

PSAT/NMSQT®

Practice Test #1

Answer Explanations

Preliminary SAT/National Merit Scholarship Qualifying Test
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User Notes:

Please have a copy of the PSAT/NMSQT Practice Test #1 to reference for the passages and other information that form the basis for the questions in the Evidence-Based Reading and Writing and the Math sections of the Practice Test.

You can also refer to the test to see the information given to students about math formulas and how to record the student-produced responses.

In this document, we have provided the following for each question:

- difficulty level
- content description
- best or correct answer
- answer explanation

Reading Test Answer Explanations

Question 1

The main purpose of the passage is to

- (A) describe a main character and a significant change in her life.
- (B) provide an overview of a family and a nearby neighbor.
- (C) discuss some regrettable personality flaws in a main character.
- (D) explain the relationship between a main character and her father.

Item Difficulty: Easy

Content: Rhetoric / Analyzing purpose

Best Answer: A

Choice A is the best answer. Emma Woodhouse's life and family are discussed, including the marriage of her governess Miss Taylor who then moves out of Emma's home. In line 74, Emma wonders how she is to "bear the change" of Miss Taylor's departure, which indicates its significance.

Choices B and D are incorrect because the passage focuses more on Emma than on her family and neighbors, and Emma's relationship with her father is a relatively minor consideration. Choice C is also incorrect because Emma is characterized as handsome and clever with a happy disposition, and her arrogance is only briefly mentioned.

Question 2

Which choice best summarizes the first two paragraphs of the passage (lines 1-14)?

- (A) Even though a character loses a parent at an early age, she is happily raised in a loving home.
- (B) An affectionate governess helps a character to overcome the loss of her mother, despite the indifference of her father.
- (C) Largely as a result of her father's wealth and affection, a character leads a contented life.
- (D) A character has a generally comfortable and fulfilling life, but then she must recover from losing her mother.

Item Difficulty: Hard

Content: Information and Ideas / Summarizing

Best Answer: A

Choice A is the best answer. The passage indicates that Emma's mother died long ago and that Emma barely remembers her. Emma is raised by an affectionate father and governess and is described as a person with a happy disposition.

Choices B, C, and D are incorrect: Emma's father is not described as indifferent, Emma is not described as contented because of her father's wealth, and Emma does not appear to suffer from the loss of her mother.

Question 3

The narrator indicates that the particular nature of Emma's upbringing resulted in her being

- (A) despondent.
- (B) self-satisfied.
- (C) friendless.
- (D) inconsiderate.

Item Difficulty: Medium

Content: Information and Ideas / Reading closely

Best Answer: B

Choice B is the best answer. According to the passage, Emma had "a disposition to think a little too well of herself" (line 30). Thinking a "little too well of herself" means that Emma had an elevated opinion of herself, or that she was self-satisfied.

Choices A, C, and D are incorrect because Emma's relationship with her father and Miss Taylor, the two characters who raised her, did not result in her being despondent, friendless, or inconsiderate.

Question 4

Which choice provides the best evidence for the answer to the previous question?

- (A) Lines 1-5 ("Emma . . . her")
- (B) Lines 9-14 ("Her . . . affection")
- (C) Lines 28-32 ("The real . . . enjoyments")
- (D) Lines 32-34 ("The danger . . . her")

Item Difficulty: Medium

Content: Information and Ideas / Citing textual evidence

Best Answer: C

Choice C is the best answer. Lines 28-32 state that "The real evils indeed of Emma's situation were the power of having rather too much her own way, and a

disposition to think a little too well of herself; these were the disadvantages which threatened alloy to her many enjoyments." Thinking a "little too well of herself" means that Emma had an elevated opinion of herself, or that she was self-satisfied.

Choices A, B, and D are incorrect because they do not provide the best evidence for Emma being self-satisfied. Choice A describes Emma's positive traits, choice B describes Emma's affectionate relationship with Miss Taylor, and choice D discusses only that Emma's problems were negligible.

Question 5

As used in line 26, "directed" most nearly means

- (A) trained.
- (B) aimed.
- (C) guided.
- (D) addressed.

Item Difficulty: Medium

Content: Information and Ideas / Interpreting words and phrases in context

Best Answer: C

Choice C is the best answer. In lines 25-27, Emma's situation is described as "doing just what she liked; highly esteeming Miss Taylor's judgment, but directed chiefly by her own." In other words, Emma respects Miss Taylor's opinion but makes decisions directed, or guided, primarily by her own opinion.

Choices A, B, and D are incorrect because lines 25-27 emphasize that in "doing what she liked" Emma was directed, or guided, by her own opinion. Emma's opinion is not trained by, aimed at, or addressed by anyone else.

Question 6

As used in line 54, "want" most nearly means

- (A) desire.
- (B) lack.
- (C) requirement.
- (D) request.

Item Difficulty: Hard

Content: Information and Ideas / Interpreting words and phrases in context

Best Answer: B

Choice B is the best answer. Lines 53-55 describe how Emma felt a loss after Miss Taylor married and moved out of Emma's home: "but it was a black morning's work for her. The want of Miss Taylor would be felt every hour of every day." In this context, "want" means "lack."

Choices A, C, and D are incorrect because in this context "want" does not mean desire, requirement, or request.

Question 7

It can most reasonably be inferred that after Miss Taylor married, she had

- (A) less patience with Mr. Woodhouse.
- (B) fewer interactions with Emma.
- (C) more close friends than Emma.
- (D) an increased appreciation for Emma.

Item Difficulty: Easy

Content: Information and Ideas / Reading closely

Best Answer: B

Choice B is the best answer. According to lines 76-81, following Miss Taylor's marriage, "Emma was aware that great must be the difference between a Mrs. Weston only half a mile from them, and a Miss Taylor in the house; and with all her advantages, natural and domestic, she was now in great danger of suffering from intellectual solitude." This implies that since Miss Taylor's marriage, the two characters see each other less often.

Choice A is incorrect because the passage does not mention Miss Taylor's relationship with Mr. Woodhouse. Choices C and D are incorrect because the passage describes how Miss Taylor's marriage might affect Emma but not how the marriage might affect Miss Taylor.

Question 8

Which choice provides the best evidence for the answer to the previous question?

- (A) Line 37 ("Miss . . . married")
- (B) Lines 47-48 ("The event . . . friend")
- (C) Lines 61-66 ("A large . . . recollection")
- (D) Lines 74-81 ("How . . . solitude")

Item Difficulty: Medium

Content: Information and Ideas / Citing textual evidence

Best Answer: D

Choice D is the best answer because lines 74-81 refer to Emma's new reality of "intellectual solitude" after Miss Taylor moved out of the house.

Choices A, B, and C are incorrect because none of these choices support the idea that Miss Taylor and Emma had fewer interactions following Miss Taylor's marriage. Choice A mentions Emma's "sorrow" towards losing Miss Taylor, choice B introduces how Miss Taylor may benefit from the marriage, and choice C describes Emma's and Miss Taylor's close friendship.

Question 9

Which situation is most similar to the one described in lines 84-92 ("The evil . . . time")?

- (A) A mother and her adult son have distinct tastes in art and music that result in repeated family arguments.
- (B) The differences between an older and a younger friend are magnified because the younger one is more active and athletic.
- (C) An older and a younger scientist remain close friends despite the fact that the older one's work is published more frequently.
- (D) The age difference between a high school student and a college student becomes a problem even though they enjoy the same diversions.

Item Difficulty: Medium

Content: Information and Ideas / Reading closely

Best Answer: B

Choice B is the best answer. Lines 84-92 describe the fact that though Emma and her father have a loving relationship, Mr. Woodhouse is much older than Emma and in poor health. For these reasons, he did not make a good companion for the spirited, young Emma. Their relationship is most similar to a friendship between an older and younger person that is negatively affected by the fact one is more lively and active than the other.

Choice A is incorrect because Emma and her father did not have regular arguments. Choice C is incorrect because the relationship between Emma and Mr. Woodhouse was affected by the difference in their age and activity, not any relative successes one or the other might have had. Choice D is incorrect because there is no indication that Emma and her father enjoyed the same activities.

Question 10

As used in line 10, “plot” most nearly means

- (A) mark.
- (B) form.
- (C) plan.
- (D) claim.

Item Difficulty: Easy

Content: Information and Ideas / Interpreting words and phrases in context

Best Answer: C

Choice C is the best answer. The first paragraph discusses the “vast informal economy driven by human relationships” (lines 6-7) that existed in the Soviet Union as a result of the gaps in the official economy. Lines 9-10 state that “The Soviet people didn’t plot how they would build these [social] networks.” In this context, the word “plot” means “plan”; the paragraph is implying that the informal economy grew up spontaneously, without premeditation or planning.

Choices A, B, and D are incorrect because in this context “plot” does not mean mark, form, or claim.

Question 11

The references to the shoemaker, the programmer, and the apple farmer in lines 37-40 (“We can easily . . . community”) primarily serve to

- (A) illustrate the quality of products and services in countries around the world.
- (B) emphasize the broad reach of technologies used to connect people.
- (C) demonstrate that recommendations made online are trustworthy.
- (D) call attention to the limits of the expansion of the global economy.

Item Difficulty: Easy

Content: Rhetoric / Analyzing text structure

Best Answer: B

Choice B is the best answer. The third paragraph of the passage (lines 27-46) describes how new technologies are affecting new economies, as people are using social media to vet people and businesses through eBay, Twitter, Facebook, and YouTube. The author uses broad examples (a business in South America, a person in Asia, and a farmer in the reader’s local community) to imply that these technologies have a global reach.

Choice A is incorrect because the passage provides no comment about the quality of products or services. Choice C is incorrect because the passage never alludes to

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the trustworthiness of online recommendations. Choice D is incorrect because the idea that the new global economy will have only a limited expansion is oppositional to the passage's main points.

Question 12

The passage's discussion of life in the Soviet Union in the 1960s and 1970s primarily serves to

- (A) introduce the concept of social networking.
- (B) demonstrate that technology has improved social connections.
- (C) list differences between the Soviet Union and other countries.
- (D) emphasize the importance of examining historical trends.

Item Difficulty: Medium

Content: Rhetoric / Analyzing text structure

Best Answer: A

Choice A is the best answer. The Soviet Union of the 1960s and 1970s was most notable for the disparity between its official economy and a second, unofficial one. The author explains how unwanted items sold at state stores were not the "nice furnishings" found in people's homes. These "nice furnishings" were a result of the Soviet Union's unofficial economy driven by social networking, or "relationship-driven economics" (lines 16-17).

Choices B, C, and D are incorrect because the author does not use the discussion of life in the Soviet Union in the 1960s and 1970s to show how technology has changed social conditions, how the Soviet Union was different from other countries, or how important it is to consider historical trends.

Question 13

As used in line 45, "post" most nearly means

- (A) publish.
- (B) transfer.
- (C) assign.
- (D) denounce.

Item Difficulty: Easy

Content: Information and Ideas / Interpreting words and phrases in context

Best Answer: A

Choice A is the best answer. The third paragraph of the passage (lines 27-46) describes how new technology has impacted the economy. The author states that

people can use websites to post descriptions of projects, which means that people can write these descriptions and publish them online.

Choices B, C, and D are incorrect because in this context “post” does not mean transfer, assign, or denounce.

Question 14

The author indicates that, in comparison to individuals, traditional organizations have tended to be

- (A) more innovative and less influential.
- (B) larger in size and less subject to regulations.
- (C) less reliable and less interconnected.
- (D) less efficient and more expensive.

Item Difficulty: Medium

Content: Information and Ideas / Understanding relationships

Best Answer: D

Choice D is the best answer. The passage explains that socially driven economies create new societies where “amplified individuals—individuals empowered with technologies and the collective intelligence of others in their social network—can take on many functions that previously only large organizations could perform, often more efficiently, at lower cost or no cost at all, and with much greater ease” (lines 66-72). It is clear from these lines that the author views some large organizations as less efficient and more expensive than individuals.

Choices A, B, and C are incorrect because the passage offers no evidence that the author believes traditional organizations are more innovative, less regulated, or less reliable than individuals.

Question 15

Which choice provides the best evidence for the answer to the previous question?

- (A) Lines 22-26 (“Empowered . . . connectedness”)
- (B) Lines 40-42 (“We no longer . . . ideas”)
- (C) Lines 47-50 (“We are moving . . . socialstructing”)
- (D) Lines 66-72 (“amplified . . . ease”)

Item Difficulty: Medium

Content: Information and Ideas / Citing textual evidence

Best Answer: D

Choice D is the best answer. Lines 66-72 explain how socially driven economies are creating societies where individuals no longer rely on traditional organizations to perform specific tasks. Instead, individuals can use technology and social relationships to more efficiently perform these tasks at a lower cost.

Choices A, B, and C are incorrect because they do not directly compare individuals to traditional organizations.

Question 16

The author recognizes counterarguments to the position she takes in the passage by

- (A) acknowledging the risks and drawbacks associated with new technologies and social networks.
- (B) admitting that some people spend too much time unproductively on the Internet.
- (C) drawing an analogy between conditions today and conditions in the Soviet Union of the 1960s and 1970s.
- (D) conceding that the drawbacks of social structuring may prove over time to outweigh the benefits.

Item Difficulty: Medium

Content: Rhetoric / Analyzing arguments

Best Answer: A

Choice A is the best answer. While the author argues throughout the passage that new technologies benefit modern economies, she also recognizes that some people believe this new technology “distances us from the benefits of face-to-face communication and quality social time” (lines 86-87).

Choice B is incorrect because the author provides no evidence of Internet overuse. Choice C is incorrect because the author provides an example of the Soviet Union of the 1960s and 1970s to explain an economic process called “social structuring.” Choice D is incorrect because the author concludes that social structuring may ultimately be “opening up new opportunities to create, learn, and share” (lines 91-92).

Question 17

Which choice provides the best evidence for the answer to the previous question?

- (A) Lines 35-37 (“We can look . . . videos”)
- (B) Lines 74-76 (“a world . . . hackers”)
- (C) Lines 79-84 (“They . . . science”)
- (D) Lines 85-87 (“Much . . . time”)

Item Difficulty: Medium

Content: Information and Ideas / Citing textual evidence

Best Answer: D

Choice D is the best answer as it acknowledges that people have identified some risks and drawbacks to using new technology to form social connections. Some people believe that new technology distances users from the advantages of “face-to-face communication and quality social time” (lines 86-87).

Choices A, B, and C are incorrect because they do not show that the author recognized counterarguments to her argument. Choices A and B provide examples of the impact and use of the new technologies, and choice C summarizes the benefits of social structuring.

Question 18

Which statement best summarizes the information presented in the graph?

- (A) Far more people around the world own computers and cell phones today than in 2005.
- (B) The number of people sharing digital information has more than tripled since 2005.
- (C) The volume of digital information created and shared has increased tremendously in recent years.
- (D) The amount of digital information created and shared is likely to be almost 8 zettabytes in 2015.

Item Difficulty: Medium

Content: Synthesis / Analyzing quantitative information

Best Answer: C

Choice C is the best answer. The graph shows a steady increase in digital information created and shared in recent years, beginning with less than one zettabyte in 2005 and rising to nearly 8 zettabytes projected for 2015.

Choices A, B, and D are incorrect because they do not summarize the information presented in the graph. Choices A and B provide details that, while likely true, cannot be directly inferred from the information in the graph, and choice D provides a detail from the graph but not a summary of it.

Question 19

According to the graph, which statement is true about the amount of digital information projected to be created and shared globally in 2012?

- (A) Growth in digital information creation and sharing was projected to be wildly out of proportion to growth in 2011 and 2013E.
- (B) The amount of digital information created and shared was projected to begin a new upward trend.
- (C) The amount of digital information created and shared was projected to peak.
- (D) The amount of digital information created and shared was projected to pass 2 zettabytes for the first time.

Item Difficulty: Medium

Content: Synthesis / Analyzing quantitative information

Best Answer: D

Choice D is the best answer. The graph shows that the amount of digital information projected to be created and shared in 2012 is about 2.5 zettabytes. Since the graph shows a steady increase in the creation and sharing of digital information, and the digital information created and shared in 2011 was approximately 1.75 zettabytes, the graph shows that the 2012 projections passes the 2 zettabyte barrier for the first time.

Choice A is incorrect because the graph shows the projected 2012 numbers to be part of a steady increase consistent with the 2011 and 2013E numbers. Choice B is incorrect because the graph projects the 2012 number to continue the increase started in 2005. Choice C is incorrect because the 2012 numbers are projected to continue increasing through at least 2015.

Question 20

The passage is written from the perspective of someone who is

- A) actively involved in conducting hibernator research.
- B) a participant in a recent debate in the field of cardiology.
- C) knowledgeable about advances in hibernator research.
- D) an advocate for wildlife preservation.

Item Difficulty: Hard

Content: Rhetoric / Analyzing point of view

Best Answer: C

Choice C is the best answer. The author is someone who knows about advances in hibernator research but isn't necessarily an active participant in that research.

Choice A is incorrect because the passage mentions that "Fröbert and his colleagues" (line 32) are conducting hibernator research. Choice B is incorrect because the passage discusses the heart health of bears but never provides evidence that this research is contested. Choice D is incorrect because the passage focuses on hibernating animals and their health more than wildlife preservation.

Question 21

It is reasonable to conclude that the main goal of the scientists conducting the research described in the passage is to

- A) learn how the hibernation patterns of bears and squirrels differ.
- B) determine the role that fat plays in hibernation.
- C) illustrate the important health benefits of exercise for humans.
- D) explore possible ways to prevent human diseases.

Item Difficulty: Medium

Content: Information and Ideas / Reading closely

Best Answer: D

Choice D is the best answer. The author begins the passage by suggesting that the bear hibernation research may be beneficial to human health: "Understanding how hibernators, including ground squirrels, marmots and bears, survive their long winter's naps may one day offer solutions for problems such as heart disease, osteoporosis and muscular dystrophy" (lines 1-5). In the last paragraph of the passage, the author suggests that Fröbert hopes to use his research findings to "stave off hardened arteries in humans as well" (lines 76-77).

Choice A is incorrect because the passage briefly mentions ground squirrels and does not specifically compare them to bears. Choice B is incorrect because the passage clearly states that during hibernation fat acts as fuel for a resting animal.

Choice C is incorrect because the passage discusses exercise only within the context of bears.

Question 22

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 1-5 (“Understanding . . . dystrophy”)
- B) Lines 10-13 (“Fat . . . squirrels”)
- C) Lines 31-35 (“To . . . bears”)
- D) Lines 42-46 (“Once . . . tissues”)

Item Difficulty: Medium

Content: Information and Ideas / Citing textual evidence

Best Answer: A

Choice A is the best answer. This sentence supports the idea that one of the goals of the hibernation research discussed in the passage is to try to improve human health: “Understanding how hibernators, including ground squirrels, marmots and bears, survive their long winter’s naps may one day offer solutions for problems such as heart disease, osteoporosis and muscular dystrophy” (lines 1-5).

Choices B, C, and D are incorrect because they do not address the main goal of the hibernator research. Choice B is incorrect because lines 10-13 describe only one aspect of hibernation: fat as fuel. Choices C and D are incorrect because lines 31-35 and 42-46 describe the field research, not the goal of this research.

Question 23

What main effect do the quotations by Andrews in lines 10-18 have on the tone of the passage?

- A) They create a bleak tone, focusing on the difficulties hibernators face during the winter.
- B) They create a conversational tone, relating scientific information in everyday language.
- C) They create an ominous tone, foreshadowing the dire results of Andrews’s research.
- D) They create an absurd tone, using images of animals acting as if they were human.

Item Difficulty: Medium

Content: Rhetoric / Analyzing word choice

Best Answer: B

Choice B is the best answer. In lines 10-18 the molecular biologist Matthew Andrews explains how fat is important to hibernating animals, stating “Fat is where it’s at” and “You bring your own lunch with you.” The use of this nonscientific language creates a conversational tone that allows readers to understand what might otherwise be a complex topic.

Choices A, C, and D are incorrect because Andrews’s phrases, such as “Fat is where it’s at,” are relaxed rather than bleak, ominous, or absurd.

Question 24

As used in line 19, “stores” most nearly means

- A) preservatives.
- B) reserves.
- C) stacks.
- D) shelters.

Item Difficulty: Medium

Content: Information and Ideas / Interpreting words and phrases in context

Best Answer: B

Choice B is the best answer. Lines 19-20 describe how fat is important to hibernating animals, as “[b]igger fat stores mean a greater chance of surviving until spring.” In this context, hibernating animals have “stores,” or reserves, of fat that they put away for later use.

Choices A, C, and D are incorrect because in this context “stores” does not mean preservatives, stacks, or shelters.

Question 25

Based on the passage, what is Fröbert’s hypothesis regarding why bears’ arteries do not harden during hibernation?

- A) The bears’ increased plasma cholesterol causes the arteries to be more flexible.
- B) Sluggish circulation pinches off the blood vessels rather than hardening the arteries.
- C) Bears exercise in short, infrequent bursts during hibernation, which staves off hardened arteries.
- D) Bears possess a molecule that protects against hardened arteries.

Item Difficulty: Medium

Content: Information and Ideas / Reading closely

Best Answer: D

Choice D is the best answer. The passage concludes by noting that “Fröbert hopes to find some protective molecule that could stave off hardened arteries in humans as well” (lines 75-77). This makes clear the scientist’s belief that even though bears begin hibernation while ““very, very fat”” (lines 62-63) and do not exercise for many months, these animals have some molecule that protects them from hardened arteries.

Choices A and B are incorrect because lines 58-69 explain that the bears’ elevated plasma cholesterol levels combined with the sluggish circulation that results from their lack of exercise during hibernation “are a recipe for hardened arteries” (lines 67-68). Choice C is incorrect because lines 63-64 state that hibernating bears “get zero exercise during hibernation.”

Question 26

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 19-20 (“Bigger . . . spring”)
- B) Lines 24-27 (“The brown . . . day”)
- C) Lines 70-73 (“Even . . . streaks”)
- D) Lines 74-77 (“It’s . . . well”)

Item Difficulty: Medium

Content: Information and Ideas / Citing textual evidence

Best Answer: D

Choice D is the best answer. The passage concludes by noting that “Fröbert hopes to find some protective molecule that could stave off hardened arteries in humans as well” (lines 75-77). This sentence explains Fröbert’s hypothesis that the reason bears do not “build up such artery-hardening streaks” (lines 72-73) is because they have some molecule that protects them from hardened arteries.

Choices A, B, and C are incorrect because they do not address Fröbert’s hypothesis. Choice A is incorrect because lines 19-20 highlight the importance of fat to hibernators. Choice B is incorrect because lines 24-27 describe the diet of one group of hibernating bears. Choice C is incorrect because lines 70-73 describe the hardening of arteries in inactive humans.

Question 27

What information discussed in paragraph 10 (lines 58-69) is represented by the graph?

- A) The information in lines 58-62 (“Recent . . . reported”)
- B) The information in lines 62-64 (“These . . . hibernation”)
- C) The information in lines 64-66 (“Lolling . . . circulation”)
- D) The information in lines 67-69 (“It’s . . . strokes”)

Item Difficulty: Medium

Content: Synthesis / Analyzing quantitative information

Best Answer: A

Choice A is the best answer. The graph compares the total plasma cholesterol found in seven bears during periods of their hibernation and nonhibernation, exemplifying how that cholesterol is generally higher during the hibernating stage. Meanwhile, lines 58-62 describe the very phenomena that the graph depicts: “Recent analyses revealed that Scandinavian brown bears spend the summer with plasma cholesterol levels considered high for humans; those values then increase substantially for hibernation, Fröbert and his colleagues reported.”

Choices B, C, and D are incorrect because none of the other lines in paragraph 10 discuss the comparative levels of plasma cholesterol found in bears during their hibernating and nonhibernating phases. Lines 62-64 describe how bears spend their hibernating phase. Lines 64-66 describe the poor circulation those bears experience during hibernation. Lines 67-69 explain the heart risks that may occur in humans who are overweight and inactive.

Question 28

Which statement about the effect of hibernation on the seven bears is best supported by the graph?

- A) Only one of the bears did not experience an appreciable change in its total plasma cholesterol level.
- B) Only one of the bears experienced a significant increase in its total plasma cholesterol level.
- C) All of the bears achieved the desirable plasma cholesterol level for humans.
- D) The bear with the lowest total plasma cholesterol level in its active state had the highest total plasma cholesterol level during hibernation.

Item Difficulty: Medium

Content: Synthesis / Analyzing quantitative information

Best Answer: A

Choice A is the best answer because the graph shows that six of the seven bears experienced increased plasma cholesterol during hibernation; the seventh bear experienced neither an increase nor a decrease in plasma cholesterol.

Choices B, C, and D are incorrect because they are not supported by the graph.

Question 29

Which choice best describes the structure of the first paragraph?

- (A) A personal history is narrated, historical examples are given, and a method is recommended.
- (B) A position is stated, historical context is given, and earnest advice is given.
- (C) Certain principles are stated, opposing principles are stated, and a consensus is reached.
- (D) A historical period is described, and its attributes are reviewed.

Item Difficulty: Medium

Content: Rhetoric / Analyzing text structure

Best Answer: B

Choice B is the best answer. In the first paragraph, Andrew Carnegie states his position that the changes in society that are occurring are “not to be deplored, but welcomed as highly beneficial” (lines 12-13). After providing historical context on the interactions between rich and poor, Carnegie concludes the first paragraph by giving earnest advice: “It is a waste of time to criticize the inevitable” (lines 27-28).

Choice A is incorrect because the first paragraph emphasizes the current realities of humanity as a whole—the very “conditions of human life” (lines 4-5)—but not any one personal history. Choice C is incorrect because the first paragraph describes the author’s personal opinion and his conclusion, not a conclusion reached by a consensus. Choice D is incorrect because the first paragraph focuses more on “our age” (line 1) than on the past.

Question 30

The author most strongly implies which of the following about “the ties of brotherhood” (line 2)?

- (A) They were always largely fictitious and are more so at present.
- (B) They are stronger at present than they ever were before.
- (C) They are more seriously strained in the present than in the past.
- (D) They will no longer be able to bring together the rich and the poor.

Item Difficulty: Hard

Content: Information and Ideas / Reading closely

Best Answer: C

Choice C is the best answer. Carnegie states in lines 1-4 that a serious problem of his time was how to distribute wealth so that “the ties of brotherhood may still bind together the rich and poor in harmonious relationship.” In other words, he was concerned that the “ties of brotherhood” between rich and poor were not as strong as they used to be.

Choice A is incorrect because Carnegie implies that changes in modern society have negatively impacted the relationship between the rich and poor, but he does not suggest that such a relationship never existed. Choice B is incorrect because the passage implies that “the ties of brotherhood” are weaker than they were previously. Choice D is incorrect because Carnegie states that these ties continue and “may still bind together the rich and poor in harmonious relationship.”

Question 31

The author uses “dwelling, dress, food, and environment” (lines 7-8) as examples of

- (A) things more valued in the present than in the past.
- (B) bare necessities of life.
- (C) things to which all people are entitled.
- (D) possible indications of differences in status.

Item Difficulty: Medium

Content: Rhetoric / Analyzing text structure

Best Answer: D

Choice D is the best answer. Carnegie explains that the contrast between the rich and poor is greater than in the past: “In former days there was little difference between the dwelling, dress, food, and environment of the chief and those of his retainers...” (lines 6-9). Carnegie uses the examples of “dwelling, dress, food, and environment” to show the difference in status between the rich and the poor.

Choice A is incorrect because Carnegie does not suggest that basic necessities, like food and housing, are more valued in the present than they were in the past. Choice B is incorrect because, while these aspects of life are basic necessities, they are used here as examples of areas in which differences in status might be evident. Choice C is incorrect because Carnegie is not using these examples to suggest that “dwelling, dress, food, and environment” are things to which all people are entitled.

Question 32

The author describes the people who live in the “houses of some” (line 15) as interested in the

- (A) materials from which their houses are constructed.
- (B) size of their homes.
- (C) advantages of culture.
- (D) pedigree of their guests.

Item Difficulty: Medium

Content: Information and Ideas / Reading closely

Best Answer: C

Choice C is the best answer. In lines 14-18 Carnegie states that it is “essential, for the progress of the race that the houses of some should be homes for all that is highest and best in literature and the arts, and for all the refinements of civilization, rather than that none should be so.” Carnegie is suggesting that “houses of some” should be filled with people who care a great deal about culture, or the “highest and best in literature and the arts.”

Choices A, B, and D are incorrect because lines 14-18 explicitly state that the people who live in the “houses of some” care a great deal about culture, not that they care about what materials their homes are made of, the size of those homes, or the pedigree of their guests.

Question 33

Which choice provides the best evidence for the answer to the previous question?

- (A) Lines 9-10 (“the palace . . . laborer”)
- (B) Lines 15-16 (“all . . . arts”)
- (C) Lines 18-19 (“Much . . . squalor”)
- (D) Lines 19-20 (“Without . . . Maecenas”)

Item Difficulty: Hard

Content: Information and Ideas / Citing textual evidence

Best Answer: B

Choice B is the best answer. In lines 15-16 Carnegie advocates that the “houses of some” should be filled with people who care a great deal about culture, such as “all that is highest and best in literature and the arts.”

Choices A and C are incorrect because lines 9-10 and 18-19 highlight a disparity in wealth between the rich and poor but do not specifically mention people who live in the “houses of some.” Choice D is incorrect because in lines 19-20 Carnegie is suggesting that patrons of the arts exist because of wealth.

Question 34

The author uses the phrase “good old times” (line 20) as an example of

- (A) a cliché that still has life and usefulness left in it.
- (B) a bit of folk wisdom from his childhood.
- (C) something said by those who have acquired great riches.
- (D) something said by people who do not share his viewpoint.

Item Difficulty: Hard

Content: Rhetoric / Analyzing word choice

Best Answer: D

Choice D is the best answer. Carnegie uses quotation marks around the phrase the “good old times” to suggest that others refer to the past as the “good old times.” However, Carnegie states that these “‘good old times’ were not good old times. Neither master nor servant was as well situated then as to-day” (lines 20-22), which suggests that Carnegie does not believe that things were better in the past.

Choice A is incorrect because Carnegie immediately refutes the usefulness of the cliché by saying that the “‘good old times’ were not good old times.” Choice B is incorrect because the passage provides no evidence that the saying comes from Carnegie’s childhood. Choice C is incorrect because there is no evidence that the phrase the “good old times” is a cliché used by the wealthy.

Question 35

What is the author’s main point about the disadvantages of the modern economic system?

- (A) It provides only a few people with the advantages of culture.
- (B) It replicates many of the problems experienced in the past.
- (C) It creates divisions between different categories of people.
- (D) It gives certain people great material advantages over others.

Item Difficulty: Medium

Content: Information and Ideas / Determining central ideas and themes

Best Answer: C

Choice C is the best answer. Lines 47-60 explain that by Carnegie's time standards of living had raised significantly, and that the cost of this increase is that "All intercourse between [rich and poor] is at an end. Rigid castes are formed . . ." (lines 65-66). A disadvantage of the modern economic system, in other words, is that divisions exist between classes and types of people.

Choice A is incorrect because Carnegie says it is "essential" that some people have access to high culture (line 14). Choice B is incorrect because Carnegie argues that the "conditions of human life have not only been changed, but revolutionized, within the past few hundred years" (lines 4-6) and does not suggest that the modern economic system replicates past problems. Choice D is incorrect because Carnegie writes "Much better this great irregularity than universal squalor" (lines 18-19).

Question 36

Which choice provides the best evidence for the answer to the previous question?

- (A) Lines 37-39 ("The master . . . conditions")
- (B) Lines 43-45 ("There was . . . State")
- (C) Lines 46-47 ("The inevitable . . . prices")
- (D) Lines 65-66 ("All intercourse . . . end")

Item Difficulty: Hard

Content: Information and Ideas / Citing textual evidence

Best Answer: D

Choice D is the best answer. Lines 47-60 explain that by Carnegie's time standards of living had raised significantly, with lines 61-62 then explaining that those increases came at a cost: "The price we pay for this salutary change is, no doubt, great." Lines 65-66 explains what that cost, or disadvantage, is: "All intercourse between [rich and poor] is at an end." A disadvantage of the modern economic system, in other words, is that it creates divisions between classes and types of people.

Choice A, B, and C are incorrect because they do not provide evidence that Carnegie believes there are disadvantages to the modern economic system. Choices A and B are incorrect because lines 37-39 and 43-45 explain what life was like "Formerly," in the time of master and apprentice, before the modern economic system came to exist. Choice C is incorrect because lines 46-47 also describes a condition of a time before the modern economic system.

Question 37

As used in line 82, “in its train” is closest in meaning to

- (A) before it.
- (B) with it.
- (C) anticipating it.
- (D) advancing it.

Item Difficulty: Medium

Content: Information and Ideas / Interpreting words and phrases in context

Best Answer: B

Choice B is the best answer. In the final paragraph of the passage, Carnegie writes of the “law of competition” (lines 76-77), explaining that the law has some costs but also provides improved living conditions for everyone “in its train.” Saying these conditions come “in the train” of the law means they accompany the law or come with it.

Choices A, C, and D are incorrect because in this context “in its train” does not mean precede the law, predict the arrival of the law, or help advance the law.

Question 38

S2

The author of Passage 1 suggests that the usefulness of de-extinction technology may be limited by the

- (A) amount of time scientists are able to devote to genetic research.
- (B) relationship of an extinct species to contemporary ecosystems.
- (C) complexity of the DNA of an extinct species.
- (D) length of time that a species has been extinct.

Item Difficulty: Medium

Content: Information and Ideas / Reading closely

Best Answer: D

Choice D is the best answer. Lines 9-11 explain that, although some extinct species can be brought back to life, “Only species whose DNA is too old to be recovered, such as dinosaurs, are the ones to consider totally extinct, bodily and genetically.” The determining factor is the length of time that species has been extinct.

Choices A, B, and C are incorrect because lines 9-11 explicitly state that only DNA that is “too old to be recovered” determines whether a species can be brought back to life, not the amount of time scientists devote to genetic research, the relationship between an extinct species and contemporary ecosystems, or how complex a species’ DNA might be.

Question 39

Which choice provides the best evidence for the answer to the previous question?

- (A) Lines 7-9 (“Thanks . . . life”)
- (B) Lines 9-11 (“Only . . . genetically”)
- (C) Line 13 (“It will be . . . difficult”)
- (D) Lines 13-14 (“It will take . . . succeed”)

Item Difficulty: Medium

Content: Information and Ideas / Citing textual evidence

Best Answer: B

Choice B is the best answer. Lines 9-11 state that species that have DNA that is “too old to be recovered” cannot be brought back to life.

Choices A, C, and D are incorrect because they do not indicate any limits to de-extinction technology. Choice A is incorrect because lines 7-9 explain only that the use of DNA can lead to certain species being brought back to life. Choices C and D are incorrect because line 13 and lines 13-14 explain some challenges to bringing back certain species but do not explain the limits to de-extinction technology.

Question 40

As used in line 27, “deepest” most nearly means

- (A) most engrossing.
- (B) most challenging.
- (C) most extensive.
- (D) most fundamental.

Item Difficulty: Hard

Content: Information and Ideas / Interpreting words and phrases in context

Best Answer: D

Choice D is the best answer. Lines 24-27 explain that “Just the thought of mammoths and passenger pigeons alive again invokes the awe and wonder that drives all conservation at its deepest level.” The author of Passage 1 is suggesting that the “prospect of de-extinction” (line 21) evokes the same emotions of “awe and wonder” that propel conservation efforts at its deepest, or most fundamental, level.

Choices A, B, and C are incorrect because in this context the “deepest” level of conservation does not mean the most engrossing level, most challenging level, or most extensive level.

Question 41

The authors of Passage 2 indicate that the matter of shrinking biodiversity should primarily be considered a

- (A) historical anomaly.
- (B) global catastrophe.
- (C) scientific curiosity.
- (D) political problem.

Item Difficulty: Medium

Content: Information and Ideas / Reading closely

Best Answer: B

Choice B is the best answer. “Shrinking biodiversity” means the loss of species, and the authors of Passage 2 clearly state that shrinking biodiversity is a global issue: “Species today are vanishing in such great numbers—many from hunting and habitat destruction—that the trend has been called a sixth mass extinction, an event on par with such die-offs as the one that befell the dinosaurs 65 million years ago” (37-41). Labeling this loss of diversity a “mass extinction,” shows that the authors believe this situation is serious and widespread.

Choice A is incorrect because the passage states the current loss of biodiversity would be a “sixth” mass extinction, indicating that the occurrence is far from an anomaly (or abnormality). Choices C and D are incorrect because the authors of Passage 2 do not primarily present the shrinking biodiversity as a scientific curiosity or a political problem.

Question 42

Which choice provides the best evidence for the answer to the previous question?

- (A) Lines 37-41 (“Species . . . ago”)
- (B) Lines 42-45 (“A program . . . woes”)
- (C) Lines 53-56 (“Against . . . irresponsible”)
- (D) Lines 65-67 (“Such . . . grave”)

Item Difficulty: Medium

Content: Information and Ideas / Citing textual evidence

Best Answer: A

Choice A is the best answer. Lines 37-41 label the shrinking biodiversity as a global catastrophe, as it is “a sixth mass extinction, an event on par with such die-offs as the one that befell the dinosaurs 65 million years ago.” Labeling this loss of

diversity a “mass extinction” implies the authors’ belief that this shrinking biodiversity is serious and widespread.

Choices B, C, and D do not explain the authors’ opinions on shrinking biodiversity. Choices B and C are incorrect because lines 42-45 and 53-56 describe what the authors view as possible problems with de-extinction. Choice D is incorrect because lines 65-67 provide one reason to continue with de-extinction programs.

Question 43

As used in line 37, “great” most nearly means

- (A) lofty.
- (B) wonderful.
- (C) large.
- (D) intense.

Item Difficulty: Easy

Content: Information and Ideas / Interpreting words and phrases in context

Best Answer: C

Choice C is the best answer. Lines 37-40 state that “species today are vanishing at such great numbers” that the loss of these species is considered a “sixth mass extinction.” In this context, there is a “great,” or large, number of species at risk of extinction.

Choice A, B, and D are incorrect because in this context, “great,” does not mean lofty, wonderful, or intense.

Question 44

The reference to the “black-footed ferret and the northern white rhino” (line 64) serves mainly to

- (A) emphasize a key distinction between extinct and living species.
- (B) account for types of animals whose numbers are dwindling.
- (C) provide examples of species whose gene pools are compromised.
- (D) highlight instances of animals that have failed to adapt to new habitats.

Item Difficulty: Medium

Content: Rhetoric / Analyzing text structure

Best Answer: C

Choice C is the best answer. The authors of Passage 2 suggest that de-extinction may “help save endangered species.” (line 60). Lines 61-64 provide an example of how de-extinction could be beneficial: “For example, extinct versions of genes

could be reintroduced into species and subspecies that have lost a dangerous amount of genetic diversity, such as the black-footed ferret and the northern white rhino." In this context, the black-footed ferret and northern white rhino are used as examples of species that have lost genetic diversity; in other words, they are species whose gene pools have been compromised.

Choices A, B, and D are incorrect because lines 61-64 clearly identify the black-footed ferret and the northern white rhino as species whose gene pools have been compromised. They are not highlighted to emphasize any difference between extinct and living species, to explain why the numbers of some animals are dwindling, or to describe species that failed to adapt to new environments.

Question 45

Which choice best states the relationship between the two passages?

- (A) Passage 2 attacks a political decision that Passage 1 strongly advocates.
- (B) Passage 2 urges caution regarding a technology that Passage 1 describes in favorable terms.
- (C) Passage 2 expands on the results of a research study mentioned in Passage 1.
- (D) Passage 2 considers practical applications that could arise from a theory discussed in Passage 1.

Item Difficulty: Medium

Content: Synthesis / Analyzing multiple texts

Best Answer: B

Choice B is the best answer. Passage 1 enthusiastically supports the idea of de-extinction, saying it is "profound news. That something as irreversible and final as extinction might be reversed is a stunning realization" (lines 22-24). Passage 2, on the other hand, recognizes the "gee-whiz appeal" (line 29) of de-extinction but is less certain about its implementation: "Yet with limited intellectual bandwidth and financial resources to go around, de-extinction threatens to divert attention from the modern biodiversity crisis" (lines 30-33). Therefore, Passage 2 urges restraint for an idea that Passage 1 enthusiastically supports.

Choice A is incorrect because neither passage focuses on a political decision. Choice C is incorrect because Passage 1 does not mention a research study. Choice D is incorrect because Passage 2 does not consider practical uses (or "applications") of de-extinction as much as the practical problems that result from its use.

Question 46

How would the authors of Passage 2 most likely respond to the “prospect” referred to in line 21, Passage 1?

- (A) With approval, because it illustrates how useful de-extinction could be in addressing widespread environmental concerns.
- (B) With resignation, because the gradual extinction of many living species is inevitable.
- (C) With concern, because it implies an easy solution to a difficult problem.
- (D) With disdain, because it shows that people have little understanding of the importance of genetic diversity.

Item Difficulty: Hard

Content: Synthesis / Analyzing multiple texts

Best Answer: C

Choice C is the best answer. The author of passage 1 is amazed by the idea of de-extinction, while the authors of passage 2 warn that a “program to restore extinct species poses a risk of selling the public on a false promise that technology alone can solve our ongoing environmental woes” (lines 42-45). This statement shows that the authors of Passage 2 view de-extinction as a “false promise” that may make the problem of shrinking biodiversity appear easier to solve than it actually will be.

Choice A is incorrect because the authors of Passage 2 are less enthusiastic about the “prospect” of de-extinction than the author of Passage 1, as they state that de-extinction “threatens to divert attention from the modern biodiversity crisis” (lines 32-33). Choice B is incorrect because, while the authors of Passage 2 acknowledge that some extinctions may be inevitable, they are not resigned to de-extinction. Choice D is incorrect because the authors of Passage 2 do not suggest that people have little understanding of the biodiversity crisis.

Question 47

Which choice would best support the claim that the authors of Passage 2 recognize that the “imagination soars” (line 24, Passage 1) in response to de-extinction technology?

- (A) Lines 28-30 (“The . . . news”)
- (B) Lines 30-33 (“Yet . . . crisis”)
- (C) Lines 58-59 (“That . . . altogether”)
- (D) Lines 61-63 (“For . . . diversity”)

Item Difficulty: Medium

Content: Synthesis / Analyzing multiple texts

Best Answer: A

Choice A is the best answer. In lines 22-24, the author of Passage 1 writes: “That something as irreversible and final as extinction might be reversed is a stunning realization. The imagination soars.” This enthusiasm for such an exciting possibility is also recognized in Passage 2, which states in lines 28-30 that “The idea of bringing back extinct species holds obvious gee-whiz appeal and a respite from a steady stream of grim news.” By conceding that there is “gee-whiz appeal” to de-extinction, the authors of Passage 2 recognize that it is an idea that makes the “imagination [soar].”

Choice B is incorrect because lines 30-33 explain why de-extinction is a threat. Choice C is incorrect because lines 58-59 concede only that the idea of de-extinction is not entirely without merit, a characterization which is far less enthusiastic than the statement “the imagination soars.” Choice D is incorrect because lines 61-63 provide a single example of when de-extinction might be appropriate.

Writing and Language Test Answer Explanations

Question 1

- (A) NO CHANGE
- (B) see an annual loss of \$63.2 billion each year
- (C) lose \$63.2 billion annually
- (D) have a yearly loss of \$63.2 billion annually

Item Difficulty: Medium

Content: Effective Language Use / Concision

Best Answer: C

Choice C is the best answer because it states the situation succinctly and is free of redundancies.

Choices A, B, and D are incorrect because all three contain a redundancy in which a reference to the annual nature of the loss is stated twice; for example, Choice A states “yearly” and “annually.”

Question 2

- (A) NO CHANGE
- (B) main things leading up to
- (C) huge things about
- (D) primary causes of

Item Difficulty: Medium

Content: Effective Language Use / Style and tone

Best Answer: D

Choice D is the best answer because the use of language is correct for standard written English and matches the formal tone of the passage.

Choices A and C are incorrect because both rely on colloquial language, specifically “big” and “huge,” which strays from the formal tone of the article. Additionally, “things” in Choice C is vague and informal. Choice B is incorrect for the same reason.

Question 3

- (A) NO CHANGE
- (B) have spent
- (C) spends
- (D) are spent

Item Difficulty: Medium

Content: Conventions of Usage / Agreement / Subject-verb agreement

Best Answer: C

Choice C is the best answer because the verb “spends” grammatically corresponds with the singular noun “American.”

Choices A, B, and D are incorrect because, in each instance, the noun and verb do not grammatically correspond. The verbs “spend,” “have spent” and “are spent” would correspond with a plural noun, but not with the singular noun “American.”

Question 4

- (A) NO CHANGE
- (B) workers; managers
- (C) workers, managers,
- (D) workers, managers

Item Difficulty: Medium

Content: Conventions of Punctuation / Within-sentence punctuation

Best Answer: D

Choice D is the best answer because it provides punctuation that creates a complete sentence with clauses whose relationship to one another is clear.

Choice A is incorrect because it results in a sentence fragment. Choice B is incorrect because the first clause is dependent, signaled by the conditional phrase “As long as,” so a semicolon cannot be used. Choice C is incorrect because the comma following “managers” inappropriately separates the noun from the verb “should champion.”

Question 5

To make this paragraph most logical, sentence 3 should be placed

- (A) where it is now.
- (B) before sentence 1.
- (C) after sentence 1.
- (D) after sentence 4.

Item Difficulty: Hard

Content: Organization / Logical sequence

Best Answer: C

Choice C is the best answer. Sentence 3 logically follows the statement in sentence 1 where readers learn that part of the problem is the work itself. Sentence 3 then tells readers what about the work has caused the decrease in sleep: “The hours the average American spend[s] working have increased dramatically....”

Choices A, B, and D are incorrect because they do not order the information in the paragraph logically.

Question 6

At this point, the writer is considering adding the following sentence.

“Even fifteen-minute power naps improve alertness, creativity, and concentration.”

Should the writer make this addition here?

- (A) Yes, because it demonstrates that the benefits of napping can be gained without sacrificing large amounts of work time.
- (B) Yes, because it explains the methodology of the studies mentioned in the previous sentence.
- (C) No, because a discussion of the type of nap workers take is not important to the writer’s main point in the paragraph.
- (D) No, because it contradicts the writer’s discussion of napping in the previous sentences.

Item Difficulty: Medium

Content: Development / Focus

Best Answer: A

Choice A is the best answer because it adds relevant information in support of the claim that companies should allow their employees to take naps.

Choice B is incorrect because the prospective sentence does not explain methodology. Choice C is incorrect because the example in the sentence provides additional information in support of napping. Choice D is incorrect because there is no contradiction.

Question 7

Which choice provides a supporting example that reinforces the main point of the sentence?

- (A) NO CHANGE
- (B) including a lower risk of cardiovascular problems such as heart attack and stroke.
- (C) which are essential in an era of rising health care costs.
- (D) in addition to making employees more efficient.

Item Difficulty: Hard
Content: Development / Support
Best answer: B

Choice B is the best answer because it offers a specific example of a long-term health benefit that could lead to “reduced health care costs.”

Choices A, C, and D are incorrect because they offer no supporting examples of long-term health benefits that could reduce health care costs.

Question 8

- (A) NO CHANGE
- (B) gently wake
- (C) gently to wake
- (D) gentle waking of

Item Difficulty: Medium
Content: Sentence Structure / Sentence formation / Parallel structure
Best Answer: B

Choice B is the best answer because the verb “wake” is consistent with the preceding verbs in the series, “block” and “play.” Furthermore, choice B provides a verb that creates a grammatically complete and standard sentence.

Choices A, C, and D are incorrect because, in each instance, the verb is not consistent with the preceding verbs in the series, “block” and “play.”

Question 9

- (A) NO CHANGE
- (B) among
- (C) between
- (D) into

Item Difficulty: Easy

Content: Conventions of Usage / Conventional expression

Best Answer: B

Choice B is the best answer because, in this context, the preposition “among” is the only idiomatic choice: napping can be promoted “among” people but not “throughout,” “between,” or “into” them.

Choices A, C, and D are incorrect because the prepositions “throughout,” “between,” and “into” are unidiomatic in this context.

Question 10

- (A) NO CHANGE
- (B) but it benefits
- (C) as also to
- (D) but also to

Item Difficulty: Medium

Content: Sentence Structure / Sentence formation / Subordination and coordination

Best Answer: D

Choice D is the best answer because it completes a parallel construction in which two elements are compared. In this construction “but also to” is parallel to “not only to” and thus is the only choice that creates a grammatically complete and standard sentence. The “not only...but also” construction is also known as a correlative conjunction, meaning that these two phrases should always travel in pairs.

Choices A and C are incorrect because they fail to complete the comparison that the preposition “not only to” signals. Choice B is incorrect because it results in a run-on and incomplete sentence.

Question 11

The writer wants a concluding sentence that restates the main argument of the passage. Which choice best accomplishes this goal?

- (A) NO CHANGE
- (B) Clearly, employers should consider reducing employees' hours when they are overworked.
- (C) Companies should consider employee schedules carefully when implementing a napping policy.
- (D) More businesses should follow their lead and embrace napping on the job.

Item Difficulty: Medium

Content: Organization / Introductions, conclusions, and transitions

Best Answer: D

Choice D is the best answer because it logically concludes the essay, the main argument of which is that napping during the workday boosts employee productivity and morale and reduces costs associated with poor health and absences.

Choices A, B, and C are incorrect because none of these choices restates the main argument of the passage.

Question 12

- (A) NO CHANGE
- (B) pollination: this is
- (C) pollination,
- (D) pollination;

Item Difficulty: Medium

Content: Conventions of Punctuation / Nonrestrictive and parenthetical elements

Best Answer: C

Choice C is the best answer because it provides the appropriate punctuation for the nonrestrictive modifying clause "including honeybee pollination." Because the clause is not essential to the sentence, it should be offset with commas (or other matching punctuation). Since a comma is used before the clause, a comma must be used after it as well.

Choices A and D are incorrect because the punctuation does not match the comma that sets off the nonrestrictive modifying clause "including honeybee pollination."

Choice B is incorrect because “this is” is unnecessarily wordy.

Question 13

- (A) NO CHANGE
- (B) highlights the potentially disastrous effects
- (C) highlight the potentially disastrous effects
- (D) highlight the potentially disastrous affects

Item Difficulty: Medium

Content: Conventions of Usage / Frequently confused words

Best Answer: B

Choice B is the best answer because the verb “highlights” grammatically corresponds with the singular noun “the importance of bees.” Additionally, “effects” is the correct noun to describe outcomes.

Choices A and D are incorrect because “affects” is the incorrect word in this context. Choice C is incorrect because there is no subject-verb agreement between the singular noun “the importance of bees” and the verb “highlight.”

Question 14

- (A) NO CHANGE
- (B) Known as colony
- (C) It is known as colony
- (D) Colony

Item Difficulty: Medium

Content: Sentence Structure / Sentence formation / Modifier placement

Best Answer: B

Choice B is the best answer because it provides a dependent clause that adequately introduces the main subject, colony collapse disorder, which corresponds directly to the subject in the second clause: “this phenomenon.”

Choice A is incorrect because “They” has no clear antecedent and creates a comma splice. Choice C is incorrect because it also results in a comma splice. Choice D is incorrect because it creates redundancy with the following noun phrase “this phenomenon.”

Question 15

Which choice offers the most accurate interpretation of the data in the chart?

- (A) NO CHANGE
- (B) been above the acceptable range.
- (C) not changed noticeably from year to year.
- (D) greatly increased every year.

Item Difficulty: Medium

Content: Development / Quantitative information

Best Answer: B

Choice B is the best answer because it accurately represents the information in the chart.

Choice A is incorrect because in the 2011-2012 winter season, bee mortality rates fell below 25% of the bee colony. Choice C is incorrect because, according to the chart, bee mortality rates have varied noticeably year to year. Choice D is incorrect for a similar reason. The chart shows that, year to year, bee mortality rates have both increased and decreased.

Question 16

Which choice offers an accurate interpretation of the data in the chart?

- (A) NO CHANGE
- (B) portion of bees lost was double what it had been the previous year, rising to
- (C) number of losses, which had fallen within the acceptable range the previous year, rose to
- (D) portion of total colonies lost rose almost 10 percentage points, with a loss of

Item Difficulty: Medium

Content: Development / Quantitative information

Best Answer: D

Choice D is the best answer because it accurately represents the comparison in bee population loss between the 2010–2012 and 2012–2013 periods. Compared to the 2011–2012 winter season, bee loss was almost 10 percentage points higher the following year.

Choice A is incorrect because it states that compared to the preceding years, bee losses fell in 2012–2013 when, according to the data, the opposite was true. Choice B is incorrect because the bee loss in 2012–2013 did not double from 2011–2012. Given that bee loss in 2011–2012 hovered around 22%, double would be around 44%, while the chart says bee loss in 2012–2013 was just over 30%. Choice C is incorrect because it makes a false statement: the number of losses had *not* “fallen within the acceptable range the previous year.”

Question 17

Which choice most smoothly and effectively introduces the writer’s discussion of studies of CCD in this paragraph?

- (A) NO CHANGE
- (B) Bees are vanishing, and according to studies there are several possible reasons for this trend.
- (C) Several possible reasons, offered by studies, may explain why bees are vanishing.
- (D) DELETE the underlined sentence.

Item Difficulty: Medium

Content: Effective Language Use / Syntax

Best Answer: A

Choice A is the best answer. It adequately introduces the paragraph’s main topic in a grammatically complete and standard manner. In addition, its use of the passive voice (“Studies have offered”) establishes a pattern that the next sentence maintains (“One reason that is often cited”).

Choices B and C are incorrect because each is redundant. In B, there is no need to refer to bees vanishing and “this trend” in the same sentence. In C, there is no need to specify that “reasons . . . may explain.” Choice D is incorrect because if the paragraph were to begin with the sentence “One reason that is often cited...,” the writer’s discussion of studies of CCD would not be introduced smoothly and effectively.

Question 18

At this point, the writer is considering adding the following sentence.

“Prolonged exposure to neonicotinoids has been shown to increase bees’ vulnerability to disease and parasitic mites.”

Should the writer make this addition here?

- (A) Yes, because it provides support for the claim made in the previous sentence.
- (B) Yes, because it introduces a new idea that will become important later in the passage.
- (C) No, because it would be better placed elsewhere in the passage.
- (D) No, because it contradicts the main idea of the passage.

Item Difficulty: Medium

Content: Development / Focus

Best Answer: A

Choice A is the best answer because the information supports the preceding claim by showing how lingering neonicotinoids impact bees in particular. The previous sentence notes “one reason” why bees are vanishing (the use of neonicotinoids), and this proposed sentence usefully elaborates on how neonicotinoids harm bees.

Choices B, C, and D are incorrect because the information doesn’t introduce a new idea that will become important later in the passage, belong elsewhere in the passage, or contradict the main idea.

Question 19

- (A) NO CHANGE
- (B) is a pretty big deal.
- (C) can’t be put on the back burner.
- (D) cannot be ignored.

Item Difficulty: Easy

Content: Effective Language Use / Style and tone

Best Answer: D

Choice D is the best answer because the diction is consistent with the article’s tone and style.

Choices A, B, and C are incorrect because the casual tone and style of the phrases “is not to be scoffed at,” “is a pretty big deal,” and “can’t be put on the back burner” deviate from the more formal tone and style established in the rest of the article.

Question 20

- (A) NO CHANGE
- (B) crops, this is an expensive proposition when there is a shortage of bees.
- (C) crops, an expensive proposition when there is a shortage of bees.
- (D) crops; an expensive proposition when there is a shortage of bees.

Item Difficulty: Hard

Content: Sentence Structure / Sentence formation / Sentence boundaries

Best Answer: C

Choice C is the best answer because it creates a grammatically correct relationship between an independent clause and a dependent one.

Choices A and D are incorrect because a semicolon should link two independent clauses in order to be grammatically correct; in each instance the second clause is dependent. Choice B is incorrect because it creates a comma splice.

Question 21

- (A) NO CHANGE
- (B) there
- (C) their
- (D) its

Item Difficulty: Easy

Content: Conventions of Usage / Possessive determiners

Best Answer: C

Choice C is the best answer because it provides the correct possessive form of a plural noun, the farmers who are the main subject of the sentence.

Choices A and B are incorrect because neither is the correct possessive form of "they." Choice A is a contraction of the subject "they" and the verb "are," while Choice B is an adverb that refers to a place or a particular point in time. Choice D is incorrect because it is the possessive form of a singular, not a plural, noun.

Question 22

The writer wants a conclusion that addresses the future of efforts to combat CCD. Which choice results in the passage having the most appropriate concluding sentence?

- (A) NO CHANGE
- (B) Still, bee colonies have experienced such devastating losses that the consequences of the issue have been felt worldwide.
- (C) Although CCD is a relatively new phenomenon, scientists have been studying other aspects of honeybees for over a century.
- (D) Genetic variation in bee colonies generally improves bees' productivity, disease resistance, and ability to regulate body temperature.

Item Difficulty: Hard

Content: Organization / Introductions, conclusions, and transitions

Best Answer: A

Choice A is the best answer because the passage already has an appropriate concluding sentence that addresses "the future of efforts to combat CCD." This sentence supports the last paragraph's focus on "commonsense measures" by outlining potential CCD-prevention efforts such as "[a] decrease in the use of certain pesticides, herbicides, and fungicides" and stating that these efforts "could begin a shift in a favorable direction."

Choices B, C, and D are incorrect because they don't address "the future of efforts to combat CCD" that the question demands. Choice B describes the current impact of diminishing bee populations instead of discussing the future. Choice C introduces a new topic that departs from the paragraph's main topic. Choice D introduces a related topic that needs further elaboration.

Question 23

- (A) NO CHANGE
- (B) stood;
- (C) stood—
- (D) stood

Item Difficulty: Easy

Content: Conventions of Punctuation / Unnecessary punctuation

Best Answer: D

Choice D is the best answer because it creates a grammatically complete and standard sentence.

Choices A, B, and C are incorrect because each inserts unnecessary punctuation that disrupts the meaning of the sentence, which is to state where Giuseppe Ferrua stood.

Question 24

- (A) NO CHANGE
- (B) inside
- (C) for
- (D) on

Item Difficulty: Easy

Content: Conventions of Usage / Conventional expression

Best Answer: A

Choice A is the best answer because the preposition “with” correctly reflects the relationship between the subject, verb, and object: “landscape,” “dotted,” and “vineyards,” respectively.

Choices B, C, and D are incorrect because each provides a preposition that does not appropriately represent the relationship between the subject, verb, and object. A landscape can be dotted “with” vineyards; it cannot be dotted “inside,” “for,” or “on” vineyards.

Question 25

- (A) NO CHANGE
- (B) however,
- (C) by contrast,
- (D) thereafter,

Item Difficulty: Medium

Content: Organization / Introductions, conclusions, and transitions

Best Answer: A

Choice A is the best answer because the information in the sentence elaborates on and supports the claim in the previous sentence: that lunar farming “is driven by the belief that the Moon influences levels of moisture in the soil.”

Choices B, C, and D are incorrect because they do not appropriately signal the information in the sentence, which elaborates on and supports the claim in the previous sentence. Rather, Choices B and C suggest that the writer is drawing a contrast, and Choice D introduces a time sequence that is not present in the paragraph.

Question 26

- (A) NO CHANGE
- (B) Given that
- (C) So
- (D) DELETE the underlined portion and begin the sentence with a capital letter.

Item Difficulty: Medium

Content: Sentence Structure / Sentence formation / Subordination and coordination

Best Answer: B

Choice B is the best answer because it creates a grammatically complete and standard sentence. It also correctly reflects the relationship specified in the passage between moisture and the lunar calendar.

Choice A is incorrect because “Although” suggests that the second clause will say something contrary to the first. Choices C and D are incorrect because each results in a grammatically incomplete sentence.

Question 27

Which choice most effectively sets up the paragraph?

- (A) NO CHANGE
- (B) People all over the world farm by the Moon.
- (C) Farming by the Moon is not new.
- (D) Talk of the Moon’s influence is far-reaching.

Item Difficulty: Medium

Content: Development / Proposition

Best Answer: C

Choice C is the best answer because it acts effectively as a transition between the previous paragraph and this one.

Choices A, B, and D are incorrect because none of the three introduces the paragraph’s main topic, the long history of lunar farming.

Question 28

Which choice provides the most specific information on the type of advice a lunar calendar offers?

- (A) NO CHANGE
- (B) actions relevant to farming.
- (C) points in time at which to undertake certain tasks.
- (D) optimal times to plant, weed, prune, and harvest.

Item Difficulty: Medium

Content: Effective Language Use / Precision

Best Answer: D

Choice D is the best answer because it provides “the most specific information on the type of advice a lunar calendar offers.”

Choices A, B, and C are incorrect because each is vague; specifically, “farm chores,” “actions,” and “certain tasks” are all nebulous terms, and the question asks for the “most specific information.”

Question 29

- (A) NO CHANGE
- (B) almanacs’s
- (C) almanac’s
- (D) almanacs’

Item Difficulty: Medium

Content: Conventions of Punctuation / Possessive nouns and pronouns

Best Answer: C

Choice C is the best answer because it provides the grammatically correct option for a possessive singular noun. The editor belongs to, or is affiliated with, the almanac.

Choices A, B, and D are incorrect because each fails to provide a grammatically correct possessive noun. There is only one almanac, the “*Old Farmer’s Almanac*,” to which the editor belongs.

Question 30

- (A) NO CHANGE
- (B) skeptics, who have yet to be convinced.
- (C) skeptics—those who doubt the method.
- (D) skeptics.

Item Difficulty: Hard

Content: Effective Language Use / Concision

Best Answer: D

Choice D is the best answer because it introduces the paragraph’s topic succinctly without repeating information. By definition, skeptics are people who are unsure, have yet to be convinced, doubt the method, etc.

Choices A, B, and C are incorrect because all three include redundant information about skeptics.

Question 31

- (A) NO CHANGE
- (B) those
- (C) it’s
- (D) its

Item Difficulty: Medium

Content: Conventions of Usage / Possessive determiners

Best Answer: D

Choice D is the best answer because it provides the possessive pronoun that grammatically corresponds to a singular noun, “agriculture.”

Choices A, B, and C are incorrect because each fails to provide a grammatically correct or appropriate possessive pronoun. Choice A presents a possessive pronoun for a plural antecedent rather than a singular one. Choice B’s “those” is vague, leaving the reader unsure of the relationship between the practices and agriculture. Choice C presents a grammatically incorrect construction of the possessive pronoun for it.

Question 32

The writer wants to conclude the paragraph effectively while also reinforcing the point that skepticism toward lunar farming still exists. Which choice best accomplishes this goal?

- (A) NO CHANGE
- (B) and therefore no sound scientific data on the subject exist to date.
- (C) yet many continue to practice lunar farming.
- (D) leading many to conclude that the practice is based in folklore, not fact.

Item Difficulty: Hard

Content: Organization / Introductions, conclusions, and transitions

Best Answer: D

Choice D is the best answer because it satisfies the directions of the question by “reinforcing the point that skepticism toward lunar farming still exists.” Only Choice D refers back to the skeptics mentioned at the beginning of the paragraph, acknowledging that “many...conclude that the practice” of lunar farming is “based in folklore, not fact.”

Choices A, B, and C are incorrect because, while each makes a logical connection with the preceding part of the sentence, none of the three refers back to the skeptics mentioned at the beginning of the paragraph.

Question 33

Which choice gives an additional supporting example that emphasizes the importance of the senses in judging the success of the lunar farming method?

- (A) NO CHANGE
- (B) She has taken photographs of the grapevines and landscape.
- (C) She takes careful notes about Ferrua’s farming methods, asking Ferrua to clarify how he prepares the soil.
- (D) She dips bread into Ferrua’s olive oil as he explains a soil preparation he does in the fall.

Item Difficulty: Medium

Content: Development / Support

Best Answer: A

Choice A is the best answer because it corresponds with the question’s instructions to choose “an additional supporting example that emphasizes the importance of the senses.” Professor Coffman’s statement about the fragrant rosemary logically follows the English farmer’s statement about his potatoes, as both use sensory impressions to attest to the success of lunar farming.

Choices B, C, and D are incorrect because each fails to provide an additional supporting example that demonstrates that Professor Coffman “has a similar response” to that of the English farmer. Choices B and D both involve the senses, but neither uses sensory impressions to judge the success of lunar farming. Choice C doesn’t involve a sensory experience; it recounts an experience of information gathering.

Question 34

The writer is considering deleting the underlined portion (ending the sentence with a period). Should the writer make this deletion?

- A) Yes, because the underlined portion detracts from the paragraph’s focus on the Szathmary collection.
- B) Yes, because the information in the underlined portion is provided in the previous sentence.
- C) No, because the underlined portion defines a term that is important to the passage.
- D) No, because the underlined portion gives an example of a particular culinary artifact.

Item Difficulty: Hard

Content: Development / Focus

Best Answer: C

Choice C is the best answer because the term “manuscript recipe books” is unclear without the underlined portion to define it.

Choice A is incorrect because the underlined portion is consistent with the paragraph’s focus; it does not detract from it. Choice B is incorrect because the underlined information does not appear in the previous sentence. Choice D is incorrect because, while it asserts correctly that the underlined portion should not be deleted, it does not offer a persuasive reason for keeping the definition of “manuscript recipe books.”

Question 35

- A) NO CHANGE
- B) Regardless of
- C) In contrast to
- D) In addition to

Item Difficulty: Hard

Content: Organization / Introductions, conclusions, and transitions

Best Answer: A

Choice A is the best answer. “Because of” supports the cause-effect relationship between the two clauses in the sentence, which state that as result of the 20,000-item donation’s size and range, figuring out how to make the information available to the public was “a challenge.”

Choices B, C, and D are incorrect because they do not support the cause-effect relationship between the two clauses.

Question 36

- A) NO CHANGE
- B) donation of so many culinary artifacts,
- C) massive donation of cookbooks,
- D) donation,

Item Difficulty: Hard

Content: Effective Language Use / Concision

Best Answer: D

Choice D is the best answer because it does not contain information that has already been established in the preceding sentences of the passage.

Choices A, B, and C are incorrect because they repeat information already established in the preceding sentences of the passage.

Question 37

- A) NO CHANGE
- B) for
- C) and
- D) but

Item Difficulty: Medium

Content: Sentence Structure / Sentence formation / Subordination and coordination

Best Answer: D

Choice D is the best answer because it provides a conjunction, “but,” that accurately reflects the relationship between the two clauses. This relationship contrasts the librarians’ desire to share all the objects in the collection with the problem of presenting the delicate manuscripts.

Choices A, B, and C are incorrect because each provides a conjunction that does not reflect the relationship between the two clauses.

Question 38

- A) NO CHANGE
- B) his or her
- C) their
- D) one’s

Item Difficulty: Medium

Content: Conventions of Usage / Agreement / Pronoun-antecedent agreement

Best Answer: C

Choice C is the best answer because the possessive pronoun “their” grammatically corresponds to the plural “volunteers.”

Choice A is incorrect because it provides a possessive pronoun that would correspond with “we,” which would only be valid if the writer were part of the group of volunteers. Choices B and D are incorrect because each provides a possessive pronoun for a singular noun, yet the subject of the clause is the plural noun “volunteers.”

Question 39

- A) NO CHANGE
- B) simple directions
- C) bare-bones how-tos
- D) facile protocols

Item Difficulty: Medium

Content: Effective Language Use / Style and tone

Best Answer: B

Choice B is the best answer because it offers wording that is clear and consistent with the style of the passage.

Choices A and D are incorrect because both use jargon, or unnecessarily esoteric language, which is inconsistent with the passage’s formal yet accessible style. Choice C is incorrect because the wording is clunky and too colloquial for the passage’s style.

Question 40

- A) NO CHANGE
- B) therefore,
- C) however,
- D) in short,

Item Difficulty: Medium

Content: Organization / Introductions, conclusions, and transitions

Best Answer: C

Choice C is the best answer. It provides a conjunction, “however,” which captures the contrast between transcribing the recipes, described as “easy,” and recognizing some of the ingredients and measurements in the recipes, described as “puzzling.”

Choices A, B, and D are incorrect because each fails to capture the relationship between the sentence in which the conjunction appears and the sentence preceding it. Choice A is incorrect because it proposes a conjunction that suggests the sentence is building upon information in the previous sentence. Choice B is incorrect because “therefore” suggests a cause-effect relationship between the two sentences. Choice D is incorrect because it suggests that the second sentence is providing a shortened version of information introduced in the first sentence. Instead, the difference between “easy” in the first sentence of the sequence and “puzzling” in the second denotes a contrast.

Question 41

- A) NO CHANGE
- B) access to
- C) excess of
- D) excess to

Item Difficulty: Easy

Content: Conventions of Usage / Frequently confused words

Best Answer: B

Choice B is the best answer because it provides the correct noun, “access,” to indicate the ability to utilize something, and the correct preposition, “to,” to link the noun to the prepositional phrase that follows it.

Choice A is incorrect because it provides a noun and preposition combination that does not correspond to standard English. Choices C and D are incorrect because both present the noun “excess,” which is a close homonym of “access,” but means a surfeit or overabundance.

Question 42

- A) NO CHANGE
- B) work
- C) worked
- D) could have worked

Item Difficulty: Hard

Content: Sentence Structure / Inappropriate shifts in construction / Verb tense, mood, and voice

Best Answer: B

Choice B is the best answer because it provides a verb in the present tense (“work”), which is consistent with the present tense verb “don’t fare” that opens the sentence.

Choices A and C are incorrect because both use verbs in the past tense. Choice D is incorrect because the compound verb “could have worked” presents a possibility that is not consistent with the tone or purpose of the sentence, in which the writer is making a comparison between archival recipes that don’t hold up well in the present day and those that do.

Question 43

- A) NO CHANGE
- B) almond, cheesecake summer, mince,
- C) almond cheesecake summer, mince
- D) almond, cheesecake, summer, mince,

Item Difficulty: Easy

Content: Conventions of Punctuation / Items in a series

Best Answer: A

Choice A is the best answer because it provides items in a series that are whole discrete items, each one an example of a dessert from the Szathmary collection. Each item in the series is presented in standard English with the adjective preceding the main noun, for example, “summer mince pie.”

Choices B, C, and D are incorrect because each one scrambles the names of the dessert items by separating the parts of their names by commas.

Question 44

The writer plans to add the following sentence to this paragraph.

“The judges reported that the entries were delicious.”

To make this paragraph most logical, the sentence should be placed

- A) after sentence 1.
- B) after sentence 2.
- C) after sentence 3.
- D) after sentence 4.

Item Difficulty: Medium

Content: Organization / Logical sequence

Best Answer: D

Choice D is the best answer because the proposed sentence logically follows information about a contest at the Iowa State Fair. At no other point in the paragraph does the writer mention a contest.

Choices A, B, and C are incorrect because the writer has yet to state that there was a contest or other situation that involved an official judge, so placement of the proposed sentence after any of the first three sentences would be illogical.

Math Test – No Calculator Answer Explanations

Question 1

A babysitter earns \$8 an hour for babysitting 2 children and an additional \$3 tip when both children are put to bed on time. If the babysitter gets the children to bed on time, what expression could be used to determine how much the babysitter earned?

- A) $8x + 3$, where x is the number of hours
- B) $3x + 8$, where x is the number of hours
- C) $x(8 + 2) + 3$, where x is the number of children
- D) $3x + (8 + 2)$, where x is the number of children

Item Difficulty: Easy

Content: Heart of Algebra

Correct Answer: A

Choice A is the correct answer. Let x be the number of hours that the babysitter worked. Since the babysitter earns money at a rate of \$8 per hour, she earned $8x$ dollars for the x hours worked. If the babysitter gets both children to bed on time, the babysitter earns an additional \$3 tip. Therefore, the babysitter earned a total amount of $8x + 3$ dollars.

Choice B is incorrect since the tip and the rate per hour have been interchanged in the expression. Choices C and D are incorrect since the number of children is not part of how the babysitter's earnings are calculated.

Question 2

$$3(x + y) = y$$

If (x, y) is a solution to the equation above and

$y \neq 0$, what is the ratio $\frac{x}{y}$?

- A) $-\frac{4}{3}$
- B) $-\frac{2}{3}$
- C) $\frac{1}{3}$
- D) $\frac{2}{3}$

Item Difficulty: Medium

Content: Passport to Advanced Math

Correct Answer: B

Choice B is the correct answer. We can find the ratio $\frac{x}{y}$ by rearranging the equation. Multiplying out the expression on the left side of the equation yields $3x + 3y = y$. Then, subtracting $3y$ from both sides of the equation gives $3x = -2y$. Finally, dividing both sides of this equation by $3y$ (note that $y \neq 0$) gives $\frac{x}{y} = -\frac{2}{3}$.

Choices A, C, and D are incorrect; they could result from errors during algebraic transformations of the equation $3(x + y) = y$.

Question 3

$$\frac{1}{2}x - \frac{1}{4}y = 10$$

$$\frac{1}{8}x - \frac{1}{8}y = 19$$

Which ordered pair (x, y) satisfies the system of equations above?

A) $(-112, -264)$

B) $(64, 88)$

C) $\left(\frac{232}{3}, \frac{224}{3}\right)$

D) $(288, 536)$

Item Difficulty: Medium

Content: Heart of Algebra

Correct Answer: A

Choice A is the correct answer. First, we clear the fractions from the two given equations by multiplying both sides of the first equation by 4 and then both sides of the second equation by 8 (note that the new equations are equivalent to the

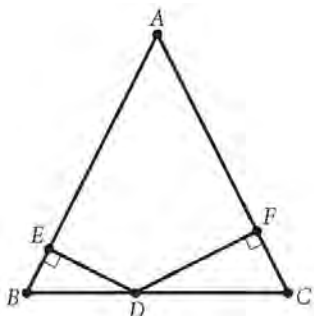
original ones). Thus the system becomes $\begin{cases} 2x - y = 40 \\ x - y = 152 \end{cases}$. Subtracting side by side

the second equation from the first eliminates the variable y ,

$(2x - y) - (x - y) = 40 - 152$, leaving an equation with just one variable, x . Solving this equation gives $x = -112$. Substituting -112 for x into the equation $x - y = 152$ gives $y = -264$. Therefore, $(-112, -264)$ is the ordered pair that satisfies the system of equations given.

Choices B, C, and D are incorrect since the ordered pair in each choice does not satisfy both equations in the system. For example, the ordered pair of choice B, $(64, 88)$, does not satisfy equation $\frac{1}{8}x - \frac{1}{8}y = 19$ because $\frac{1}{8}(64) - \frac{1}{8}(88) \neq 19$.

Question 4



Note: Figure not drawn to scale.

Triangle ABC above is isosceles with $AB = AC$ and $BC = 48$. The ratio of DE to DF is $5 : 7$. What is the length of \overline{DC} ?

- A) 12
- B) 20
- C) 24
- D) 28

Item Difficulty: Medium

Content: Additional Topic in Math

Correct Answer: D

Choice D is the correct answer. The base angles, $\angle B$ and $\angle C$, of isosceles triangle ABC are congruent. Additionally, $\triangle BED$ and $\triangle CFD$ are both right triangles and therefore are congruent. Because $\triangle BED$ and $\triangle CFD$ have two corresponding pairs of angles that are congruent, they are similar. Consequently, the corresponding sides of the

similar triangles are proportional. So $\frac{BD}{DC} = \frac{DE}{DF}$, and since $\frac{DE}{DF} = \frac{5}{7}$, it follows

that $\frac{BD}{DC} = \frac{5}{7}$. If we let $BD = 5x$, then $DC = 7x$. Since

$BD + DC = BC$ and $BC = 48$, it follows that $5x + 7x = 48$. Solving this equation for x gives $x = 4$, and so DC is $7(4) = 28$.

Alternatively: Due to the similarity of $\triangle BED$ and $\triangle CFD$, one can conclude that

$\frac{BD}{DC} = \frac{5}{7}$, and so DC must be greater than half of BC , which is 24. Of the choices

given, only one satisfies this condition, namely 28. If $DC = 28$, then

$BD = 48 - 28 = 20$, confirming that $\frac{BD}{DC} = \frac{20}{28} = \frac{5}{7}$. Therefore, the length of \overline{DC}

must be 28.

Choices A, B, and C are incorrect because each of the values for DC would result in BC being less than 48 units long.

Question 5

In a certain game, a player can solve easy or hard puzzles. A player earns 30 points for solving an easy puzzle and 60 points for solving a hard puzzle. Tina solved a total of 50 puzzles playing this game, earning 1,950 points in all. How many hard puzzles did Tina solve?

- A) 10
- B) 15
- C) 25
- D) 35

Item Difficulty: Medium
Content: Heart of Algebra
Correct Answer: B

Choice B is the correct answer. Let x and y be the number of easy and hard puzzles, respectively, that Tina solved. Since she solved a total of 50 puzzles, it follows that $x + y = 50$. She earned a total of 1,950 points, so it must also be true that $30x + 60y = 1,950$. Dividing both sides of this equation by 30 gives $x + 2y = 65$. Subtracting the first equation, $x + y = 50$, from the second equation, $x + 2y = 65$, gives $y = 15$. Therefore, Tina solved 15 hard puzzles.

Alternatively: Let x be the number of easy puzzles Tina solved. Then, $50 - x$ is the number of hard puzzles she solved. And since she earned a total of 1,950 points, it must be true that $30x + 60(50 - x) = 1,950$. Solving this equation for x gives $x = 35$, and so $50 - x = 15$. Therefore, Tina solved 15 hard puzzles.

Choices A and C are incorrect because if the number of hard puzzles Tina solved were as they indicate, the total number of points she would earn will not be 1,950. The incorrect answer in choice D could be the result of interchanging the number of hard puzzles and easy puzzles.

Question 6

$$2x^2 + 7x - 15 = 0$$

If r and s are two solutions of the equation above and $r > s$, which of the following is the value of $r - s$?

- A) $\frac{15}{2}$
- B) $\frac{13}{2}$
- C) $\frac{11}{2}$
- D) $\frac{3}{2}$

Item Difficulty: Medium

Content: Passport to Advanced Math

Correct Answer: B

Choice B is correct. This equation can be solved using the quadratic formula or factoring. The quadratic formula approach is left as an exercise for students. We will show first how to solve this equation using simple factoring and then will show how to solve it using both the structure of the equation and factoring.

Since $7x = 10x - 3x$, the given equation can be rewritten as $2x^2 + (10x - 3x) - 15 = 0$. Regrouping the terms so that the left side of the equation is in the factored form gives $(2x - 3)(x + 5) = 0$, from which it follows that $2x - 3 = 0$ or $x + 5 = 0$. Thus, the quadratic equation has solutions $\frac{3}{2}$ and -5 . Since r and s are solutions to the

quadratic equation and $r > s$, we can conclude that $r = \frac{3}{2}$ and $s = -5$; therefore,
 $r - s = \frac{3}{2} - (-5) = \frac{13}{2}$.

Alternatively: Multiplying the original equation by 2, we can rewrite it in terms of $2x$ as follows: $(2x)^2 + 7(2x) - 30 = 0$. Since the two numbers whose sum is -7 and whose product is -30 are -10 and 3 , the equation will be factored as

$(2x - 3)(2x + 10) = 0$, generating $\frac{3}{2}$ and -5 as solutions. Since r and s are solutions to the quadratic equation and $r > s$, we can conclude that $r = \frac{3}{2}$ and $s = -5$;
 therefore, $r - s = \frac{3}{2} - (-5) = \frac{13}{2}$.

Choices A, C, and D are incorrect and could result from calculating the value of expressions given in terms of the solutions r and s , but are not equivalent to the

difference $r - s$ of these solutions. For example, $\frac{15}{2}$ is the value of $-rs$, not the value of $r - s$.

Question 7

To cut a lawn, Allan charges a fee of \$15 for his equipment and \$8.50 per hour spent cutting a lawn. Taylor charges a fee of \$12 for his equipment and \$9.25 per hour spent cutting a lawn. If x represents the number of hours spent cutting a lawn, what are all the values of x for which Taylor's total charge is greater than Allan's total charge?

- A) $x > 4$
- B) $3 \leq x \leq 4$
- C) $4 \leq x \leq 5$
- D) $x < 3$

Item Difficulty: Medium

Content: Heart of Algebra

Correct Answer: A

Choice A is the correct answer. If x represents the number of hours spent cutting the lawn, the total fee that Allan charges is $8.5x + 15$ dollars and the total fee that Taylor charges is $9.25x + 12$ dollars. To find all of the values of x for which Taylor's total fee is greater than Allan's total fee, we solve the inequality $9.25x + 12 > 8.5x + 15$, which simplifies to $0.75x > 3$, and so $x > 4$.

Alternatively: Since Taylor's hourly rate charge is higher than Allan's, it can be concluded that after a certain amount of hours, Taylor's total charge will always be greater than Allan's total charge. Thus the inequality that represents all possible values of x for which this occurs will be of the form $x > a$ for some value a . Of the choices given, only $x > 4$ is in this form. Lastly, one can confirm that Taylor and Allan charge the same amount when $x = 4$. Therefore, choice A is correct.

Choice B is incorrect because Allan's total charge is greater than Taylor's total charge when $x < 4$. Choice C is incorrect because Allan's total charge and Taylor's total charge at $x = 4$ are exactly the same, and Taylor's total charge is greater than Allan's total charge also for values of x greater than 5. Choice D is incorrect because Allan's total charge is greater than Taylor's charge when x is less than 3.

Question 8

$$n = 456 - 3T$$

The equation above is used to model the relationship between the number of cups, n , of hot chocolate sold per day in a coffee shop and the average daily temperature, T , in degrees Fahrenheit. According to the model, what is the meaning of the 3 in the equation?

- A) For every increase of 3°F, one more cup of hot chocolate will be sold.
- B) For every decrease of 3°F, one more cup of hot chocolate will be sold.
- C) For every increase of 1°F, three more cups of hot chocolate will be sold.
- D) For every decrease of 1°F, three more cups of hot chocolate will be sold.

Item Difficulty: Medium

Content: Heart of Algebra

Correct Answer: D

Choice D is the correct answer. According to the model, if the average daily temperature is T degrees Fahrenheit, then the number of cups of hot chocolate sold per day in the coffee shop would be $456 - 3T$. If the temperature decreases by 1°F, then the number of cups of hot chocolate sold per day in the coffee shop would be $456 - 3(T - 1)$, which can be rewritten as $(456 - 3T) + 3$. Therefore, for every 1°F drop in the average daily temperature, the coffee shop sells three more cups of hot chocolate.

Choices A and B are incorrect because the change in the average daily temperature and the change in the number of cups of hot chocolate have been interchanged. Choice C is incorrect because, according to the model, the higher value of daily temperature corresponds to a lower, not higher, number of cups of hot chocolate sold.

Question 9

A truck enters a stretch of road that drops 4 meters in elevation for every 100 meters along the length of the road. The road is at 1,300 meters elevation where the truck entered, and the truck is traveling at 16 meters per second along the road. What is the elevation of the road, in meters, at the point where the truck passes t seconds after entering the road?

- A) $1,300 - 0.04t$
- B) $1,300 - 0.64t$
- C) $1,300 - 4t$
- D) $1,300 - 16t$

Item Difficulty: Medium
Content: Heart of Algebra
Best Answer: B

Choice B is the correct answer. Since the truck is traveling at 16 meters per second along the road, the distance it has traveled t seconds after entering the road is $16t$ meters. Since the elevation of the road drops 4 meters for every 100 meters along the length of the road, it follows that for $16t$ meters along the road, the elevation drops $\frac{4}{100} \times 16t$ or $0.64t$. Therefore, the elevation of the road at the point where the truck passes t seconds after entering the road is $1,300 - 0.64t$ meters.

Choice A is incorrect because $\frac{4}{100}t$ would be the number of meters that the elevation drops t seconds after the truck enters the road if its speed were 1 meter per second. Choice C is incorrect because $4t$ meters does not give the number of meters the elevation of the road drops. Choice D is incorrect because the drop rate of 4 meters for every 100 meters along the road is not used.

Question 10

If $f(x - 1) = 2x + 3$ for all values of x , what is the value of $f(-3)$?

- A) -7
- B) -5
- C) -3
- D) -1

Item Difficulty: Medium

Content: Passport to Advanced Math

Correct Answer: D

Choice D is correct. Since $f(x - 1) = 2x + 3$ for all values of x , $f(-3) = f(-2 - 1) = 2(-2) + 3$ and so the value of $f(-3)$ is -1 .

Alternatively: $2x + 3$ can be rewritten as $2(x - 1) + 5$ and since $f(x - 1) = 2(x - 1) + 5$ for all values of x , it follows that $f(x) = 2x + 5$ for all values of x . Substituting -3 for x in this equation gives $f(-3) = 2(-3) + 5 = -1$.

Choices A, B, and C are incorrect because f is a function, and there is one and only one value for $f(-3)$, which as shown above is -1 . Therefore, neither of the choices, -7 , -5 , or -4 can be the value of $f(-3)$.

Question 11

Which of the following is equivalent to $(s - t)\left(\frac{s}{t}\right)$?

- A) $\frac{s}{t} - s$
- B) $\frac{s}{t} - st$
- C) $\frac{s^2}{t} - s$
- D) $\frac{s^2}{t} - \frac{s}{t^2}$

Item Difficulty: Medium

Content: Passport to Advanced Math

Correct Answer: C

Choice C is the correct answer. Using the distributive property to expand the given expression gives $s\left(\frac{s}{t}\right) - t\left(\frac{s}{t}\right) = \frac{s^2}{t} - s$.

Choices A, B, and D are incorrect. In each of these choices, at least one of the products in the expansion is not correct. For example $s\left(\frac{s}{t}\right) = \frac{s^2}{t}$, not $\frac{s}{t}$, and $t\left(\frac{s}{t}\right) = s$, not st or $\frac{s}{t}$.

Question 12

$$p(x) = 3(x^2 + 10x + 5) - 5(x - k)$$

In the polynomial $p(x)$ defined above, k is a constant. If $p(x)$ is divisible by x , what is the value of k ?

- A) -3
- B) -2
- C) 0
- D) 3

Item Difficulty: Medium

Content: Passport to Advanced Math

Correct Answer: A

Choice A is the correct answer. If polynomial $p(x)$ is divisible by x , then x must be a factor of the polynomial, or equivalently, the constant term of the polynomial must be zero. Multiplying out on the right side of the equation gives

$$p(x) = 3x^2 + 30x + 15 - 5x + 5k, \text{ which can be rewritten as } p(x) = 3x^2 + 25x + (5k + 15).$$

Hence, $5k + 15 = 0$, and so $k = -3$.

Choices B, C, and D are the not correct answers because if the value of k were as indicated in those choices, then x would not be a factor of the polynomial $p(x)$, and so $p(x)$ would not be divisible by x .

Question 13

In the xy -plane, if the parabola with equation $y = ax^2 + bx + c$, where a , b , and c are constants, passes through the point $(-1, 1)$, which of the following must be true?

- A) $a - b = 1$
- B) $-b + c = 1$
- C) $a + b + c = 1$
- D) $a - b + c = 1$

Item Difficulty: Hard

Content: Passport to Advanced Math

Correct Answer: D

Choice D is the correct answer. If the graph of a parabola passes through the point $(-1, 1)$, then the ordered pair $(-1, 1)$ must satisfy the equation of the parabola.

Thus, $1 = a(-1)^2 + b(-1) + c$, which is equivalent to $a - b + c = 1$.

Choices A, B, and C are incorrect and could result from misinterpreting what it means for the point $(-1, 1)$ to be on the parabola or from common calculation errors while expressing this fact algebraically.

These are the directions students will see in the test for the Student-Produced Response questions.

Question 14

For what value of h is $24 = \frac{h}{10} - 6$?

Item Difficulty: Easy

Content: Heart of Algebra

Correct Answer: 300

The correct answer is 300. To solve the given equation for h , first add 6 to both

sides of the equation to get $30 = \frac{h}{10}$. Then multiply both sides of this equation by 10 to yield $h = 300$.

Question 15

What is the value of a if $(2a + 3) - (4a - 8) = 7$?

Item Difficulty: Medium
Content: Heart of Algebra
Correct Answer: 2

The correct answer is 2. The equation given can be rewritten as $2a + 3 - 4a + 8 = 7$, which is equivalent to $-2a + 11 = 7$, and so $a = 2$.

Question 16

If x is not equal to zero, what is the value

of $\frac{4(3x)^2}{(2x)^2}$?

Item Difficulty: Medium
Content: Passport to Advanced Math
Correct Answer: 9

The correct answer is 9. Multiplying out the given expression gives $\frac{4(9x^2)}{4x^2}$. Since $x \neq 0$, dividing both the numerator and the denominator of the fraction by $4x^2$ simplifies the expression to 9.

Question 17

If $x - 2$ is a factor of $x^2 - bx + b$, where b is a constant, what is the value of b ?

Item Difficulty: Hard
Content: Passport to Advanced Math
Correct Answer: 4

The correct answer is 4. If $x - 2$ is a factor of $x^2 - bx + b$, where b is a constant, then $x^2 - bx + b$ can be written as the product $(x - 2)(x - a)$ for some real number a . Expanding $(x - 2)(x - a)$ gives $x^2 - 2x - ax + 2a$, which can be rewritten as $x^2 - (2 + a)x + 2a$. Hence, $x^2 - (2 + a)x + 2a = x^2 - bx + b$ is true for all values of x . Consequently, the coefficients of like terms on each side of the equation must be the same: $2 + a = b$ and $2a = b$. Solving this system gives $b = 4$.

Alternatively: Since $x - 2$ is a factor of $x^2 - bx + b$ and $(x - 2)^2 = x^2 - 4x + 4$, one can correctly conclude that the value of b is 4.

Math Test – Calculator Answer Explanations

Question 1

Tyra subscribes to an online gaming service that charges a monthly fee of \$5.00 and \$0.25 per hour for time spent playing premium games. Which of the following functions gives Tyra's cost, in dollars, for a month in which she spends x hours playing premium games?

- A) $C(x) = 5.25x$
- B) $C(x) = 5x + 0.25$
- C) $C(x) = 5 + 0.25x$
- D) $C(x) = 5 + 25x$

Item Difficulty: Easy

Content: Heart of Algebra

Correct Answer: C

Choice C is the correct answer. Tyra pays \$0.25 per hour for time spent playing premium games, so for the month in which she spends x hours playing premium games, she pays $0.25x$ dollars for playing the premium games. She also pays an additional \$5 monthly fee. Therefore, Tyra's cost, in dollars, for the month in which she spends x hours playing premium games is given by the function

$$C(x) = 5 + 0.25x.$$

Choice A is incorrect because Tyra is not charged \$5.25 per hour for time playing premium games. Choice B is incorrect because the charge per hour has been interchanged with the monthly fee. Choice D is incorrect because $25x$ is the charge for playing premium games in cents, not in dollars.

Question 2

A grocery store sells a brand of juice in individual bottles and in packs of 6 bottles. On a certain day, the store sold a total of 281 bottles of the brand of juice, of which 29 were sold as individual bottles. Which equation shows the number of packs of bottles, p , sold that day?

A) $p = \frac{281 - 29}{6}$

B) $p = \frac{281 + 29}{6}$

C) $p = \frac{281}{6} - 29$

D) $p = \frac{281}{6} + 29$

Item Difficulty: Easy

Content: Heart of Algebra

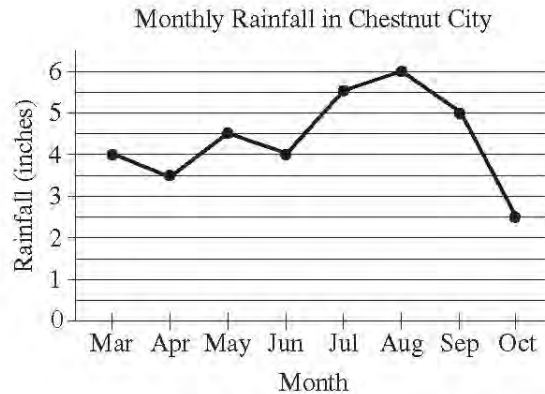
Correct Answer: A

Choice A is the correct answer. Since the store sold a total of 281 bottles, 29 of which were sold individually, it follows that $281 - 29$ bottles were sold in packs of 6 bottles. Therefore, the number of packs of bottles, p , sold that day in the store is

$$p = \frac{281 - 29}{6}.$$

Choice B is incorrect. Adding the number of bottles sold individually, 29, to the total number of bottles sold, 281, does not give the number of bottles that were sold in packs of 6. Choices C and D are incorrect and could result from dividing all of the bottles into groups of 6 (incorrectly assuming that all 281 bottles of juice were sold in packs of 6), and either subtracting the 29 bottles sold individually from that result, as in choice C, or adding the 29 bottles to that result, as in choice D.

Question 3



The line graph above shows the monthly rainfall from March to October last year in Chestnut City. According to the graph, what was the greatest change (in absolute value) in the monthly rainfall between two consecutive months?

- A) 1.5 inches
- B) 2.0 inches
- C) 2.5 inches
- D) 3.5 inches

Item Difficulty: Medium

Content: Probability and Data Analysis

Correct Answer: C

Choice C is the correct answer. The greatest change (in absolute value) in monthly rainfall could be an increase or a decrease in monthly rainfall. The table below shows the approximate changes in monthly rainfall in Chestnut City last year between each of the two consecutive months.

Consecutive months	Change in monthly rainfall (inches)
March to April	0.5
April to May	1
May to June	0.5
June to July	1.5
July to August	0.5
August to September	1
September to October	2.5

Of the values on the right column, the greatest is from September to October, which is a change of 2.5 inches.

Choices A, B, and D are incorrect because they contain values that either do not represent any of the changes in monthly rainfall between two consecutive months or that are not the greatest change.

Question 4

A rectangle has perimeter P , length ℓ and width w . Which of the following represents ℓ in terms of P and w ?

A) $\ell = P - w$

B) $\ell = \frac{2P - w}{2}$

C) $\ell = \frac{P - 2w}{2}$

D) $\ell = 2P - 2w$

Item Difficulty: Medium

Content: Passport to Advanced Math

Correct Answer: C

Choice C is the correct answer. The perimeter of a rectangle is the sum of the four sides and can be calculated using the formula $P = 2\ell + 2w$, where ℓ is the length and w is the width of the rectangle. Subtracting $2w$ from both sides of the equation gives

$$P - 2w = 2\ell, \text{ and then dividing by } 2 \text{ yields } \ell = \frac{P - 2w}{2}.$$

Choice A is incorrect. This choice does not use the fact that the perimeter of a rectangle is the sum of two lengths and two widths. Choice B and D are incorrect. In each of these choices, the equation incorrectly doubles the perimeter.

Question 5

Which ordered pair (x, y) satisfies the system of equations shown below?

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

- A) $(-6, 2)$
- B) $(-2, 2)$
- C) $(2, -2)$
- D) $(4, 2)$

Item Difficulty: Medium

Content: Heart of Algebra

Correct Answer: C

Choice C is the correct answer. To eliminate y , the first equation in the system can be multiplied by 2 and then the equations can be added as shown below.

$$\begin{array}{r}4x - 2y = 12 \\x + 2y = -2 \\ \hline5x + 0 = 10\end{array}$$

Since the result is $5x = 10$, it follows that $x = 2$. Substituting 2 for x into the equation $x + 2y = -2$ gives $2 + 2y = -2$ and so $y = -2$. Therefore, $(2, -2)$ is the solution to the system given.

Alternatively: Use the substitution method to solve the system. For example, the first equation can be rewritten as $y = 2x - 6$. Substituting $2x - 6$ for y in the second equation gives $x + 2(2x - 6) = -2$, and so $x = 2$. Finally, substituting 2 for x in $y = 2x - 6$ gives $y = -2$, leading to the same solution of the system, namely $(2, -2)$.

Choice B is incorrect. The value for x and the value for y have been reversed in the ordered pair. Choices A and D are incorrect. The ordered pair in each of these choices does not satisfy at least one of the equations in the system. For example, the ordered pair $(4, 2)$ does not satisfy the equation $x + 2y = -2$, since $4 + 2(2) \neq -2$.

Question 6

A soda company is filling bottles of soda from a tank that contains 500 gallons of soda. At most, how many 20-ounce bottles can be filled from the tank? (1 gallon = 128 ounces)

- A) 25
- B) 78
- C) 2,560
- D) 3,200

Item Difficulty: Easy

Content: Probability and Data Analysis

Correct Answer: D

Choice D is the correct answer. Since 1 gallon equals 128 ounces, 500 gallons equal $(500)(128) = 64,000$ ounces. Therefore, the maximum number of 20-ounce bottles that can be filled with the soda from the tank is $\frac{64,000}{20} = 3,200$.

Choice A is incorrect and could result from dividing 500 (the number of gallons contained in the tank) by 20 (the capacity of one bottle, in ounces). The gallons need to be converted into ounces first, and then the result can be divided by 20. Choices B and C are incorrect because they do not give the maximum number of 20-ounce bottles that can be filled from the soda in the tank.

Question 7

A car traveled at an average speed of 80 miles per hour for 3 hours and consumed fuel at a rate of 34 miles per gallon. Approximately how many gallons of fuel did the car use for the entire 3-hour trip?

- A) 2
- B) 3
- C) 6
- D) 7

Item Difficulty: Medium

Content: Probability and Data Analysis

Correct Answer: D

Choice D is the correct answer. Since the car traveled at an average speed of 80 miles per hour, the distance the car traveled during 3 hours is $(80)(3) = 240$ miles.

The car consumed fuel at a rate of 34 miles per gallon, so the car used $\frac{240}{34}$ gallons of fuel, which is approximately 7 gallons of fuel.

Choices A, B, and C are incorrect. For each of these choices, the amount of fuel is not enough to travel the entire 240 miles.

Question 8

What is the slope of the line in the xy -plane that passes through the points

$$\left(-\frac{5}{2}, 1\right) \text{ and } \left(-\frac{1}{2}, 4\right) ?$$

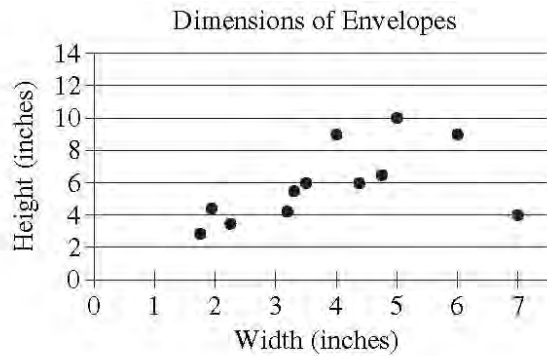
- A) -1
- B) $-\frac{2}{3}$
- C) 1
- D) $\frac{3}{2}$

Item Difficulty: Medium
Content: Heart of Algebra
Correct Answer: D

Choice D is the correct answer. In the xy -plane, the slope m of a line that passes through the points (x_1, y_1) and (x_2, y_2) is the change in y over the change in x (rise over run), which is expressed by the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Thus, the slope of the line through the points $\left(-\frac{5}{2}, 1\right)$ and $\left(-\frac{1}{2}, 4\right)$ is $\frac{4 - 1}{-\frac{1}{2} - \left(-\frac{5}{2}\right)}$, which simplifies to $\frac{3}{2}$.

Choices A and C are incorrect because the change in y and the change in x do not have the same magnitude. Choice B is incorrect; the fraction $-\frac{2}{3}$ is the negative reciprocal of the slope of the line through the points $\left(-\frac{5}{2}, 1\right)$ and $\left(-\frac{1}{2}, 4\right)$.

Question 9



The scatterplot above shows the widths and the heights of 12 types of rectangular envelopes. What is the width, in inches, of the envelope represented by the data point that is farthest from the line of best fit (not shown)?

- A) 2
- B) 5
- C) 7
- D) 12

Item Difficulty: Medium

Content: Probability and Data Analysis

Correct Answer: C

Choice C is the correct answer. The data point that is farthest from the line of best fit is located at (7, 4), which means that this point represents a type of envelope that is 7 inches wide and 4 inches high.

Choices A and B are incorrect because none of the data points with width 2 or width 5 is the farthest from the line of best fit. Choice D is incorrect because the scatterplot does not contain any points with width 12 inches.

Question 10

A high school basketball team won exactly 65 percent of the games it played during last season. Which of the following could be the total number of games the team played last season?

- A) 22
- B) 20
- C) 18
- D) 14

Item Difficulty: Medium

Content: Probability and Data Analysis

Correct Answer: B

Choice B is the correct answer. The number of games won by the basketball team must be a whole number. Since 65% is equivalent to $\frac{13}{20}$, it follows that, of the choices given, the total number of games the team played last season can only be 20. Multiplying $\frac{13}{20}$ by each of the other answer choices does not result in a whole number.

Choices A, C, and D are incorrect because 65% of each of the numbers in the choices results in non-whole numbers.

Question 11

$$110x + y = 1,210$$

A coffee shop is running a promotion where a number of free coffee samples are given away each day. The equation above can be used to model the number of free coffee samples, y , that remain to be given away x days after the promotion began. What does it mean that $(11, 0)$ is a solution to this equation?

- A) During the promotion, 11 samples are given away each day.
- B) It takes 11 days during the promotion to see 1,210 customers.
- C) It takes 11 days during the promotion until none of the samples are remaining.
- D) There are 11 samples available at the start of the promotion.

Item Difficulty: Medium

Content: Heart of Algebra

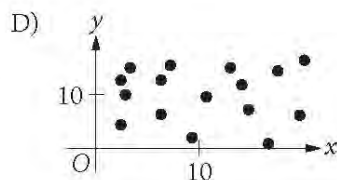
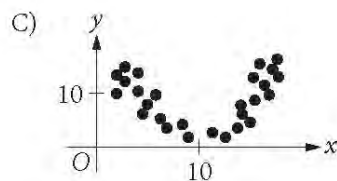
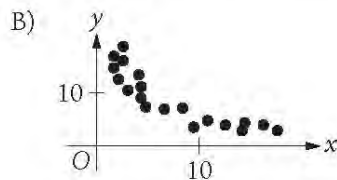
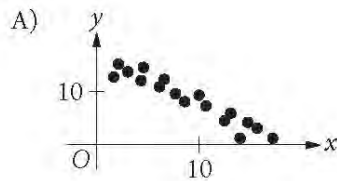
Correct Answer: C

Choice C is the correct answer. Since x represents the number of days after the promotion began and y represents the remaining number of coffee samples, the fact that the ordered pair $(11, 0)$ is a solution to the given equation means that it takes 11 days during the promotion until none of the samples are remaining.

Choice A is incorrect; if 11 samples were given away each day, then the coefficient of x in the equation would be 11. Therefore, this is not the correct interpretation of $(11, 0)$ as a solution to the equation. Choice B is incorrect; the total number of free coffee samples given away during 11 days of the promotion was 1,210. But the number of customers who were in the store during those days need not be 1,210. Choice D is incorrect; according to the given equation, there were 1,210, not 11, samples available at the start of the promotion.

Question 12

Which scatterplot shows a negative association that is not linear? (Note: A negative association between two variables is one in which higher values of one variable correspond to lower values of the other variable, and vice versa.)



Item Difficulty: Medium

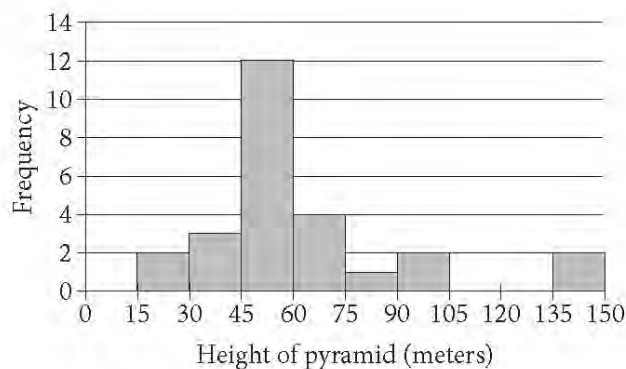
Content: Probability and Data Analysis

Correct Answer: B

Choice B is the correct answer. Of the choices given, only the scatterplots in A and B show a negative association between variables x and y , and of these two associations, the one depicted in choice B is not linear.

Choice A is incorrect. The association depicted in this scatterplot is negative, but it can also be linear. Choice C is incorrect. The association depicted in this scatterplot is not linear. However, for x greater than 10, the association between x and y is positive. Choice D is incorrect. There is no clear association between x and y in this scatterplot.

Question 13



The histogram above shows the distribution of the heights, in meters, of 26 pyramids in Egypt. Which of the following could be the median height of the 26 pyramids represented in the histogram?

- A) 44 meters
- B) 48 meters
- C) 63 meters
- D) 77 meters

Item Difficulty: Medium

Content: Probability and Data Analysis

Correct Answer: B

Choice B is the correct answer. The median of a data set is the middle value when the data points are sorted in either ascending or descending order. When the number of the data points is even, then the median is the mean of the two middle values of the sorted data. Hence, the median height of the 26 pyramids is the mean

of the 13th and 14th tallest pyramids. Since the number of pyramids that are less than 30 meters high is 5 and the number of pyramids that are less than 60 meters high is 17, the median height of the 26 pyramids must be between 45 and 60 meters. Therefore, of the choices given, only 48 meters could be the median height of the 26 pyramids.

Choices A, C, and D are incorrect because the median height of the 26 pyramids cannot be less than 45 meters or greater than 60 meters.

Questions 14-16 refer to the following information.

A survey of 170 randomly selected teenagers aged 14 through 17 in the United States was conducted to gather data on summer employment of teenagers. The data are shown in the table below.

	Have a summer job	Do not have a summer job	Total
Ages 14–15	20	69	89
Ages 16–17	39	42	81
Total	59	111	170

Question 14

Which of the following is closest to the percent of those surveyed who had a summer job?

- A) 22%
- B) 35%
- C) 47%
- D) 53%

Item Difficulty: Medium

Content: Probability and Data Analysis

Correct Answer: B

Choice B is the correct answer. The number of teenagers surveyed in the data is 170. Of those surveyed, a total of 59 teenagers had a summer job; thus, the percent of those teenager surveyed who had a summer job is $\frac{59}{170} = 0.347$, which rounds to 35%.

Choice A is incorrect. This choice, 22%, is the approximate percent $\left(\frac{20}{89} \approx 0.22\right)$ of teenagers aged 14 to 15 who had summer jobs. But that is not precisely what is

asked in this question. Choices C and D are incorrect and may be the result of calculating relative frequencies that are different from what the problem asks.

Question 15

In 2012 the total population of individuals in the United States who were between 14 and 17 years old (inclusive) was about 17 million. If the survey results are used to estimate information about summer employment of teenagers across the country, which of the following is the best estimate of the total number of individuals between 16 and 17 years old in the United States who had a summer job in 2012?

- A) 8,200,000
- B) 3,900,000
- C) 2,000,000
- D) 390,000

Item Difficulty: Hard

Content: Probability and Data Analysis

Correct Answer: B

Choice B is the correct answer. In 2012, the total population of individuals in the United States who were between 14 and 17 years old (inclusive) was about 17 million, which is 10^5 times the size of the survey sample, 170. Since of those surveyed, 39 teenagers aged 16 to 17 had a summer job, it follows that the best estimate of the total number of individuals aged 16 to 17 in the United States who had a summer job in 2012 was $39 \times 10^5 = 3,900,000$.

Choices A, C, and D are incorrect and are likely the result of either conceptual or calculation errors made.

Question 16

Based on the data, how many times more likely is it for a 14 year old or a 15 year old to NOT have a summer job than it is for a 16 year old or a 17 year old to NOT have a summer job? (Round the answer to the nearest hundredth.)

- A) 0.52 times as likely
- B) 0.65 times as likely
- C) 1.50 times as likely
- D) 1.64 times as likely

Item Difficulty: Hard

Content: Probability and Data Analysis

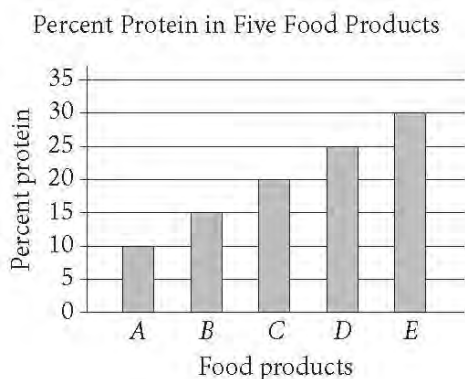
Correct Answer: C

Choice C is the correct answer. According to the data shown in the table, 69 out of 89 teenagers aged 14 to 15 did not have summer jobs. So for a 14- or 15-year-old, the likelihood of not having a summer job is $\frac{69}{89}$. And since 42 out of 81 teenagers aged 16 to 17 did not have a summer job, the likelihood that a 15- or 16-year-old not having a summer job is $\frac{42}{81}$. Therefore, a 14- or 15-year-old is $\frac{69}{89} \div \frac{42}{81} = \frac{1,863}{1,246} = 1.49518$, or about 1.50, times more likely to not have

a summer job.

Choice A is incorrect. This choice could result from calculating the likelihood that a teenager aged 16 to 17 will not have a summer job $\left(\frac{42}{81}\right)$. Choice B is incorrect. This choice could result from calculating the likelihood that a teenager aged 14 through 17 will not have a summer job is $\left(\frac{111}{170}\right)$. Choice D is incorrect. This choice could result from calculating the ratio of the number of teenagers aged 14 to 15 who do not have a summer job (69) to the number of teenagers aged 16 to 17 who do not have a summer job (42). If the total number of those surveyed in the two different groups were the same, this result would be correct. But the sizes of the two groups are different; therefore, the result obtained is incorrect.

Question 17



The graph above shows the amount of protein supplied by five different food products, A, B, C, D, and E, as a percentage of their total weights. The costs of 10 grams of products A, B, C, D, and E are \$2.00, \$2.20, \$2.50, \$4.00, and \$5.00, respectively. Which of the five food products supplies the most protein per dollar?

- A) A
- B) B
- C) C
- D) E

Item Difficulty: Medium

Content: Probability and Data Analysis

Correct Answer: C

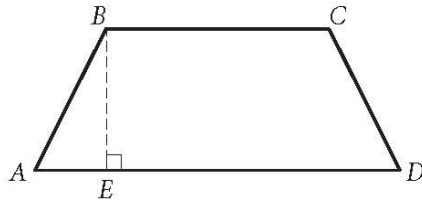
Choice C is the correct answer. The table below organizes the information in the graph and the additional data needed to answer the question.

Food product	Cost of 10 grams of product	Amount of product (in grams)	Percent protein	Amount of protein (in grams)	Protein per dollar (in grams/dollar)
A	\$2.00	10	10%	$0.1(10) = 1$	$\frac{10(0.1)}{2} = 0.5$
B	\$2.20	10	15%	$0.15(10) = 1.5$	$\frac{10(0.15)}{2.2} = 0.68$
C	\$2.50	10	20%	$0.2(10) = 2$	$\frac{10(0.2)}{2.5} = 0.8$
D	\$4.00	10	25%	$0.25(10) = 2.5$	$\frac{10(0.25)}{4} = 0.625$
E	\$5.00	10	30%	$0.3(10) = 3$	$\frac{10(0.3)}{5} = 0.6$

According to the table, food product C provides the most protein per dollar (0.8).

Choices A, B, and D are incorrect. For each choice, the protein per dollar for each of the food products is less than 0.8 grams of protein per dollar.

Question 18



In quadrilateral $ABCD$ above, \overline{BC} is parallel to \overline{AD} , and $AB = CD$. If BC and AD were each doubled and BE was reduced by 50 percent, how would the area of $ABCD$ change?

- A) The area of $ABCD$ would be decreased by 50 percent.
- B) The area of $ABCD$ would be increased by 50 percent.
- C) The area of $ABCD$ would not change.
- D) The area of $ABCD$ would be multiplied by 2.

Item Difficulty: Medium

Content: Passport to Advanced Math

Correct Answer: C

Choice C is the correct answer. Quadrilateral $ABCD$ is a trapezoid, and the formula for the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$, where b_1 and b_2 are the bases of the trapezoid (BC and AD) and h is the height (BE). If the bases (BC and AD) are each doubled and the height (BE) is reduced by 50%, then the area of the new trapezoid $ABCD$ would be $\frac{1}{2}\left(\frac{h}{2}\right)(2b_1 + 2b_2)$, which after multiplying out becomes $\frac{1}{2}h(b_1 + b_2)$, the same as the area of the original trapezoid. Therefore, the area of the trapezoid would not change.

Choice A is incorrect. This choice does not take into account the changes to the bases, BC and AD . Choice B is incorrect. This choice could result from incorrectly interpreting the impact of doubling the bases on the area of $ABCD$ as a 100% increase and the impact of reducing the height by 50% as a 50% decrease, resulting

in a combined $100\% - 50\% = 50\%$ increase of the area. Choice D is incorrect. This choice does not take into account the change to height, BE .

Question 19

Boyd grows only tomatoes and raspberries in his garden. Last year, he grew 140 pounds of tomatoes and 60 pounds of raspberries. This year, the production, by weight, of tomatoes declined by 20 percent, and the production, by weight, of raspberries declined by 50 percent. By what percentage did the total yield, by weight, of Boyd's garden decline?

- A) 29 percent
- B) 30 percent
- C) 35 percent
- D) 70 percent

Item Difficulty: Hard

Content: Probability and Data Analysis

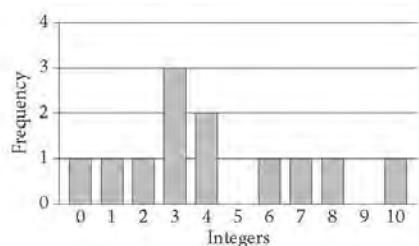
Correct Answer: A

Choice A is the correct answer. Since Boyd's production of tomatoes declined by 20% and the production of raspberries declined by 50% from the previous year, this year, his tomato production was $140 - 0.2(140) = 112$ pounds and his raspberry production was $60 - 0.5(60) = 30$ pounds. The percent decline in the total yield is the decline in the number of pounds of tomatoes and raspberries divided by the original number of pounds of tomatoes and raspberries, which is

$$\frac{28 + 30}{140 + 60} = 0.29 = 29\%.$$

Choice B is incorrect. This choice is close to the answer, but rounding may have erroneously led to this answer. Choice C is incorrect. This choice, 35%, may be a result of calculating the mean of 20% and 50%. Choice D is incorrect. This choice is the approximate percent weight of the tomatoes and raspberries produced this year compared to the last year, but that's not what the problem asks for.

Question 20



The graph above shows the frequency distribution of a list of randomly generated integers between 0 and 10. What is the mean of the list of numbers?

- A) 3.0
- B) 3.5
- C) 4.25
- D) 12.0

Item Difficulty: Medium

Content: Probability and Data Analysis

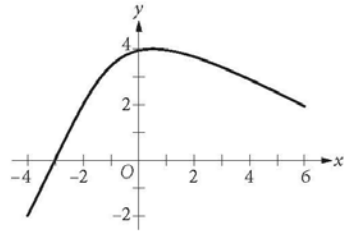
Correct Answer: C

Choice C is the correct answer. There are 12 integers in the list, and some of them are repeated at the frequencies shown in the graph. So the mean of the list of numbers is the sum of the numbers (repeats included) divided by 12. That is

$$\frac{0 + 1 + 2 + 3(3) + 2(4) + 6 + 7 + 8 + 10}{12} = 4.25.$$

Choice A is incorrect; 3 is the mode, not the mean, of the list of numbers. Choice B is incorrect; 3.5 is the median, not the mean, of the list of numbers. Choice D is incorrect; 12 is the total number of the integers in the list.

Question 21



What is the minimum value of the function graphed on the xy -plane above, for $-4 \leq x \leq 6$?

- A) $-\infty$
- B) -4
- C) -2
- D) 1

Item Difficulty: Hard

Content: Passport to Advanced Math

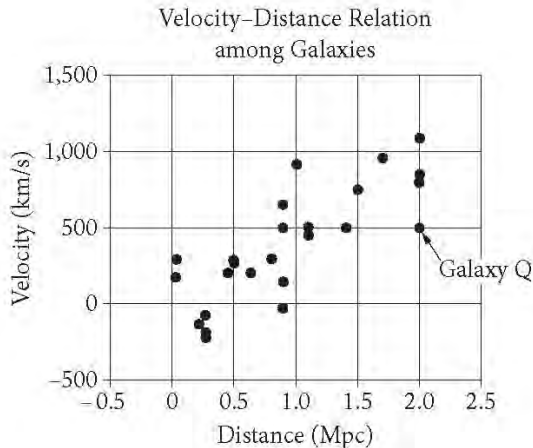
Correct Answer: C

Choice C is the correct answer. The minimum value of a graphed function is the minimum y -value of all the points on the graph. For the graph shown, the minimum is at the left endpoint of the graph, the y -value of which is -2 .

Choice A is incorrect. If the graph would continue indefinitely downward, then the minimum value of the function would be negative infinity. However, the domain of the function is restricted ($-4 \leq x \leq 6$) and the minimum value of the graph occurs at point $(-4, -2)$. Choice B is incorrect; -4 is the x -value of the point on the graph where the minimum value of the function occurs. Choice D is incorrect because there are points of the graph below the x -axis; therefore, the minimum value of the function cannot be positive.

Questions 22-24 refer to the following information.

In 1929, the astronomer Edwin Hubble published the data shown. The graph plots the velocity of galaxies relative to Earth against the distances of galaxies from Earth.



Hubble's data can be modeled by the equation $v = 500d$, where v is the velocity, in kilometers per second, at which the galaxy is moving away from Earth and d is the distance, in megaparsecs, of the galaxy from Earth. Assume that the relationship is valid for larger distances than are shown in the graph. (A megaparsec (Mpc) is 3.1×10^{19} kilometers.)

Question 22

According to Hubble's data, how fast, in meters per second, is Galaxy Q moving away from Earth?

- A) 2×10^6 m/s
- B) 5×10^5 m/s
- C) 5×10^2 m/s
- D) 2.5×10^2 m/s

Item Difficulty: Hard

Content: Probability and Data Analysis

Correct Answer: B

Choice B is the correct answer. The coordinates of the data point that represent Galaxy Q on the scatterplot are (2.0, 500), which means that Galaxy Q is at a distance of about 2.0 Mpc from Earth and moves away from Earth at a velocity of approximately 500 km/s. The question asks for the velocity in meters per second; therefore, kilometers (km) need to be converted into meters (m). Since 1 km is

equal to 1,000 m , it follows that Galaxy Q is moving away from Earth at a velocity of $500 \times 1,000$ m/s, or 5×10^5 m/s.

Choices A, C, and D are incorrect and may result from an incorrect interpretation of the coordinates of the point that represents Galaxy Q on the scatterplot or an incorrect conversion of the units.

Question 23

There are four galaxies shown in the graph at approximately 0.9 Mpc from Earth. Which of the following is closest to the range of velocities of these four galaxies, in kilometers per second?

- A) 100
- B) 200
- C) 450
- D) 700

Item Difficulty: Hard

Content: Probability and Data Analysis

Correct Answer: D

Choice D is the correct answer. The velocities, in km/s, of the four galaxies shown in the graph at approximately 0.9 Mpc from Earth are about -50 , $+200$, $+500$, and $+650$. Thus, the range of the four velocities is approximately $650 - (-50) = 700$ km/s.

Choices A, B, and C are incorrect. The range of velocities is the difference between the largest and smallest velocity. Each of the answer choices A, B, and C are too small compared to the real value of the range.

Question 24

Based on the model, what is the velocity, in kilometers per second, of a galaxy that is 15 Mpc from Earth?

- A) 7,500 km/s
- B) 5,000 km/s
- C) 1,100 km/s
- D) 750 km/s

Item Difficulty: Medium

Content: Heart of Algebra

Correct Answer: A

Choice A is the correct answer. The model indicates that the relationship between the velocities of the galaxies, in km/s, and their distance from Earth, in Mpc, is $v = 500d$. Therefore, the velocity of a galaxy that is 15 Mpc from Earth is $v = 500(15)$ km/s, or 7,500 km/s.

Based on the model, the other choices are incorrect: Choice B is the speed of a galaxy that is 10 Mpc from Earth. Choice C is the speed of a galaxy that is 2.2 Mpc from Earth. Choice D is the speed of a galaxy that is 1.5 Mpc from Earth.

Question 25

Janice puts a fence around her rectangular garden. The garden has a length that is 9 feet less than 3 times its width. What is the perimeter of Janice's fence if the area of her garden is 5,670 square feet?

- A) 342 feet
- B) 318 feet
- C) 300 feet
- D) 270 feet

Item Difficulty: Hard

Content: Passport to Advanced Math

Correct Answer: A

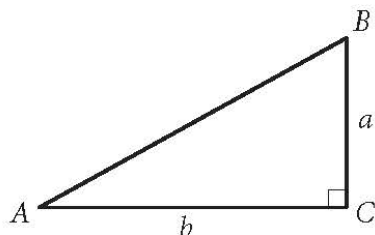
Choice A is the correct answer. Let w represent the width of Janice's garden and $3w - 9$ represent the length of Janice's garden. Since the area of Janice's garden is 5,670 square feet, it follows that $w(3w - 9) = 5,670$, which after dividing by 3 on both sides simplifies to $w(w - 3) = 1,890$.

From this point on, different ways could be used to solve this equation. One could rewrite this quadratic equation in the standard form and use the quadratic formula to solve it. Another approach would be to look among integer factors of 1,890 and try to find two that differ from each other by 3 and whose product is 1,890. The prime factorization of 1,890 ($2 \cdot 3^3 \cdot 5 \cdot 7$) can help with this. Two factors that satisfy the conditions above are 42 and 45 (note that $42 = 2 \cdot 3 \cdot 7$ and $45 = 3^2 \cdot 5$). The numbers -45 and -42 also satisfy the above conditions ($w = -42$), but since w represents the width of Janice's garden, the negative values of w can be rejected. Thus $w = 45$ feet, and so the length of the garden must be $3(45) - 9 = 126$ feet. Therefore, the perimeter of Janice's garden is $2(45 + 126) = 2(171) = 342$ feet.

Choice B is incorrect. This answer choice could result from incorrectly identifying the width of the garden as 42 feet instead of 45 feet. Choices C and D are incorrect; both answers would result in an area of the garden that is significantly smaller than 5,670 square feet. For example, if the perimeter of the garden were 270 feet, as in choice D, then $w + l = 135$ feet, where w represents the width and l represents the length of the garden. So $l = 135 - w$. It is also given that $l = 3w - 9$, which

implies that $135 - w = 3w - 9$. Solving this for w gives $w = 36$, and so $l = 99$. The area of the garden would then be 36×99 square feet, which is clearly less than 5,600 square feet.

Question 26



Given the right triangle ABC above, which of the following is equal to $\frac{b}{a}$?

- A) $\sin A$
- B) $\sin B$
- C) $\tan A$
- D) $\tan B$

Item Difficulty: Hard

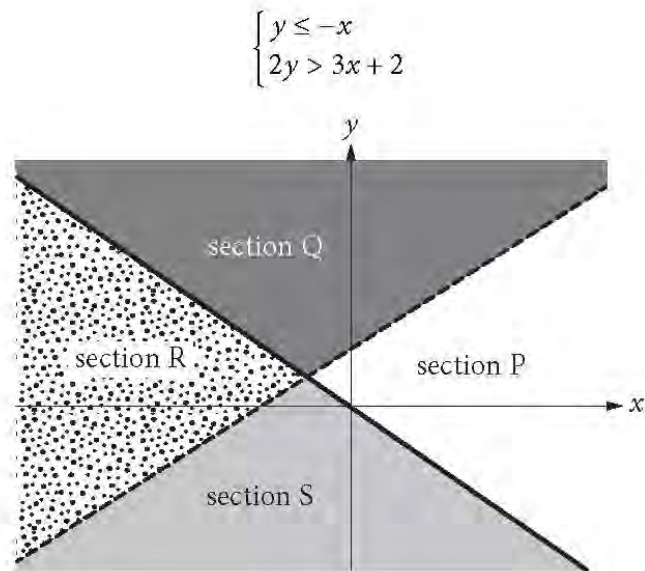
Content: Additional Topic in Math

Correct Answer: D

Choice D is the correct answer. Since the ratio $\frac{b}{a}$ involves only the legs of the right triangle, it follows that, of the given choices, the ratio can be equal to the tangent of one of the angles. In a right triangle, the tangent of an acute angle is defined as the ratio of the opposite side to the adjacent side of the angle. Side b is opposite to angle B and side a is adjacent to angle B . Therefore, $\tan B = \frac{b}{a}$.

Choices A and B cannot be correct; the sine of an acute angle in a right triangle is defined as the ratio of the opposite side to the hypotenuse, and the ratio shown involves only the legs of the triangle. Choice C is incorrect. In the triangle ABC shown, $\tan A = \frac{a}{b}$, not $\frac{b}{a}$.

Question 27



A system of inequalities and a graph are shown above. Which section or sections of the graph could represent all of the solutions to the system?

- A) Section R
- B) Sections Q and S
- C) Sections Q and P
- D) Sections Q, R, and S

Item Difficulty: Hard

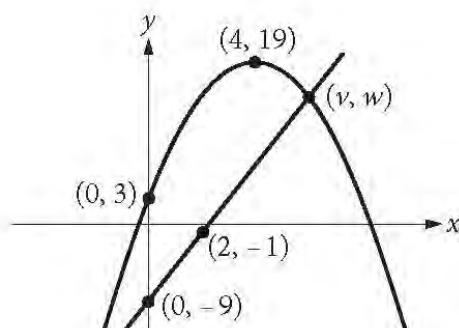
Content: Heart of Algebra

Correct Answer: A

Choice A is the correct answer. The solution set of the inequality $y \leq -x$ is the union of sections R and S of the graph. The solution set of the inequality $2y > 3x + 2$ is the union of sections R and Q of the graph. The solutions of the system consist of the coordinates of all the points that satisfy both inequalities, and therefore, section R represents all the solutions to the system since it is common to the solutions of both inequalities.

Choices B, C, and D are incorrect because they contain ordered pairs that do not satisfy both of the inequalities.

Question 28



The xy -plane above shows one of the two points of intersection of the graphs of a linear function and a quadratic function. The shown point of intersection has coordinates (v, w) . If the vertex of the graph of the quadratic function is at $(4, 19)$, what is the value of v ?

Item Difficulty: Medium

Content: Passport to Advanced Math

The correct answer is 6.

Since the vertex of the graph of the quadratic function is at $(4, 19)$, the equation of the parabola is of the form $y = a(x - 4)^2 + 19$. It is also given that the parabola passes through point $(0, 3)$. This means that

$a(3 - 4)^2 + 19$, and so $a = -1$. So the graph of the parabola is $y = -(x - 4)^2 + 19$.

Since the line passes through the points $(0, -9)$ and $(2, -1)$, one can calculate the slope of the line $\left(\frac{-1 - (-9)}{2 - 0} = 4\right)$ that passes through these points and write the equation of the line in the slope-intercept form as $y = 4x - 9$.

The coordinates of the intersection points of the line and the parabola satisfy both the equation of the parabola and the equation of the line. Therefore, these coordinates are the solutions to the system of equations below:

$$y = 4x - 9$$

$$y = -(x - 4)^2 + 19$$

Substituting $4x - 9$ for y into the second equation gives $4x - 9 = -(x - 4)^2 + 19$, which is equivalent to $x^2 - 4x - 12 = 0$. After factoring, this equation can be rewritten as

$(x - 6)(x + 2) = 0$, and so $x = 6$ or $x = -2$. Since point (v, w) is on the right side of the y -axis, it follows that v cannot be -2 . Therefore, $v = 6$.

Question 29

In a college archaeology class, 78 students are going to a dig site to find and study artifacts. The dig site has been divided into 24 sections, and each section will be studied by a group of either 2 or 4 students. How many of the sections will be studied by a group of 2 students?

Item Difficulty: Hard

Content: Heart of Algebra

The correct answer is 9.

Let x be the number of sections that will be studied by 2 students and y be the number of sections that will be studied by 4 students. Since there are 24 sections that will be studied by 78 students, it follows that $x + y = 24$ and $2x + 4y = 78$. Solving this system gives $x = 9$ and $y = 15$. Therefore, 9 of the sections will be studied by a group of 2 students.

Alternatively, if all 24 sections were studied by a group of 4 students, then the total number of students required would be $24 \times 4 = 96$. Since the actual number of students is 78, the difference $96 - 78 = 18$ represents the number of “missing” students, and each pair of these “missing” students represents one of the sections that will be studied by 2 students. Hence, the number of sections that will be studied by 2 students is equal to the number of pairs that 18 students can form, which is $\frac{18}{2} = 9$.

Questions 30 and 31 refer to the following information.

$$v = v_0 - gt \quad (\text{speed-time})$$

$$h = v_0t - \frac{1}{2}gt^2 \quad (\text{position-time})$$

$$v^2 = v_0^2 - 2gh \quad (\text{position-speed})$$

An arrow is launched upward with an initial speed of 100 meters per second (m/s). The equations above describe the constant-acceleration motion of the arrow, where v_0 is the initial speed of the arrow, v is the speed of the arrow as it is moving up in the air, h is the height of the arrow above the ground, t is the time elapsed since the arrow was projected upward, and g is the acceleration due to gravity (9.8 m/s^2).

Question 30

What is the maximum height from the ground the arrow will rise to the nearest meter?

Item Difficulty: Hard

Content: Passport to Advanced Math

The correct answer is 510.

As the arrow moves upward, its speed decreases continuously and it becomes 0 when the arrow reaches its maximum height. Using the position-speed equation and the fact that $v = 0$ when h is maximum gives $0 = 100^2 - 2gh$. Solving for h

gives $h = \frac{100^2}{2(9.8)}$ meters, which to the nearest meter is 510.

Alternatively, the maximum height can be found using the position-time equation.

Substituting 100 for v_0 and 9.8 for g into this equation gives $h = 100t - \frac{1}{2}(9.8)t^2$.

Completing the square gives the equivalent equation

$h = -4.9\left(t - \frac{100}{9.8}\right)^2 + 4.9\left(\frac{100}{9.8}\right)^2$. Therefore, the maximum height from the ground

the arrow will rise is $4.9\left(\frac{100}{9.8}\right)^2$ meters, which to the nearest meter is 510.

Question 31

How long will it take for the arrow to reach its maximum height to the nearest tenth of a second?

Item Difficulty: Hard

Content: Passport to Advanced Math

The correct answer is 10.2 seconds (or $51/5$ seconds).

As the arrow moves upward, its speed decreases continuously, and it becomes 0 when the arrow reaches its maximum height. Using the speed-time equation and the fact that $v = 0$ when h is maximum, we get $0 = 100 - 9.8t$.

Solving this equation for t gives $t = \frac{100}{9.8} = 10.2041$ seconds, which to the nearest tenth of a second is 10.2.

Answer Key

Reading		Writing & Language		Math Test – No Calculator		Math Test – Calculator	
Q 1	A	Q 1	C	Q 1	A	Q 1	C
Q 2	A	Q 2	D	Q 2	B	Q 2	A
Q 3	B	Q 3	C	Q 3	A	Q 3	C
Q 4	C	Q 4	D	Q 4	D	Q 4	C
Q 5	C	Q 5	C	Q 5	B	Q 5	C
Q 6	B	Q 6	A	Q 6	B	Q 6	D
Q 7	B	Q 7	B	Q 7	A	Q 7	D
Q 8	D	Q 8	B	Q 8	D	Q 8	D
Q 9	B	Q 9	B	Q 9	B	Q 9	C
Q 10	C	Q 10	D	Q 10	D	Q 10	B
Q 11	B	Q 11	D	Q 11	C	Q 11	C
Q 12	A	Q 12	C	Q 12	A	Q 12	B
Q 13	A	Q 13	B	Q 13	D	Q 13	B
Q 14	D	Q 14	B	Q 14	300	Q 14	B
Q 15	D	Q 15	B	Q 15	2	Q 15	B
Q 16	A	Q 16	D	Q 16	9	Q 16	C
Q 17	D	Q 17	A	Q 17	4	Q 17	C
Q 18	C	Q 18	A			Q 18	C
Q 19	D	Q 19	D			Q 19	A
Q 20	C	Q 20	C			Q 20	C
Q 21	D	Q 21	C			Q 21	C
Q 22	A	Q 22	A			Q 22	B
Q 23	B	Q 23	D			Q 23	D
Q 24	B	Q 24	A			Q 24	A
Q 25	D	Q 25	A			Q 25	A
Q 26	D	Q 26	B			Q 26	D
Q 27	A	Q 27	C			Q 27	A
Q 28	A	Q 28	D			Q 28	6
Q 29	B	Q 29	C			Q 29	9
Q 30	C	Q 30	D			Q 30	510
Q 31	D	Q 31	D			Q 31	10.2, 51/5
Q 32	C	Q 32	D				
Q 33	B	Q 33	A				
Q 34	D	Q 34	C				
Q 35	C	Q 35	A				
Q 36	D	Q 36	D				
Q 37	B	Q 37	D				
Q 38	D	Q 38	C				
Q 39	B	Q 39	B				
Q 40	D	Q 40	C				
Q 41	B	Q 41	B				
Q 42	A	Q 42	B				
Q 43	C	Q 43	A				
Q 44	C	Q 44	D				
Q 45	B						
Q 46	C						
Q 47	A						

H3

QUESTION 11.

Choice D is the best answer. In lines 11-12, the author introduces the main purpose of the passage, which is to examine the “different views on where ethics should apply when someone makes an economic decision.” The passage examines what historical figures Adam Smith, Aristotle, and John Stuart Mill believed about the relationship between ethics and economics.

Choices A, B, and C are incorrect because they identify certain points addressed in the passage (cost-benefit analysis, ethical economic behavior, and the role of the free market), but do not describe the passage’s main purpose.

QUESTION 12.

Choice D is the best answer. In lines 4-5, the author suggests that people object to criticizing ethics in free markets because they believe free markets are inherently ethical, and therefore, the role of ethics in free markets is unnecessary to study. In the opinion of the critics, free markets are ethical because they allow individuals to make their own choices about which goods to purchase and which goods to sell.

Choices A and B are incorrect because they are not objections that criticize the ethics of free markets. Choice C is incorrect because the author does not present the opinion that free markets depend on devalued currency.

QUESTION 13.

Choice A is the best answer. In lines 4-5, the author states that some people believe that free markets are “already ethical” because they “allow for personal choice.” This statement provides evidence that some people believe criticizing the ethics of free markets is unnecessary because free markets permit individuals to make their own choices.

Choices B, C, and D are incorrect because they do not provide the best evidence of an objection to a critique of the ethics of free markets.

QUESTION 14.

Choice B is the best answer. In lines 6-7, the author states that people “have accepted the ethical critique and embraced corporate social responsibility.” In this context, people “embrace,” or readily adopt, corporate social responsibility by acting in a certain way.

Choices A, C, and D are incorrect because in this context “embraced” does not mean lovingly held, eagerly hugged, or reluctantly used.

H3

QUESTION 15.

Choice C is the best answer. The third and fourth paragraphs of the passage present Adam Smith's and Aristotle's different approaches to defining ethics in economics. The fifth paragraph offers a third approach to defining ethical economics, how "instead of rooting ethics in character or the consequences of actions, we can focus on our actions themselves. From this perspective some things are right, some wrong" (lines 45-48).

Choice A is incorrect because the fifth paragraph does not develop a counterargument. Choices B and D are incorrect because although "character" is briefly mentioned in the fifth paragraph, its relationship to ethics is examined in the fourth paragraph.

QUESTION 16.

Choice A is the best answer. In lines 57-59, the author states that "Many moral dilemmas arise when these three versions pull in different directions but clashes are not inevitable." In this context, the three different perspectives on ethical economics may "clash," or conflict, with one another.

Choices B, C, and D are incorrect because in this context "clashes" does not mean mismatches, collisions, or brawls.

QUESTION 17.

Choice C is the best answer. In lines 59-64, the author states, "Take fair trade coffee . . . for example: buying it might have good consequences, be virtuous, and also be the right way to act in a flawed market." The author is suggesting that in the example of fair trade coffee, all three perspectives about ethical economics—Adam Smith's belief in consequences dictating action, Aristotle's emphasis on character, and the third approach emphasizing the virtue of good actions—can be applied. These three approaches share "common ground" (line 64), as they all can be applied to the example of fair trade coffee without contradicting one another.

Choices A, B, and D are incorrect because they do not show how the three different approaches to ethical economics share common ground. Choice A simply states that there are "different views on ethics" in economics, choice B explains the third ethical economics approach, and choice D suggests that people "behave like a herd" when considering economics.

QUESTION 18.

Choice C is the best answer. In lines 83-88, the author states that psychology can help "define ethics for us," which can help explain why people "react in disgust at economic injustice, or accept a moral law as universal."

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Choices A and B are incorrect because they identify topics discussed in the final paragraph (human quirks and people's reaction to economic injustice) but not its main idea. Choice D is incorrect because the final paragraph does not suggest that economists may be responsible for reforming the free market.

QUESTION 19.

Choice A is the best answer. The data in the graph show that in Tanzania between the years 2000 and 2008, fair trade coffee profits were around \$1.30 per pound, while profits of regular coffee were in the approximate range of 20–60 cents per pound.

Choices B, C, and D are incorrect because they are not supported by information in the graph.

QUESTION 20.

Choice B is the best answer. The data in the graph indicate that between 2002 and 2004 the difference in per-pound profits between fair trade and regular coffee was about \$1. In this time period, fair trade coffee was valued at around \$1.30 per pound and regular coffee was valued at around 20 cents per pound. The graph also shows that regular coffee recorded the lowest profits between the years 2002 and 2004, while fair trade coffee remained relatively stable throughout the entire eight-year span (2000 to 2008).

Choices A, C, and D are incorrect because they do not indicate the greatest difference between per-pound profits for fair trade and regular coffee.

QUESTION 21.

Choice C is the best answer. In lines 59-61, the author defines fair trade coffee as “coffee that is sold with a certification that indicates the farmers and workers who produced it were paid a fair wage.” This definition suggests that purchasing fair trade coffee is an ethically responsible choice, and the fact that fair trade coffee is being produced and is profitable suggests that ethical economics is still a consideration. The graph's data support this claim by showing how fair trade coffee was more than twice as profitable as regular coffee.

Choice A is incorrect because the graph suggests that people acting on empathy (by buying fair trade coffee) is productive for fair trade coffee farmers and workers. Choices B and D are incorrect because the graph does not provide support for the idea that character or people's fears factor into economic choices.

H4

QUESTION 32.

Choice D is the best answer. In lines 25-29, Burke describes the contract between a person and society as one that is “not a partnership in things subservient only to the gross animal existence of a temporary and perishable nature. It is a partnership in all science; a partnership in all art; a partnership in every virtue, and in all perfection.” Describing that contract as a partnership in all things indicates its seriousness, while describing it as not being a “temporary and perishable nature” implies its permanence.

Choice A is incorrect because line 27 states that the contract between a person and society is not “temporary or perishable,” meaning it is not brief. Choices B and C are incorrect because the passage does not compare the contracts in terms of complexity or precision.

QUESTION 33.

Choice D is the best answer. In lines 1-9, Burke explains that people have “consecrated the state” to “avoid . . . the evils of inconstancy and versatility,” and that people should examine “the faults of the state . . . with pious awe and trembling solitude.” Burke then explains that society is taught to “look with horror on those children of their country who want to hack that aged parent in pieces” (lines 10-12). Burke is arguing that children want to revise the state, or “this aged parent,” by amending its faults. In this context, “state” refers to a political entity, or government, that attempts to protect its citizens from “the evils of inconstancy and versatility.”

Choices A, B, and C are incorrect because in this context, “state” does not mean style of living, position in life, or temporary condition.

QUESTION 34.

Choice A is the best answer. In lines 17-29, Burke argues that “subordinate contracts,” are simply business agreements over traded goods, while the state is not merely “a partnership agreement in a trade . . . or some other such low concern . . . but a partnership in all science; a partnership in all art;

H4

a partnership in every virtue, and in all perfection.” In this context, Burke is stating that the state is not a contract consisting of “low” or petty concerns.

Choices B, C, and D are incorrect because in this context, “low” does not mean weak, inadequate, or depleted.

QUESTION 35.

Choice D is the best answer. In lines 41-43, Paine asserts that “Every age and generation must be as free to act for itself, *in all cases*, as the ages and generations which preceded it.” He later states that deceased citizens of a state should no longer have “any authority in directing who shall be its governors, or how its government shall be organized, or how administered” (lines 61-63). Paine doesn’t believe, in other words, that the decisions of previous generations should dictate the conditions of modern life and government.

Choices A, B, and C are incorrect because they do not accurately characterize the way Paine views historical precedents.

QUESTION 36.

Choice B is the best answer. In lines 30-34, Burke describes societal contracts as long-term agreements that preserve the interests of past generations and link the living and the dead into a “partnership.” Paine, however, states that past generations have no “control” over the decisions made by living (line 71) because the dead have “no longer any participation in the concerns of this world” (lines 59-60).

Choices A, C, and D are incorrect because they do not accurately characterize how Paine would respond to Burke’s claim that societal contracts link past and current generations.

QUESTION 37.

Choice D is the best answer. Lines 67-72 provide the best evidence that Paine would respond to Burke’s statement that society is a “partnership” between past and current generations (lines 30-34) with the explanation that the current generation cannot know what judgments the dead would make about contemporary issues. In these lines Paine explains: “What possible obligation, then, can exist between them; what rule or principle can be laid down, that two nonentities, the one out of existence, and the other not in, and who never can meet in this world, that the one should control the other to the end of time?”

Choices A, B, and C are incorrect because the lines cited do not provide the best evidence that Paine would respond to Burke’s statement that society is a “partnership” between past and current generations (lines 30-34) by arguing that the current generation cannot know what judgments the dead would make about contemporary issues.

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QUESTION 38.

Choice D is the best answer. Paine concludes Passage 2 with the argument that because social issues change over time, the living should not try to adhere to decisions made by former generations (lines 73-80). Burke, however, states that living citizens exist within a “universal kingdom” (line 35) comprised of the living, the dead, and those who are not yet born. Burke argues that the living do not have the right to change their government based on “their speculations of a contingent improvement” (lines 36-37). Therefore, Burke would disapprove of Paine’s concluding argument, as he believes the living do not have sufficient justification for changing the existing governmental structure.

Choices A, B, and C are incorrect because they do not accurately describe how Burke would likely have responded to Paine’s remarks in the final paragraph of Passage 2.

QUESTION 39.

Choice D is the best answer. Lines 34-38 provide the best evidence that Burke would disapprove of Paine’s remarks in the final paragraph of Passage 2: “The municipal corporations of that universal kingdom are not morally at liberty at [the living’s] pleasure, and on their speculations of a contingent improvement, wholly to separate and tear asunder the bands of their subordinate community.” In these lines, Burke is arguing that the living do not have sufficient justification to change the existing governmental structure.

Choices A, B, and C do not provide the best evidence that Burke would disapprove of Paine’s remarks in the final paragraph of Passage 2, as Burke believes the living do not have sufficient justification for changing the existing governmental structure.

QUESTION 40.

Choice A is the best answer. The primary argument of Passage 1 is that an inviolable contract exists between a people and its government, one that is to be “looked on with other reverence” (lines 24-25). Passage 1 suggests that this contract exists between past and future generations as well; in effect, current and future generations should be governed by decisions made in the past. Passage 2 challenges these points, as it argues that current and future generations are not obligated to preserve past generations’ beliefs: “The Parliament or the people of 1688, or of any other period, had no more right to dispose of the people of the present day, or to bind or to control them in any shape whatever, than the parliament or the people of the present day have to dispose of, bind, or control those who are to live a hundred or a thousand years hence” (lines 48-54).

H4

Choices B, C, and D are incorrect because Passage 2 does not offer an alternative approach to Passage 1, support an idea introduced in Passage 1, or exemplify an attitude promoted in Passage 1.

QUESTION 41.

Choice B is the best answer. Passage 1 argues that the government is sacred (lines 3-6) and that no person should interfere with it (lines 6-9). Passage 2 argues that people have the right to make changes to their government: “The circumstances of the world are continually changing, and the opinions of men change also; and as government is for the living, and not for the dead, it is the living only that has any right in it” (lines 73-76).

Choices A, C, and D are incorrect because they do not identify the main purpose of both passages.

QUESTION 22.

Choice B is the best answer. Lines 2-4 of the passage describe DNA as “a very long chain, the backbone of which consists of a regular alternation of sugar and phosphate groups.” The backbone of DNA, in other words, is the main structure of a chain made up of repeating units of sugar and phosphate.

Choice A is incorrect because the passage describes DNA on the molecular level only and never mentions the spinal column of organisms. Choice C is incorrect because the passage describes the backbone of the molecule as having “a regular alternation” of sugar and phosphate, not one or the other. Choice D is incorrect because the nitrogenous bases are not the main structural unit of DNA; rather, they are attached only to the repeating units of sugar.

QUESTION 23.

Choice D is the best answer. The authors explain that hydrogen bonds join together pairs of nitrogenous bases, and that these bases have a specific structure that leads to the pairing: “One member of a pair must be a purine and the other a pyrimidine in order to bridge between the two chains” (lines 27-29). Given the specific chemical properties of a nitrogenous base, it would be inaccurate to call the process random.

Choice A is incorrect because lines 5-6 describe how nitrogenous bases attach to sugar but not how those bases pair with one another. Choice B is incorrect because lines 9-10 do not contradict the student’s claim. Choice C is incorrect because lines 23-25 describe how the two molecules’ chains are linked, not what the specific pairing between nitrogenous bases is.

QUESTION 24.

Choice D is the best answer. In lines 12-14 the authors state: “the first feature of our structure which is of biological interest is that it consists not of one chain, but of two.”

Choices A and B are incorrect because lines 12-14 explicitly state that it is the two chains of DNA that are of “biological interest,” not the chemical formula of DNA, nor the common fiber axis those two chains are wrapped around. Choice C is incorrect because, while the X-ray evidence did help Watson and Crick to discover that DNA consists of two chains, it was not claimed to be the feature of biological interest.

QUESTION 25.

Choice C is the best answer. In lines 12-14 the authors claim that DNA molecules appear to be comprised of two chains, even though “it has often been assumed . . . there would be only one” (lines 15-17). The authors support this claim with evidence compiled from an X-ray: “the density, taken with the X-ray evidence, suggests very strongly that there are two [chains]” (lines 18-19).

Choices A, B, and D are incorrect because the authors mention density and X-ray evidence to support a claim, not to establish that DNA carries genetic information, present a hypothesis about the composition of a nucleotide, or confirm a relationship between the density and chemical formula of DNA.

QUESTION 26.

Choice B is the best answer. The authors explain that “only certain pairs of bases will fit into the structure” (lines 25-26) of the DNA molecule. These pairs must contain “a purine and the other a pyrimidine in order to bridge between the two chains” (lines 27-29), which implies that any other pairing would not “fit into the structure” of the DNA molecule. Therefore, a pair of purines would be larger than the required purine/pyrimidine pair and would not fit into the structure of the DNA molecule.

Choice A is incorrect because this section is not discussing the distance between a sugar and phosphate group. Choice C is incorrect because the passage never makes clear the size of the pyrimidines or purines in relation to each other, only in relation to the space needed to bond the chains of the DNA molecule. Choice D is incorrect because the lines do not make an implication about the size of a pair of pyrimidines in relation to the size of a pair consisting of a purine and a pyrimidine.

QUESTION 27.

Choice D is the best answer. The authors explain how the DNA molecule contains a “precise sequence of bases” (lines 43-44), and that the authors can use the order of bases on one chain to determine the order of bases on the other chain: “If the actual order of the bases on one of the pair of chains were

given, one could write down the exact order of the bases on the other one, because of the specific pairing. Thus one chain is, as it were, the complement of the other, and it is this feature which suggests how the deoxyribonucleic acid molecule might duplicate itself” (lines 45-51). The authors use the words “exact,” “specific,” and “complement” in these lines to suggest that the base pairings along a DNA chain is understood and predictable, and may explain how DNA “duplicate[s] itself” (line 51).

Choice A is incorrect because the passage does not suggest that most nucleotide sequences are known. Choice B is incorrect because these lines are not discussing the random nature of the base sequence along one chain of DNA. Choice C is incorrect because the authors are describing the bases attached only to the sugar, not to the sugar-phosphate backbone.

QUESTION 28.

Choice C is the best answer. Lines 6-7 state that “Two of the possible bases—adenine and guanine—are purines,” and on the table the percentages of adenine and guanine in yeast DNA are listed as 31.3% and 18.7% respectively.

Choices A, B, and D are incorrect because they do not state the percentages of both purines, adenine and guanine, in yeast DNA.

QUESTION 29.

Choice A is the best answer. The authors state: “We believe that the bases will be present almost entirely in their most probable forms. If this is true, the conditions for forming hydrogen bonds are more restrictive, and the only pairs of bases possible are: adenine with thymine, and guanine with cytosine” (lines 31-35). The table shows that the pairs adenine/thymine and guanine/cytosine have notably similar percentages in DNA for all organisms listed.

Choice B is incorrect. Although the choice of “Yes” is correct, the explanation for that choice misrepresents the data in the table. Choices C and D are incorrect because the table does support the authors’ proposed pairing of nitrogenous bases in DNA molecules.

QUESTION 30.

Choice A is the best answer because it gives the percentage of cytosine (17.3%) in sea urchin DNA and the percentage of guanine (17.7%) in sea urchin DNA. Their near similar pairing supports the authors’ proposal that possible pairings of nitrogenous bases are “adenine with thymine, and guanine with cytosine” (line 35).

Choices B, C, and D do not provide the best evidence for the answer to the previous question. Choice B (cytosine and thymine), Choice C (cytosine and adenine), and Choice D (guanine and adenine) are incorrect because they show pairings of nitrogenous bases that do not compose a similar percentage of the bases in sea urchin DNA.

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QUESTION 31.

Choice D is the best answer. The table clearly shows that the percentage of adenine in each organism's DNA is different, ranging from 24.7% in *E.coli* to 33.2% in the octopus. That such a variability would exist is predicted in lines 41-43, which states that "in a long molecule many different permutations are possible."

Choices A and B are incorrect because the table shows that the percentage of adenine varies between 24.7% and 33.2% in different organisms. Choice C is incorrect because lines 36-38 state that adenine pairs with thymine but does not mention the variability of the base composition of DNA.

QUESTION 42.

Choice B is the best answer. The author of Passage 1 identifies specific companies such as the “Planetary Resources of Washington,” “Deep Space Industries of Virginia,” and “Golden Spike of Colorado” to support his earlier assertion that there are many interested groups “working to make space mining a reality” (line 8).

Choices A, C, and D are incorrect because the author of Passage 1 does not mention these companies to profile the technological advances in space mining, the profit margins from space mining, or the diverse approaches to space mining.

QUESTION 43.

Choice A is the best answer. The author of Passage 1 explicitly states that one benefit to space mining is access to precious metals and earth elements: “within a few decades, [space mining] may be meeting earthly demands for precious metals, such as platinum and gold, and the rare earth elements vital for personal electronics, such as yttrium and lanthanum” (lines 18-22).

Choice B is incorrect because Passage 1 does not suggest that precious metals extracted from space may make metals more valuable on Earth. Choice C and Choice D are incorrect because Passage 1 never mentions how space mining could create unanticipated technological innovations or change scientists’ understanding of space resources.

S4

QUESTION 44.

Choice A is the best answer. Lines 18-22 suggest that space mining may help meet “earthly demands for precious metals . . . and the rare earth elements vital for personal electronics.” In this statement, the author is stating materials (“metals,” “earth elements”) that may be gathered as a result of space mining, and that these materials may be important to Earth’s economy.

Choices B, C, and D do not provide the best evidence for the answer to the previous question. Choice B is incorrect because lines 24-28 focus on an “off-planet economy” but never address positive effects of space mining. Choice C is incorrect because lines 29-30 suggest the relative value of water found in space. Choice D is incorrect because lines 41-44 state that space mining companies hope to find specific resources in lunar soil and asteroids but do not address how these resources are important to Earth’s economy.

QUESTION 45.

Choice D is the best answer. The author suggests in lines 19-22 that space mining may meet “earthly demands for precious metals, such as platinum and gold, and the rare earth elements vital for personal electronics.” In this sentence, “earthly demands” suggests that people want, or desire, these precious metals and rare earth elements.

Choices A, B, and C are incorrect because in this context “demands” does not mean offers, claims, or inquiries.

QUESTION 46.

Choice C is the best answer. Lines 29-30 introduce the idea that water mined in space may be very valuable: “water mined from other worlds could become the most desired commodity.” Lines 35-40 support this assertion by suggesting how mined space water could be used “for drinking or as a radiation shield” (lines 36-37) or to make “spacecraft fuel” (line 38).

Choice A is incorrect because the comparison in the previous paragraph (the relative value of gold and water to someone in the desert) is not expanded upon in lines 35-40. Choice B is incorrect because the question asked in the previous paragraph is also answered in that paragraph. Choice D is incorrect because no specific proposals are made in the previous paragraph; rather, an assertion is made and a question is posed.

QUESTION 47.

Choice B is the best answer. The author of Passage 2 recognizes that space mining may prove beneficial to humanity, stating that “we all stand to gain: the mineral bounty and spin-off technologies could enrich us all” (lines 50-52). The author also repeatedly mentions that space mining should be carefully considered before it is implemented: “But before the miners

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start firing up their rockets, we should pause for thought” (lines 53-54); “But [space mining’s] consequences—both here on Earth and in space—merit careful consideration” (lines 57-59).

Choice A is incorrect because the author of Passage 2 concedes that “space mining seems to sidestep most environmental concerns” (lines 55-56) but does not imply that space mining will recklessly harm the environment, either on Earth or in space. Choice C is incorrect because the author of Passage 2 does not address any key resources that may be disappearing on Earth. Choice D is incorrect because the author of Passage 2 admits that “resources that are valuable in orbit and beyond may be very different to those we prize on Earth” (lines 74-76) but does not mention any disagreement about the commercial viabilities of space mining discoveries.

QUESTION 48.

Choice A is the best answer. In lines 60-66, the author presents some environmental arguments against space mining: “[space] is not ours to despoil” and we should not “[glut] ourselves on space’s riches.” The author then suggests that these environmental arguments will be hard to “hold,” or maintain, when faced with the possible monetary rewards of space mining: “History suggests that those will be hard lines to hold . . .” (line 68).

Choices B, C, and D are incorrect because in this context, “hold” does not mean grip, restrain, or withstand.

QUESTION 49.

Choice D is the best answer. The author of Passage 1 is excited about the possibilities of space mining and how it can yield valuable materials, such as metals and elements (lines 19-20 and lines 41-42), water ice (line 35), and space dirt (line 44). The author of Passage 2, on the other hand, recognizes the possible benefits of space mining but also states that space mining should be thoughtfully considered before being implemented. Therefore, the author of Passage 2 expresses some concerns about a concept discussed in Passage 1.

Choice A is incorrect because the author of Passage 2 does not refute the central claim of Passage 1; both authors agree there are possible benefits to space mining. Choice B is incorrect because the author of Passage 1 does not describe space mining in more general terms than does the author of Passage 2. Choice C is incorrect because the author of Passage 2 is not suggesting that the space mining proposals stated in Passage 1 are impractical.

QUESTION 50.

Choice B is the best answer. In lines 18-28, the author of Passage 1 describes many of the possible economic benefits of space mining, including the

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building of “an off-planet economy” (line 25). The author of Passage 2 warns that there may be ramifications to implementing space mining and building an “emerging off-world economy” (line 73) without regulation: “But miners have much to gain from a broad agreement on the for-profit exploitation of space. Without consensus, claims will be disputed, investments risky, and the gains made insecure” (lines 83-87).

Choices A, C, and D are incorrect because the author of Passage 2 does not suggest that the benefits to space mining mentioned in lines 18-28 of Passage 1 are unsustainable, unachievable, or will negatively affect Earth’s economy. Rather, the author recognizes the benefits of space mining but advocates for the development of regulation procedures.

QUESTION 51.

Choice D is the best answer. In lines 85-87, the author of Passage 2 states that the future of space mining will prove difficult without regulations because “claims will be disputed, investments risky, and the gains made insecure.”

Choices A, B, and C are incorrect because they do not provide the best evidence for the answer to the previous question. Choice A is incorrect because lines 60-63 present some environmental concerns toward space mining. Choice B is incorrect because lines 74-76 focus on how space mining may discover valuable resources that are different from the ones found on Earth. Choice C is incorrect because lines 81-83 simply describe one person’s objections to the regulation of the space mining industry.

QUESTION 52.

Choice A is the best answer because both Passage 1 and Passage 2 indicate a belief that the resources most valued in space may differ from those most valued on our planet. Passage 2 says this explicitly in lines 74-76: “The resources that are valuable in orbit and beyond may be very different to those we prize on Earth.” Meanwhile Passage 1 suggests that water mined from space may be more valuable than metals or other earth elements when creating an “off-planet economy” (lines 25-30).

Choice B is incorrect because neither passage discusses, either implicitly or explicitly, the need for space mining to be inexpensive. Choice C is incorrect because Passage 2 does not specifically identify precious metals or rare earth elements but instead focuses on theoretical problems with space mining. Choice D is incorrect because diminishing resources on Earth is not discussed in Passage 2.

Answer Explanations

SAT Practice Test #1

Section 1: Reading Test

QUESTION 1.

Choice B is the best answer. In the passage, a young man (Akira) asks a mother (Chie) for permission to marry her daughter (Naomi). The request was certainly surprising to the mother, as can be seen from line 47, which states that prior to Akira’s question Chie “had no idea” the request was coming.

Choice A is incorrect because the passage depicts two characters engaged in a civil conversation, with Chie being impressed with Akira’s “sincerity” and finding herself “starting to like him.” Choice C is incorrect because the passage is focused on the idea of Akira’s and Naomi’s present lives and possible futures. Choice D is incorrect because the interactions between Chie and Akira are polite, not critical; for example, Chie views Akira with “amusement,” not animosity.

QUESTION 2.

Choice B is the best answer. The passage centers on a night when a young man tries to get approval to marry a woman’s daughter. The passage includes detailed descriptions of setting (a “winter’s eve” and a “cold rain,” lines 5-6); character (Akira’s “soft, refined” voice, line 33; Akira’s eyes “sh[ining] with sincerity,” line 35); and plot (“Naomi was silent. She stood a full half minute looking straight into Chie’s eyes. Finally, she spoke,” lines 88-89).

Choice A is incorrect because the passage focuses on a nontraditional marriage proposal. Choice C is incorrect because the passage concludes without resolution to the question of whether Akira and Naomi will receive permission to marry. Choice D is incorrect because the passage repeatedly makes clear that for Chie, her encounter with Akira is momentous and unsettling, as when Akira acknowledges in line 73 that he has “startled” her.

L2

QUESTION 3.

Choice C is the best answer. Akira “came directly, breaking all tradition,” (line 1) when he approached Chie and asked to marry her daughter, and he “ask[ed] directly,” without “a go-between” (line 65) or “mediation,” because doing otherwise would have taken too much time.

Choices A, B, and D are incorrect because in these contexts, “directly” does not mean in a frank, confident, or precise manner.

QUESTION 4.

Choice A is the best answer. Akira is very concerned Chie will find his marriage proposal inappropriate because he did not follow traditional protocol and use a “go-between” (line 65). This is clear in lines 63-64, when Akira says to Chie “Please don’t judge my candidacy by the unseemliness of this proposal.”

Choice B is incorrect because there is no evidence in the passage that Akira worries that Chie will mistake his earnestness for immaturity. Choice C is incorrect because while Akira recognizes that his unscheduled visit is a nuisance, his larger concern is that Chie will reject him due to the inappropriateness of his proposal. Choice D is incorrect because there is no evidence in the passage that Akira worries Chie will underestimate the sincerity of his emotions.

QUESTION 5.

Choice C is the best answer. In lines 63-64, Akira says to Chie, “Please don’t judge my candidacy by the unseemliness of this proposal.” This reveals Akira’s concern that Chie may say no to the proposal simply because Akira did not follow traditional practices.

Choices A, B, and D do not provide the best evidence for the answer to the previous question. Choice A is incorrect because line 33 merely describes Akira’s voice as “soft, refined.” Choice B is incorrect because lines 49-51 reflect Chie’s perspective, not Akira’s. Choice D is incorrect because lines 71-72 indicate only that Akira was speaking in an eager and forthright matter.

QUESTION 6.

Choice D is the best answer because Akira clearly treats Chie with respect, including “bow[ing]” (line 26) to her, calling her “Madame” (line 31), and looking at her with “a deferential peek” (line 34). Akira does not offer Chie utter deference, though, as he asks to marry Naomi after he concedes that he is not following protocol and admits to being a “disruption” (line 31).

Choice A is incorrect because while Akira conveys respect to Chie, there is no evidence in the passage that he feels affection for her. Choice B is incorrect because neither objectivity nor impartiality accurately describes how Akira addresses Chie. Choice C is incorrect because Akira conveys respect to Chie and takes the conversation seriously.

L2

QUESTION 7.

Choice D is the best answer. The first paragraph (lines 1-4) reflects on how Akira approached Chie to ask for her daughter’s hand in marriage. In these lines, the narrator is wondering whether Chie would have been more likely to say yes to Akira’s proposal if Akira had followed tradition: “Akira came directly, breaking all tradition. Was that it? Had he followed form—had he asked his mother to speak to his father to approach a go-between—would Chie have been more receptive?” Thus, the main purpose of the first paragraph is to examine why Chie reacted a certain way to Akira’s proposal.

Choice A is incorrect because the first paragraph describes only one aspect of Japanese culture (marriage proposals) but not the culture as a whole. Choice B is incorrect because the first paragraph implies a criticism of Akira’s individual marriage proposal but not the entire tradition of Japanese marriage proposals. Choice C is incorrect because the narrator does not question a suggestion.

QUESTION 8.

Choice B is the best answer. In line 1, the narrator suggests that Akira’s direct approach broke “all tradition.” The narrator then wonders if Akira had “followed form,” or the tradition expected of him, would Chie have been more receptive to his proposal. In this context, following “form” thus means following a certain tradition or custom.

Choices A, C, and D are incorrect because in this context “form” does not mean the way something looks (appearance), the way it is built (structure), or its essence (nature).

QUESTION 9.

Choice C is the best answer. Akira states that his unexpected meeting with Chie occurred only because of a “matter of urgency,” which he explains as “an opportunity to go to America, as dentist for Seattle’s Japanese community” (lines 41-42). Akira decides to directly speak to Chie because Chie’s response to his marriage proposal affects whether Akira accepts the job offer.

Choice A is incorrect because there is no evidence in the passage that Akira is worried his parents will not approve of Naomi. Choice B is incorrect because Akira has “an understanding” with Naomi (line 63). Choice D is incorrect; while Akira may know that Chie is unaware of his feelings for Naomi, this is not what he is referring to when he mentions “a matter of urgency.”

QUESTION 10.

Choice B is the best answer. In lines 39-42, Akira clarifies that the “matter of urgency” is that he has “an opportunity to go to America, as dentist for Seattle’s Japanese community.” Akira needs Chie’s answer to his marriage proposal so he can decide whether to accept the job in Seattle.

L2

Choices A, C, and D do not provide the best evidence for the answer to the previous question. Choice A is incorrect because in line 39 Akira apologizes for interrupting Chie's quiet evening. Choice C is incorrect because lines 58-59 address the seriousness of Akira's request, not its urgency. Choice D is incorrect because line 73 shows only that Akira's proposal has "startled" Chie and does not explain why his request is time-sensitive.

Answer Explanations

SAT Practice Test #2

Section 1: Reading Test

QUESTION 1.

Choice A is the best answer. The narrator admits that his job is “irksome” (line 7) and reflects on the reasons for his dislike. The narrator admits that his work is a “dry and tedious task” (line 9) and that he has a poor relationship with his superior: “the antipathy which had sprung up between myself and my employer striking deeper root and spreading denser shade daily, excluded me from every glimpse of the sunshine of life” (lines 28-31).

Choices B, C, and D are incorrect because the narrator does not become increasingly competitive with his employer, publicly defend his choice of occupation, or exhibit optimism about his job.

QUESTION 2.

Choice B is the best answer. The first sentence of the passage explains that people do not like to admit when they’ve chosen the wrong profession and that they will continue in their profession for a while before admitting their unhappiness. This statement mirrors the narrator’s own situation, as the narrator admits he finds his own occupation “irksome” (line 7) but that he might “long have borne with the nuisance” (line 10) if not for his poor relationship with his employer.

Choices A, C, and D are incorrect because the first sentence does not discuss a controversy, focus on the narrator’s employer, Edward Crimsworth, or provide any evidence of malicious conduct.

QUESTION 3.

Choice C is the best answer. The first paragraph shifts from a general discussion of how people deal with choosing an occupation they later regret (lines 1-6) to the narrator’s description of his own dissatisfaction with his occupation (lines 6-33).

L3

Choices A, B, and D are incorrect because the first paragraph does not focus on the narrator's self-doubt, his expectations of life as a tradesman, or his identification of alternatives to his current occupation.

QUESTION 4.

Choice A is the best answer. In lines 27-33, the narrator is describing the hostile relationship between him and his superior, Edward Crimsworth. This relationship causes the narrator to feel like he lives in the “shade” and in “humid darkness.” These words evoke the narrator's feelings of dismay toward his current occupation and his poor relationship with his superior—factors that cause him to live without “the sunshine of life.”

Choices B, C, and D are incorrect because the words “shade” and “darkness” do not reflect the narrator's sinister thoughts, his fear of confinement, or his longing for rest.

QUESTION 5.

Choice D is the best answer. The narrator states that Crimsworth dislikes him because the narrator may “one day make a successful tradesman” (line 43). Crimsworth recognizes that the narrator is not “inferior to him” but rather more intelligent, someone who keeps “the padlock of silence on mental wealth which [Crimsworth] was no sharer” (lines 44-48). Crimsworth feels inferior to the narrator and is jealous of the narrator's intellectual and professional abilities.

Choices A and C are incorrect because the narrator is not described as exhibiting “high spirits” or “rash actions,” but “Caution, Tact, [and] Observation” (line 51). Choice B is incorrect because the narrator's “humble background” is not discussed.

QUESTION 6.

Choice B is the best answer. Lines 61-62 state that the narrator “had long ceased to regard Mr. Crimsworth as my brother.” In these lines, the term “brother” means friend or ally, which suggests that the narrator and Crimsworth were once friendly toward one another.

Choices A, C, and D are incorrect because the narrator originally viewed Crimsworth as a friend, or ally, and later as a hostile superior; he never viewed Crimsworth as a harmless rival, perceptive judge, or demanding mentor.

QUESTION 7.

Choice D is the best answer. In lines 61-62, the narrator states that he once regarded Mr. Crimsworth as his “brother.” This statement provides evidence that the narrator originally viewed Crimsworth as a sympathetic ally.

L3

Choices A, B, and C do not provide the best evidence for the claim that Crimsworth was a sympathetic ally. Rather, choices A, B, and C provide evidence of the hostile relationship that currently exists between the narrator and Crimsworth.

QUESTION 8.

Choice D is the best answer. In lines 48-53, the narrator states that he exhibited “Caution, Tact, [and] Observation” at work and watched Mr. Crimsworth with “lynx-eyes.” The narrator acknowledges that Crimsworth was “prepared to steal snake-like” if he caught the narrator acting without tact or being disrespectful toward his superiors (lines 53-56). Thus, Crimsworth was trying to find a reason to place the narrator “in a ridiculous or mortifying position” (lines 49-50) by accusing the narrator of acting unprofessionally. The use of the lynx and snake serve to emphasize the narrator and Crimsworth’s adversarial, or hostile, relationship.

Choices A and B are incorrect because the description of the lynx and snake does not contrast two hypothetical courses of action or convey a resolution. Choice C is incorrect because while lines 48-56 suggest that Crimsworth is trying to find a reason to fault the narrator’s work, they do not imply that an altercation, or heated dispute, between the narrator and Crimsworth is likely to occur.

QUESTION 9.

Choice B is the best answer. Lines 73-74 state that the narrator noticed there was no “cheering red gleam” of fire in his sitting-room fireplace. The lack of a “cheering,” or comforting, fire suggests that the narrator sometimes found his lodgings to be dreary or bleak.

Choices A and D are incorrect because the narrator does not find his living quarters to be treacherous or intolerable. Choice C is incorrect because while the narrator is walking home he speculates about the presence of a fire in his sitting-room’s fireplace (lines 69-74), which suggests that he could not predict the state of his living quarters.

QUESTION 10.

Choice D is the best answer. In lines 68-74, the narrator states that he did not see the “cheering” glow of a fire in his sitting-room fireplace. This statement provides evidence that the narrator views his lodgings as dreary or bleak.

Choices A, B, and C do not provide the best evidence that the narrator views his lodgings as dreary. Choices A and C are incorrect because they do not provide the narrator’s opinion of his lodgings, and choice B is incorrect because lines 21-23 describe the narrator’s lodgings only as “small.”

W2

Section 2: Writing and Language Test

QUESTION 1.

Choice D is the best answer because “outweigh” is the only choice that appropriately reflects the relationship the sentence sets up between “advantages” and “drawbacks.”

Choices A, B, and C are incorrect because each implies a competitive relationship that is inappropriate in this context.

QUESTION 2.

Choice B is the best answer because it offers a second action that farmers can undertake to address the problem of acid whey disposal, thus supporting the claim made in the previous sentence (“To address the problem of disposal, farmers have found a *number of uses* for acid whey”).

Choices A, C, and D are incorrect because they do not offer examples of how farmers could make use of acid whey.

QUESTION 3.

Choice A is the best answer because it results in a sentence that is grammatically correct and coherent. In choice A, “waterways,” the correct plural form of “waterway,” conveys the idea that acid whey could impact multiple bodies of water. Additionally, the compound verb “can pollute” suggests that acid whey presents an ongoing, potential problem.

Choices B and D are incorrect because both use the possessive form of “waterway.” Choice C is incorrect because it creates an unnecessary shift in verb tense. The present tense verb “can pollute” should be used instead, as it is consistent with the other verbs in the paragraph.

QUESTION 4.

Choice C is the best answer because it utilizes proper punctuation for items listed in a series. In this case those items are nouns: “Yogurt manufacturers, food scientists, and government officials.”

Choices A and B are incorrect because both fail to recognize that the items are a part of a series. Since a comma is used after “manufacturers,” a semicolon or colon should not be used after “scientists.” Choice D is incorrect because the comma after “and” is unnecessary and deviates from grammatical conventions for presenting items in a series.

QUESTION 5.

Choice C is the best answer because sentence 5 logically links sentence 2, which explains why Greek yogurt production yields large amounts of acid

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they, and sentence 3, which mentions the need to dispose of acid whey properly.

Choices A, B, and D are incorrect because each would result in an illogical progression of sentences for this paragraph. If sentence 5 were left where it is or placed after sentence 3, it would appear illogically after the discussion of “the problem of disposal.” If sentence 5 were placed after sentence 1, it would illogically discuss “acid-whey runoff” before the mention of acid whey being “difficult to dispose of.”

QUESTION 6.

Choice D is the best answer because the paragraph includes several benefits of consuming Greek yogurt, particularly in regard to nutrition and satisfying hunger, to support the sentence’s claim that the conservation efforts are “well worth the effort.” This transition echoes the passage’s earlier claim that “the advantages of Greek yogurt outweigh the potential drawbacks of its production.”

Choices A, B, and C are incorrect because they inaccurately describe the sentence in question.

QUESTION 7.

Choice B is the best answer because it provides a grammatically standard preposition that connects the verb “serves” and noun “digestive aid” and accurately depicts their relationship.

Choice A is incorrect because the infinitive form “to be” yields a grammatically incorrect verb construction: “serves to be.” Choices C and D are incorrect because both present options that deviate from standard English usage.

QUESTION 8.

Choice C is the best answer because it presents a verb tense that is consistent in the context of the sentence. The choice is also free of the redundant “it.”

Choice A is incorrect because the subject “it” creates a redundancy. Choices B and D are incorrect because they present verb tenses that are inconsistent in the context of the sentence.

QUESTION 9.

Choice A is the best answer because it properly introduces an additional health benefit in a series of sentences that list health benefits. “Also” is the logical and coherent choice to communicate an addition.

Choices B, C, and D are incorrect because none of the transitions they offer logically fits the content that precedes or follows the proposed choice.

W2

QUESTION 10.

Choice A is the best answer because “satiated” is the only choice that communicates effectively that Greek yogurt will satisfy hunger for a longer period of time.

Choices B, C, and D are incorrect because each is improper usage in this context. A person can be “fulfilled” spiritually or in other ways, but a person who has eaten until he or she is no longer hungry cannot be described as fulfilled. Neither can he or she be described as being “complacent” or “sufficient.”

QUESTION 11.

Choice B is the best answer because it provides a syntactically coherent and grammatically correct sentence.

Choices A and C are incorrect because the adverbial conjunctions “therefore” and “so,” respectively, are unnecessary following “Because.” Choice D is incorrect because it results in a grammatically incomplete sentence (the part of the sentence before the colon must be an independent clause).

QUESTION 12.

Choice B is the best answer because the graph clearly indicates that, on March 5, average low temperatures are at their lowest point: 12 degrees Fahrenheit.

Choice A is incorrect because the phrase “as low as” suggests that the temperature falls no lower than 20 degrees Fahrenheit, but the chart shows that in January, February, and March, the temperature frequently falls below that point. Choices C and D are incorrect because the information each provides is inconsistent with the information on the chart.

QUESTION 13.

Choice A is the best answer because it concisely combines the two sentences while maintaining the original meaning.

Choices B, C, and D are incorrect because each is unnecessarily wordy, thus undermining one purpose of combining two sentences: to make the phrasing more concise.

QUESTION 14.

Choice B is the best answer because it provides a conjunctive adverb that accurately represents the relationship between the two sentences. “However” signals an exception to a case stated in the preceding sentence.

Choices A, C, and D are incorrect because each provides a transition that does not accurately represent the relationship between the two sentences, and as a result each compromises the logical coherence of these sentences.

W2

QUESTION 15.

Choice C is the best answer because it provides commas to offset the non-restrictive modifying clause “an associate professor of geology at Ohio State.”

Choices A, B, and D are incorrect because each provides punctuation that does not adequately separate the nonrestrictive modifying clause about Jason Box from the main clause.

QUESTION 16.

Choice C is the best answer because the colon signals that the other factor that contributed to the early thaw is about to be provided.

Choice A is incorrect because it results in a sentence that deviates from grammatical standards: a semicolon should be used to separate two independent clauses, but in choice A the second clause only has a subject, not a verb. Choice B is incorrect because it is unnecessarily wordy. Choice D is incorrect because “being” is unnecessary and creates an incoherent clause.

QUESTION 17.

Choice C is the best answer because it provides the correct preposition (“of”) and relative pronoun (“which”) that together create a dependent clause following the comma.

Choices A, B, and D are incorrect because each results in a comma splice. Two independent clauses cannot be joined with only a comma.

QUESTION 18.

Choice A is the best answer because the verb tense is consistent with the preceding past tense verbs in the sentence, specifically “produced” and “drifted.”

Choices B, C, and D are incorrect because each utilizes a verb tense that is not consistent with the preceding past tense verbs in the sentence.

QUESTION 19.

Choice D is the best answer because “their” is the possessive form of a plural noun. In this case, the noun is plural: “snow and ice.”

Choices A and B are incorrect because the possessive pronoun must refer to a plural noun, “snow and ice,” rather than a singular noun. Choice C is incorrect because “there” would result in an incoherent sentence.

QUESTION 20.

Choice D is the best answer. The preceding sentences in the paragraph have established that a darker surface of soot-covered snow leads to more melting

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because this darker surface absorbs heat, whereas a whiter surface, free of soot, would deflect heat. As the passage points out, exposed land and water are also dark and cannot deflect heat the way ice and snow can. Only choice D reflects the self-reinforcing cycle that the preceding sentences already imply.

Choices A, B, and C are incorrect because the information each provides fails to support the previous claim that the “result” of the soot “is a self-reinforcing cycle.”

QUESTION 21.

Choice B is the best answer because it is free of redundancies.

Choices A, C, and D are incorrect because each of the three presents a redundancy: Choice A uses “repeat” and “again”; Choice C uses “damage” and “harmful effects”; and Choice D uses “may” and “possibly.”

QUESTION 22.

Choice D is the best answer because sentence 5 describes the information Box seeks: “to determine just how much the soot is contributing to the melting of the ice sheet.” Unless sentence 4 comes after sentence 5, readers will not know what the phrase “this crucial information” in sentence 4 refers to.

Choices A, B, and C are incorrect because each results in an illogical sentence progression. None of the sentences that would precede sentence 4 provides details that could be referred to as “this crucial information.”

QUESTION 23.

Choice D is the best answer because it is free of redundancies and offers the correct form of the verb “wear” in this context.

Choices A, B, and C are incorrect because all three contain a redundancy. Considering that “quickly” is a fixed part of the sentence, choice A’s “soon” and choice B and C’s “promptly” all result in redundancies. Choices A and B are also incorrect because each uses an incorrect form of the verb.

QUESTION 24.

Choice D is the best answer because it is the only choice that provides a grammatically standard and coherent sentence. The participial phrase “Having become frustrated. . .” functions as an adjective modifying “I,” the writer.

Choices A, B, and C are incorrect because each results in a dangling modifier. The participial phrase “Having become frustrated . . .” does not refer to choice A’s “no colleagues,” choice B’s “colleagues,” or choice C’s “ideas.” As such, all three choices yield incoherent and grammatically incorrect sentences.

W2

QUESTION 25.

Choice B is the best answer because it provides the correct preposition in this context, “about.”

Choices A, C, and D are incorrect because each provides a preposition that deviates from correct usage. One might read an article “about” coworking spaces but not an article “into,” “upon,” or “for” coworking spaces.

QUESTION 26.

Choice A is the best answer because it provides the correct punctuation for the dependent clause that begins with the phrase “such as.”

Choices B, C, and D are incorrect because each presents punctuation that deviates from the standard way of punctuating the phrase “such as.” When “such as” is a part of a nonrestrictive clause, as it is here, only one comma is needed to separate it from the main independent clause.

QUESTION 27.

Choice B is the best answer because it provides a transitional phrase, “In addition to equipment,” that accurately represents the relationship between the two sentences connected by the transitional phrase. Together, the sentences describe the key features of coworking spaces, focusing on what the spaces offer (equipment and meeting rooms).

Choices A, C, and D are incorrect because each provides a transition that does not accurately represent the relationship between the two sentences.

QUESTION 28.

Choice C is the best answer because the sentence is a distraction from the paragraph’s focus. Nothing in the paragraph suggests that the cost of setting up a coworking business is relevant here.

Choices A and D are incorrect because neither accurately represents the information in the paragraph. Choice B is incorrect because it does not accurately represent the information in the next paragraph.

QUESTION 29.

Choice B is the best answer because it logically follows the writer’s preceding statement about creativity and accurately represents the information in the graph.

Choices A, C, and D are incorrect because they present inaccurate and unsupported interpretations of the information in the graph. In addition, none of these choices provides directly relevant support for the main topic of the paragraph.

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QUESTION 30.

Choice D is the best answer because it provides a relative pronoun and verb that create a standard and coherent sentence. The relative pronoun “who” refers to the subject “the people,” and the plural verb “use” corresponds grammatically with the plural noun “people.”

Choices A and B are incorrect because “whom” is the relative pronoun used to represent an object. The noun “people” is a subject performing an action (using the coworking space). Choices B and C are also incorrect because they display a form of the verb “to use” that does not correspond to the plural noun “people.”

QUESTION 31.

Choice C is the best answer because the proposed sentence offers a necessary and logical transition between sentence 2, which introduces the facility the writer chose, and sentence 3, which tells what happened at the facility “Throughout the morning.”

Choices A, B, and D are incorrect because each would result in an illogical progression of sentences.

QUESTION 32.

Choice A is the best answer because the punctuation it provides results in a grammatically standard and coherent sentence. When an independent clause is followed by a list, a colon is used to link the two.

Choice B is incorrect because the punctuation creates a fragment (a semicolon should be used to link two independent clauses). Choice C is incorrect because its use of the comma creates a series in which “several of my coworking colleagues” are distinguished from the “website developer” and others, although the logic of the sentence would suggest that they are the same. Choice D is incorrect because it lacks the punctuation necessary to link the independent clause and the list.

QUESTION 33.

Choice A is the best answer because it provides a phrase that is consistent with standard English usage and also maintains the tone and style of the passage.

Choice B is incorrect because “give some wisdom” deviates from standard English usage and presents a somewhat colloquial phrase in a text that is generally free of colloquialisms. Choices C and D are incorrect because both are inconsistent with the tone of the passage as well as its purpose. The focus of the paragraph is on sharing, not on proclaiming opinions.

W2

QUESTION 34.

Choice A is the best answer because it offers a phrase that introduces a basic definition of philosophy and thereby fits the sentence.

Choices B, C, and D are incorrect because each offers a transition that does not suit the purpose of the sentence.

QUESTION 35.

Choice A is the best answer because it offers the most succinct comparison between the basic definition of philosophy and the fact that students can gain specific, practical skills from the study of philosophy. There is no need to include the participle “speaking” in this sentence, as it is clear from context that the writer is offering a different perspective.

Choices B, C, and D are incorrect because they provide options that are unnecessarily wordy.

QUESTION 36.

Choice B is the best answer because it provides a verb that creates a grammatically complete, standard, and coherent sentence.

Choices A, C, and D are incorrect because each results in a grammatically incomplete and incoherent sentence.

QUESTION 37.

Choice D is the best answer because it most effectively sets up the information in the following sentences, which state that (according to information from the 1990s) “only 18 percent of American colleges required at least one philosophy course,” and “more than 400 independent philosophy departments were eliminated” from colleges. These details are most logically linked to the claim that “colleges have not always supported the study of philosophy.”

Choices A, B, and C are incorrect because none of these effectively sets up the information that follows, which is about colleges’ failure to support the study of philosophy.

QUESTION 38.

Choice C is the best answer because it provides a transition that logically connects the information in the previous sentence to the information in this one. Both sentences provide evidence of colleges’ lack of support of philosophy programs, so the adverb “Moreover,” which means “In addition,” accurately captures the relationship between the two sentences.

Choices A, B, and D are incorrect because each presents a transition that does not accurately depict or support the relationship between the two sentences. The second sentence is not a result of the first (“Therefore,” “Thus”), and the sentences do not provide a contrast (“However”).

W2

QUESTION 39.

Choice A is the best answer because it succinctly expresses the idea that “students who major in philosophy often do better . . . as measured by standardized test scores.”

Choices B and D are incorrect because they introduce a redundancy and a vague term, “results.” The first part of the sentence mentions a research finding or conclusion but does not directly address any “results,” so it is confusing to refer to “these results” and indicate that they “can be” or “are measured by standardized test scores.” The best way to express the idea is simply to say that some students “often do better” than some other students “in both verbal reasoning and analytical writing as measured by standardized test scores.” Choice C is incorrect because there is no indication that multiple criteria are used to evaluate students’ “verbal reasoning and analytical writing”: test scores and something else. Only test scores are mentioned.

QUESTION 40.

Choice B is the best answer because it provides subject-verb agreement and thus creates a grammatically correct and coherent sentence.

Choice A is incorrect because the verb “has scored” does not correspond with the plural subject “students.” Similarly, Choice C is incorrect because the verb “scores” would correspond with a singular subject, but not the plural subject present in this sentence. Choice D is incorrect because it results in a grammatically incomplete and incoherent sentence.

QUESTION 41.

Choice B is the best answer because it provides a coherent and grammatically standard sentence.

Choices A and D are incorrect because both present “students” in the possessive form, whereas the sentence establishes “students” as the subject (“many students . . . have”). Choice C is incorrect because the verb form it proposes results in an incomplete and incoherent sentence.

QUESTION 42.

Choice C is the best answer because it accurately depicts how inserting this sentence would affect the overall paragraph. The fact that Plato used the dialogue form has little relevance to the preceding claim about the usefulness of a philosophy background.

Choices A and B are incorrect because the proposed sentence interrupts the progression of reasoning in the paragraph. Choice D is incorrect because, as with Choice A, Plato’s works have nothing to do with “the employability of philosophy majors.”

W2

QUESTION 43.

Choice D is the best answer because it creates a complete and coherent sentence.

Choices A, B, and C are incorrect because each inserts an unnecessary relative pronoun or conjunction, resulting in a sentence without a main verb.

QUESTION 44.

Choice D is the best answer because it provides a possessive pronoun that is consistent with the sentence's plural subject "students," thus creating a grammatically sound sentence.

Choices A, B, and C are incorrect because each proposes a possessive pronoun that is inconsistent with the plural noun "students," the established subject of the sentence.

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Section 3: Math Test — No Calculator

QUESTION 1.

Choice D is correct. Since $k = 3$, one can substitute 3 for k in the equation $\frac{x-1}{3} = k$, which gives $\frac{x-1}{3} = 3$. Multiplying both sides of $\frac{x-1}{3} = 3$ by 3 gives $x-1 = 9$ and then adding 1 to both sides of $x-1 = 9$ gives $x = 10$.

Choices A, B, and C are incorrect because the result of subtracting 1 from the value and dividing by 3 is not the given value of k , which is 3.

QUESTION 2.

Choice A is correct. To calculate $(7 + 3i) + (-8 + 9i)$, add the real parts of each complex number, $7 + (-8) = -1$, and then add the imaginary parts, $3i + 9i = 12i$. The result is $-1 + 12i$.

Choices B, C, and D are incorrect and likely result from common errors that arise when adding complex numbers. For example, choice B is the result of adding $3i$ and $-9i$, and choice C is the result of adding 7 and 8.

QUESTION 3.

Choice C is correct. The total number of messages sent by Armand is the 5 hours he spent texting multiplied by his rate of texting: m texts/hour \times 5 hours = $5m$ texts. Similarly, the total number of messages sent by Tyrone is the 4 hours he spent texting multiplied by his rate of texting: p texts/hour \times 4 hours = $4p$ texts. The total number of messages sent by Armand and Tyrone is the sum of the total number of messages sent by Armand and the total number of messages sent by Tyrone: $5m + 4p$.

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Choice A is incorrect and arises from adding the coefficients and multiplying the variables of $5m$ and $4p$. Choice B is incorrect and is the result of multiplying $5m$ and $4p$. The total number of messages sent by Armand and Tyrone should be the sum of $5m$ and $4p$, not the product of these terms. Choice D is incorrect because it multiplies Armand's number of hours spent texting by Tyrone's rate of texting, and vice versa. This mix-up results in an expression that does not equal the total number of messages sent by Armand and Tyrone.

QUESTION 4.

Choice B is correct. The value 108 in the equation is the value of P in $P = 108 - 23d$ when $d = 0$. When $d = 0$, Kathy has worked 0 days that week. In other words, 108 is the number of phones left before Kathy has started work for the week. Therefore, the meaning of the value 108 in the equation is that Kathy starts each week with 108 phones to fix because she has worked 0 days and has 108 phones left to fix.

Choice A is incorrect because Kathy will complete the repairs when $P = 0$. Since $P = 108 - 23d$, this will occur when $0 = 108 - 23d$ or when $d = \frac{108}{23}$, not when $d = 108$. Therefore, the value 108 in the equation does not represent the number of days it will take Kathy to complete the repairs. Choices C and D are incorrect because the number 23 in $P = 108 - 23d = 108$ indicates that the number of phones left will decrease by 23 for each increase in the value of d by 1; in other words, that Kathy is repairing phones at a rate of 23 per day, not 108 per hour (choice C) or 108 per day (choice D).

QUESTION 5.

Choice C is correct. Only like terms, with the same variables and exponents, can be combined to determine the answer as shown here:

$$\begin{aligned}(x^2y - 3y^2 + 5xy^2) - (-x^2y + 3xy^2 - 3y^2) \\ &= (x^2y - (-x^2y)) + (-3y^2 - (-3y^2)) + (5xy^2 - 3xy^2) \\ &= 2x^2y + 0 + 2xy^2 \\ &= 2x^2y + 2xy^2\end{aligned}$$

Choices A, B, and D are incorrect and are the result of common calculation errors or of incorrectly combining like and unlike terms.

QUESTION 6.

Choice A is correct. In the equation $h = 3a + 28.6$, if a , the age of the boy, increases by 1, then h becomes $h = 3(a + 1) + 28.6 = 3a + 3 + 28.6 = (3a + 28.6) + 3$. Therefore, the model estimates that the boy's height increases by 3 inches each year.

Alternatively: The height, h , is a linear function of the age, a , of the boy. The coefficient 3 can be interpreted as the rate of change of the function; in this

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case, the rate of change can be described as a change of 3 inches in height for every additional year in age.

Choices B, C, and D are incorrect and are likely to result from common errors in calculating the value of h or in calculating the difference between the values of h for different values of a .

QUESTION 7.

Choice B is correct. Since the right-hand side of the equation is P times the

expression $\frac{\left(\frac{r}{1,200}\right)\left(1 + \frac{r}{1,200}\right)^N}{\left(1 + \frac{r}{1,200}\right)^N - 1}$, multiplying both sides of the equation by the reciprocal of this expression results in $\frac{\left(1 + \frac{r}{1,200}\right)^N - 1}{\left(\frac{r}{1,200}\right)\left(1 + \frac{r}{1,200}\right)^N} m = P$.

Choices A, C, and D are incorrect and are likely the result of conceptual or computation errors while trying to solve for P .

QUESTION 8.

Choice C is correct. Since $\frac{a}{b} = 2$, it follows that $\frac{b}{a} = \frac{1}{2}$. Multiplying both sides of the equation by 4 gives $4\left(\frac{b}{a}\right) = \frac{4b}{a} = 2$.

Choice A is incorrect because if $\frac{4b}{a} = 0$, then $\frac{a}{b}$ would be undefined. Choice B is incorrect because if $\frac{4b}{a} = 1$, then $\frac{a}{b} = 4$. Choice D is incorrect because if $\frac{4b}{a} = 4$, then $\frac{a}{b} = 1$.

QUESTION 9.

Choice B is correct. Adding x and 19 to both sides of $2y - x = -19$ gives $x = 2y + 19$. Then, substituting $2y + 19$ for x in $3x + 4y = -23$ gives $3(2y + 19) + 4y = -23$. This last equation is equivalent to $10y + 57 = -23$. Solving $10y + 57 = -23$ gives $y = -8$. Finally, substituting -8 for y in $2y - x = -19$ gives $2(-8) - x = -19$, or $x = 3$. Therefore, the solution (x, y) to the given system of equations is $(3, -8)$.

Choices A, C, and D are incorrect because when the given values of x and y are substituted in $2y - x = -19$, the value of the left side of the equation does not equal -19 .

QUESTION 10.

Choice A is correct. Since g is an even function, $g(-4) = g(4) = 8$.

Alternatively: First find the value of a , and then find $g(-4)$. Since $g(4) = 8$, substituting 4 for x and 8 for $g(x)$ gives $8 = a(4)^2 + 24 = 16a + 24$. Solving this

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last equation gives $a = -1$. Thus $g(x) = -x^2 + 24$, from which it follows that $g(-4) = -(-4)^2 + 24$; $g(-4) = -16 + 24$; and $g(-4) = 8$.

Choices B, C, and D are incorrect because g is a function and there can only be one value of $g(-4)$.

QUESTION 11.

Choice D is correct. To determine the price per pound of beef when it was equal to the price per pound of chicken, determine the value of x (the number of weeks after July 1) when the two prices were equal. The prices were equal when $b = c$; that is, when $2.35 + 0.25x = 1.75 + 0.40x$. This last equation is equivalent to $0.60 = 0.15x$, and so $x = \frac{0.60}{0.15} = 4$. Then to determine b , the price per pound of beef, substitute 4 for x in $b = 2.35 + 0.25x$, which gives $b = 2.35 + 0.25(4) = 3.35$ dollars per pound.

Choice A is incorrect. It results from using the value 1, not 4, for x in $b = 2.35 + 0.25x$. Choice B is incorrect. It results from using the value 2, not 4, for x in $b = 2.35 + 0.25x$. Choice C is incorrect. It results from using the value 3, not 4, for x in $c = 1.75 + 0.40x$.

QUESTION 12.

Choice D is correct. Determine the equation of the line to find the relationship between the x - and y -coordinates of points on the line. All lines through the origin are of the form $y = mx$, so the equation is $y = \frac{1}{7}x$. A point lies on the line if and only if its y -coordinate is $\frac{1}{7}$ of its x -coordinate. Of the given choices, only choice D, $(14, 2)$, satisfies this condition: $2 = \frac{1}{7}(14)$.

Choice A is incorrect because the line determined by the origin $(0, 0)$ and $(0, 7)$ is the vertical line with equation $x = 0$; that is, the y -axis. The slope of the y -axis is undefined, not $\frac{1}{7}$. Therefore, the point $(0, 7)$ does not lie on the line that passes the origin and has slope $\frac{1}{7}$. Choices B and C are incorrect because neither of the ordered pairs has a y -coordinate that is $\frac{1}{7}$ the value of the x -coordinate.

QUESTION 13.

Choice B is correct. To rewrite $\frac{1}{\frac{1}{x+2} + \frac{1}{x+3}}$, multiply by $\frac{(x+2)(x+3)}{(x+2)(x+3)}$.

This results in the expression $\frac{(x+2)(x+3)}{(x+3) + (x+2)}$, which is equivalent to the expression in choice B.

Choices A, C, and D are incorrect and could be the result of common algebraic errors that arise while manipulating a complex fraction.

QUESTION 14.

Choice A is correct. One approach is to express $\frac{8^x}{2^y}$ so that the numerator and denominator are expressed with the same base. Since 2 and 8 are both

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powers of 2, substituting 2^3 for 8 in the numerator of $\frac{8^x}{2^y}$ gives $\frac{(2^3)^x}{2^y}$, which can be rewritten as $\frac{2^{3x}}{2^y}$. Since the numerator and denominator of $\frac{2^{3x}}{2^y}$ have a common base, this expression can be rewritten as 2^{3x-y} . It is given that $3x - y = 12$, so one can substitute 12 for the exponent, $3x - y$, giving that the expression $\frac{8^x}{2^y}$ is equal to 2^{12} .

Choices B and C are incorrect because they are not equal to 2^{12} . Choice D is incorrect because the value of $\frac{8^x}{2^y}$ can be determined.

QUESTION 15.

Choice D is correct. One can find the possible values of a and b in $(ax + 2)(bx + 7)$ by using the given equation $a + b = 8$ and finding another equation that relates the variables a and b . Since $(ax + 2)(bx + 7) = 15x^2 + cx + 14$, one can expand the left side of the equation to obtain $abx^2 + 7ax + 2bx + 14 = 15x^2 + cx + 14$. Since ab is the coefficient of x^2 on the left side of the equation and 15 is the coefficient of x^2 on the right side of the equation, it must be true that $ab = 15$. Since $a + b = 8$, it follows that $b = 8 - a$. Thus, $ab = 15$ can be rewritten as $a(8 - a) = 15$, which in turn can be rewritten as $a^2 - 8a + 15 = 0$. Factoring gives $(a - 3)(a - 5) = 0$. Thus, either $a = 3$ and $b = 5$, or $a = 5$ and $b = 3$. If $a = 3$ and $b = 5$, then $(ax + 2)(bx + 7) = (3x + 2)(5x + 7) = 15x^2 + 31x + 14$. Thus, one of the possible values of c is 31. If $a = 5$ and $b = 3$, then $(ax + 2)(bx + 7) = (5x + 2)(3x + 7) = 15x^2 + 41x + 14$. Thus, another possible value for c is 41. Therefore, the two possible values for c are 31 and 41.

Choice A is incorrect; the numbers 3 and 5 are possible values for a and b , but not possible values for c . Choice B is incorrect; if $a = 5$ and $b = 3$, then 6 and 35 are the coefficients of x when the expression $(5x + 2)(3x + 7)$ is expanded as $15x^2 + 35x + 6x + 14$. However, when the coefficients of x are 6 and 35, the value of c is 41 and not 6 and 35. Choice C is incorrect; if $a = 3$ and $b = 5$, then 10 and 21 are the coefficients of x when the expression $(3x + 2)(5x + 7)$ is expanded as $15x^2 + 21x + 10x + 14$. However, when the coefficients of x are 10 and 21, the value of c is 31 and not 10 and 21.

QUESTION 16.

The correct answer is 2. To solve for t , factor the left side of $t^2 - 4 = 0$, giving $(t - 2)(t + 2) = 0$. Therefore, either $t - 2 = 0$ or $t + 2 = 0$. If $t - 2 = 0$, then $t = 2$, and if $t + 2 = 0$, then $t = -2$. Since it is given that $t > 0$, the value of t must be 2.

Another way to solve for t is to add 4 to both sides of $t^2 - 4 = 0$, giving $t^2 = 4$. Then, taking the square root of the left and the right side of the equation gives $t = \pm\sqrt{4} = \pm 2$. Since it is given that $t > 0$, the value of t must be 2.

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QUESTION 17.

The correct answer is 1600. It is given that $\angle AEB$ and $\angle CDB$ have the same measure. Since $\angle ABE$ and $\angle CBD$ are vertical angles, they have the same measure. Therefore, triangle EAB is similar to triangle DCB because the triangles have two pairs of congruent corresponding angles (angle-angle criterion for similarity of triangles). Since the triangles are similar, the corresponding sides are in the same proportion; thus $\frac{CD}{x} = \frac{BD}{EB}$. Substituting the given values of 800 for CD , 700 for BD , and 1400 for EB in $\frac{CD}{x} = \frac{BD}{EB}$ gives $\frac{800}{x} = \frac{700}{1400}$. Therefore, $x = \frac{(800)(1400)}{700} = 1600$.

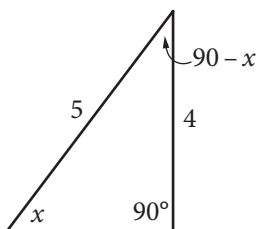
QUESTION 18.

The correct answer is 7. Subtracting the left and right sides of $x + y = -9$ from the corresponding sides of $x + 2y = -25$ gives $(x + 2y) - (x + y) = -25 - (-9)$, which is equivalent to $y = -16$. Substituting -16 for y in $x + y = -9$ gives $x + (-16) = -9$, which is equivalent to $x = -9 - (-16) = 7$.

QUESTION 19.

The correct answer is $\frac{4}{5}$ or 0.8. By the complementary angle relationship for sine and cosine, $\sin(x^\circ) = \cos(90^\circ - x^\circ)$. Therefore, $\cos(90^\circ - x^\circ) = \frac{4}{5}$. Either the fraction $\frac{4}{5}$ or its decimal equivalent, 0.8, may be gridded as the correct answer.

Alternatively, one can construct a right triangle that has an angle of measure x° such that $\sin(x^\circ) = \frac{4}{5}$, as shown in the figure below, where $\sin(x^\circ)$ is equal to the ratio of the opposite side to the hypotenuse, or $\frac{4}{5}$.



Since two of the angles of the triangle are of measure x° and 90° , the third angle must have the measure $180^\circ - 90^\circ - x^\circ = 90^\circ - x^\circ$. From the figure, $\cos(90^\circ - x^\circ)$, which is equal to the ratio of the adjacent side to the hypotenuse, is also $\frac{4}{5}$.

QUESTION 20.

The correct answer is 100. Since $a = 5\sqrt{2}$, one can substitute $5\sqrt{2}$ for a in $2a = \sqrt{2}x$, giving $10\sqrt{2} = \sqrt{2}x$. Squaring each side of $10\sqrt{2} = \sqrt{2}x$ gives $(10\sqrt{2})^2 = (\sqrt{2}x)^2$, which simplifies to $(10)^2(\sqrt{2})^2 = (\sqrt{2}x)^2$, or $200 = 2x$. This gives $x = 100$. Checking $x = 100$ in the original equation gives $2(5\sqrt{2}) = \sqrt{(2)(100)}$, which is true since $2(5\sqrt{2}) = 10\sqrt{2}$ and $\sqrt{(2)(100)} = (\sqrt{2})(\sqrt{100}) = 10\sqrt{2}$.

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Section 4: Math Test — Calculator

QUESTION 1.

Choice B is correct. On the graph, a line segment with a positive slope represents an interval over which the target heart rate is strictly increasing as time passes. A horizontal line segment represents an interval over which there is no change in the target heart rate as time passes, and a line segment with a negative slope represents an interval over which the target heart rate is strictly decreasing as time passes. Over the interval between 40 and 60 minutes, the graph consists of a line segment with a positive slope followed by a line segment with a negative slope, with no horizontal line segment in between, indicating that the target heart rate is strictly increasing then strictly decreasing.

Choice A is incorrect because the graph over the interval between 0 and 30 minutes contains a horizontal line segment, indicating a period in which there was no change in the target heart rate. Choice C is incorrect because the graph over the interval between 50 and 65 minutes consists of a line segment with a negative slope followed by a line segment with a positive slope, indicating that the target heart rate is strictly decreasing then strictly increasing. Choice D is incorrect because the graph over the interval between 70 and 90 minutes contains horizontal line segments and no segment with a negative slope.

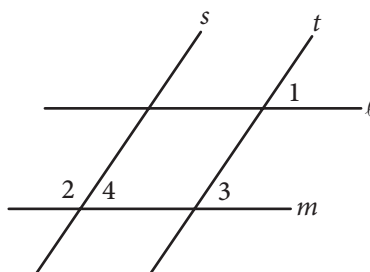
QUESTION 2.

Choice C is correct. Substituting 6 for x and 24 for y in $y = kx$ gives $24 = (k)(6)$, which gives $k = 4$. Hence, $y = 4x$. Therefore, when $x = 5$, the value of y is $(4)(5) = 20$. None of the other choices for y is correct because y is a function of x , and so there is only one y -value for a given x -value.

Choices A, B, and D are incorrect. Choice A is the result of using 6 for y and 5 for x when solving for k . Choice B results from using a value of 3 for k when solving for y . Choice D results from using $y = k + x$ instead of $y = kx$.

QUESTION 3.

Choice D is correct. Consider the measures of $\angle 3$ and $\angle 4$ in the figure below.



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The measure of $\angle 3$ is equal to the measure of $\angle 1$ because they are corresponding angles for the parallel lines ℓ and m intersected by the transversal line t . Similarly, the measure of $\angle 3$ is equal to the measure of $\angle 4$ because they are corresponding angles for the parallel lines s and t intersected by the transversal line m . Since the measure of $\angle 1$ is 35° , the measures of $\angle 3$ and $\angle 4$ are also 35° . Since $\angle 4$ and $\angle 2$ are supplementary, the sum of the measures of these two angles is 180° . Therefore, the measure of $\angle 2$ is $180^\circ - 35^\circ = 145^\circ$.

Choice A is incorrect because 35° is the measure of $\angle 1$, and $\angle 1$ is not congruent to $\angle 2$. Choice B is incorrect because it is the measure of the complementary angle of $\angle 1$, and $\angle 1$ and $\angle 2$ are not complementary angles. Choice C is incorrect because it is double the measure of $\angle 1$.

QUESTION 4.

Choice C is correct. The description “ $16 + 4x$ is 10 more than 14” can be written as the equation $16 + 4x = 10 + 14$, which is equivalent to $16 + 4x = 24$. Subtracting 16 from each side of $16 + 4x = 24$ gives $4x = 8$. Since $8x$ is 2 times $4x$, multiplying both sides of $4x = 8$ by 2 gives $8x = 16$. Therefore, the value of $8x$ is 16.

Choice A is incorrect because it is the value of x , not $8x$. Choices B and D are incorrect; those choices may be a result of errors in rewriting $16 + 4x = 10 + 14$. For example, choice D could be the result of subtracting 16 from the left side of the equation and adding 16 to the right side of $16 + 4x = 10 + 14$, giving $4x = 40$ and $8x = 80$.

QUESTION 5.

Choice D is correct. A graph with a strong negative association between d and t would have the points on the graph closely aligned with a line that has a negative slope. The more closely the points on a graph are aligned with a line, the stronger the association between d and t , and a negative slope indicates a negative association. Of the four graphs, the points on graph D are most closely aligned with a line with a negative slope. Therefore, the graph in choice D has the strongest negative association between d and t .

Choice A is incorrect because the points are more scattered than the points in choice D, indicating a weak negative association between d and t . Choice B is incorrect because the points are aligned to either a curve or possibly a line with a small positive slope. Choice C is incorrect because the points are aligned to a line with a positive slope, indicating a positive association between d and t .

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QUESTION 6.

Choice D is correct. Since there are 10 grams in 1 decagram, there are $2 \times 10 = 20$ grams in 2 decagrams. Since there are 1,000 milligrams in 1 gram, there are $20 \times 1,000 = 20,000$ milligrams in 20 grams. Therefore, 20,000 1-milligram doses of the medicine can be stored in a 2-decagram container.

Choice A is incorrect; 0.002 is the number of grams in 2 milligrams. Choice B is incorrect; it could result from multiplying by 1,000 and dividing by 10 instead of multiplying by both 1,000 and 10 when converting from decagrams to milligrams. Choice C is incorrect; 2,000 is the number of milligrams in 2 grams, not the number of milligrams in 2 decagrams.

QUESTION 7.

Choice C is correct. Let x represent the number of installations that each unit on the y -axis represents. Then $9x$, $5x$, $6x$, $4x$, and $3.5x$ are the number of rooftops with solar panel installations in cities A, B, C, D, and E, respectively. Since the total number of rooftops is 27,500, it follows that $9x + 5x + 6x + 4x + 3.5x = 27,500$, which simplifies to $27.5x = 27,500$. Thus, $x = 1,000$. Therefore, an appropriate label for the y -axis is “Number of installations (in thousands).”

Choices A, B, and D are incorrect and may result from errors when setting up and calculating the units for the y -axis.

QUESTION 8.

Choice D is correct. If the value of $|n - 1| + 1$ is equal to 0, then $|n - 1| + 1 = 0$. Subtracting 1 from both sides of this equation gives $|n - 1| = -1$. The expression $|n - 1|$ on the left side of the equation is the absolute value of $n - 1$, and the absolute value can never be a negative number. Thus $|n - 1| = -1$ has no solution. Therefore, there are no values for n for which the value of $|n - 1| + 1$ is equal to 0.

Choice A is incorrect because $|0 - 1| + 1 = 1 + 1 = 2$, not 0. Choice B is incorrect because $|1 - 1| + 1 = 0 + 1 = 1$, not 0. Choice C is incorrect because $|2 - 1| + 1 = 1 + 1 = 2$, not 0.

QUESTION 9.

Choice A is correct. Subtracting 1,052 from both sides of the equation $a = 1,052 + 1.08t$ gives $a - 1,052 = 1.08t$. Then dividing both sides of $a - 1,052 = 1.08t$ by 1.08 gives $t = \frac{a - 1,052}{1.08}$.

Choices B, C, and D are incorrect and could arise from errors in rewriting $a = 1,052 + 1.08t$. For example, choice B could result if 1,052 is added to the

left side of $a = 1,052 + 1.08t$ and subtracted from the right side, and then both sides are divided by 1.08.

QUESTION 10.

Choice B is correct. Substituting 1,000 for a in the equation $a = 1,052 + 1.08t$ gives $1,000 = 1,052 + 1.08t$, and thus $t = \frac{-52}{1.08} \approx -48.15$. Of the choices given, -48°F is closest to -48.15°F . Since the equation $a = 1,052 + 1.08t$ is linear, it follows that of the choices given, -48°F is the air temperature when the speed of a sound wave is closest to 1,000 feet per second.

Choices A, C, and D are incorrect, and might arise from errors in calculating $\frac{-52}{1.08}$ or in rounding the result to the nearest integer. For example, choice C could be the result of rounding -48.15 to -49 instead of -48 .

QUESTION 11.

Choice A is correct. Subtracting $3x$ and adding 3 to both sides of $3x - 5 \geq 4x - 3$ gives $-2 \geq x$. Therefore, x is a solution to $3x - 5 \geq 4x - 3$ if and only if x is less than or equal to -2 and x is NOT a solution to $3x - 5 \geq 4x - 3$ if and only if x is greater than -2 . Of the choices given, only -1 is greater than -2 and, therefore, cannot be a value of x .

Choices B, C, and D are incorrect because each is a value of x that is less than or equal to -2 and, therefore, could be a solution to the inequality.

QUESTION 12.

Choice C is correct. The average number of seeds per apple is the total number of seeds in the 12 apples divided by the number of apples, which is 12. On the graph, the horizontal axis is the number of seeds per apple and the height of each bar is the number of apples with the corresponding number of seeds. The first bar on the left indicates that 2 apples have 3 seeds each, the second bar indicates that 4 apples have 5 seeds each, the third bar indicates that 1 apple has 6 seeds, the fourth bar indicates that 2 apples have 7 seeds each, and the fifth bar indicates that 3 apples have 9 seeds each. Thus, the total number of seeds for the 12 apples is $(2 \times 3) + (4 \times 5) + (1 \times 6) + (2 \times 7) + (3 \times 9) = 73$, and the average number of seeds per apple is $\frac{73}{12} = 6.08$. Of the choices given, 6 is closest to 6.08.

Choice A is incorrect; it is the number of apples represented by the tallest bar but is not the average number of seeds for the 12 apples. Choice B is incorrect; it is the number of seeds per apple corresponding to the tallest bar, but is not the average number of seeds for the 12 apples. Choice D is incorrect; a student might choose this by correctly calculating the average number of seeds, 6.08, but incorrectly rounding up to 7.

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QUESTION 13.

Choice C is correct. From the table, there was a total of 310 survey respondents, and 19% of all survey respondents is equivalent to $\frac{19}{100} \times 310 = 58.9$ respondents. Of the choices given, 59, the number of males taking geometry, is closest to 58.9 respondents.

Choices A, B, and D are incorrect because the number of males taking geometry is closer to 58.9 than the number of respondents in each of these categories.

QUESTION 14.

Choice C is correct. The range of the 21 fish is $24 - 8 = 16$ inches, and the range of the 20 fish after the 24-inch measurement is removed is $16 - 8 = 8$ inches. The change in range, 8 inches, is much greater than the change in the mean or median.

Choice A is incorrect. Let m be the mean of the lengths, in inches, of the 21 fish. Then the sum of the lengths, in inches, of the 21 fish is $21m$. After the 24-inch measurement is removed, the sum of the lengths, in inches, of the remaining 20 fish is $21m - 24$, and the mean length, in inches, of these 20 fish is $\frac{21m - 24}{20}$, which is a change of $\frac{24 - m}{20}$ inches. Since m must be between the smallest and largest measurements of the 21 fish, it follows that $8 < m < 24$, from which it can be seen that the change in the mean, in inches, is between $\frac{24 - 24}{20} = 0$ and $\frac{24 - 8}{20} = \frac{4}{5}$, and so must be less than the change in the range, 8 inches. Choice B is incorrect because the median length of the 21 fish is the length of the 11th fish, 12 inches. After removing the 24-inch measurement, the median of the remaining 20 lengths is the average of the 10th and 11th fish, which would be unchanged at 12 inches. Choice D is incorrect because the changes in the mean, median, and range of the measurements are different.

QUESTION 15.

Choice A is correct. The total cost C of renting a boat is the sum of the initial cost to rent the boat plus the product of the cost per hour and the number of hours, h , that the boat is rented. The C -intercept is the point on the C -axis where h , the number of hours the boat is rented, is 0. Therefore, the C -intercept is the initial cost of renting the boat.

Choice B is incorrect because the graph represents the cost of renting only one boat. Choice C is incorrect because the total number of hours of rental is represented by h -values, each of which corresponds to the first coordinate of a point on the graph. Choice D is incorrect because the increase in cost for each additional hour is given by the slope of the line, not by the C -intercept.

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QUESTION 16.

Choice C is correct. The relationship between h and C is represented by any equation of the given line. The C -intercept of the line is 5. Since the points $(0, 5)$ and $(1, 8)$ lie on the line, the slope of the line is $\frac{8-5}{1-0} = \frac{3}{1} = 3$. Therefore, the relationship between h and C can be represented by $C = 3h + 5$, the slope-intercept equation of the line.

Choices A and D are incorrect because each uses the wrong values for both the slope and intercept. Choice B is incorrect; this choice would result from computing the slope by counting the number of grid lines instead of using the values represented by the axes.

QUESTION 17.

Choice B is correct. The minimum value of the function corresponds to the y -coordinate of the point on the graph that is the lowest along the vertical or y -axis. Since the grid lines are spaced 1 unit apart on each axis, the lowest point along the y -axis has coordinates $(-3, -2)$. Therefore, the value of x at the minimum of $f(x)$ is -3 .

Choice A is incorrect; -5 is the smallest value for an x -coordinate of a point on the graph of f , not the lowest point on the graph of f . Choice C is incorrect; it is the minimum value of f , not the value of x that corresponds to the minimum of f . Choice D is incorrect; it is the value of x at the maximum value of f , not at the minimum value of f .

QUESTION 18.

Choice A is correct. Since $(0, 0)$ is a solution to the system of inequalities, substituting 0 for x and 0 for y in the given system must result in two true inequalities. After this substitution, $y < -x + a$ becomes $0 < a$, and $y > x + b$ becomes $0 > b$. Hence, a is positive and b is negative. Therefore, $a > b$.

Choice B is incorrect because $b > a$ cannot be true if b is negative and a is positive. Choice C is incorrect because it is possible to find an example where $(0, 0)$ is a solution to the system, but $|a| < |b|$; for example, if $a = 6$ and $b = -7$. Choice D is incorrect because the equation $a = -b$ could be true, but doesn't have to be true; for example, if $a = 1$ and $b = -2$.

QUESTION 19.

Choice B is correct. To determine the number of salads sold, write and solve a system of two equations. Let x equal the number of salads sold and let y equal the number of drinks sold. Since the number of salads plus the number of drinks sold equals 209, the equation $x + y = 209$ must hold. Since each

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salad cost \$6.50, each soda cost \$2.00, and the total revenue was \$836.50, the equation $6.50x + 2.00y = 836.50$ must also hold. The equation $x + y = 209$ is equivalent to $2x + 2y = 418$, and subtracting each side of $2x + 2y = 418$ from the respective side of $6.50x + 2.00y = 836.50$ gives $4.5x = 418.50$. Therefore, the number of salads sold, x , was $x = \frac{418.50}{4.50} = 93$.

Choices A, C, and D are incorrect and could result from errors in writing the equations and solving the system of equations. For example, choice C could have been obtained by dividing the total revenue, \$836.50, by the total price of a salad and a soda, \$8.50, and then rounding up.

QUESTION 20.

Choice D is correct. Let x be the original price of the computer, in dollars. The discounted price is 20 percent off the original price, so $x - 0.2x = 0.8x$ is the discounted price, in dollars. The tax is 8 percent of the discounted price, so $0.08(0.8x)$ is the tax on the purchase, in dollars. The price p , in dollars, that Alma paid the cashiers is the sum of the discounted price and the tax: $p = 0.8x + (0.08)(0.8x)$ which can be rewritten as $p = 1.08(0.8x)$. Therefore, the original price, x , of the computer, in dollars, can be written as $\frac{p}{(0.8)(1.08)}$ in terms of p .

Choices A, B, and C are incorrect; each choice either switches the roles of the original price and the amount Alma paid, or incorrectly combines the results of the discount and the tax as $0.8 + 0.08 = 0.88$ instead of as $(0.8)(1.08)$.

QUESTION 21.

Choice C is correct. The probability that a person from Group Y who recalled at least 1 dream was chosen from the group of all people who recalled at least 1 dream is equal to the number of people in Group Y who recalled at least 1 dream divided by the total number of people in the two groups who recalled at least 1 dream. The number of people in Group Y who recalled at least 1 dream is the sum of the 11 people in Group Y who recalled 1 to 4 dreams and the 68 people in Group Y who recalled 5 or more dreams: $11 + 68 = 79$. The total number of people who recalled at least 1 dream is the sum of the 79 people in Group Y who recalled at least 1 dream, the 28 people in Group X who recalled 1 to 4 dreams, and the 57 people in Group X who recalled 5 or more dreams: $79 + 28 + 57 = 164$. Therefore, the probability is $\frac{79}{164}$.

Choice A is incorrect; it is the number of people in Group Y who recalled 5 or more dreams divided by the total number of people in Group Y. Choice B is incorrect; it uses the total number of people in Group Y as the denominator of the probability. Choice D is incorrect; it is the total number of people in the two groups who recalled at least 1 dream divided by the total number of people in the two groups.

QUESTION 22.

Choice B is correct. The average rate of change in the annual budget for agriculture/natural resources from 2008 to 2010 is the total change from 2008 to 2010 divided by the number of years, which is 2. The total change in the annual budget for agriculture/natural resources from 2008 to 2010 is $488,106 - 358,708 = 129,398$, in thousands of dollars, so the average change in the annual budget for agriculture/natural resources from 2008 to 2010 is $\frac{\$129,398,000}{2} = \$64,699,000$ per year. Of the options given, this average rate of change is closest to \$65,000,000 per year.

Choices A and C are incorrect; they could result from errors in setting up or calculating the average rate of change. Choice D is incorrect; \$130,000,000 is the approximate total change from 2008 to 2010, not the average change from 2008 to 2010.

QUESTION 23.

Choice B is correct. The human resources budget in 2007 was 4,051,050 thousand dollars, and the human resources budget in 2010 was 5,921,379 thousand dollars. Therefore, the ratio of the 2007 budget to the 2010 budget is slightly greater than $\frac{4}{6} = \frac{2}{3}$. Similar estimates for agriculture/natural resources give a ratio of the 2007 budget to the 2010 budget of slightly greater than $\frac{3}{4}$; for education, a ratio of slightly greater than $\frac{2}{3}$; for highways and transportation, a ratio of slightly less than $\frac{5}{6}$; and for public safety, a ratio of slightly greater than $\frac{5}{9}$. Therefore, of the given choices, education's ratio of the 2007 budget to the 2010 budget is closest to that of human resources.

Choices A, C, and D are incorrect because the 2007 budget to 2010 budget ratio for each of these programs in these choices is further from the corresponding ratio for human resources than the ratio for education.

QUESTION 24.

Choice A is correct. The equation of a circle can be written as $(x - h)^2 + (y - k)^2 = r^2$ where (h, k) are the coordinates of the center of the circle and r is the radius of the circle. Since the coordinates of the center of the circle are $(0, 4)$, the equation is $x^2 + (y - 4)^2 = r^2$, where r is the radius. The radius of the circle is the distance from the center, $(0, 4)$, to the given endpoint of a radius, $(\frac{4}{3}, 5)$. By the distance formula, $r^2 = \left(\frac{4}{3} - 0\right)^2 + (5 - 4)^2 = \frac{25}{9}$. Therefore, an equation of the given circle is $x^2 + (y - 4)^2 = \frac{25}{9}$.

Choice B is incorrect; it results from the incorrect equation $(x + h)^2 + (y + k)^2 = r^2$. Choice C is incorrect; it results from using r instead of r^2 in the equation for the circle. Choice D is incorrect; it results from using the incorrect equation $(x + h)^2 + (y + k)^2 = \frac{1}{r}$.

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QUESTION 25.

Choice D is correct. When the ball hits the ground, its height is 0 meters. Substituting 0 for h in $h = -4.9t^2 + 25t$ gives $0 = -4.9t^2 + 25t$, which can be rewritten as $0 = t(-4.9t + 25)$. Thus, the possible values of t are $t = 0$ and $t = \frac{25}{4.9} \approx 5.1$. The time $t = 0$ seconds corresponds to the time the ball is launched from the ground, and the time $t \approx 5.1$ seconds corresponds to the time after launch that the ball hits the ground. Of the given choices, 5.0 seconds is closest to 5.1 seconds, so the ball returns to the ground approximately 5.0 seconds after it is launched.

Choice A, B, and C are incorrect and could arise from conceptual or computation errors while solving $0 = -4.9t^2 + 25t$ for t .

QUESTION 26.

Choice B is correct. Let x represent the number of pears produced by the Type B trees. Then the Type A trees produce 20 percent more pears than x , which is $x + 0.20x = 1.20x$ pears. Since Type A trees produce 144 pears, the equation $1.20x = 144$ holds. Thus $x = \frac{144}{1.20} = 120$. Therefore, the Type B trees produced 120 pears.

Choice A is incorrect because while 144 is reduced by approximately 20 percent, increasing 115 by 20 percent gives 138, not 144. Choice C is incorrect; it results from subtracting 20 from the number of pears produced by the Type A trees. Choice D is incorrect; it results from adding 20 percent of the number of pears produced by Type A trees to the number of pears produced by Type A trees.

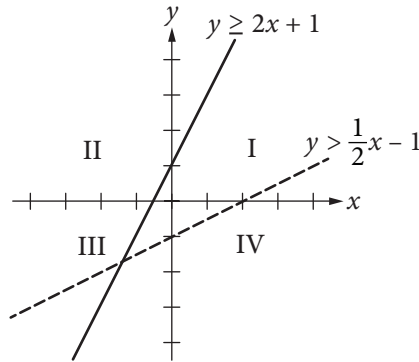
QUESTION 27.

Choice C is correct. The area of the field is 100 square meters. Each 1-meter-by-1-meter square has an area of 1 square meter. Thus, on average, the earthworm counts to a depth of 5 centimeters for each of the regions investigated by the students should be about $\frac{1}{100}$ of the total number of earthworms to a depth of 5 centimeters in the entire field. Since the counts for the smaller regions are from 107 to 176, the estimate for the entire field should be between 10,700 and 17,600. Therefore, of the given choices, 15,000 is a reasonable estimate for the number of earthworms to a depth of 5 centimeters in the entire field.

Choice A is incorrect; 150 is the approximate number of earthworms in 1 square meter. Choice B is incorrect; it results from using 10 square meters as the area of the field. Choice D is incorrect; it results from using 1,000 square meters as the area of the field.

QUESTION 28.

Choice C is correct. To determine which quadrant does not contain any solutions to the system of inequalities, graph the inequalities. Graph the inequality $y \geq 2x + 1$ by drawing a line through the y -intercept $(0, 1)$ and the point $(1, 3)$, and graph the inequality $y > \frac{1}{2}x - 1$ by drawing a dashed line through the y -intercept $(0, -1)$ and the point $(2, 0)$, as shown in the figure below.



The solution to the system of inequalities is the intersection of the shaded regions above the graphs of both lines. It can be seen that the solutions only include points in quadrants I, II, and III and do not include any points in quadrant IV.

Choices A and B are incorrect because quadrants II and III contain solutions to the system of inequalities, as shown in the figure above. Choice D is incorrect because there are no solutions in quadrant IV.

QUESTION 29.

Choice D is correct. If the polynomial $p(x)$ is divided by $x - 3$, the result can be written as $\frac{p(x)}{x - 3} = q(x) + \frac{r}{x - 3}$, where $q(x)$ is a polynomial and r is the remainder. Since $x - 3$ is a degree 1 polynomial, the remainder is a real number. Hence, $p(x)$ can be written as $p(x) = (x - 3)q(x) + r$, where r is a real number. It is given that $p(3) = -2$ so it must be true that $-2 = p(3) = (3 - 3)q(3) + r = (0)q(3) + r = r$. Therefore, the remainder when $p(x)$ is divided by $x - 3$ is -2 .

Choice A is incorrect because $p(3) = -2$ does not imply that $p(5) = 0$. Choices B and C are incorrect because the remainder -2 or its negative, 2 , need not be a root of $p(x)$.

QUESTION 30.

Choice D is correct. Any quadratic function q can be written in the form $q(x) = a(x - h)^2 + k$, where a , h , and k are constants and (h, k) is the vertex of the parabola when q is graphed in the coordinate plane. (Depending on the

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sign of a , the constant k must be the minimum or maximum value of q , and h is the value of x for which $a(x - h)^2 = 0$ and $q(x)$ has value k .) This form can be reached by completing the square in the expression that defines q . The given equation is $y = x^2 - 2x - 15$, and since the coefficient of x is -2 , the equation can be written in terms of $(x - 1)^2 = x^2 - 2x + 1$ as follows: $y = x^2 - 2x - 15 = (x^2 - 2x + 1) - 16 = (x - 1)^2 - 16$. From this form of the equation, the coefficients of the vertex can be read as $(1, -16)$

Choices A and C are incorrect because the coordinates of the vertex A do not appear as constants in these equations. Choice B is incorrect because it is not equivalent to the given equation.

QUESTION 31.

The correct answer is any number between 4 and 6, inclusive. Since Wyatt can husk at least 12 dozen ears of corn per hour, it will take him no more than $\frac{72}{12} = 6$ hours to husk 72 dozen ears of corn. On the other hand, since Wyatt can husk at most 18 dozen ears of corn per hour, it will take him at least $\frac{72}{18} = 4$ hours to husk 72 dozen ears of corn. Therefore, the possible times it could take Wyatt to husk 72 dozen ears of corn are 4 hours to 6 hours, inclusive. Any number between 4 and 6, inclusive, can be gridded as the correct answer.

QUESTION 32.

The correct answer is 107. Since the weight of the empty truck and its driver is 4500 pounds and each box weighs 14 pounds, the weight, in pounds, of the delivery truck, its driver, and x boxes is $4500 + 14x$. This weight is below the bridge's posted weight limit of 6000 pounds if $4500 + 14x < 6000$. That inequality is equivalent to $14x \leq 1500$ or $x < \frac{1500}{14} = 107\frac{1}{7}$. Since the number of packages must be an integer, the maximum possible value for x that will keep the combined weight of the truck, its driver, and the x identical boxes below the bridge's posted weight limit is 107.

QUESTION 33.

The correct answer is $\frac{5}{8}$ or .625. Based on the line graph, the number of portable media players sold in 2008 was 100 million, and the number of portable media players sold in 2011 was 160 million. Therefore, the number of portable media players sold in 2008 is $\frac{100 \text{ million}}{160 \text{ million}}$ of the portable media players sold in 2011. This fraction reduces to $\frac{5}{8}$. Either $\frac{5}{8}$ or its decimal equivalent, .625, may be gridded as the correct answer.

QUESTION 34.

The correct answer is 96. Since each day has a total of 24 hours of time slots available for the station to sell, there is a total of 48 hours of time slots

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available to sell on Tuesday and Wednesday. Each time slot is a 30-minute interval, which is equal to a $\frac{1}{2}$ -hour interval. Therefore, there are a total of $\frac{48 \text{ hours}}{\frac{1}{2} \text{ hours/time slot}} = 96$ time slots of 30 minutes for the station to sell on

Tuesday and Wednesday.

QUESTION 35.

The correct answer is 6. The volume of a cylinder is $\pi r^2 h$, where r is the radius of the base of the cylinder and h is the height of the cylinder. Since the storage silo is a cylinder with volume 72π cubic yards and height 8 yards, it is true that $72\pi = \pi r^2(8)$, where r is the radius of the base of the cylinder, in yards. Dividing both sides of $72\pi = \pi r^2(8)$ by 8π gives $r^2 = 9$, and so the radius of base of the cylinder is 3 yards. Therefore, the diameter of the base of the cylinder is 6 yards.

QUESTION 36.

The correct answer is 3. The function $h(x)$ is undefined when the denominator of $\frac{1}{(x-5)^2 + 4(x-5) + 4}$ is equal to zero. The expression $(x-5)^2 + 4(x-5) + 4$ is a perfect square: $(x-5)^2 + 4(x-5) + 4 = ((x-5) + 2)^2$, which can be rewritten as $(x-3)^2$. The expression $(x-3)^2$ is equal to zero if and only if $x = 3$. Therefore, the value of x for which $h(x)$ is undefined is 3.

QUESTION 37.

The correct answer is 1.02. The initial deposit earns 2 percent interest compounded annually. Thus at the end of 1 year, the new value of the account is the initial deposit of \$100 plus 2 percent of the initial deposit: $\$100 + \frac{2}{100}(\$100) = \$100(1.02)$. Since the interest is compounded annually, the value at the end of each succeeding year is the sum of the previous year's value plus 2 percent of the previous year's value. This is again equivalent to multiplying the previous year's value by 1.02. Thus, after 2 years, the value will be $\$100(1.02)(1.02) = \$100(1.02)^2$; after 3 years, the value will be $\$100(1.02)^3$; and after t years, the value will be $\$100(1.02)^t$. Therefore, in the formula for the value for Jessica's account after t years, $\$100(x)^t$, the value of x must be 1.02.

QUESTION 38.

The correct answer is 6.11. Jessica made an initial deposit of \$100 into her account. The interest on her account is 2 percent compounded annually, so after 10 years, the value of her initial deposit has been multiplied 10 times by the factor $1 + 0.02 = 1.02$. Hence, after 10 years, Jessica's deposit is worth $\$100(1.02)^{10} = \121.899 to the nearest tenth of a cent. Tyshaun made an initial deposit of \$100 into his account. The interest on his account is 2.5 percent compounded annually, so after 10 years, the value of his initial deposit

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has been multiplied 10 times by the factor $1 + 0.025 = 1.025$. Hence, after 10 years, Tyshaun's deposit is worth $\$100(1.025)^{10} = \128.008 to the nearest tenth of a cent. Hence, Jessica's initial deposit earned $\$21.899$ and Tyshaun's initial deposit earned $\$28.008$. Therefore, to the nearest cent, Tyshaun's initial deposit earned $\$6.11$ more than Jessica's initial deposit.