 \Rightarrow y = 3x + 1$, so the slope is 3, (G).

    Alternatively, find two points that lie on the line and use them to calculate the slope. First, let $x = 0$:
    $6y - 18(0) = 6 \Rightarrow 6y = 6 \Rightarrow y = 1$, so (0,1) lies on the line. Let $y = 0$: $6(0) - 18x = 6 \Rightarrow -18x = 6 \Rightarrow x = -\dfrac{1}{3}$,
    so $\left(-\dfrac{1}{3}, 0\right)$ lies on the line. Now calculate the slope: $m = \dfrac{\text{rise}}{\text{run}} = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{0-1}{-\dfrac{1}{3}-0} = \dfrac{-1}{-\dfrac{1}{3}} = 3$.

19. **(D)** *Mathematics/Algebra/Solving Simultaneous Equations.* **CRS: XEI 28–32f. CC: 8.EE.C.8b.** Create a system of simultaneous equations. Let a represent the number of adults and c represent the number of children. Since there are 8 people, $a + c = 8$. And the total is the amount spent on child meals plus the amount spent on adult meals: \$46.60 = \$6.95a + \$3.95c. Solve for c in the first equation:
    $a + c = 8 \Rightarrow c = 8 - a$. Substitute this expression for c into the second equation and solve for a:
    $46.60 = 6.95a + 3.95c \Rightarrow 46.60 = 6.95a + 3.95(8 - a) \Rightarrow 46.60 = 6.95a + 31.60 - 3.95a \Rightarrow$
    $15 = 6.95a - 3.95a \Rightarrow 15 = 3a \Rightarrow 5 = a$, (D).

    🔵 Alternatively, apply the "test-the-test" strategy. Start with answer choice (C):

C. $a = 4 : 4 + c = 8 \Rightarrow c = 4$ and $6.95(4) + 3.95(4) = 43.60$ ✗

Since (C) results in a total price less than the actual price, the number of adults must be larger, so now test (D):

D. $a = 5 \Rightarrow 5 + c = 8 \Rightarrow c = 3$ and $6.95(5) + 3.95(3) = 46.60$ ✓

20. **(K)** *Mathematics/Statistics and Probability/Data Representation/Bar, Cumulative, and Line Graphs.* **CRS: GRE 28–32a. CC: 8.F.B.5.** According to the graph, at $t = 0$ hours, $d = 6$ miles. This means that at the start of the walk, you are already 6 miles from home. Therefore, the correct answer choice must be (K).

21. **(E)** *Mathematics/Trigonometry/Definitions of the Six Trigonometric Functions.* **CRS: FUN 24–27b. CC: HSG-SRT.C.8.** Use the definition of cosine to label the sides of the triangle. Since the cosine of an angle is the length of the adjacent side divided by the length of the hypotenuse, from $\cos Z = \dfrac{4}{7}$, we know that $\overline{YZ} = 4$ and $\overline{XZ} = 7$:
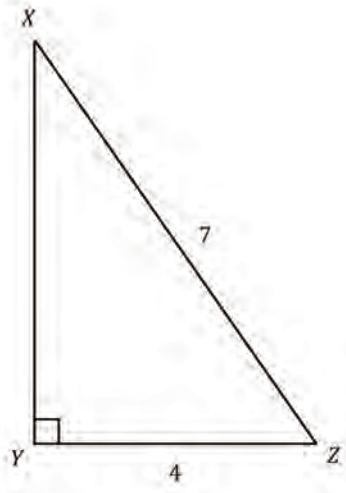
Next, $\cos X = \dfrac{\overline{XY}}{\overline{XZ}}$, so to determine the length of $\overline{XY}$ use the Pythagorean theorem:

$a^2 + b^2 = c^2 \Rightarrow \overline{XY}^2 + 4^2 = 7^2 \Rightarrow \overline{XY}^2 = 33 \Rightarrow \overline{XY} = \sqrt{33}$. Therefore, $\cos X = \dfrac{\sqrt{33}}{7}$, (E).

22. **(F)** *Mathematics/Algebra/Manipulating Algebraic Expressions/Manipulating Expressions with Exponents.* **CRS: NUM 28–32d. CC: HSN-CN.A.2.** Apply the rules for working with exponents $\left[\left(x^a \right)^b = x^{(a)(b)} \right] : \left(y^{-5} \right)^3 = y^{-15} = \dfrac{1}{y^{15}}$, (F).

🅣🅘🅟 Alternatively, apply the "plug-and-chug" strategy. For example, let $y = 2$: $\left(y^{-5} \right)^3 = \left(2^{-5} \right)^3 = \dfrac{1}{32{,}768}$.

Now, test the answer choices:

F. $\dfrac{1}{y^{15}} \Rightarrow \dfrac{1}{2^{15}} \Rightarrow \dfrac{1}{32{,}768}$ ✓

23. **(C)** *Mathematics/Geometry/Triangles/Properties of Triangles.* **CRS: MEA 28–32a. CC: 7.G.B.6.** Since the triangles are similar, their sides are proportional. And since the sides are proportional, the sum of the sides (that is, the perimeters), must be proportional as well. The ratio is 3:5, so the perimeter of the smaller triangle, P_S, is $\dfrac{3}{5}$ of the perimeter of the larger triangle P_L:

$$P_S = \frac{3}{5}P_L \Rightarrow (5+7+9) = \frac{3}{5}P_L \Rightarrow P_L = \frac{5}{3}(21) = 35, \text{(C)}.$$

24. **(F)** *Mathematics/Coordinate Geometry/Slope of a Line.* **CRS: GRE 24–27b. CC: 8.F.B.4.** Apply the definition of the slope of a line, *m*: $m = \dfrac{\text{rise}}{\text{run}} = \dfrac{\triangle y}{\triangle x} = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{5-4}{-4-6} = -\dfrac{1}{10}$, (F).

25. **(C)** *Mathematics/Geometry/Complex Figures.* **CRS: MEA 20–23a. CC: 6.G.A.1.** The area of $\triangle DEC$ is $\dfrac{1}{2}(\text{base} \bullet \text{height})$. According to the figure, the base equals 8 and the height equals 4 since the width of rectangle *ABCD* is the same as the height of $\triangle DEC$. Therefore, the area of $\triangle DEC$ is $\dfrac{1}{2}(8 \bullet 4) = 16$, (C).

26. **(H)** *Mathematics/Geometry/Rectangles and Squares.* **CRS: MEA 20–23a. CC: 4.MD.A.3.** Draw a diagram of the given information:
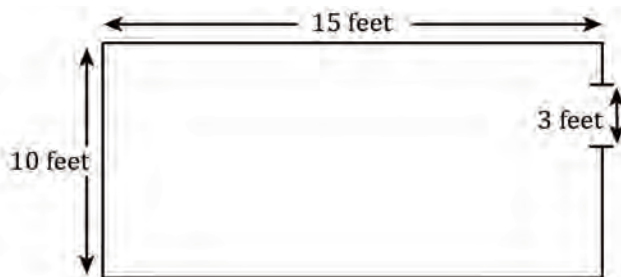
The total perimeter of the plot is 2(15) + 2(10) = 50 feet. Subtract the 3-foot-wide opening to determine the length of fencing required: 50 – 3 = 47 feet, (H).

27. **(E)** *Mathematics/Geometry/Rectangles and Squares.* **CRS: MEA 20–23a. CC: 4.MD.A.3.** The area of the entire rectangular plot is (10)(15) = 150 square feet, (E).

28. **(F)** *Mathematics/Geometry/Rectangles and Squares.* **CRS: BOA 24–27a. CC: 7.G.A.1.** Draw a diagram. Since the item stem specifies the center of the vegetable can be no more than 10 inches from the inner edge of the border or each other, and we are looking for the maximum number of rows, assume the separation distance is the minimum: 10 inches. The width of the vegetable plot is 8 feet, or $(8)(12) = 96$ inches. With 10 inches between the outer edges and the first and last row, as well as 10 inches in between, no more than 8 rows are possible in 96 inches:
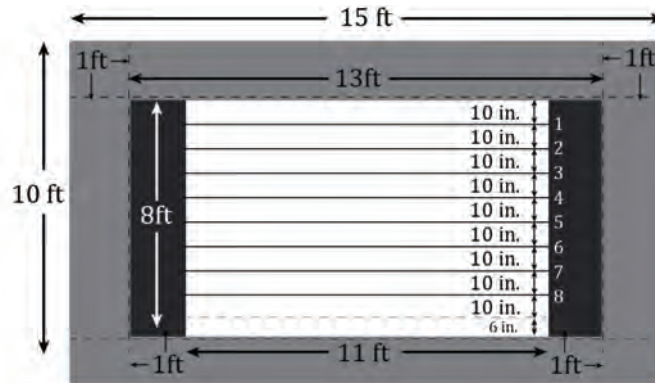
Adding another row would take the width of the vegetable plot from 90 inches to 100 inches, which is more than the 96 inches available.

29. **(A)** *Mathematics/Algebra/Solving Algebraic Equations or Inequalities with One Variable/Equations Involving Absolute Value.* **CRS: XEI 28–32d. CC: HSA-REI.B.4b.** To solve an absolute value equation, solve the derived equations: $x + 9 = 19$ and $x + 9 = -19$. Thus, $x = 10$ and $x = -28$. Check that the solutions are not extraneous: $\left|10+9\right|\overset{?}{=}19 \Rightarrow 19 = 19$ and $\left|-28+9\right|\overset{?}{=}19 \Rightarrow \left|-19\right|\overset{?}{=}19 \Rightarrow 19 = 19$. Therefore, the possible values for x are -28 and 10, (A).

TIP Alternatively, apply the "test-the-test" strategy:

A. -28: $\left|-28+9\right|\overset{?}{=}19 \Rightarrow \left|-19\right|\overset{?}{=}19 \Rightarrow 19 = 19$ ✓

   10: $\left|10+9\right|\overset{?}{=}19 \Rightarrow \left|19\right|\overset{?}{=}19 \Rightarrow 19 = 19$ ✓

30. **(G)** *Mathematics/Coordinate Geometry/Distance Formula.* **CRS: GRE 24–27d. CC: HSG-GPE.B.6.** One way to solve this item is to apply the midpoint formula. The midpoint of a line segment $\overline{AB}$, (x, y), is $\left(\dfrac{x_A + x_B}{2}, \dfrac{y_A + y_B}{2}\right)$, so the midpoint $(9, -8)$ is $\left(\dfrac{3+x_T}{2}, \dfrac{1+y_T}{2}\right)$. Thus, $9 = \dfrac{3+x_T}{2} \Rightarrow x_T = 9(2) - 3 = 15$ and $-8 = \dfrac{1+y_T}{2} \Rightarrow y_T = -17$. So the coordinates of T are $(15, -17)$, (G).

Alternatively, conceptualize this item graphically:
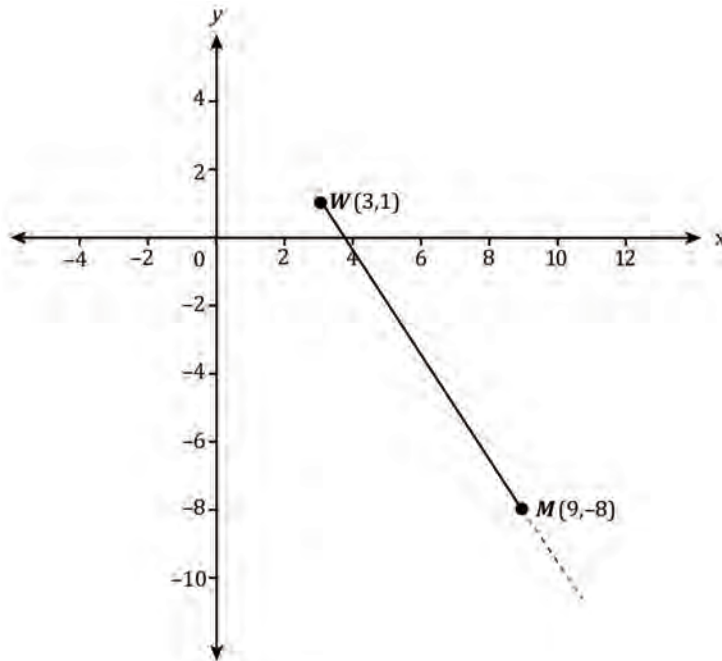
Point *T* must lie on the dashed line at a distance from *M* equal to the distance *W* is from *M*. To find point *T*, determine the vertical and horizontal distances from *M* to *W* and use these distances to find point *T*:
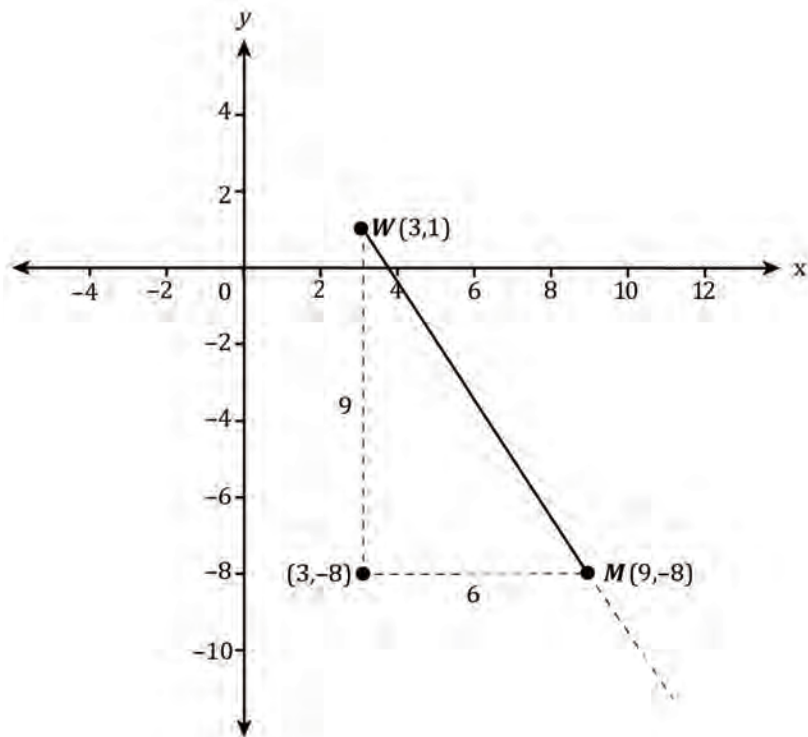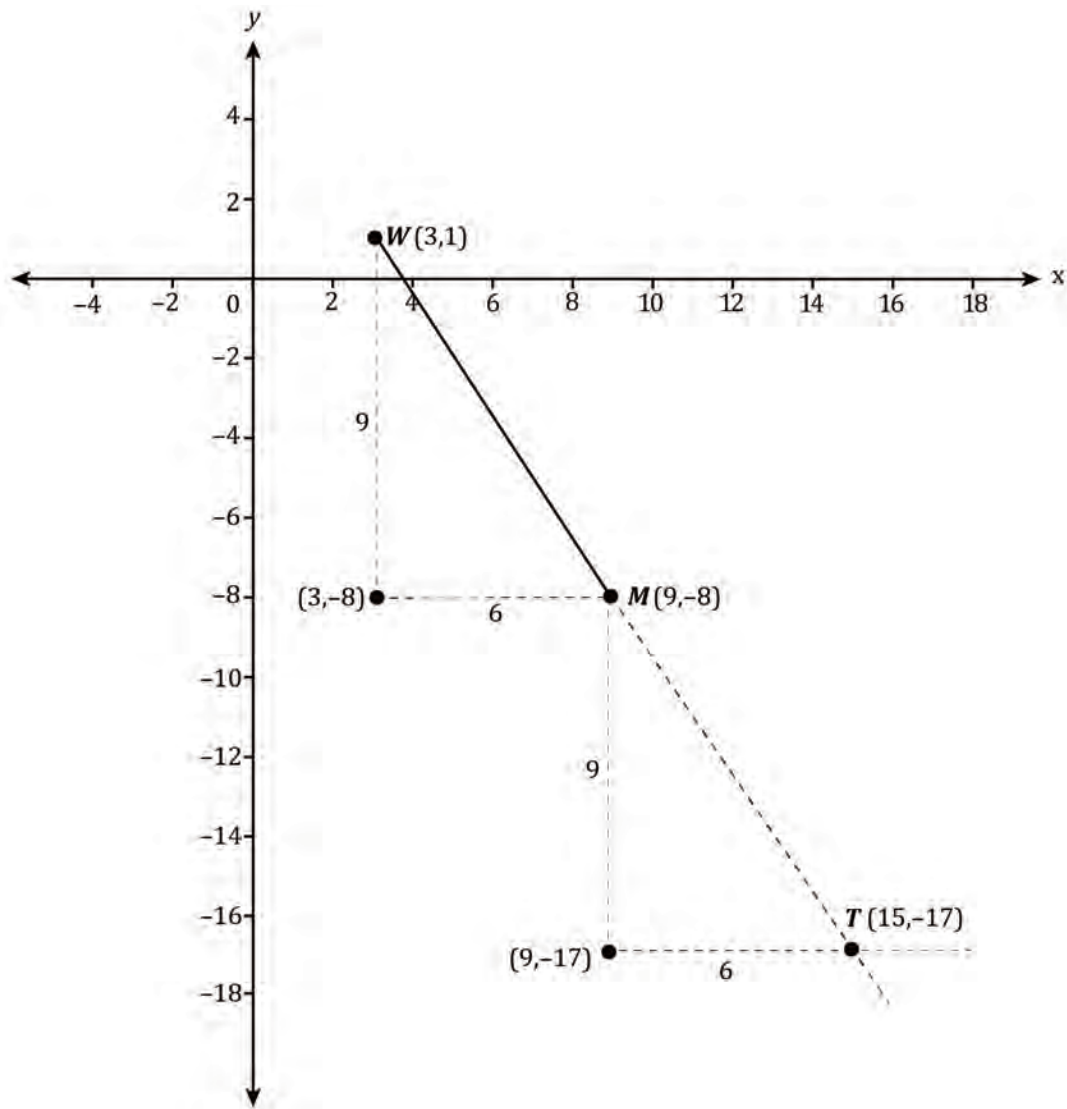
Therefore, the coordinates of point T are $(15,-17)$.

Finally, you can also apply the "test-the-test" strategy by plotting the coordinates given in the answer choices. Only (G), $(15,-17)$ is possible:
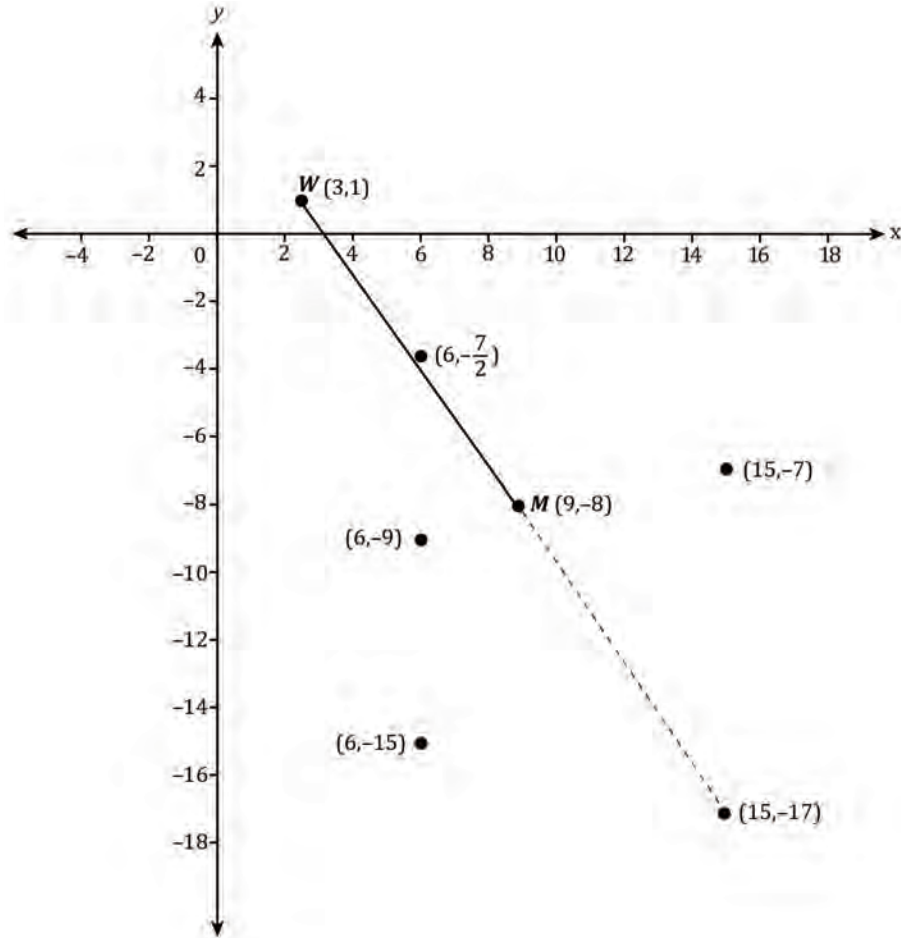
31. **(C)** *Mathematics/Geometry/Circles.* **CRS: MEA 24–27b. CC: 7.G.B.4.** Use the formula for the circumference of a circle, $C = 2\pi(r)$, to solve for r, the radius of the circle: $96\pi = 2\pi(r) \Rightarrow$ $96 = 2r \Rightarrow 48 = r$, (C).

32. **(G)** *Mathematics/Geometry/Rectangles and Squares/Triangles/Pythagorean Theorem.* **CRS: PPF 28–32b. CC: 8.G.B.7.** The diagonal of a rectangle forms two right triangles in which the legs of the triangle are the adjacent sides of the rectangle:
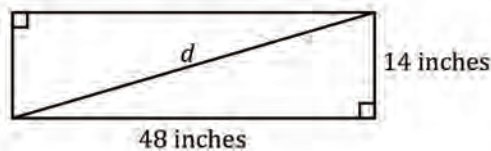

Use the Pythagorean theorem to find the length of the diagonal:
$d^2 = 14^2 + 48^2 = 196 + 2{,}304 = 2{,}500 \Rightarrow d = 50$, (G).

33. **(C)** *Mathematics/Coordinate Geometry/Transformations and Their Effects on Graphs of Functions.* **CRS: GRE 28–32d. CC: HSG-GPE.B.6.** For this item, define the translation to directly solve it.
$ABCD \Rightarrow A'B'C'D'$, $A \Rightarrow A'$, $B \Rightarrow B'$, $C \Rightarrow C'$, and $D \Rightarrow D'$. Use the pair of corresponding points $A \Rightarrow A'$ to define the translation: $(-4,-2) \Rightarrow (4,-12)$, so the *x*-coordinate moved 4 – (–4) = 4 + 4 = 8 units to the

right, and the y-coordinate moved $-12 - (-2) = -12 + 2 = -10$ units, or 10 units down. The remaining pairs of corresponding points have the same translation, so for $B \Rightarrow B'$, $(-4,3) \Rightarrow (x',y')$ and $(-4,3) \Rightarrow (-4+8,\ 3-10) = (4,-7)$, (C).

Alternatively, graph the original rectangle and the given points of its translation:
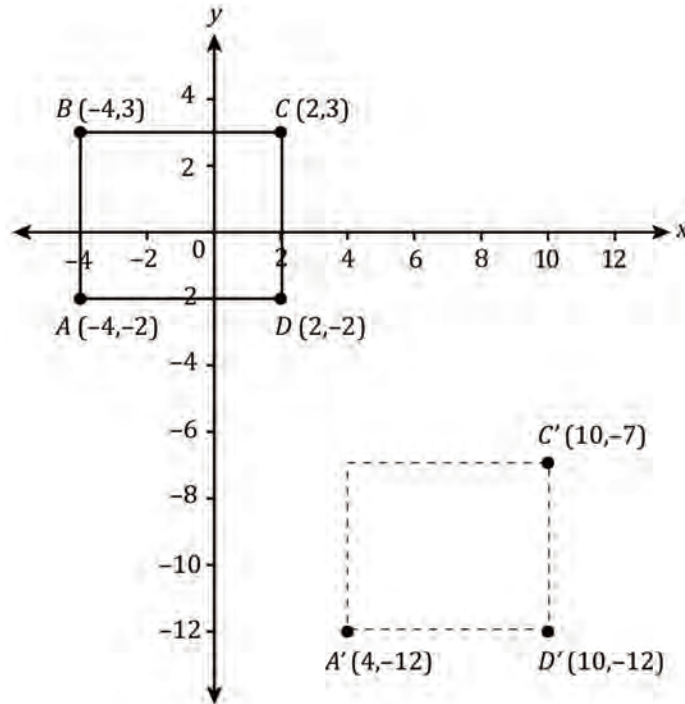
Therefore, B' must be at coordinates $(4,-7)$.

34. **(H)** *Mathematics/Algebra/Solving Quadratic Equations and Relations.* **CRS: XEI 24–27c. CC: HSA-REI.B.4b.** Since $\{-2,\ 4\}$ is a solution set to the quadratic equation $x^2 + nx - 8 = 0$, $(x+2)(x-4) = 0$.

Apply the FOIL method to multiply the binomials: $x^2 - 4x + 2x - 8 = 0 \Rightarrow x^2 - 2x - 8 = 0$. Therefore, n = –2, (H).

Alternatively, plug x = –2 into the given equation and solve for n: $x^2 + nx - 8 = 0 \Rightarrow$ $(-2)^2 + (-2)n - 8 = 0 \Rightarrow -2n = 4 \Rightarrow n = -2$.

35. **(C)** *Mathematics/Arithmetic/Common Arithmetic Items/Percents* and *Statistics and Probability/Data Representation/Tables.* **CRS: BOA 20–23a. CC: 7.RP.A.3.** The percent change is equal to the difference between the 9/30 closing value and the 8/24 closing value: $\dfrac{7{,}630 - 8{,}600}{8{,}600} \approx -0.113 = 11.3\%$ decrease, (C).

36. **(K)** *Mathematics/Statistics and Probability/Averages* and *Data Representation/Tables.* **CRS: PSD 33–36b. CC: 8.F.B.5.** The statement in (K) is the only one that accounts for the entire table of data: if the average decline is greater than the average advance, the overall change will be a decline. The remaining choices are all wrong because they do not account for the overall changes in closing values, but only focus on one value, as in (F), (G), and (J), or a group of values, as in (H).

37. **(C)** *Mathematics/Statistics and Probability/Averages.* **CRS: PSD 16–19a. CC: HSS-ID.A.2.** Calculate the average of the closing values for 9/13 through 9/17:

Date	Closing Value	Change
9/13	7,945	+150
9/14	8,020	+75
9/15	8,090	+70
9/16	7,870	−220
9/17	7,895	+25

$$\text{average} = \frac{\text{sum of values}}{\text{number of values}} = \left(\frac{7,945+8,020+8,090+7,870+7,895}{5}\right) = \left(\frac{39,820}{5}\right) = 7,964, \text{(C)}.$$

38. **(G)** *Mathematics/Trigonometry/Definitions of Trigonometric Functions.* **CRS: FUN 28–32b. CC: HSF-IF.A.2.** The inclusion of the trigonometric values in the item stem suggests using them to find the necessary value. Since the height of the building is opposite the 37° angle, and the only other given measure is the adjacent side, use the definition of tangent to determine the height, h:

$$\tan\theta = \frac{\text{side opposite }\theta}{\text{side adjacent to }\theta} \Rightarrow \tan 37° = \frac{h}{75} \Rightarrow h = (\tan 37°)(75) = (0.754)(75) \approx 57, \text{(G)}.$$

39. **(C)** *Mathematics/Geometry/Complex Figures.* **CRS: MEA 20–23b. CC: 7.G.A.1.** The area of a trapezoid is:

$A = \frac{(b_1 + b_2)h}{2}$, where b_1 and b_2 are the lengths of the parallel sides $(\overline{AD}$ and $\overline{BC})$ and h is the side

perpendicular to b_1 and b_2 $(\overline{DC})$, so the area of $ABCD$ is $\left(\frac{\overline{AD}+\overline{BC}}{2}\right)(\overline{DC})$. Since the perimeter of $ABCD$ is

39, $\overline{AB} + \overline{BC} + \overline{CD} + \overline{DA} = 39 \Rightarrow 8 + \overline{BC} + 5 + \overline{DA} = 39 \Rightarrow \overline{BC} + \overline{DA} = 26$. Therefore, the area of $ABCD$ is

$\left(\frac{26}{2}\right)5 = 65$, (C).

If you forgot the formula for the area of a trapezoid, you can still solve this item by noting that the area of *ABCD* is the sum of the area of a triangle and a rectangle:
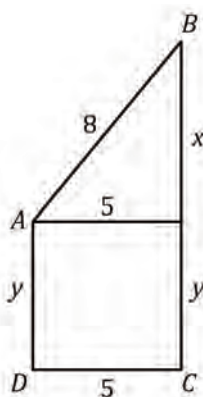
The missing side of the triangle can be found using the Pythagorean theorem: $x^2 + 5^2 = 8^2 \Rightarrow x = \sqrt{39}$. And the perimeter of the trapezoid can be used to find the missing length of the rectangle:

$8 + \sqrt{39} + 5 + 2y = 39 \Rightarrow y = \dfrac{26 - \sqrt{39}}{2}$. So, the area of the trapezoid is

$$\frac{1}{2}\left(\sqrt{39}\right)(5) + \left(\frac{26 - \sqrt{39}}{2}\right)(5) = \frac{26 \bullet 5}{2} = 65.$$

40. **(F)** *Mathematics/Arithmetic/Complicated Arithmetic Application Items.* **CRS: NUM 24–27d. CC: 8.EE.A.2.** This item basically asks, "What factor times 2.4×10^5 is 9.3×10^7?" So,

$$9.3 \times 10^7 = x\left(2.4 \times 10^5\right) \Rightarrow x = \frac{9.3 \times 10^7}{2.4 \times 10^5} = \frac{93 \times 10^6}{24 \times 10^4} \approx 4 \times 10^{6-4} = 4 \times 10^2, \text{ (F)}.$$

41. **(B)** *Mathematics/Arithmetic/Simple Manipulations.* **CRS: NUM 24–27b. CC: 6.NS.B.4.** Recall the impact of performing operations with positive and negative numbers:

Addition: A positive plus a negative results in a decrease in the value.
Subtraction: A positive minus a negative results in an increase in the value.
Multiplication: A positive multiplied by a negative results in a negative value.
Division: A positive divided by a negative results in a negative value.

Thus, for $35 \underline{} \left(-\dfrac{1}{56}\right)$, only addition or subtraction in the blank will yield a positive result and the result from subtracting will be larger. To assess the impact of averaging, note that by definition, an average calculates a measure of the middle of a group of numbers. The midpoint of 35 and $-\dfrac{1}{56}$ will be less than both the sum and difference of the two numbers, so (B) is correct.

TIP Alternatively, apply the "test-the-test" strategy. Evaluate each of the answer choices to find which results in the largest value:

A. Averaged with: $\dfrac{35 + \left(-\dfrac{1}{56}\right)}{2} \approx \dfrac{34.98}{2} \approx 17.49$

B. Minus: $35 - \left(-\dfrac{1}{56}\right) = 35 + \dfrac{1}{56} \approx 35.02$

C. Plus: $35 + \left(-\dfrac{1}{56}\right) = 35 - \dfrac{1}{56} \approx 34.98$

D. Divided by: $\dfrac{35}{\left(-\dfrac{1}{56}\right)} = 35(-56) = -1,960$

E. Multiplied by: $35\left(-\dfrac{1}{56}\right) = \dfrac{35}{-56} \approx -0.625$

42. (J) *Mathematics/Geometry/Graphs of Quadratic Equations and Relations.* **CRS: GRE 28–32e. CC: HSG-GPE.A.1.** The equation for a circle with center (h,k) and radius r is: $(x-h)^2+(y-k)^2=r^2$. Therefore, $(x-7)^2+\left[y-(-6)\right]^2=10^2\Rightarrow(x-7)^2+(y+6)^2=100$, (J).

   TIP Alternatively, apply the "plug-and-chug" strategy. Find the coordinates of a point on the circle described in the item stem, and substitute it into the answer choices to find which yields a true statement. The circle has center (7,–6) and a radius of 10, so all points 10 units away from the center comprise the circle. Therefore, the points (7+10,–6), (7–10,–6), (7,–6+10), and (7,–6–10) all lie on the circle. Choose one point that is easy to work with to test the answer choices. For example, use (7,–6+10), or (7,4):
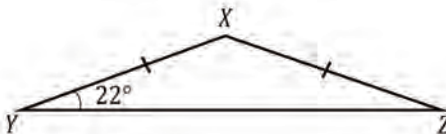
   F. $(7+7)^2-(4-6)^2\overset{?}{=}100\Rightarrow(14)^2-(-2)^2\overset{?}{=}100\Rightarrow196-4\overset{?}{=}100\Rightarrow192\neq100$ ✘

   G. $(7+7)^2-(4-6)^2\overset{?}{=}10\Rightarrow(14)^2-(-2)^2\overset{?}{=}10\Rightarrow196-4\overset{?}{=}10\Rightarrow192\neq10$ ✘

   H. $(7+7)^2+(4-6)^2\overset{?}{=}10\Rightarrow(14)^2+(-2)^2\overset{?}{=}10\Rightarrow196+4\overset{?}{=}10\Rightarrow200\neq10$ ✘

   J. $(7-7)^2+(4+6)^2\overset{?}{=}100\Rightarrow(0)^2+(10)^2\overset{?}{=}100\Rightarrow100=100$ ✔

43. (A) *Mathematics/Geometry/Triangles/Properties of Triangles.* **CRS: PPF 24–27c. CC: HSG-CO.C.10.** Draw a figure of the given information:

   Since $\overline{XY}=\overline{XZ}$, the triangle is an isosceles triangle. The base angles of an isosceles triangle are also congruent, so $\angle Z=\angle Y=22$. Since the sum of the measure of the angles of a triangle is $180\,^\circ$, $\angle X+\angle Y+\angle Z=180°\Rightarrow\angle X+22°+22°=180°\Rightarrow\angle X=136°$, (A).

44. (G) *Mathematics/Geometry/Rectangles and Squares.* **CRS: MEA 28–32a. CC: 7.G.B.6.** The volume of a cube with side s is s^3. Since the area of one face of the cube is 144 square centimeters, $s^2=144\Rightarrow s=12$. Thus, the volume of the cube is $12^3=1{,}728$ cubic centimeters, (G).

45. (C) *Mathematics/Probability and Statistics/Probability.* **CRS: PSD 20–23c. CC: 7.SP.C.5.** The probability of an event is the number of occurrences of the desired outcome of an event divided by the total number of possible outcomes. In this case, the total number of possible outcomes is the number of integers from 1 to 12:12. And the number of desired outcomes is the number of factors of 12 from 1 to 12. The factors of 12 are 1, 2, 3, 4, 6, and 12, for a total of 6 factors. Therefore, the probability that the chosen number is a factor of 12 is $\dfrac{6}{12}=\dfrac{1}{2}$, (C).

46. **(H)** *Mathematics/Arithmetic/Complicated Arithmetic Application Items.* **CRS: BOA 24–27a. CC: 7.EE.B.3.** Substitute the given values (I = 75, P = 1,000, and t = $\dfrac{9}{12} = 0.75$) into the interest formula and solve for r: $I = Prt \Rightarrow 75 = (1,000)(r)(0.75) \Rightarrow 75 = 750r \Rightarrow r = 0.10 = 10\%$, (H).

47. **(E)** *Mathematics/Algebra/Expressing and Evaluating Algebraic Functions/Function Notation.* **CRS: FUN 28–32a. CC: HSF-IF.A.2.** First, evaluate $f(3)$: $f(x) = 2x^2 + x \Rightarrow f(3) = 2(3)^2 + 3 = 21$. Next, evaluate $f(21)$: $f(21) = 2(21)^2 + 21 = 903$, (E).

48. **(F)** *Mathematics/Algebra/Solving Quadratic Equations and Relations.* **CRS: XEI 20–23a. CC: 7.EE.B.3.** Factor 54 to determine the possible values for x only: 54 = (6)(9) = (2)(3)(3)(3). Since 54 = xy^2, xy^2 = (2)(3)(3)(3), so $y^2 = 3^2$ and x = (2)(3). Note that because y is squared, it can also be negative. Therefore, the possible values of y are 3 and –3, (F).

    💡 Alternatively, apply the "test-the-test" strategy. Test each answer choice to determine which meets the stated requirements:

    F.　–3, 3: $x(3)^2 = 54 \Rightarrow x = 6$ and $x(-3)^2 = 54 \Rightarrow x = 6$.

    In both cases, x and y are integers less than 10, so (F) must be correct.

49. **(D)** *Mathematics/Geometry/Rectangles and Squares.* **CRS: PPF 33–36a. CC: HSG-CO.C.10.** Quadrilaterals with opposite sides of equal length are parallelograms and rhombi are parallelograms with four sides of equal length. Rectangles and squares are special cases of parallelograms, in which the angles each equal 90 °. Since the item stem states that the quadrilateral has sides of equal length, but does not provide information about the angles, the information is sufficient only to conclude that the quadrilateral is a rhombus, II, and a parallelogram, IV, (D).

    💡 Alternatively, apply the "eliminate-and-guess" strategy. Draw examples of quadrilaterals with sides of equal length exploring different interior angle measures:
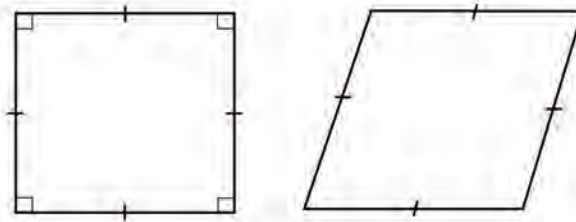
    It is possible for a quadrilateral to maintain sides of equal length without all four angles being 90 °. Therefore, quadrilaterals with equal sides may or may not have 90 ° angles, which eliminates I and III and answer choices (A), (B), (C), and (E). Thus, (D) must be the correct choice.

50. **(J)** *Mathematics/Coordinate Geometry/Slope-Intercept Form of a Linear Equation.* **CRS: GRE 24–27c. CC: 8.F.B.4.** In the slope-intercept form of a linear equation, $y = mx + b$, m is the slope of the line and b is the y-intercept. Calculate the slope from the given ordered pairs: $m = \dfrac{\text{rise}}{\text{run}} = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{1 - 3}{0 - (-2)} = \dfrac{-2}{2} = -1$.

    The y-intercept is the point where the line intersects the y-axis, that is, the value of y for $x = 0$. Thus, (0,1) are the coordinates of the y-intercept, and $b = 1$. Therefore, the slope-intercept form of the equation is: $y = mx + b \Rightarrow y = -x + 1$, (J).

51. **(E)** *Mathematics/Statistics and Probability/Median.* **CRS: XEI 24–27b. CC: 7.EE.A.1.** The median of a list of numbers arranged in ascending or descending order is the middle value of the list. According to the item stem, x is the median of the third list of numbers, the values of which are 2 less than the values of the second list of numbers. This implies that the median of the second list is $x + 2$. The values of the numbers in the second list are $\dfrac{1}{10}$ of the values of the corresponding numbers in the original list.

Therefore, the median of the original list is 10 times the value of the median of the second list: $10(x + 2)$, (E).

🔵 Alternatively, apply the "plug-and-chug" strategy. Create lists of numbers according to the scenario depicted in the item stem. Identify the median for each list. Substitute the value of the median for the third list, x, into each answer choice to determine which expression yields the median of the first list.

	Original List	Second List	Third List
	50	$\dfrac{50}{10} = 5$	5 – 2 = 3
	60	$\dfrac{60}{10} = 6$	6 – 2 = 4
	70	$\dfrac{70}{10} = 7$	7 – 2 = 5
Median	**60**	**6**	**4**

A. $\dfrac{x}{10} - 2 : \dfrac{4}{10} - 2 \overset{?}{=} 60 \Rightarrow 0.4 - 2 \overset{?}{=} 60 \Rightarrow -1.6 \neq 60$ ✗

B. $\dfrac{x}{10} : \dfrac{4}{10} \overset{?}{=} 60 \Rightarrow 0.4 \neq 60$ ✗

C. $x + 2 : 4 + 2 \overset{?}{=} 60 \Rightarrow 6 \neq 60$ ✗

D. $10x + 2 : 10(4) + 2 \overset{?}{=} 60 \Rightarrow 42 \neq 60$ ✗

E. $10(x + 2) : 10(4 + 2) \overset{?}{=} 60 \Rightarrow 10(6) \overset{?}{=} 60 \Rightarrow 60 = 60$ ✓

52. **(F)** *Mathematics/Algebra/Solving Quadratic Equations and Relations.* **CRS: NUM 28–32c. CC: 8.EE.A.1.** In order for $(x + 4)(x - 3) < 0$ to always be true, neither $x + 4$ nor $x - 3$ can equal zero and $(x + 4)$ and $(x - 3)$ cannot both be positive or negative. So, either $x + 4 > 0 \Rightarrow x > -4$ and $x - 3 < 0 \Rightarrow x < 3$, or $x + 4 < 0 \Rightarrow x < -4$ and $x - 3 > 0 \Rightarrow x > 3$. Since it is impossible for x to be both less than –4 and greater than 3, the first case must be true: $-4 < x < 3$. Compare the solution set $-4 < x < 3$ with the solution set for each answer choice that makes it negative:

F. $x - 5 : x - 5 < 0 \Rightarrow x < 5$

G. $x - 2 : x - 2 < 0 \Rightarrow x < 2$

H. $x + 5 : x + 5 < 0 \Rightarrow x < -5$

J. $2x : 2x < 0 \Rightarrow x < 0$

K. $x^2 - 1 : x^2 - 1 < 0 \Rightarrow x^2 < 1 \Rightarrow -1 < x < 1$

The only answer choice for which the solution set includes $-4 < x < 3$ is (F).

Alternatively, reason that for a given expression to always have a negative value, there cannot be a value within the solution set $-4 < x < 3$ that results in a positive number. Only (F), $x - 5$, will always be negative since any value for x less than 5 will yield a negative result. (G) is wrong since values between 2 and 3 result in a positive value: $2.5 - 2 = 0.5$. (H) is wrong, as all values for x yield positive values. (J) and (K) are wrong because all positive values for x yield a positive value for $2x$, and those greater than 1 yield a positive value for $x^2 - 1$.

53. **(D)** *Mathematics/Coordinate Geometry/Graphs of First-Degree Inequalities.* **CRS: XEI 33–36c. CC: HSA-REI.B.3.** Absolute value is a measure of the magnitude of a quantity. To solve the inequality, consider the two possibilities, positive and negative, that the expression within the absolute value could be: $x + y > 1$ and $-(x + y) > 1$.

To graph the solution sets, rewrite both inequalities in slope-intercept form ($y = mx + b$, where m is the slope and b is the y-intercept). First, $(x + y) > 1 \Rightarrow y > -x + 1$, so the slope is -1 and the y-intercept is 1. Since $y > -x + 1$, the solution set is the values of x and y to the right (greater than) this line. Note that the dashed line indicates that the solution set doesn't include the line:

To graph this inequality, locate the y-intercept, (0,1), and then step 1 unit down and 1 unit to the right as indicated by the slope of -1.
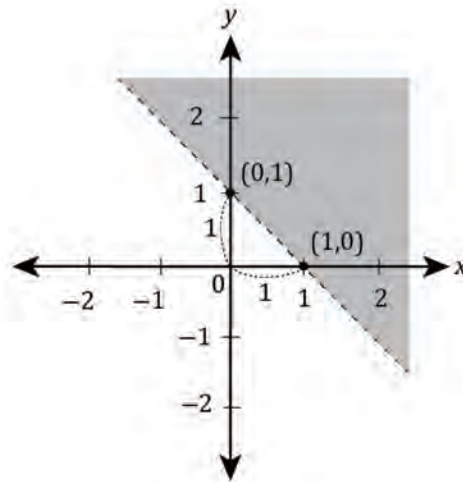
Second, $-(x + y) > 1 \Rightarrow -y > x + 1 \Rightarrow y < -x - 1$ (recall that when multiplying an inequality by a negative, the inequality switches direction). Again, locate the point of y-intercept, $(0, -1)$, and then step 1 unit down and 1 unit to the right as indicated by the slope of -1. Since $y < -x - 1$, the solution set is the values of x and y to the left (less than) this line. Again, the dashed line indicates that the solution set doesn't include the line:
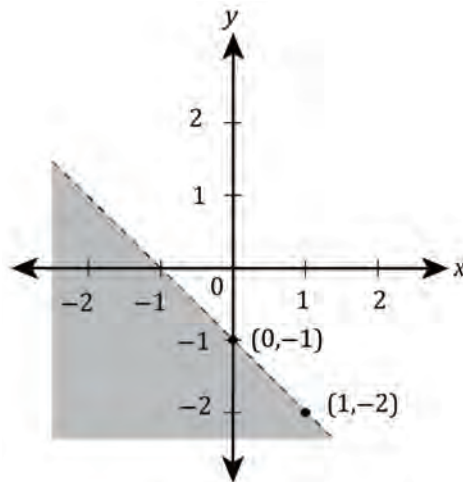
Thus, the solution set of $|x + y| > 1$ is the combination of the two graphs, (D).

TIP Alternatively, apply the "test-the-test" strategy. For each answer choice, select a point (or points) in the shaded portion(s) of the graph, and test whether $|x + y| > 1$ is true for the coordinate pair(s).

A. (0,0): $|0 + 0| \overset{?}{>} 1 \Rightarrow 0 > 1$ ✗

B. (2,2): $|2 + 2| \overset{?}{>} 1 \Rightarrow 4 > 1$ ✓

C. (–2,–2): $|-2 + -2| \overset{?}{>} 1 \Rightarrow |-4| \overset{?}{>} 1 \Rightarrow 4 > 1$ ✓

D. (2,2): $|2 + 2| \overset{?}{>} 1 \Rightarrow 4 > 1$ ✓

   (–2,–2): $|-2 + -2| \overset{?}{>} 1 \Rightarrow |-4| \overset{?}{>} 1 \Rightarrow 4 > 1$ ✓

E. (0,0): $|0 + 0| \overset{?}{>} 1 \Rightarrow 0 > 1$ ✗

   (2,2): $|2 + 2| \overset{?}{>} 1 \Rightarrow 4 > 1$ ✓

   (–2,–2): $|-2 + -2| \overset{?}{>} 1 \Rightarrow |-4| \overset{?}{>} 1 \Rightarrow 4 > 1$ ✓

Thus, (D) is the correct answer choice, as it includes both areas that yield a true statement.

54. **(F)** *Mathematics/Trigonometry/Trigonometric Relationships.* **CRS: FUN 33–36b. CC: HSF-TF.B.7.** Apply the relationship, sin($x + y$) = sin x cos y + cos x sin y, to the expression 4 sin x cos x. Let $y = x$:

$\sin(x + y) = \sin x \cos y + \cos x \sin y \Rightarrow \sin(x + x) = \sin x \cos x + \cos x \sin x \Rightarrow \sin(2x) = 2\sin x \cos x$.
Therefore, $4\sin x \cos x = 2(2\sin x \cos x) = 2\sin 2x$, **(F)**.

55. **(C)** *Mathematics/Geometry/Complex Figures.* **CRS: PPF 33–36b. CC: HSG-CO.A.2.** According to the item stem, the angle that the light strikes the mirror (angle of inflection) is equal to the angle of reflection:
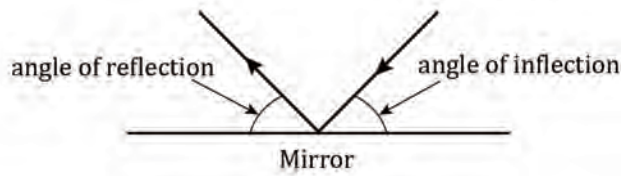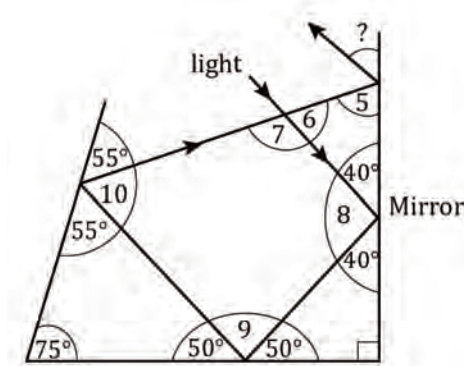
Mark the identical angles on the diagram:
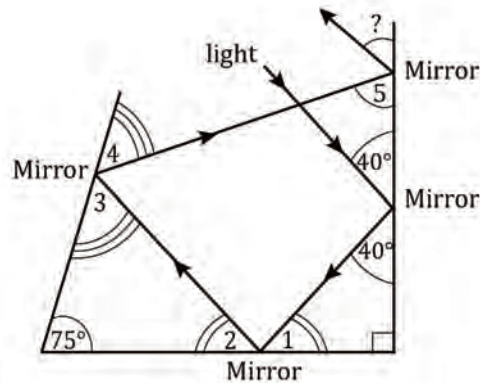
Use the total degree measure of the interior angles of a triangle (180°) to determine the measures of $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$: $\angle 1 = 180° - 40° - 90° = 50° = \angle 2$ and $\angle 3 = 180° - 75° - 50° = 55° = \angle 4$

Add the information to the diagram:

To determine the measure of $\angle 5$ requires the measure of $\angle 6$. To determine the measure of $\angle 6$ requires the measure of $\angle 7$. To determine the measure of angle $\angle 7$ requires the measures of $\angle 8$, $\angle 9$, and $\angle 10$. Use the total degree measure of a straight line (180°) to determine the measures of $\angle 8$, $\angle 9$, and $\angle 10$: $\angle 8 = 180° - 40° - 40° = 100°$, $\angle 9 = 180° - 50° - 50° = 80°$, and $\angle 10 = 180° - 55° - 55° = 70°$.

Use the total degree measure of the interior angles of a quadrilateral (360°) to determine the measure of $\angle 7$: $\angle 7 = 360° - \angle 8 - \angle 9 - \angle 10 = 360° - 100° - 80° - 70° = 110°$. Thus, $\angle 6 = 180° - 110° = 70°$, $\angle 5 = 180° - 40° - 70° = 70°$, and the missing angle equals $\angle 5$, or 70°, (C).

56. **(K)** *Mathematics/Algebra/Solving Algebraic Equations or Inequalities in One Variable/Inequalities Involving Absolute Value.* **CRS: GRE 24–27c. CC: 8.F.B.4.** To solve an absolute value equation, create and solve the derived equations. For $|x - c| \geq 2$, the derived equations are $x - c \geq 2$ or $-(x - c) \geq 2$. Therefore,

$x \geq c+2$ and $-x+c \geq 2 \Rightarrow -x \geq 2-c \Rightarrow x \leq c-2$. So, $x \leq c-2$ and $x \geq c+2$, which is represented by the graph in (K).

57. **(A)** *Mathematics/Coordinate-Geometry/Slope of a Line.* **CRS: GRE 33–36c. CC: HSG-CO.A.4.** The square is to be divided into two congruent (equal) regions by the line $y = ax + 2$. Since $y = ax + 2$ is in slope-intercept form, a is the slope and 2 is the y-intercept. For the two areas to be equal, the line must end at the opposite side of the square, 1 unit below C:
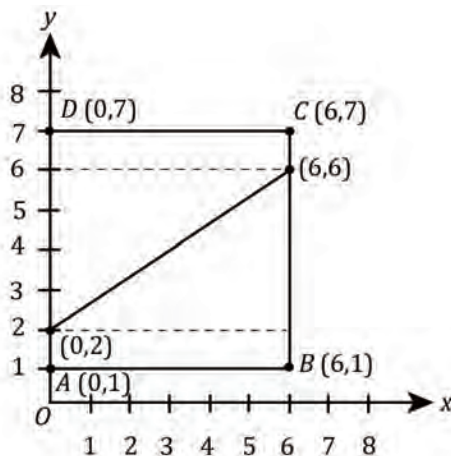

Thus, the line $y = ax + 2$ goes through points (0,2) and (6,6). Calculate the slope of the line, a, using these two points: $a = \dfrac{\text{rise}}{\text{run}} = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{6-2}{6-0} = \dfrac{4}{6} = \dfrac{2}{3}$, (A).

58. **(F)** *Mathematics/Algebra/Manipulating Algebraic Expressions/Manipulating Expressions Involving Exponents.* **CRS: FUN 33–36b. CC: HSF-IF.A.2.** By definition, $\log_b(y) = x$ means b raised to x equals y: $b^x = y$. Thus, $3^p = 2$ and $3^q = 5$. And since 10 = (2)(5), $10 = \left(3^p\right)\left(3^q\right) = 3^{p+q}$, (F).

59. **(D)** *Mathematics/Trigonometry/Definitions of Trigonometric Functions* and *Coordinate Geometry/Transformations and Their Effects on Graphs of Functions.* **CRS: FUN 33–36b. CC: HSF-IF.A.1.** The range of a function is the set of y-values and the domain is the set of x-values. Recall the rules for transformations of groups:

1. When a constant c is added to a function, the graph of the function moves c units up if $c > 0$, and c units down if $c < 0$.
2. When a constant c is added to the x-values, the graph of the function moves c units to the left if $c > 0$, and c units to the right if $c < 0$.
3. When the function is multiplied by a constant c, the graph is stretched vertically if $c > 1$, compressed vertically if $0 < c < 1$, and reflected over the x-axis if $c < 0$.
4. When the x-values are multiplied by a constant c the graph is compressed horizontally if $c > 1$, stretched horizontally if $0 < c < 1$, and reflected over the y-axis if $c < 0$.

The range, or y-values, is impacted by transformations that result in vertical changes in the graph, so focus on situations 1 and 3 above.

The base function of $y(x)$ is $\cos(x)$:

$y = \cos(x)$
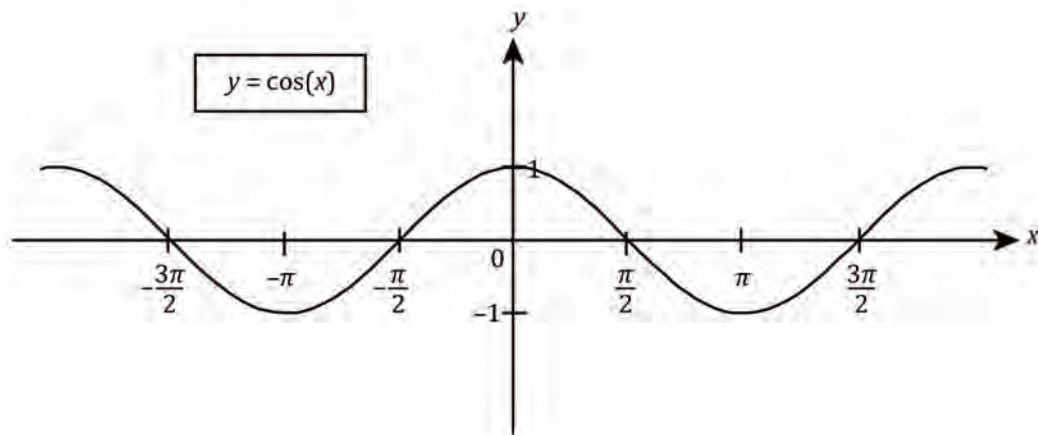
Multiplying $\cos(x)$ by 3 stretches it vertically by a factor of 3:

$y(x) = 3\cos(x)$
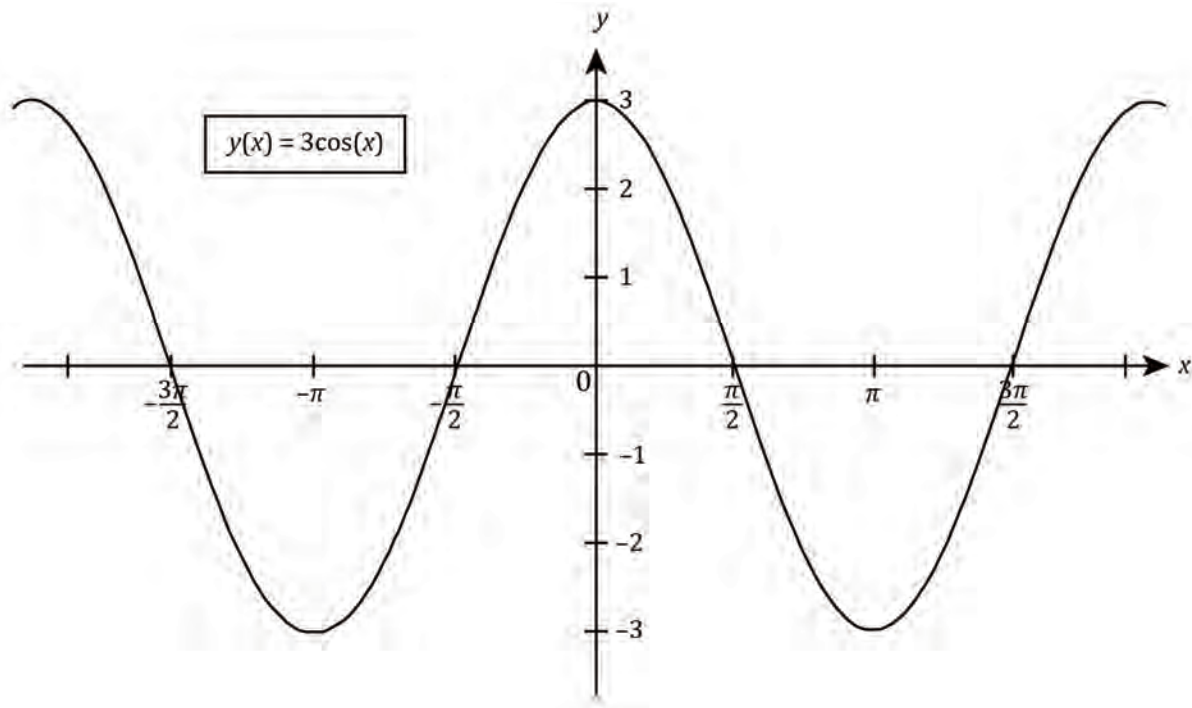
And adding 1 shifts the graph up 1 unit:
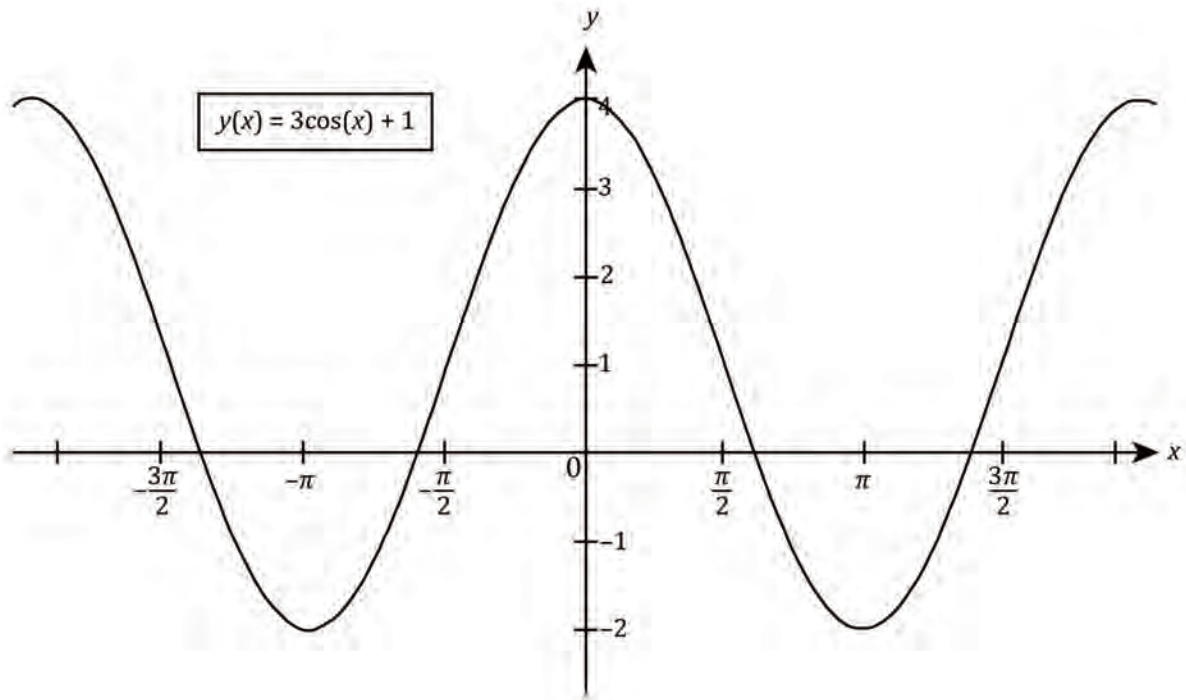
Therefore, the range of the y-values is $-2 \leq y(x) \leq 4$, (D).

Alternatively, use a graphing calculator, to graph the function $y(x) = 3\cos(5x - 4) + 1$.

60. **(J)** *Mathematics/Arithmetic/Complicated Arithmetic Application Items.* **CRS: BOA 33–36a. CC: 7.RP.A.3.**

Since the area of each cube face doesn't change, simply count the number of square faces before and after the transformation:
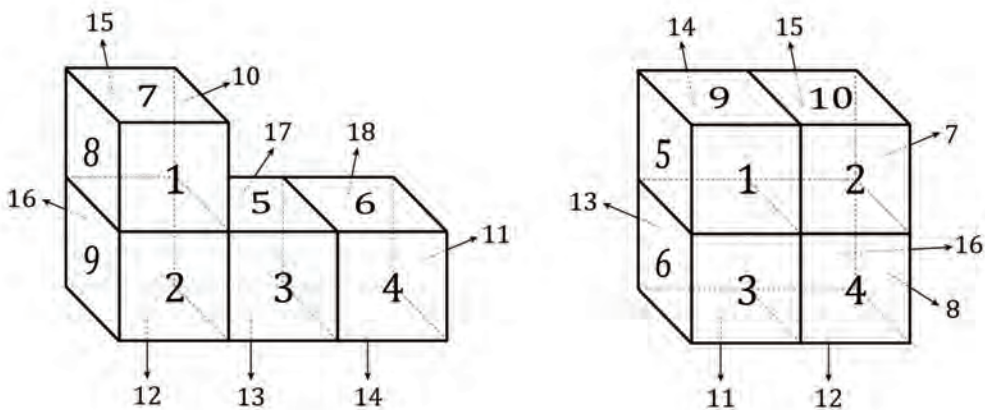
Therefore, the change in surface area is the difference divided by the original: $\dfrac{16-18}{18} \approx -0.11 = -11\%$, (J).

Mathematics — Common Core State Standards

Standard	Description
4.MD.A.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems.
5.OA.B.3	Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.
6.EE.A.2c	Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
6.EE.B.7	Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.
6.G.A.1	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
6.NS.B.2	Fluently divide multi-digit numbers using the standard algorithm.
6.NS.B.4	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.
6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
6.RP.A.3b	Solve unit rate problems including those involving unit pricing and constant speed.
6.RP.A.3d	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
7.EE.A.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
7.G.A.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
7.G.B.4	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
7.G.B.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
7.G.B.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
7.RP.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
7.SP.C.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions.
8.EE.A.2	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
8.EE.C.8b	Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.
8.F.A.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
8.F.B.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
8.F.B.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
8.G.B.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
HSA–REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
HSA–REI.B.4b	Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.
HSF–IF.A.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$.
HSF–IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
HSF-TF.B.7	Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.
HSG-CO.A.2	Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).
HSG-CO.A.4	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
HSG–CO.C.10	Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.*
HSG–GPE.A.1	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
HSG-GPE.B.6	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
HSG–SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
HSN-CN.A.2	Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
HSS–CP.A.1	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").
HSS-ID.A.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

Mathematics — College Readiness Standards

Standard	Description
Basic Operations and Applications	
BOA 16–19a	Solve one-step arithmetic problems.
BOA 16–19b	Solve some routine two-step arithmetic problems
BOA 20–23a	Solve two- or three-step arithmetic problems involving rate and proportion, tax added, percentage off, computing with a given average, etc.
BOA 24–27a	Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
BOA 33–36a	Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
Probability, Statistics, and Data Analysis	
PSD 16–19a	Calculate the average of a list of numbers
PSD 20–23c	Determine the probability of a simple event
PSD 20–23d	Understand simple counting techniques.
PSD 33–36b	Analyze and draw conclusions based on information from figures, tables, and graphs
Number Concepts	
NUM 20–23a	Show familiarity with basic features of the number system.
NUM 24–27b	Put fractions in order.
NUM 24–27d	Work with scientific notation
NUM 28–32c	Apply number properties involving positive/negative numbers
NUM 28–32d	Apply the rules of exponents.
Expressions, Equations, and Inequalities	
XEI 16–19a	Substitute whole numbers for unknown quantities to evaluate expressions
XEI 20–23a	Evaluate algebraic expressions using integers.
XEI 20–23c	Solve routine first-degree equations.
XEI 20–23d	Perform straightforward word-to-symbol translations
XEI 20–23e	Multiply two binomials.
XEI 24–27b	Write expressions, equations, or inequalities with a single variable for common pre-algebra situations.
XEI 24–27c	Identify solutions to basic quadratic equations.
XEI 24–27e	Factor simple quadratics such as the difference of squares and perfect square trinomials.
XEI 28–32d	Solve absolute value equations
XEI 28–32f	Find solutions to systems of linear equations.
XEI 33–36c	Solve simple absolute value inequalities
Graphical Representations	
GRE 24–27b	Find the slope of a line from points or equations.
GRE 24–27c	Match linear graphs to their equations.
GRE 24–27d	Find the midpoint of a line segment.
GRE 28–32a	Analyze and apply information from graphs in the coordinate plane.
GRE 28–32d	Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point
GRE 28–32e	Demonstrate the knowledge of special characteristics of parabolas and circles.
GRE 33–36c	Solve problems integrating multiple algebraic and/or geometric concepts
Properties of Plane Figures	

PPF 24–27a	Use several angle properties to find an unknown angle measure
PPF 24–27b	Recognize Pythagorean triples
PPF 24–27c	Use properties of isosceles triangles.
PPF 28–32b	Use the Pythagorean theorem.
PPF 33–36a	Know how to draw conclusions based on a set of conditions.
PPF 33–36b	Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
Measurement	
MEA 20–23a	Compute the area and perimeter of triangles and rectangles in simple problems
MEA 20–23b	Use geometric formulas when all necessary information is given
MEA 24–27b	Compute the area and circumference of circles after identifying necessary information
MEA 28–32a	Compute another measure using relationships involving area, perimeter, and volume of geometric figures.
Functions	
FUN 20–23a	Evaluate quadratic functions, expressed in function notation, at integer values
FUN 24–27b	Express the sine, cosine, and tangent of a right triangle angle as a ratio of given side lengths.
FUN 28–32a	Evaluate composite functions at integer values.
FUN 28–32b	Solve right-triangle problems by applying basic trigonometric ratios.
FUN 33–36b	Use trigonometric concepts and basic identities to solve problems

Test 3: Reading

Passage I—Prose Fiction

1. **(D)** *Reading/Prose Fiction/Implied Idea.* **CCRS: REL 20–23b. CC: ELA-Literacy.CCRA.R.3.** This question contains a thought reverser. The correct answer is the one that *can't* be inferred from the passage. (A) is wrong because both women have a sense of humor. Martha's humor is first implied in line 37, where she smirks, and both women's senses of humor are evident when they answer the narrator's question about what they thought of each other when they first met (lines 68–86). (B) is wrong because both women are brutally honest, as we also see in their story about their first meeting. (C) is wrong for the same reason as (A) and (B)—both women are lively, as shown in the same story, as well as throughout the passage. (D) is the correct answer because the passage describes only Martha as pausing before she speaks (lines 16–17). Nothing is said about Ola pausing before she speaks.

   TIP This question is a "thought reverser." Thought reversers require close reading so that you don't answer the question incorrectly.

2. **(F)** *Reading/Prose Fiction/Implied Idea.* **CCRS: GEN 13–15a. CC: ELA-Literacy.CCRA.R.1.** In lines 7–10, the narrator calls Martha and, as the passage says, "I tell her Ola's idea about making a movie." We can eliminate (G) and (J), because the passage clearly states that the original idea was Ola's, not the narrator's. (H) is also wrong, because it is the narrator who tells Martha about the idea, not the other way around. (F) is the correct answer—Ola came up with the idea, and the narrator and Martha went along with it eagerly.

3. **(C)** *Reading/Prose Fiction/Implied Idea.* **CCRS: SUP 20–23b. CC: ELA-Literacy.CCRA.R.2.** In lines 25–27, the narrator says that she is just getting used to using the camera—in fact, she only remembers to take the lens cap off sometimes. In lines 42–43, the narrator worries that she has left the lens cap on while attempting to film the crow. Both of these suggest that she is still a novice with the camera and thus insecure about her skills, (C). (A), (B), and (D) may all be true statements, but the context of the references to the lens cap supports (C) much more strongly.

4. **(J)** *Reading/Prose Fiction/Implied Idea.* **CCRS: GEN 24–27a. CC: ELA-Literacy.CCRA.R.1.** Based on the passage as a whole, we know Martha to be a good-spirited and funny woman, who is willingly going along with the movie project. Thus, (F), (G), and (H) are wrong. She isn't feeling weary or condescending, and there is no reason for "profound relief." (J) is the best answer—she has been watching the young narrator practice her camera skills with a sense of slight amusement.

5. **(B)** *Reading/Prose Fiction/Explicit Detail.* **CCRS: GEN 13–15a. CC: ELA-Literacy.CCRA.R.1.** Lines 68–86 tell the story of the initial meeting between the two women. Ola and her daughter were painting their house, and Martha yelled from the road that it didn't look good. Ola offered a quick retort, saying that if she had enough energy to yell at a stranger, she had enough energy to help paint, so Martha did. While this could have been a bitter confrontation, it ended up with Martha helping Ola paint, a cooperative effort. (B) best describes this series of events. (A) is wrong because the two women end up becoming friends. (C) is wrong because the event does not begin as a relaxed get-together—it begins as a confrontation about paint color. (D) is wrong because the encounter turns pleasant rather than unpleasant, and Ola's daughter doesn't help resolve the problem.

6. **(H)** *Reading/Prose Fiction/Explicit Detail.* **CCRS: GEN 13–15a. CC: ELA-Literacy.CCRA.R.1.** In lines 19–30, Martha advises the narrator on how to use a camera. Her advice, to "let the camera become part of

you" and to "turn the camera on and shoot," is most compatible with (H), an intuitive method. Her advice is not scientific, (F); cautious, (G); or secret, (J).

7. **(B) *Reading/Prose Fiction/Implied Idea.* CCRS: GEN 13–15a. CC: ELA-Literacy.CCRA.R.1.** Through a couple of steps of reasoning, we can discover who Diane is. First of all, in lines 71–72, Martha talks about how Ola painted the house the day after she and Diane moved in. Later, in lines 77–79, Ola tells the narrator that her mother was embarrassed and begged her not to paint the house yellow. From putting these two references together, we see that Diane was the narrator's mother, (B).

8. **(F) *Reading/Prose Fiction/Development.* CCRS: MID 20–23a. CC: ELA-Literacy.CCRA.R.2.** In the last paragraph, the narrator explains why she wants to make the movie. In lines 91–94, she says regarding Ola's friends, "I want to know who they are and what they've done. I'll put them all in front of the camera, and when the movie's done, it can be my gift to Ola." The narrator is explaining her motivation for making the film, (F). (G) is wrong because the paragraph does not include details about the narrator's past. (H) is wrong because the paragraph does not go into more details about her relationship with Martha. Finally, (J) is wrong because there is nothing in the paragraph that would cause the reader to doubt the narrator's reliability.

9. **(D) *Reading/Prose Fiction/Main Idea.* CCRS: MID 16–19a. CC: ELA-Literacy.CCRA.R.2.** In the first paragraph, the narrator is thinking about things she has observed from Ola's friends and heard from her father—that everyone has a story. She concludes that, as her father says, these stories connect all people to each other, (D). (A) is wrong because, while it has some elements of truth, it's not exactly the main point of the paragraph. While it appears that the narrator trusts her father's words, the paragraph isn't about her father's assessment of people, but rather his idea that all people are connected by their stories. (B) is a misunderstanding of the paragraph. It does not discuss Ola's storytelling capabilities, but rather the idea that all people have their own stories to tell. (C) does seem to be true based on the first paragraph, but the item stem asks for the main conclusion that the narrator draws. Her main conclusion is not that Ola is close to her neighbors, but that people are connected through stories.

10. **(H) *Reading/Prose Fiction/Implied Idea.* CCRS: MOW 20–23a. CC: ELA-Literacy.CCRA.R.4.** Just before the quoted statement, the passage says, "Ola's short and delicate—like she'd break if you held her arm too tight" (lines 59–60). The narrator goes on to say that Ola wouldn't break. The implication is that even though Ola appears to be small and delicate, she is strong, (H). (F) and (G) are not supported by any other ideas in the passage. In fact, we know from the story of Martha and Ola's first meeting that Ola is willing to show her feelings. (J) may or may not be true, but there is no real information in the passage to support this idea, especially in the context of the quoted statement.

Passage II—Social Science

11. **(B) *Reading/Social Science/Explicit Detail.* CCRS: GEN 16–19a. CC: ELA-Literacy.CCRA.R.1.** The correct answer is (B). As we read through the paragraphs describing the scientists' process, we see a lot of evidence of their enthusiasm. After they created their product, they organized blind taste tests to compare their product to traditional burgers (lines 26–27). They then gave their product to families to test in home cooking (lines 29–33). Finally, the team approached McDonald's to have the company make hamburgers out of their product (lines 63–65). All of these actions show that the Auburn scientists were enthusiastic in their promotion of their work. (A) is wrong because the passage doesn't say that the scientists were critics of the fast-food industry, just that they wanted to come up with a healthier hamburger. (C) is wrong because the scientists were very interested in the practical uses of their beef. This is evident from all of the promotional efforts described above—taste tests, at-home cooking tests, and even selling the product to McDonald's. (D) is wrong because the passage says that the researchers

were interested in the taste of the product. Lines 8–10 say that they wanted to make a product "that tasted as good as regular ground beef."

12. **(H)** *Reading/Social Science/Implied Idea.* **CCRS: REL 20–23c. CC: ELA-Literacy.CCRA.R.3.** As we learn in lines 74–78, people liked AU Lean because they didn't know it was the healthy option. Therefore, we can infer that if they had known, as in (H), the outcome of the experiment would likely have been different. There is no evidence that (F), (G), or (J) would have changed the outcome of the experiment.

13. **(D)** *Reading/Social Science/Application.* **CCRS: GEN 20–23a. CC: ELA-Literacy.CCRA.R.1.** Lines 61–63 state that there is no reason to use twenty-percent-fat ground beef in fast-food burgers. The item stem asks which of the groups is likely NOT to agree with this statement. Let's use the process of elimination to determine the answer. (A) can be eliminated because the McDonald's officials who introduced the McLean Deluxe obviously believed that it would be a popular alternative to their regular burger. (B) can be eliminated because the scientists who created the AU Lean clearly believed in their product. (C) is wrong because nutritionists who saw the benefit of the low-fat alternative would support the statement. The only group listed who may not support the statement are the fast-food company executives who had seen the product fail with consumers, (D).

14. **(G)** *Reading/Social Science/Explicit Detail.* **CCRS: SUP 20–23b. CC: ELA-Literacy.CCRA.R.2.** Carrageenan is mentioned in line 18. In lines 12–16, the passage says that the Auburn scientists were trying to eliminate some of the fat and needed something that would hold the same amount of water, and they settled on carrageenan. Thus, (G) is the correct answer. Carrageenan was a substitute for fat. Flavor enhancers, (F), are mentioned in lines 19–20, but the passage says that they were "also" selected; they were separate from carrageenan. (H) is wrong because, while protein is mentioned in the paragraph, carrageenan was not added to enhance the protein content. Finally, (J) is wrong because according to the passage, carrageenan is seaweed, therefore carrageenan can't be a replacement for itself.

15. **(A)** *Reading/Social Science/Implied Idea.* **CCRS: REL 20–23c. CC: ELA-Literacy.CCRA.R.3.** The fifth paragraph says that the volume of food people eat impacts their feelings of satisfaction more than the number of calories in the food. Therefore, for an AU Lean hamburger to feel as satisfying as a traditional burger, the most important factor would be to keep the volume of food the same, (A). (B) is wrong because lines 47–49 state that volume is more important than calorie content. (C) is wrong because the whole point of an AU Lean burger is that the fat content is much less than that of a traditional burger. Therefore, it is impossible for the two types of burgers to have the same fat content. (D) is wrong because the author doesn't put much emphasis on cooking method, whereas he makes a much clearer case for (A).

16. **(J)** *Reading/Social Science/Main Idea.* **CCRS: REL 20–23c. CC: ELA-Literacy.CCRA.R.3.** Lines 70–81 talk about the McLean's flop and the reasons for it. (F) is wrong because the passage doesn't talk about McDonald's advertising (or lack thereof) for the McLean. (G) is the second-best choice because lines 71–74 say that production problems were "part" of the problem. However, the item stem asks for the *main* reason that the McLean failed. The meaning of (H) is unclear; what is "market" hamburger? The passage says nothing to indicate that this was a hang-up for consumers. (J) is the correct choice. The main problem, as noted in lines 76–81, is that people liked the AU Lean when they didn't know that that was what they were eating. Once they knew, a "psychological handicap" (line 75) prevented them from choosing the McLean.

17. **(A)** *Reading/Social Science/Implied Idea.* **CCRS: MID 20–23b. CC: ELA-Literacy.CCRA.R.8.** This question comes at the end of a paragraph that discusses the reasons that the McLean failed. The main conclusion of the paragraph is that people didn't want a healthy choice, especially from a fast-food restaurant. (A) captures this attitude. The author is appealing to the prevailing perception that people go to fast-food

restaurants not to get healthy food, but for other reasons, like taste or convenience. If they had wanted healthy food, they would have gone to a different type of restaurant or cooked at home. Based on this common notion of fast-food restaurants, the answer to the question, meant rhetorically, is negative. Who goes to McDonald's for health food? No one. (B) is wrong because people *didn't* want the healthy choice. (C) is wrong because, by the end of the paragraph, the author is not unsure of people's attitude. Rather, he has reached the conclusion that consumers don't want healthy fast food. (D) is wrong because nothing in the passage indicates that the author opposes the sale of AU Lean. If anything, the tone of the passage seems to indicate his support for healthier fast-food options.

18. **(G)** *Reading/Social Science/Implied Idea.* **CCRS: GEN 16–19a. CC: ELA-Literacy.CCRA.R.1.** In the last paragraph, the author says that the nutrition industry has assumed that the best way to help people improve their food choices is to give them information about what is in their food. However, this approach can backfire (as it did with the McLean). Therefore, the implication is that the nutrition industry should reconsider whether transparency about a food's nutritional content actually helps people make better choices, (G). (F) is wrong because the nutrition industry has already made its goals transparent, and this has backfired. (H) and (J) are wrong because these are examples of transparency, the approach that has not worked. In lines 85–88, the author mentions both of these approaches, and goes on to say that they can backfire.

19. **(C)** *Reading/Social Science/Explicit Detail.* **CCRS: SUP 13–15a. CC: ELA-Literacy.CCRA.R.2.** Because the item stem includes the words "according to the passage," we know that this is an Explicit Detail item; the answer will be specifically stated in the passage. Look back to lines 20–23, where the ingredients of AU Lean are listed. Line 21 states that the patty was three-quarters water, so (C) is the correct answer. The other answer choices are wrong because, while fat, seaweed, and protein were the other ingredients, they made up much smaller percentages of the patty.

20. **(J)** *Reading/Social Science/Explicit Detail.* **CCRS: REL 20–23b. CC: ELA-Literacy.CCRA.R.3.** (J) is the correct answer. Lines 43–46 state that people usually can't taste a difference in burgers that have between five and twenty-five percent fat, when the lower fat burgers have water and added flavorings to make up for the missing fat. Therefore, in the example given in the item stem, most people wouldn't be able to tell the difference between hamburgers that were eight percent fat and twenty percent fat. (F), (G), and (H) are wrong because these conclusions are unsupported by the given information.

Passage III—Humanities

21. **(D)** *Reading/Humanities/Development.* **CCRS: REL 20–23b. CC: ELA-Literacy.CCRA.R.3.** This question asks how the second paragraph relates to the first paragraph of the passage. The first paragraph presents a problem—all keyboard instruments invented at that point in time were unsatisfactory. The correct answer is (D) because the second paragraph describes a solution to this problem—the invention of the first piano in 1711, as described in lines 20–21. (A) is incorrect because the second paragraph doesn't move further back in time as the answer choice suggests. (B) is incorrect because there is no mention of the "general public's reaction to the developments described in the first paragraph." (C) is incorrect because there is no argument presented in the first paragraph.

22. **(H)** *Reading/Humanities/Explicit Detail.* **CCRS: SUP 20–23a. CC: ELA-Literacy.CCRA.R.2.** In this case, the question is asking students to determine which of the answer choices is NOT addressed in the passage. The correct answer, (H), is the only question not answered in the passage. All of the other questions are answered in the passage.

TIP This question is a "thought reverser." Thought reversers require close reading so that you don't

answer the question incorrectly.

23. **(A)** *Reading/Humanities/Implied Idea.* **CCRS: REL 20–23b. CC: ELA-Literacy.CCRA.R.3.** This question asks students to infer what the writer of the passage thinks about two of the important figures mentioned in the passage, Beethoven and Cristofori. The writer makes several references to the important contributions of both Beethoven (lines 72–76) and Cristofori (lines 6–10), which supports answer choice (A). Answer choices (B) and (D) are incorrect because they refer to both Beethoven and Cristofori as musicians, but Cristofori was not a musician, he was an inventor. Answer choice (C) is incorrect because Beethoven and Cristofori were appreciated during their lifetimes, not after their deaths as the answer choice suggests.

24. **(G)** *Reading/Humanities/Explicit Detail.* **CCRS: GEN 20–23a. CC: ELA-Literacy.CCRA.R.1.** This question asks about the significance of an explicit detail in the passage. (G) is correct because in lines 23–25, the passage states that the process of developing the piano, which began in Italy, took hold in eighteenth-century Germany. (F) is incorrect because Cristofori was Italian and did his work in Italy. (H) is incorrect because nowhere in the passage does it state where the best harpsichords and clavichords were produced. (J) is incorrect because there is no mention in the passage of a "split" among piano makers over the best way to make keyboards.

> **TIP** When answering explicit detail questions, skim the passage for keywords or phrases. In this case, the phrase "eighteenth-century Germany" will be helpful in locating the correct answer.

25. **(D)** *Reading/Humanities/Explicit Detail.* **CCRS: MOW 20–23a. CC: ELA-Literacy.CCRA.R.4.** This requires understanding the phrase in context and reading back in the passage to see what the "breakthrough" was. (D) is the correct answer because lines 16–20 describe Cristofori's breakthrough as being the development of "an instrument as large and robust as the big harpsichords." Answer choices (A), (B), and (C) are incorrect because they are not mentioned in reference to "Cristofori's breakthrough."

> **TIP** This question reads like a vocabulary question, but given the basic level of the phrase in question (*Cristofori's breakthrough)*, we know it is actually an explicit detail question.

26. **(F)** *Reading/Humanities/Implied Idea.* **CCRS: SUP 20–23b. CC: ELA-Literacy.CCRA.R.2.** This question asks for evidence of others' deep respect for Beethoven. To find the correct answer, (F), one could skim for the word "Broadwood" and locate the correct answer in line 77. Skimming for the keywords or phrases in the remaining answer choices (G), (H), and (J) would reveal that those answer choices don't connect to the idea of others' deep respect for Beethoven.

> **TIP** Students can find the answer to this question by skimming the passage for the keywords from the answer choices.

27. **(B)** *Reading/Humanities/Vocabulary.* **CCRS: MOW 20–23a. CC: ELA-Literacy.CCRA.R.4.** This question asks students to determine the intended meaning of the phrase *extreme limits* in the context of the passage. Lines 87–88 reference ". . .the piano's extreme limits of power and expressiveness." The correct answer is (B) because "extreme limits" mostly closely means "far reaches" in this context. Answer choices (A), (C) and (D) do not correlate to "extreme limits."

28. **(H)** *Reading/Humanities/Explicit Detail.* **CCRS: SUP 20–23a. CC: ELA-Literacy.CCRA.R.2.** This question asks students to identify a specific detail about Johann Sebastian Bach's reaction to the first piano he played. The correct answer, (H), is supported by lines 29–31, which state that Bach was impressed by the piano but also noted some limitations. Answer choices (F), (G), and (H) are not supported by the passage.

29. **(A)** *Reading/Humanities/Explicit Detail.* **CCRS: REL 20–23b. CC: ELA-Literacy.CCRA.R.3**. This question asks students to identify a specific detail about the ways in which a piano was better than a harpsichord. The correct answer, (A), is supported by the fourth paragraph, which discusses the piano as a solo instrument. In particular, have students focus on lines 49–51, which contain the phrase "solo concerts." The remaining answer choices are not supported by the passage.

    TIP Skimming for key words or phrases from the answer choices can help locate the correct answer.

30. **(G)** *Reading/Humanities/Explicit Detail.* **CCRS: GEN 16–19a. CC: ELA-Literacy.CCRA.R.1**. The specific detail in this question relates to the *Hammerklavier* sonata. Since the key word in question, *Hammerklavier*, is so unusual, it is not difficult to locate it in line 86. Once located, students must find the answer choice that most closely paraphrases what is stated in lines 85–88. The correct answer choice, (G), most closely paraphrases what is stated. The remaining answer choices are not supported by the passage.

    TIP This is another question where skimming is a useful tool.

Passage IV—Natural Science

31. **(D)** *Reading/Natural Science/Main Idea.* **CCRS: MID 28–32a. CC: ELA-Literacy.CCRA.R.2**. This question asks students to identify the main purpose of the passage. The correct answer, (D), is supported by the topic sentence of the first paragraph: "bluefin tuna and swordfish have evolved into some of the sea's most highly developed fishes." This alludes to the adaptations and special traits mentioned in (D). (A) is incorrect because it is too specific to be a main idea—a proposal for research is not mentioned in the passage. (B) is incorrect because throughout the passage bluefin tuna and swordfish are both lauded for their adaptive qualities, and one fish is not praised above the other. (C) is incorrect because although some reasons for the adaptation of these fish are given, this answer choice is too specific to be a good main idea.

32. **(F)** *Reading/Natural Science/Voice.* **CCRS: GEN 20–23b. CC: ELA-Literacy.CCRA.R.1**. This question is about interpreting the author's attitude towards the topic. The correct answer is (F) because the author's attitude is one of appreciation. Phrases such as "exquisitely adapted"" (line 8) and "ocean princes" (line 20–21) have a positive connotation that convey the author's appreciation. (G) and (H) are incorrect because the author is neither concerned or confused about the bluefin tuna and the swordfish. (J) is incorrect because the passage contains many positive words and phrases that convey the author's appreciation of the fish, so the author is not neutral towards the topic.

33. **(D)** *Reading/Natural Science/Explicit Detail.* **CCRS: SUP 24–27a. CC: ELA-Literacy.CCRA.R.2**. This question asks students how the body temperature of a cold-blooded fish is determined. The correct answer, (D), is supported by lines 5–7, which state that the body temperature of cold-blooded fish is "in synchrony with the surrounding water." The remaining answer choices are not supported by the passage.

34. **(F)** *Reading/Natural Science/Explicit Detail.* **CCRS: REL 33–36b. CC: ELA-Literacy.CCRA.R.3**. This question asks about a specific detail related to the difference between the temperature-regulation systems of swordfish and bluefin. The correct answer choice, (F), is supported in the passage by lines 22–25 and lines 33–37. These lines explain how the temperature-regulation systems of both fish differ. (G) is incorrect because although the first part of the answer choice is correct—swordfish do have a heat-producing organ behind their eyes—the bluefin do not have a heat-producing organ near their backbone. Answer choices (H) and (J) are not supported by the passage.

    TIP To answer this question correctly students must find information in two different places about the

temperature-regulation systems of both the swordfish and the bluefin, and then determine how they are different.

35. **(D)** *Reading/Natural Science/Implied Idea.* **CCRS: GEN 24–27b. CC: ELA-Literacy.CCRA.R.1.** This question asks students to make an assumption about why bluefins remain rigid while swimming. Eliminate all answer choices that do not relate to the red muscles of a bluefin or to the swimming practices of bluefin. The correct answer choice, (D), is the only answer choice that is relevant to the red muscles of the bluefin and gives insight into why these fish remain rigid while swimming.

    TIP Process of elimination might be useful in answering this question.

36. **(G)** *Reading/Natural Science/Implied Idea.* **CCRS: REL 24–27e. CC: ELA-Literacy.CCRA.R.3.** This is another question that tests students' inference and deducing skills. The question asks why the waters near the Gulf Stream pose a challenge to the majority of fish. In lines 19–20 the passage states that "Moving between such [temperature] extremes would stun the nervous system of a cold-blooded fish," which is most closely aligned with the correct answer choice, (G). (F) is incorrect because predators are not mentioned in the passage. (H) and (J) are not supported by the passage. The only information given as to why the waters of the Gulf Stream are challenging relates to temperature extremes, which is supported by answer choice (G).

37. **(C)** *Reading/Natural Science/Explicit Detail.* **CCRS: SUP 24–27a. CC: ELA-Literacy.CCRA.R.2.** This question asks readers to identify the meaning of the Greek-derived name for the bluefin. Lines 53–54 state that the Greek name *Thunnus thynnus* means "to dart or lunge forward." This is supported by answer choice (C).

    TIP Since this question is asking about such a specific detail, the Greek-derived name, students can skim the passage for the word "Greek" to locate the correct answer.

38. **(G)** *Reading/Natural Science/Main Idea.* **CCRS: MID 24–27b. CC: ELA-Literacy.CCRA.R.2.** This question asks about the main idea or purpose of the last paragraph of the passage. A close reading of the last paragraph reveals that the main idea is most closely aligned with answer choice (G). Lines 83–84 state: "How they [the fish] navigate, no one really knows," which supports the fact that researchers do not fully understand the migration patterns of swordfish and bluefin. The remaining answer choices are not supported by the passage.

39. **(D)** *Reading/Natural Science/Explicit Detail.* **CCRS: SUP 24–27c. CC: ELA-Literacy.CCRA.R.2.** For this item, students may use process of elimination. The correct answer choice is (D). Lines 3–5 list the types of fish which inhabit the North Sea and the Gulf of Mexico—all the fish except the bluefin.

    TIP This question is a thought reverser. It is asking which ideas the passage supports EXCEPT one of the answer choices.

40. **(G)** *Reading/Natural Science/Explicit Detail.* **CCRS: REL 24–27e. CC: ELA-Literacy.CCRA.R.3.** This question asks about the purpose of the heat generated by a swordfish. The second paragraph discusses the ways that the internal heating system of the swordfish works. The correct answer choice, (G), is supported primarily by lines 25–26, which state that the warm brain and eyes of the swordfish help them chase their food. None of the other answer choices are supported in the passage.

The following tables list the descriptions for all the Common Core State Standards and the College and Career Readiness Standards that are referenced in this *Navigator Plus*.

Reading — Common Core State Standards

Standard	Description
ELA–Literacy.CCRA.R.1	Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
ELA–Literacy.CCRA.R.2	Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
ELA–Literacy.CCRA.R.3	Analyze how and why individuals, events, or ideas develop and interact over the course of a text.
ELA–Literacy.CCRA.R.4	Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
ELA–Literacy.CCRA.R.8	Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

Reading — College Readiness Standards

Standard	Description
Main Idea and Author's Approach	
MID 16–19a	Recognize a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives.
MID 20–23a	Infer the main idea or purpose of paragraphs in an uncomplicated literary passage.
MID 20–23b	Understand the author or narrator's approach (e.g., point of view, kinds of evidence used) in uncomplicated passages.
MID 24–27b	Infer the main idea or purpose of paragraphs in more complex passages.
MID 28–32a	Infer the main idea or purpose of more complex passages and paragraphs.
Supporting Details	
SUP 13–15a	Locate basic facts such as names, dates, and events that are clearly stated in a passage.
SUP 20–23a	Locate important details in uncomplicated passages.
SUP 20–23b	Make simple inferences about the role of details in passages.
SUP 24–27a	Locate important details in more complex passages.
SUP 24–27c	Decide which details support important points in more challenging passages even though the details may appear in different sections throughout a passage.
Sequential, Comparative, and Cause–Effect Relationships	
REL 20–23b	Identify clear relationships between people, ideas, and so on in uncomplicated passages.
REL 20–23c	Identify clear cause-effect relationships in uncomplicated passages.
REL 24–27e	Identify clear cause-effect relationships in more complex passages.
REL 33–36b	Understand the subtleties in relationships between people, ideas, and so on in a passage.
Meaning of Words	
MOW 20–23a	Determine the meaning of figurative and nonfigurative words, phrases, and statements in uncomplicated passages using contextual clues.

Generalizations and Conclusions	
GEN 13–15a	Make simple generalizations and draw conclusions about main characters in uncomplicated literary narratives.
GEN 16–19a	Make simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages.
GEN 20–23a	Make generalizations and conclusions about people, ideas, etc., in uncomplicated passages.
GEN 20–23b	Make generalizations and conclusions using details that support the main points of more challenging passages.
GEN 24–27a	Make subtle generalizations and conclusions about people, ideas, and so on in more literary passages.
GEN 24–27b	Make generalizations and conclusions about people, ideas, and so on in more challenging passages.

Test 4: Science

Passage I

1. **(D)** *Science/Data Representation/Comprehension.* **CCRS: ID 28–32a.** In Figure 1, a section of Chromosome 13 contains the "ribosomal RNA gene." Find that gene name in Table 1, and see which biological process it affects: protein synthesis, (D).

   > 💡 Do not be concerned if the topic of the passage is unfamiliar or contains many strange symbols, units, or abbreviations. You gather information and solve problems all the time in your everyday life. The ACT is asking you to perform these same skills.

2. **(G)** *Science/Data Representation/Comprehension.* **CCRS: EM 24–27b.** The second sentence of the passage states that two genes are *linked* if they are on the same chromosome. The question is really asking, then, if the tRNA proline gene and the hexokinase gene are on the same chromosome. Figure 1 shows that the two genes are found on different chromosomes (14 and 10, respectively), so, by definition, they are not linked, (G).

3. **(A)** *Science/Data Representation/Comprehension.* **CCRS: ID 28–32a.** The genes associated with digestion are not listed in Table 1 as being associated with an immune response, (C), or respiration, (D), so these choices are wrong. Either the three genes associated with digestion are on the same chromosome, (B), or they aren't, (A). They are found on chromosomes 1, 7, and 16, so (A) is correct.

4. **(G)** *Science/Data Representation/Analysis.* **CCRS: ID 24–27a.** The second sentence of the passage states that two genes are *linked* if they are on the same chromosome. The question asks which gene is linked to the neurofibromatosis gene. In other words, it asks which gene is on the same chromosome (17) as the neurofibromatosis gene. The growth hormone gene is also found on that chromosome, so the two genes are *linked*, (G).

5. **(D)** *Science/Data Representation/Analysis.* **CCRS: EM 20–23a.** In almost all cases, females have two X chromosomes, and males have an X and Y chromosome. The TSPY gene, (D), is located on the Y chromosome, so, generally speaking, females do not have it.

Passage II

6. **(J)** *Science/Data Representation/Comprehension.* **CCRS: ID 20–23a.** In Experiment 2, four mustard plants (*A. thaliana*) were labeled S1, S2, S3, and S4. Scientists added a vector carrying the gene that encodes TMT1 to each of these plants. The text in Experiment 1 explains that a vector carries a gene into a new organism. The foreign gene is then expressed in the new organism and its offspring. In this experiment, the vector carried a gene for a catalyst called TMT1. A catalyst makes it easier for a chemical reaction to occur. Once the *A. thaliana* plants could make the catalyst TMT1, they could convert more γ-tocopherol to α-tocopherol. The plants grew and divided until each plant yielded ten identical plants. Scientists measured how much tocopherol and the percentage of the two forms of tocopherol that each group of plants (S1–S4) contained. The averages for each group are in Table 2. At the end of the experiment, the highest percentage of γ-tocopherol was found in S4, (J).

7. **(B)** *Science/Data Representation/Comprehension.* **CCRS: ID 24–27f.** In Experiment 1, six mustard plants (*A. thaliana*) that were genetically the same were exposed to different genes. The first plant, L1, was exposed to a vector carrying one version of the TMT gene, TMT1. The next three plants, L2, L3, and L4, were exposed to vectors carrying different versions of the TMT gene, TMT2, TMT3, and TMT4, respectively. The fifth plant, L5, was exposed to a vector that didn't carry any genes. The sixth plant, L6, was not exposed to a vector at all. The six plants grew and divided until each plant yielded ten identical plants. Table 1 shows the results of Experiment 1. Three of the four plant lines that received a TMT gene

contained 3% γ-tocopherol and 97% α-tocopherol (2% and 98% for L4). L5 and L6 did not have the ability to make the catalyst TMT, so nearly all of their tocopherol remained in the γ-tocopherol form.

The question says that one of the four strains of *A. thaliana* from Experiment 2 is genetically the same as the plants used in Experiment 1. If the plants were the same and the version of the TMT gene were the same (TMT1), the percentages of γ-tocopherol and α-tocopherol would be the same, too. The S2 group of plants from Experiment 2 had the same results as L1, the plant line treated with TMT1 in Experiment 1. Therefore, (G) is correct.

> Another quick way to determine the answer is to compare tocopherol concentrations. Only one plant strain has the same tocopherol concentration (360 mg/kg) as the *A. thaliana* lines, S2 (B).

8. **(J)** *Science/Data Representation/Analysis.* **CCRS: ID 20–23b.** In order to see if the vector itself affected the percentages of γ-tocopherol and α-tocopherol in *A. thaliana*, scientists needed to run the experiment with two controls, (J): an untreated group of plants (L6) and a group of plants that received a vector that didn't carry any genes (L5). If the empty vector had affected the tocopherol reaction, the results from L5 and L6 would have differed from each other. Exposing the plants to an empty vector had the same results as leaving the plants untreated.

9. **(C)** *Science/Data Representation/Analysis.* **CCRS: ID 24–27f.** The question asks which enzyme was "less effective", so start by considering the enzyme's job. Then determine which gene (TMT1, TMT2, TMT3, or TMT4) produced a TMT enzyme that did not do the job as well as the other TMT enzymes did. All versions of TMT promote the conversion of γ-tocopherol to α-tocopherol. TMT3 converted 49% of its tocopherol to the α-tocopherol form. TMT1, TMT2, and TMT4, however, converted 97%, 97%, and 98%, respectively, of their tocopherol to the α-tocopherol form. Therefore, the TMT3 gene, (C), produced an enzyme, TMT3, that was less efficient than the other three versions of the TMT enzyme.

10. **(J)** *Science/Data Representation/Analysis.* **CCRS: EM 20–23a.** The transfer of the TMT gene was unsuccessful for one strain in Experiment 2. What makes a gene transfer successful? What would make this scientist think that one of the gene transfers had been unsuccessful? The purpose of the experiment was to insert a foreign gene into a plant. If the transfer were successful, the plant would show that the gene was doing its job. In this case, the gene is one version of the TMT gene, and if it does its job, the plant will produce that version of the TMT enzyme, and the TMT enzyme will convert a significant portion of γ-tocopherol to α-tocopherol. The S4 plants (J), though, only contained 1% α-tocopherol. They behaved as though they did not have a TMT enzyme, probably because the TMT gene did not transfer properly.

> If you're not sure how to answer this question, try to get to the essence of it. The question is asking about one strain being unlike the others. A quick glance at Table 2 shows that S4 is the odd strain, performing differently than S1, S2, and S3.

11. **(B)** *Science/Data Representation/Comprehension.* **CCRS: SI 33–36b.** The passage explains that *G. soja* naturally has the TMT gene that produces the catalyst TMT, so it can readily convert γ-tocopherol to α-tocopherol. *A. thaliana*, though, does not have the gene to produce TMT, so it cannot convert nearly as much γ-tocopherol to α-tocopherol. Adding a *G. soja* TMT gene into an *A. thaliana* genome results in an *A. thaliana* plant that can produce more α-tocopherol, (B).

Passage III

12. **(H)** *Science/Data Representation/Comprehension.* **CCRS: EM 24–27a.** This question asks about recognizing trends in graphs. When a passage has two graphs, begin by determining which graph(s) the question is asking about. This question refers to both graphs, and, more specifically to the H = 1.5 m curve of data in each graph. In Figure 2, that curve is represented by a small x; in Figure 3, it is represented by a little square. θ(°) runs along the *x*-axis, and X (m) runs along the *y*-axis. Between θ = 5° and θ = 45°, the X value increases at first and then decreases, (H).

TIP When a question directs you to specific data or figures, be sure to pay attention to the right ones. There is no reason to lose points for not paying attention to easy details!

13. **(A)** *Science/Data Representation/Analysis.* **CCRS: ID 24–27c.** The sliding sphere data is found in Figure 3. Three heights (H) were studied in this experiment. For all incline angles, θ(°), as H decreased, X decreased, too. The question asks about θ = 10°. The smallest recorded H is 1.0 m, and the corresponding X is 0.56 m. H = 0.5 m is a smaller H than was studied in this experiment. Following the trend in the data, this new, smaller H would lead to a new, smaller X. Therefore, X would most likely be less than 0.56 m, (A).

14. **(H)** *Science/Data Representation/Analysis.* **CCRS: ID 24–27c.** The experiment was run repeatedly, and each time, the inclined plane (line AB in Figure 1) was elevated another 5° (θ), and the new result, the horizontal distance the ball traveled before hitting the floor (X), was recorded. This question asks for the anticipated result of the experiment if the inclined plane had been raised 2.5° each time instead. Connect the known data points to estimate results that aren't directly plotted. Since the question refers to the sliding sphere, be sure to refer to Figure 3 only. H = 2.0 m data are denoted by a star in that graph. The highest point (the highest X) would occur between θ = 25° and θ = 30° at θ = 27.5°, (H).

15. **(B)** *Science/Data Representation/Analysis.* **CCRS: ID 28–32c.** This question, like the two before, asks you to extrapolate unknown information from the known data. Extrapolate means to estimate based on a trend in the data. This question refers to the H = 2.0 m data for the rolling sphere, so pay attention to the circle shaped data points in Figure 2. Connect the dots to see where the untested data points would probably fall. θ = 50° is a larger angle than was tested, so extend all the *x*-axes and the H = 2.0 m data line. At θ = 50°, X is most nearly 0.65, (B).

16. **(F)** *Science/Data Representation/Analysis.* **CCRS: ID 20–23c.** Energy cannot be created or destroyed, but it can be converted to another type of energy. Kinetic energy (KE) is the amount of energy an object has due to motion (in a straight line). Kinetic energy is calculated by the equation $KE = \frac{1}{2}mv^2$; m = mass of the object and v = the object's velocity. Potential energy (PE) is the energy an object *could* have if a force were allowed to have its effect. A common example of PE is an object held off the ground. The force of gravity would pull it to the ground if the object were not held up. Potential energy is calculated by the equation PE = mgh; m = the mass of the object, g = gravitational acceleration, and h = the object's height off the ground. In this experiment, a sphere is held at a distance h above the bottom of the incline, and it is not moving. At the beginning of the experiment, the sphere has a maximum PE and KE = 0. Once it is let go and starts to move, some of its PE begins to convert to KE. When the object reaches B (h = 0), all of the PE, relative to the bottom of the incline, has been converted to KE. (F) describes this progression.

Passage IV

17. **(C)** *Science/Data Representation/Analysis.* **CCRS: ID 24–27a.** Study 1 tested the voltage and resistance of wires made of different metals but held at the same temperature. Study 4 tested one copper wire at different temperatures. Otherwise, these experiments were the same. This question asks which temperature Study 1 used. A wire made of the same metal (copper) and held at the same temperature (unknown) would have the same voltage and resistance in both studies. When the copper wire was 20°C (Table 4), its voltage was 0.11 volt and its resistance was 0.14 ohms. Those results match the results of the copper wire in Study 1. Therefore, the copper wire in Study 1 was 20°C, (C).

18. **(J)** *Science/Data Representation/Analysis.* **CCRS: ID 20–23c.** Study 3 investigated the voltage and resistance of copper wires with a constant length and temperature but variable wire widths (cross-sectional areas). This question asks for the relationship between the cross-sectional area of the wires and resistance (*R*). Table 3 shows that as the cross-sectional area increases, *R* decreases. This relationship is consistent with the graph in answer choice (J).

19. **(D)** *Science/Data Representation/Comprehension.* **CCRS: ID 20–23b.** This question simply asks for the list of metals tested in Study 1 in order from smallest resistance (R) to largest resistance. Copper has the smallest R (0.14 ohms) and lead has the largest R (1.7 ohms). (D) is the only option that lists lead as having the largest R, so it isn't even necessary to consider the other two metals.

20. **(H)** *Science/Data Representation/Analysis.* **CCRS: SI 24–27c.** Study 2 investigated the voltage and resistance of copper wires with a constant cross-sectional area and temperature but variable wire lengths. Longer wires resulted in higher voltages and resistances. More specifically, doubling the wire length resulted in doubling the voltage and resistance. This question asks you to use this information to predict the voltage of a new wire that is identical to a tested wire but twice as long. In Study 4, when the wire was set to 60°C, the voltage was 0.13 volt. If the wire were two times longer, the voltage (based on the results of Study 2) would be twice as high, 0.26 volt, (H).

21. **(C)** *Science/Data Representation/Comprehension.* **CCRS: EM 24–27a.** This question asks which combination of wire lengths and widths (cross-sectional areas) would result in the greatest resistance (R). In Study 2, resistance increases as wire length increases. In Study 3, resistance increases as the cross-sectional area decreases. Therefore, the resistance would be greatest for a longer wire (40 cm) with a smaller cross-sectional area (15 mm^2), (C).

22. **(G)** *Science/Data Representation/Analysis.* **CCRS: EM 20–23b.** Sentences 4 and 5 in the passage text explain that the ammeter measures the electrical current passing through the experimental system. The premise of the experiment is that when the electrical current was held steady (0.80 amp, measured by the ammeter) and passed through various test wires, the voltage could be measured (by the voltmeter) and the resistance could be calculated. The assumption is that all of the current measured by the ammeter would pass through the test wire, (G). That's why the experimenters placed it just before the test wire. The resistance of the voltmeter is so large that it draws no appreciable current.

Passage V

23. **(A)** *Science/Data Representation/Comprehension.* **CCRS: ID 24–27f.** This passage is a classic example of an unfamiliar topic which is complicated by unfamiliar names, definitions, and abbreviations and accompanied by an unfamiliar type of graph. The graph has a non-linear *x*-axis, two *y*-axes, and six data lines. The questions, though, are still going to ask about trends and relationships in the data. Resist the urge to be overwhelmed and take apart the questions, step by step.

"According to Figure 1": refer to the figure, not the table
"Oceanic basalt": the star line
"and continental basalt": the square line
"differ most in their...": how are they most different in regards to their...
"relative concentrations": *x*-axis
"of which of the following REEs": the right *y*-axis

Now that the parts of the question are more familiar, determine what the questions is essentially asking: The star and square are farthest apart on the *x*-axis at which line of the (right) *y*-axis? Now check where the star and square are (approximately) for each of the answer choices.

(A) Cerium: star = 10, square = 70, difference = 60
(B) Samarium: star = 16, square = 30, difference = 14
(C) Holmium: star = almost on top of square, difference = none
(D) Lutetium: star = right next to square, difference = a lot less than 60

Oceanic basalt (star data points) and continental basalt (square data points) differ most in their relative concentration (*x*-axis) of the REE (right *y*-axis) Cerium, (A).

You don't have to understand what the passage is about to answer some questions correctly. You have practiced finding trends in tables and graphs. That skill enables you to correctly answer many questions.

24. **(H)** *Science/Data Representation/Analysis.* **CCRS: EM 24–27a.** The question refers to "one of the igneous rock types" listed in Figure 1, and the answer choices are four of the data lines in Figure 1. That means we will be paying attention to the (F) star, (G) diamond, (H) triangle, and (J) circle data points. The question says that a new lump of rock was analyzed for three different REEs (right y-axis) and the scientists discovered the relative concentration (x-axis) for each of them. In other words, which REE has the three (x,y) data points in the table? Find lanthanum on the right y-axis, and see where it has an $x = 91$ value—just about where the triangle is. That's enough to know that (H) is the correct answer. If you do the same for europium and ytterbium, you will find a little triangle at those (x,y) points, too.

25. **(B)** *Science/Data Representation/Analysis.* **CCRS: EM 20–23a.** This question references Table 1. Looking at that table, which of the following is true? For clarity, call neodymium N and samarium S; that removes one level of unfamiliarity.

(A) N < S always
(B) N > S always
(C) sometimes, N < S & sometimes N = S
(D) sometimes, N > S & sometimes N = S

Jotting down these simplifications makes this question much, much easier. N is greater than S for all the rock types in Table 1, (B).

26. **(H)** *Science/Data Representation/Application.* **CCRS: EM 24–27a.** The ACT includes application questions that, by definition, require you to apply the data given to a new situation—in this case, a new type of rock. This question requires the outside knowledge that limestone is a type of sedimentary rock. Without that information, you need to guess. Never leave a question blank; the ACT has no penalty for wrong answers. First, see if you can eliminate any answer choice(s) based on the given data. The terbium levels in Figure 1 range from 8 (circle) to 21 (square), so all of the answer choices are still possibly correct. So much for process of elimination. If you have to make a blind guess, first cross off the extremes, (F) and (J), and guess between the remaining two. In this case, though, one of these data lines is not like the others. Sedimentary rock has a thick data line covering the 15 to 20 range. That's interesting, especially because that is the range in answer choice (H). Figure 1 graphs data about six rock types and one *category* of rocks, sedimentary rocks. Very possibly, the new rock falls into that category. Therefore, (H) is the best guess and correct.

27. **(A)** *Science/Data Representation/Comprehension.* **CCRS: ID 16–19a.** Sometimes, figuring out what the question is asking is the hardest part. Recognize that understanding what the question is really asking is a skill in and of itself. Practice deciphering the question stems for yourself rather than giving in to the temptation to skim through explanations. Try paraphrasing and simplifying long terms.

This question can be boiled down to: "In Figure 1, the plot of x-axis vs. (left) y-axis covers the smallest range of (x-axis) for which data line?" In plain English: Which type of rock has the smallest difference in its maximum and minimum x values? This isn't a graph built to eyeball the data. The x-axis is non-linear. The horizontal space between two points over to the left of the graph represents a small difference in x values. The same horizontal space over to the right of the graph represents a huge difference in x values. Take the time to pay attention to actual values, even though they will be approximate.

(A), the star: maximum $x = 19$, minimum $x = 8$, difference = 11
(B), the square: maximum $x = 75$, minimum $x = 17$, difference = more than 11
(C), the circle: maximum $x > 200$, minimum $x = 2.5$, difference = much more than 11
(D), the fat line: maximum $x > 100$, minimum $x = 12$, difference = also much more than 11

It turns out that the *y*-axis was mentioned for no good reason. The left *y*-axis is unnecessary for the entire passage and accompanying questions; it simply added a level of complexity and unfamiliarity to make the passage harder.

TIP Don't forget to check the axes on figures. A logarithmic scale like the one shown here could throw off your answers if you just assume it is linear without looking at it closely.

Passage VI

28. (**F**) *Science/Conflicting Viewpoints/Comprehension.* **CCRS: ID 20–23c.** Whenever two viewpoints are described, be very careful to refer to the correct viewpoint. This question asks about Scientist 2's text. Sentence 2 of that text states that "large quantities of CO_2 continuously entered the atmosphere through…volcanic activity." That means that (G) and (J) are wrong. The difference between the remaining answer choices is whether the CO_2 then entered carbonate deposits (F) or the ocean (H). Sentence 3, though, states that CO_2 becomes part of carbonate deposits, (F).

    TIP Conflicting viewpoints passages will typically include questions that ask what one scientist thinks. One of the wrong answer choices will likely answer the question according to the other scientist. Anticipate this wrong answer choice, and be careful to avoid it.

29. (**A**) *Science/Conflicting Viewpoints/Analysis.* **CCRS: EM 20–23a.** Scientist 1 states (sentence 2) that NH_3 is a greenhouse gas that warms the atmosphere. Sentence 4 goes on to say that another gas, CH_4, combined with nitrogen gas to produce compounds that kept NH_3 molecules intact longer than they would have lasted without CH_4 present. If NH_3 warmed the earth and CH_4 kept NH_3 around longer, then the atmosphere would have been warmer if CH_4 and NH_3 were both present than if just NH_3 were present, (A). Scientist 1 does not believe that CO_2 accumulated in the atmosphere, regardless of whether CH_4 was present or not, so (D) is wrong.

30. (**H**) *Science/Conflicting Viewpoints/Application.* **CCRS: ID 24–27e.** The answer choices have actual numerical values and units (ppm), but the question stem discusses two greenhouse gases (CO_2 and NH_3) in relative terms (ex: "3 times higher"). Scientist 2, sentence 1 states that Earth has a *current* CO_2 concentration of 360 ppm. The question stem presents new information: Any given concentration of NH_3 can trap as much heat as three times that concentration of CO_2. The question is asking how much NH_3 it would take to trap an amount of heat equivalent to that trapped by the present-day Earth's current CO_2 concentration. Earth's current CO_2 concentration (360 ppm) is three times higher than the NH_3 concentration it would take to do the same job (120 ppm), (H).

31. (**A**) *Science/Conflicting Viewpoints/Application.* **CCRS: EM 24–27a.** First, realize that a "30% dimmer" Sun (question stem) is the same as a Sun that was "only 70% as bright" (the scenario discussed in the passage). The question is asking whether less sunshine means more (A), the same (B), less (C), or zero (D) greenhouse gases were necessary to have the same effect as currently when the sun is brighter. More sunshine would raise Earth's surface temperatures. More greenhouse gases also raise Earth's surface temperatures. Earth had less sunshine four billion years ago, so it needed more greenhouse gases in the atmosphere to make up the difference, (A).

32. (**F**) *Science/Data Representation/Application.* **CCRS: EM 24–27e.** Scientist 1 believes that CH_4 was abundant in the atmosphere 4 BYA; Scientist 2 thinks there wasn't enough CH_4 in the atmosphere to affect NH_3 levels. Consider what would happen to the two Scientists' views if a new discovery showed that a large amount of CH_4 were added to the atmosphere. Scientist 1 already believed the CH_4 was in the air but didn't explain how it got there, (F). Scientist 2's view is challenged; it assumed that low CH_4 levels led to low NH_3 levels. Therefore, (G) and (H) are wrong. Scientist 1 stated a hypothesis of where NH_3 came from 4 BYA, and this new information doesn't challenge that idea, so (G) is wrong.

33. **(B)** *Science/Data Representation/Application.* **CCRS: EM 20–23b.** The question references "organic compounds" that protect NH_3 from UV radiation. Sentence 4 in the Scientist 1 text explains that CH_4 combined with nitrogen gas to produce "organic compounds" that blocked UV radiation and kept NH_3 intact. If the organic compounds block UV radiation from interacting with NH_3, those compounds need to be at the same level of the atmosphere or higher up. Therefore, (B) is correct. If the organic compounds were below (closer to the earth than) the NH_3, UV radiation would break apart the NH_3; nothing would stand in its way. Therefore, (A) is wrong. (C) is wrong because the organic compounds need to be near the NH_3 that could be degraded by UV radiation, and that is in the atmosphere, not in the sea. (D) is wrong because NH_3 is not produced by carbonate deposits, and, even if it were, the organic compounds still would need to be near the NH_3 that could be degraded by UV radiation.

34. **(J)** *Science/Data Representation/Analysis.* **CCRS: ID 24–27e.** Sentence 1 of Scientist 2's text states that 4 BYA, Earth's atmosphere had a 75% higher concentration of CO_2 than the modern day CO_2 concentration of 360 ppm. In other words, a long time ago, there was more CO_2 in the air than today. The question asks for the concentration of CO_2 in the air back then. Only (J) has a value that is greater than today's CO_2 concentration, so (J) is correct.

> You don't actually have to do any math to answer this question. Since only one of the answer choices is higher than 360 ppm, that one has to be correct. Indeed, a 75% higher concentration of CO_2 is 360 ppm + 0.75(360 ppm) = 630 ppm, but it is not necessary to verify that the math is correct.

Passage VII

35. **(D)** *Science/Research Summary/Application.* **CCRS: SI 24–27c.** The question presents a new situation and asks you to predict what will happen based on the results of the experiments described in the passage. The top layer of water is cold, and the bottom layer is hot. If they were allowed to interact with each other, would they mix? Why or why not? Use the answer choices as a clue:

(A) No, because the cold water on top is denser than the hot water on the bottom.
(B) No, because the cold water on top isn't as dense as the hot water on the bottom.
(C) Yes, because the hot water on the bottom is denser than the cold water on top.
(D) Yes, because the hot water on the bottom isn't as dense as the cold water on top.

First off, which water is denser—the cold or the hot water? Experiment 1 tested the effect of high temperature on the volume of the water. Hot water needed to take up more space. It squirted out the top. That means that hot water is less dense than it was at 20°C (the start of the experiment). Therefore, (B) and (C) are wrong. The top layer has denser water than the bottom. Liquids with the highest densities will form the bottom layer when liquids of varying densities are mixed. Heavier water sinks. In this case, the top layer has more water molecules in a given volume than the bottom layer does. The top layer will mix with the bottom layer so those molecules can spread out. Therefore, (D) is correct.

36. **(F)** *Science/Research Summary/Comprehension.* **CCRS: EM 24–27a.** According to Experiment 1, the boiling point of pure water is the lowest at 100°C. According to Experiment 3, slightly salted water has a slightly higher boiling point, and even saltier water has an even higher boiling point. 1 L of water with 0 g of salt added would have the lowest boiling point, (F).

37. **(B)** *Science/Research Summary/Analysis.* **CCRS: ID 20–23c.** All Experiments started at 20°C. In Experiment 2, the flask of (20°C) water was put in a cold bath that was already below freezing, –6°C. The water volume in the flask and tubing decreased from the start of the experiment (20°C) until the temperature hit 4°C. Colder than that, the water volume increased again. (B) is the graph that shows this relationship.

38. **(F)** *Science/Research Summary/Analysis.* **CCRS: SI 24–27d.** The second part of Experiment 3 tested the effect of decreasing temperature on the density of salt water. Both the low salt sample and the high salt

sample became more dense but did not freeze when they reached the temperature of the surrounding cold bath, –6°C. If the samples had been able to get even colder, they may have frozen (or maybe not). Maybe they would have continued to get denser (or maybe not). The only way to gather more information on the effects of colder temperatures on the density of salt water is to cool the flask even more, (F).

39. (C) *Science/Research Summary/Application.* **CCRS: SI 33–36b***.* Experiment 3 tested the effects of adding salt to water on boiling point, freezing point, and density. Solution I had a low salt concentration, and Solution II had a high salt concentration. They boiled at 102°C and 104°C, respectively. Experiment 1 showed that water without salt boiled at 100°C. When it started to boil, it squirted out of the tubing stuck in the flask. If Solutions I and II were mixed together, the mix would have an intermediate salt concentration and boiling point. Therefore, at a temperature between 102°C and 104°C, the mixture would boil and salt water would squirt out of the tubing, (C).

40. (H) *Science/Research Summary/Analysis.* **CCRS: ID 24–27a***.* Approach this question type as a series of True/False questions. All of the answer choices include I as a true statement, so really, it can be disregarded. The question stem states that the water level in the tubing decreased (changed). Therefore, Statement I is true. Mass is determined by how many atoms are in something. The amount of water (number of water molecules) didn't change in the experiment, though, so the mass of the water is unchanged. Therefore, Statement II is false. When the water in the flask and tubing was cooled from 20°C to 4°C, its volume decreased but its mass stayed the same. The same number of water molecules occupied a smaller volume. In other words, its density increased. Therefore, Statement III is true. Since Statements I and III are true but Statement II is not, (H) is correct.

Science – College Readiness Standards

Interpretation of Data

ID 16–19a	Select two or more pieces of data from a data presentation.
ID 20–23a	Choose data from a complex data presentation.
ID 20–23b	Combine or compare data from a data presentation.
ID 20–23c	Translate information into a diagram, table, or graph.
ID 24–27a	Combine or compare the data from two or more basic data presentations.
ID 24–27c	Use data points in a table or graph to interpolate.
ID 24–27e	Identify and use a simple mathematical relationship between data.
ID 24–27f	When presented with new, simple information, be able to analyze the given information.
ID 28–32a	Combine or compare data from a simple data presentation to data from a complex presentation.
ID 28–32c	Use data points in a table or graph to extrapolate.

Scientific Investigation

SI 24–27c	In an experiment, predict what the results will be for an additional trial or measurement.
SI 24–27d	Identify the experimental conditions that would produce a specified result.
SI 33–36b	Predict how changing the methods or design of an experiment will affect the results.

Evaluation of Models, Inferences, and Experimental Results

EM 20–23a	Choose a simple hypothesis, prediction, or conclusion that is supported by two or more models or data presentations.
EM 20–23b	Identify assumptions or key issues in a model.
EM 24–27a	Choose a simple hypothesis, prediction, or conclusion that is supported by two or more models or data presentations.
EM 24–27b	Decide whether the given information supports or contradicts a hypothesis or conclusion and be able to explain why it does or doesn't.
EM 24–27e	Decide which models are weakened or supported by additional information.