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Sample Questions and Answer Explanations

RW question 1

To dye wool, Navajo (Diné) weaver Lillie Taylor uses plants and vegetables from Arizona, where she lives. For example, she achieved the deep reds and browns featured in her 2003 rug *In the Path of the Four Seasons* by using Arizona dock roots, drying and grinding them before mixing the powder with water to create a dye bath. To intensify the appearance of certain colors, Taylor also sometimes mixes in clay obtained from nearby soil.

Which choice best states the main idea of the text?

A) Reds and browns are not commonly featured in most of Taylor's rugs.

B) *In the Path of the Four Seasons* is widely acclaimed for its many colors and innovative weaving techniques.

C) Taylor draws on local resources in the approach she uses to dye wool.

D) Taylor finds it difficult to locate Arizona dock root in the desert.

Key	C
Domain	Information and Ideas
Skill	Central Ideas and Details

Key Explanation: Choice C is the best answer. The passage focuses on the idea that the artist Lillie Taylor uses resources such as plants and vegetables from where she lives in Arizona to make dyes for wool.

Distractor Explanations: Choice A is incorrect because the passage offers no evidence that reds and browns are unusual colors in Taylor's rugs; in fact, it offers an example of a rug that does feature those colors. **Choice B** is incorrect because the passage offers no indication of whether *In the Path of the Four Seasons* is widely acclaimed; it also does not mention whether the weaving techniques are innovative. **Choice D** is incorrect because the passage offers no evidence that Taylor has a hard time finding Arizona dock root.

RW question 2

Jan Gimsa, Robert Sleigh, and Ulrike Gimsa have hypothesized that the sail-like structure running down the back of the dinosaur *Spinosaurus aegyptiacus* improved the animal's success in underwater pursuits of prey species capable of making quick, evasive movements. To evaluate their hypothesis, a second team of researchers constructed two battery-powered mechanical models of *S. aegyptiacus*, one with a sail and one without, and subjected the models to a series of identical tests in a water-filled tank.

Which finding from the model tests, if true, would most strongly support Gimsa and colleagues' hypothesis?

A) The model with a sail took significantly longer to travel a specified distance while submerged than the model without a sail did.

B) The model with a sail displaced significantly more water while submerged than the model without a sail did.

C) The model with a sail had significantly less battery power remaining after completing the tests than the model without a sail did.

D) The model with a sail took significantly less time to complete a sharp turn while submerged than the model without a sail did.

Key	D
Domain	Information and Ideas
Skill	Command of Evidence (Textual)

Key Explanation: Choice D is the best answer. The passage states that Gimsa and colleagues' hypothesis was that the sail-like structure on the back of *S. aegyptiacus* enhanced the dinosaur's ability to travel underwater to hunt down "prey species capable of making quick, evasive movements." This choice's finding would effectively support the hypothesis because it would indicate that the sail-like structure would enable a

dinosaur moving underwater to maneuver more quickly than a dinosaur moving underwater without the structure.

Distractor Explanations: Choice A is incorrect because it would essentially contradict the hypothesis by suggesting that a dinosaur moving underwater with the sail-like structure would move more slowly than a dinosaur moving underwater without the structure. **Choice B** is incorrect because there is no clear passage-based relationship between the amount of water displaced and the hypothesis. **Choice C** is incorrect because there is no clear passage-based relationship between the amount of battery power used and the hypothesis.

Key Explanation: Choice B is the best answer. The quotation addresses both aspects of the claim: cycles of anticipation ("Each, coming, brings ambitions high") and regretful reflection ("And each, departing, leaves a sigh / Linked to the past").

Distractor Explanations: Choice A is incorrect because the quotation focuses on anticipation ("An ominous stillness fills the night, / A pause—a hush") but not regretful reflection. **Choice C** is incorrect because the quotation focuses on worry and anxiety (". . . a sense of care / Akin to fright?") rather than anticipation and regretful reflection. **Choice D** is incorrect because the quotation focuses on regretful reflection ("It tells of many a squandered day") but not anticipation.

RW question 3

"Ghosts of the Old Year" is an early 1900s poem by James Weldon Johnson. In the poem, the speaker describes experiencing an ongoing cycle of anticipation followed by regretful reflection: _____

Which quotation from "Ghosts of the Old Year" most effectively illustrates the claim?

A) "The snow has ceased its fluttering flight, / The wind sunk to a whisper light, / An ominous stillness fills the night, / A pause—a hush."

B) "And so the years go swiftly by, / Each, coming, brings ambitions high, / And each, departing, leaves a sigh / Linked to the past."

C) "What does this brazen tongue declare, / That falling on the midnight air / Brings to my heart a sense of care / Akin to fright?"

D) "It tells of many a squandered day, / Of slighted gems and treasured clay, / Of precious stores not laid away, / Of fields unreaped."

Key	B
Domain	Information and Ideas
Skill	Command of Evidence (Textual)

RW question 4

Participants' Evaluation of the Likelihood That Robots Can Work Effectively in Different Occupations

Occupation	Somewhat or very unlikely (%)	Neutral (%)	Somewhat or very likely (%)
television news anchor	24	9	67
teacher	37	16	47
firefighter	62	9	30
surgeon	74	9	16
tour guide	10	8	82

Rows in table may not add up to 100 due to rounding.

Georgia Tech roboticists De'Aira Bryant and Ayanna Howard, along with ethicist Jason Borenstein, were interested in people's perceptions of robots' competence. They recruited participants and asked them how likely they think it is that a robot could do the work required in various occupations. Participants' evaluations varied widely depending on which occupation was being considered; for example, _____

Which choice most effectively uses data from the table to complete the example?

A) 82% of participants believe that it is somewhat or very likely that a robot could work effectively as a tour guide, but only 16% believe that it is somewhat or very likely that a robot could work as a surgeon.

B) 47% of participants believe that it is somewhat or very likely that a robot could work effectively as a teacher, but 37% of respondents believe that it is somewhat or very unlikely that a robot could do so.

C) 9% of participants were neutral about whether a robot could work effectively as a television news anchor, which is the same percent of participants who were neutral when asked about a robot working as a surgeon.

D) 62% of participants believe that it is somewhat or very unlikely that a robot could work effectively as a firefighter.

Key	A
Domain	Information and Ideas
Skill	Command of Evidence (Quantitative)

Key Explanation: Choice A is the best answer. This choice supports the claim by contrasting two occupations that survey participants gave widely divergent probabilities of robots working effectively in: tour guide (82 percent) and surgeon (16 percent).

Distractor Explanations: Choice B is incorrect because it focuses on only one occupation—that of teacher—and therefore does not illustrate how survey participants' views of the likelihood of robots working effectively vary widely by occupation. **Choice C** is incorrect because although it does compare survey participants' views of robots working effectively in two occupations, the percentages cited for television news anchor and surgeon are the same, not widely varied. **Choice D** is incorrect because it focuses on only one occupation—that of firefighter—and therefore does not illustrate how survey participants' views of the likelihood of robots working effectively vary widely by occupation.

RW question 5

Many animals, including humans, must sleep, and sleep is known to have a role in everything from healing injuries to encoding information in long-term memory. But some scientists claim that, from an evolutionary standpoint, deep sleep for hours at a time leaves an animal so vulnerable that the known benefits of sleeping seem insufficient to explain why it became so widespread in the animal kingdom. These scientists therefore imply that _____

Which choice most logically completes the text?

A) it is more important to understand how widespread prolonged deep sleep is than to understand its function.

B) prolonged deep sleep is likely advantageous in ways that have yet to be discovered.

C) many traits that provide significant benefits for an animal also likely pose risks to that animal.

D) most traits perform functions that are hard to understand from an evolutionary standpoint.

Key	B
Domain	Information and Ideas
Skill	Inferences

Key Explanation: Choice B is the best answer. The passage indicates that although scientists recognize that sleep, which is widespread among animal species, has benefits, some scientists believe that deep, prolonged sleep is so risky from the perspective of animal species' survival and well-being that there must be some so-far-undiscovered advantage(s) to sleep to make it worthwhile from an evolutionary standpoint.

Distractor Explanations: Choice A is incorrect because the passage suggests that the extent of deep, prolonged sleep among animal species is well understood by scientists and that the real question for scientists is why so many animal species engage in deep, prolonged sleep. **Choice C** is incorrect because the passage offers no evidence that any trait other than deep, prolonged

sleep poses both benefits and risks for animal species. **Choice D** is incorrect because the passage offers no evidence that any trait other than deep, prolonged sleep has one or more functions that are hard for scientists to understand.

RW question 6

In recommending Bao Phi's collection *Sông I Sing*, a librarian noted that pieces by the spoken-word poet don't lose their _____ nature when printed: the language has the same pleasant musical quality on the page as it does when performed by Phi.

Which choice completes the text with the most logical and precise word or phrase?

A) jarring

B) scholarly

C) melodic

D) personal

Key	C
Domain	Craft and Structure
Skill	Words in Context

Key Explanation: Choice C is the best answer. "Melodic," referring to a pleasant arrangement of sounds, effectively signals the later use in the passage of "pleasant musical quality" to refer to Phi's spoken-word poetry when read rather than heard.

Distractor Explanations: Choice A is incorrect because "jarring," meaning disagreeable or upsetting, suggests the opposite of what the passage says about the "pleasant musical quality" of Phi's spoken-word poetry, whether read or heard. **Choice B** is incorrect because "scholarly" does not effectively signal the later use in the passage of "pleasant musical quality" to refer to Phi's spoken-word poetry. **Choice D** is incorrect because "personal" does not effectively signal the later use in the passage of "pleasant musical quality" to refer to Phi's spoken-word poetry.

RW question 7

The following text is from F. Scott Fitzgerald's 1925 novel *The Great Gatsby*.

[Jay Gatsby] was balancing himself on the dashboard of his car with that resourcefulness of movement that is so peculiarly American—that comes, I suppose, with the absence of lifting work in youth and, even more, with the formless grace of our nervous, sporadic games. This quality was continually breaking through his punctilious manner in the shape of restlessness.

As used in the text, what does the word "quality" most nearly mean?

A) Characteristic

B) Standard

C) Prestige

D) Accomplishment

Key	A
Domain	Craft and Structure
Skill	Words in Context

Key Explanation: Choice A is the best answer. As used in the last sentence of the passage, "quality" refers to a trait or attribute ("characteristic")—specifically, Jay Gatsby's "resourcefulness of movement," which manifested as restlessness.

Distractor Explanations: Choice B is incorrect because although Jay Gatsby's "resourcefulness of movement" is a trait or attribute, referring to it as a "standard" implies that he is meeting a requirement or criterion set by others, a conclusion the passage does not support. **Choices C** and **D** are incorrect because neither "prestige" nor "accomplishment" makes sense in this context.

RW question 8

The work of molecular biophysicist Enrique M. De La Cruz is known for _____ traditional boundaries between academic disciplines. The university laboratory that De La Cruz runs includes engineers, biologists, chemists, and physicists, and the research the lab produces makes use of insights and techniques from all those fields.

Which choice completes the text with the most logical and precise word or phrase?

A) reinforcing

B) anticipating

C) epitomizing

D) transcending

Key	D
Domain	Craft and Structure
Skill	Words in Context

Key Explanation: Choice D is the best answer. "Transcending," which means rising above or going beyond limits, effectively signals that De La Cruz broke down traditional academic disciplinary boundaries by working with experts, ideas, and methods from numerous fields.

Distractor Explanations: Choice A is incorrect because "reinforcing" suggests the opposite of what the passage says, which is that De La Cruz broke down, rather than made stronger, traditional barriers between academic disciplines. **Choice B** is incorrect because "anticipating," in the sense of expecting or acting in advance of something, does not make sense in this context. **Choice C** is incorrect because "epitomizing," meaning to use something as an ideal example, suggests the opposite of what the text says, which is that De La Cruz broke down, rather than idealized, traditional barriers between academic disciplines.

RW question 9

Some studies have suggested that posture can influence cognition, but we should not overstate this phenomenon. A case in point: In a 2014 study, Megan O'Brien and Alaa Ahmed had subjects stand or sit while making risky simulated economic decisions. Standing is more physically unstable and cognitively demanding than sitting; accordingly, O'Brien and Ahmed hypothesized that standing subjects would display more risk aversion during the decision-making tasks than sitting subjects did, since they would want to avoid further feelings of discomfort and complicated risk evaluations. But O'Brien and Ahmed actually found no difference in the groups' performance.

Which choice best states the main purpose of the text?

A) It presents the study by O'Brien and Ahmed to critique the methods and results reported in previous studies of the effects of posture on cognition.

B) It argues that research findings about the effects of posture on cognition are often misunderstood, as in the case of O'Brien and Ahmed's study.

C) It explains a significant problem in the emerging understanding of posture's effects on cognition and how O'Brien and Ahmed tried to solve that problem.

D) It discusses the study by O'Brien and Ahmed to illustrate why caution is needed when making claims about the effects of posture on cognition.

Key	D
Domain	Craft and Structure
Skill	Text Structure and Purpose

Key Explanation: Choice D is the best answer. The passage asserts that "we should not overstate" the effect of posture on cognition and uses the O'Brien and Ahmed study as a "case in point" in support of that claim.

Distractor Explanations: Choice A is incorrect because although the passage indicates that O'Brien and Ahmed reached different conclusions from those of other researchers, it does not use the O'Brien and Ahmed study to criticize how those earlier studies were conducted or to directly challenge the accuracy of those studies' results. **Choice B** is incorrect because although the passage indicates that the results from studies finding a link between posture and cognition have been overstated, it offers no evidence that the O'Brien and Ahmed study has often been misunderstood. **Choice C** is incorrect because the passage suggests that although O'Brien and Ahmed were interested in studying the matter of posture and cognition, it does not indicate what these researchers thought before conducting their study or that the researchers set out specifically to solve a problem.

RW question 10

The following text is from Herman Melville's 1854 short story "The Lightning-Rod Man."

The stranger still stood in the exact middle of the cottage, where he had first planted himself. His singularity impelled a closer scrutiny. A lean, gloomy figure. Hair dark and lank, mattedly streaked over his brow. His sunken pitfalls of eyes were ringed by indigo halos, and played with an innocuous sort of lightning: the gleam without the bolt. The whole man was dripping. He stood in a puddle on the bare oak floor: his strange walking-stick vertically resting at his side.

Which choice best states the function of the underlined sentence in the text as a whole?

A) It sets up the character description presented in the sentences that follow.

B) It establishes a contrast with the description in the previous sentence.

C) It elaborates on the previous sentence's description of the character.

D) It introduces the setting that is described in the sentences that follow.

Key	A
Domain	Craft and Structure
Skill	Text Structure and Purpose

Key Explanation: Choice A is the best answer. The underlined sentence, which asserts that the uniqueness of the stranger's physical appearance invited careful examination, sets up the following sentences' description of the stranger's distinctive physical features and stance.

Distractor Explanations: Choice B is incorrect because the underlined sentence has no direct logical relationship to the previous sentence. **Choice C** is incorrect because the previous sentence does not describe the stranger, so the underlined sentence cannot build on it in this way. **Choice D** is incorrect because the underlined sentence offers a general sense of the stranger's physical appearance and does not introduce a setting, nor is the main purpose of the following sentences to describe a setting.

RW question 11

Text 1

What factors influence the abundance of species in a given ecological community? Some theorists have argued that historical diversity is a major driver of how diverse an ecological community eventually becomes: differences in community diversity across otherwise similar habitats, in this view, are strongly affected by the number of species living in those habitats at earlier times.

Text 2

In 2010, a group of researchers including biologist Carla Cáceres created artificial pools in a New York forest. They stocked some pools with a diverse mix of zooplankton species and others with a single zooplankton species and allowed the pool communities to develop naturally thereafter. Over the course of four years, Cáceres and colleagues periodically measured the species diversity of the pools, finding—contrary to their

expectations—that by the end of the study there was little to no difference in the pools' species diversity.

Based on the texts, how would Cáceres and colleagues (Text 2) most likely describe the view of the theorists presented in Text 1?

A) It is largely correct, but it requires a minor refinement in light of the research team's results.

B) It is not compelling as a theory regardless of any experimental data collected by the research team.

C) It may seem plausible, but it is not supported by the research team's findings.

D) It probably holds true only in conditions like those in the research team's study.

Key	C
Domain	Craft and Structure
Skill	Cross-Text Connections

Key Explanation: Choice C is the best answer. Text 2 indicates that Cáceres and colleagues expected to find at the end of their study that the pools they stocked with multiple zooplankton species would have greater diversity than the pools they stocked with a single zooplankton species but that this was not, in fact, the case.

Distractor Explanations: Choice A is incorrect because the findings obtained by Cáceres and colleagues fundamentally challenge the hypothesis in Text 1 rather than largely support it. **Choice B** is incorrect because "contrary to their expectations" (Text 2) indicates that Cáceres and colleagues had assumed the hypothesis in Text 1 was correct prior to conducting their own study. **Choice D** is incorrect because the findings obtained by Cáceres and colleagues undermine, rather than support, the hypothesis in Text 1.

RW question 12

While researching a topic, a student has taken the following notes:

- Maika'i Tubbs is a Native Hawaiian sculptor and installation artist.
- His work has been shown in the United States, Canada, Japan, and Germany, among other places.
- Many of his sculptures feature discarded objects.
- His work *Erasure* (2008) includes discarded audiocassette tapes and magnets.
- His work *Home Grown* (2009) includes discarded pushpins, plastic plates and forks, and wood.

The student wants to emphasize a similarity between the two works. Which choice most effectively uses relevant information from the notes to accomplish this goal?

A) *Erasure* (2008) uses discarded objects such as audiocassette tapes and magnets; *Home Grown* (2009), however, includes pushpins, plastic plates and forks, and wood.

B) Like many of Tubbs's sculptures, both *Erasure* and *Home Grown* include discarded objects: *Erasure* uses audiocassette tapes, and *Home Grown* uses plastic forks.

C) Tubbs's work, which often features discarded objects, has been shown both within the United States and abroad.

D) Tubbs completed *Erasure* in 2008 and *Home Grown* in 2009.

Key	B
Domain	Expression of Ideas
Skill	Rhetorical Synthesis

Key Explanation: Choice B is the best answer. The sentence uses "like many of Tubbs's sculptures" and "both" to emphasize a similarity between *Erasure* and *Home Grown* in terms of their common use of discarded objects, though the specific discarded objects used differed between the two works.

Distractor Explanations: Choice A is incorrect because although the sentence discusses two of Tubbs's works, the use of "however" emphasizes a contrast, rather than a similarity, between the works. **Choice C** is incorrect because the sentence focuses only on Tubbs's work in general and does not mention any specific works. **Choice D** is incorrect because the sentence simply conveys information about two of Tubbs's works—the year in which each was completed—without establishing any sort of logical relationship between the pieces of information.

RW question 13

Iraqi artist Nazik Al-Malaika, celebrated as the first Arabic poet to write in free verse, didn't reject traditional forms entirely; her poem "Elegy for a Woman of No Importance" consists of two ten-line stanzas and a standard number of syllables. Even in this superficially traditional work, _____ Al-Malaika was breaking new ground by memorializing an anonymous woman rather than a famous man.

Which choice completes the text with the most logical transition?

A) in fact,

B) though,

C) therefore,

D) moreover,

Key	B
Domain	Expression of Ideas
Skill	Transitions

Key Explanation: Choice B is the best answer. The passage's first sentence establishes that although Al-Malaika is famous for her free verse poetry, she still made some use of traditional poetic forms, as in her work "Elegy for a Woman of No Importance." The passage's last sentence qualifies the point made in the passage's first sentence by indicating that even when Al-Malaika

used traditional forms, as in "Elegy," she challenged tradition, in this case by making an "anonymous woman rather than a famous man" the subject of the poem. "Though" is the best transition for the passage's last sentence because, along with "even," it signals that Al-Malaika subverted traditional poetic forms even when she used them by, in this case, using a nontraditional subject for an elegy.

Distractor Explanations: Choice A is incorrect because "in fact" illogically signals that the passage's last sentence stresses or amplifies the truth of the assertion made in the passage's first sentence. **Choice C** is incorrect because "therefore" illogically signals that the passage's last sentence describes a consequence arising from the assertion made in the passage's first sentence. **Choice D** is incorrect because "moreover" illogically signals that the passage's last sentence merely offers additional information about the assertion made in the passage's first sentence.

RW question 14

According to Naomi Nakayama of the University of Edinburgh, the reason seeds from a dying dandelion appear to float in the air while _____ is that their porous plumes enhance drag, allowing the seeds to stay airborne long enough for the wind to disperse them throughout the surrounding area.

Which choice completes the text so that it conforms to the conventions of Standard English?

A) falling,

B) falling:

C) falling;

D) falling

Key	D
Domain	Standard English Conventions
Skill	Boundaries

Key Explanation: Choice D is the best answer. No punctuation is needed.

Distractor Explanations: Choices A, B, and **C** are incorrect because each inserts unnecessary punctuation (a comma, colon, and semicolon, respectively) between the sentence's subject ("the reason . . . falling") and the verb "is."

RW question 15

Rabinal Achí is a precolonial Maya dance drama performed annually in Rabinal, a town in the Guatemalan highlands. Based on events that occurred when Rabinal was a city-state ruled by a king, _____ had once been an ally of the king but was later captured while leading an invading force against him.

Which choice completes the text so that it conforms to the conventions of Standard English?

A) *Rabinal Achí* tells the story of K'iche' Achí, a military leader who

B) K'iche' Achí, the military leader in the story of *Rabinal Achí,*

C) there was a military leader, K'iche' Achí, who in *Rabinal Achí*

D) the military leader whose story is told in *Rabinal Achí*, K'iche' Achí,

Key	A
Domain	Standard English Conventions
Skill	Form, Structure, and Sense

Key Explanation: Choice A is the best answer. This choice ensures that the introductory participial phrase "Based on events that occurred when Rabinal was a city-state ruled by a king" appears immediately before the noun it modifies, "*Rabinal Achí*."

Distractor Explanations: Choices B, C, and **D** are incorrect because "Based on events that occurred when Rabinal was a city-state ruled by a king" should appear next to the words it modifies, "*Rabinal Achí*," whereas all these choices result in dangling modifiers.

Math question 1

If $f(x) = x + 7$ and $g(x) = 7x$, what is the value of $4f(2) - g(2)$?

A) -5

B) 1

C) 22

D) 28

Key	C
Domain	Algebra
Skill	*Linear functions*
	Evaluate a linear function given an input value

Key Explanation: Choice C is correct. The value of $f(2)$ can be found by substituting 2 for x in the given equation $f(x) = x + 7$, which yields $f(2) = 2 + 7$, or $f(2) = 9$. The value of $g(2)$ can be found by substituting 2 for x in the given equation $g(x) = 7x$, which yields $g(2) = 7(2)$, or $g(2) = 14$. The value of the expression $4f(2) - g(2)$ can be found by substituting the corresponding values into the expression, which gives $4(9) - 14$. This expression is equivalent to $36 - 14$, or 22.

Distractor Explanations: Choice A is incorrect. This is the value of $f(2) - g(2)$, not $4f(2) - g(2)$. **Choice B** is incorrect and may result from calculating $4f(2)$ as $4(2) + 7$, rather than $4(2 + 7)$. **Choice D** is incorrect and may result from conceptual or calculation errors.

Math question 2

The y-intercept of the graph of $y = -6x - 32$ in the xy-plane is $(0, y)$. What is the value of y?

Key	-32
Domain	Algebra
Skill	*Linear equations in two variables*
	Make connections between an algebraic representation and a graph

Key Explanation: The correct answer is -32. It's given that the y-intercept of the graph of $y = -6x - 32$ is $(0, y)$. Substituting 0 for x in this equation yields $y = -6(0) - 32$ or $y = -32$. Therefore, the value of y that corresponds to the y-intercept of the graph of $y = -6x - 32$ in the xy-plane is -32.

Math question 3
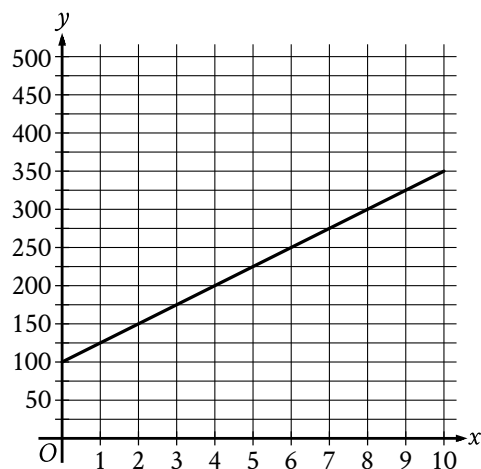
The graph of the function f, where $y = f(x)$, models the total cost y, in dollars, for a certain video game system and x games. What is the best interpretation of the slope of the graph in this context?

A) Each game costs $25.

B) The video game system costs $100.

C) The video game system costs $25.

D) Each game costs $100.

Key	A
Domain	Algebra
Skill	*Linear functions*
	Interpret the graph of a linear function in terms of a context

Key Explanation: Choice A is correct. The given graph is a line, and the slope of a line is defined as the change in the value of *y* for each increase in the value of *x* by 1. It's given that *y* represents the total cost, in dollars, and that *x* represents the number of games. Therefore, the change in the value of *y* for each increase in the value of *x* by 1 represents the change in total cost, in dollars, for each increase in the number of games by 1. In other words, the slope represents the cost, in dollars, per game. The graph shows that when the value of *x* increases from 0 to 1, the value of *y* increases from 100 to 125. It follows that the slope is 25, or the cost per game is $25. Thus, the best interpretation of the slope of the graph is that each game costs $25.

Distractor Explanations: Choice B is incorrect. This is an interpretation of the *y*-intercept of the graph rather than the slope of the graph. **Choice C** is incorrect. The slope of the graph is the cost per game, not the cost of the video game system. **Choice D** is incorrect. Each game costs $25, not $100.

Math question 4

$$y < -4x + 4$$

Which point (x, y) is a solution to the given inequality in the xy-plane?

A) $(2, -1)$

B) $(2, 1)$

C) $(0, 5)$

D) $(-4, 0)$

Key	D
Domain	Algebra
Skill	*Linear inequalities in one or two variables*
	For a linear inequality, interpret a point in the *xy*-plane

Key Explanation: Choice D is correct. For a point (x, y) to be a solution to the given inequality in the *xy*-plane, the value of the point's *y*-coordinate must be less than the value of $-4x + 4$, where *x* is the value of the *x*-coordinate of the point. This is true of the point $(-4, 0)$ because $0 < -4(-4) + 4$, or $0 < 20$. Therefore, the point $(-4, 0)$ is a solution to the given inequality.

Distractor Explanations: Choices A, B, and **C** are incorrect. None of these points is a solution to the given inequality because each point's *y*-coordinate is greater than the value of $-4x + 4$ for the point's *x*-coordinate.

Math question 5

Figure A and figure B are both regular polygons. The sum of the perimeter of figure A and the perimeter of figure B is 63 inches. The equation $3x + 6y = 63$ represents this situation, where x is the number of sides of figure A and y is the number of sides of figure B. Which statement is the best interpretation of 6 in this context?

A) Each side of figure B has a length of 6 inches.

B) The number of sides of figure B is 6.

C) Each side of figure A has a length of 6 inches.

D) The number of sides of figure A is 6.

Key	A
Domain	Algebra
Skill	*Linear equations in two variables*
	For a linear equation, interpret a solution, constant, variable, factor, or term based on the context

Key Explanation: Choice A is correct. It's given that figure A and figure B (not shown) are both regular polygons and the sum of the perimeters of the two figures is 63 inches. It's also given that x is the number of sides of figure A and y is the number of sides of figure B, and that the equation $3x + 6y = 63$ represents this situation. Thus, $3x$ and $6y$ represent the perimeters, in inches, of figure A and figure B, respectively. Since $6y$ represents the perimeter, in inches, of figure B and y is the number of sides of figure B, it follows that each side of figure B has a length of 6 inches.

Distractor Explanations: Choice B is incorrect. The number of sides of figure B is y, not 6. **Choice C** is incorrect. Since the perimeter, in inches, of figure A is represented by $3x$, each side of figure A has a length of 3 inches, not 6 inches. **Choice D** is incorrect. The number of sides of figure A is x, not 6.

Math question 6

Store A sells raspberries for $5.50 per pint and blackberries for $3.00 per pint. Store B sells raspberries for $6.50 per pint and blackberries for $8.00 per pint. A certain purchase of raspberries and blackberries would cost $37.00 at store A or $66.00 at store B. How many pints of blackberries are in this purchase?

A) 12

B) 8

C) 5

D) 4

Key	C
Domain	Algebra
Skill	*Systems of two linear equations in two variables*
	Create and use a system of two linear equations

Key Explanation: Choice C is correct. It's given that store A sells raspberries for $5.50 per pint and

blackberries for $3.00 per pint, and a certain purchase of raspberries and blackberries at store A would cost $37.00. It's also given that store B sells raspberries for $6.50 per pint and blackberries for $8.00 per pint, and this purchase of raspberries and blackberries at store B would cost $66.00. Let r represent the number of pints of raspberries and b represent the number of pints of blackberries in this purchase. The equation $5.50r + 3.00b = 37.00$ represents this purchase of raspberries and blackberries from store A and the equation $6.50r + 8.00b = 66.00$ represents this purchase of raspberries and blackberries from store B. Solving the system of equations by elimination gives the value of r and the value of b that make the system of equations true. Multiplying both sides of the equation for store A by 6.5 yields $(5.50r)(6.5) + (3.00b)(6.5) = (37.00)(6.5)$, or $35.75r + 19.5b = 240.5$. Multiplying both sides of the equation for store B by 5.5 yields $(6.50r)(5.5) + (8.00b)(5.5) = (66.00)(5.5)$, or $35.75r + 44b = 363$. Subtracting both sides of the equation for store A, $35.75r + 19.5b = 240.5$, from the corresponding sides of the equation for store B, $35.75r + 44b = 363$, yields $(35.75r - 35.75r) + (44b - 19.5b) = (363 - 240.5)$, or $24.5b = 122.5$. Dividing both sides of this equation by 24.5 yields $b = 5$. Thus, 5 pints of blackberries are in this purchase.

Distractor Explanations: Choices A and **B** are incorrect and may result from conceptual or calculation errors. **Choice D** is incorrect. This is the number of pints of raspberries, not blackberries, in the purchase.

Math question 7

$$g(x) = x^2 + 55$$

What is the minimum value of the given function?

A) 3,025

B) 110

C) 55

D) 0

Key	C
Domain	Advanced Math
Skill	*Nonlinear functions*
	Determine the most suitable form of a function to display key features

Key Explanation: Choice C is correct. A quadratic function in the form $g(x) = a(x - h)^2 + k$, where a, h, and k are constants, has a minimum value of k at $x = h$ when $a > 0$. The given quadratic function can be rewritten as $g(x) = 1(x - 0)^2 + 55$, where $h = 0$ and $k = 55$. Therefore, the minimum value of the given function is 55.

Distractor Explanations: Choice A is incorrect and may result from squaring the minimum value. **Choice B** is incorrect and may result from multiplying the minimum value by 2. **Choice D** is incorrect. This is the x-value at which the minimum value of $g(x)$ occurs.

Math question 8

The function h is defined by $h(x) = a^x + b$, where a and b are positive constants. The graph of $y = h(x)$ in the xy-plane passes through the points $(0, 10)$ and $\left(-2, \frac{325}{36}\right)$. What is the value of ab?

A) $\frac{1}{4}$

B) $\frac{1}{2}$

C) 54

D) 60

Key	C
Domain	Advanced Math
Skill	*Nonlinear functions*
	Make connections between algebraic representations and a graph

Key Explanation: Choice C is correct. It's given that the function h is defined by $h(x) = a^x + b$ and that the graph of $y = h(x)$ in the xy-plane passes through the points $(0, 10)$ and $\left(-2, \frac{325}{36}\right)$. Substituting 0 for x and 10 for $h(x)$ in the equation $h(x) = a^x + b$ yields $10 = a^0 + b$, or $10 = 1 + b$. Subtracting 1 from both sides of this equation yields $9 = b$. Substituting -2 for x and $\frac{325}{36}$ for $h(x)$ in the equation $h(x) = a^x + 9$ yields $\frac{325}{36} = a^{-2} + 9$. Subtracting 9 from both sides of this equation yields $\frac{1}{36} = a^{-2}$, which can be rewritten as $\frac{1}{36} = \frac{1}{a^2}$, or $a^2 = 36$. Taking the square root of both sides of this equation yields $a = 6$ and $a = -6$, but because it's given that a is a positive constant, a must equal 6. Because the value of a is 6 and the value of b is 9, the value of ab is $(6)(9)$, or 54.

Distractor Explanations: Choice A is incorrect and may result from finding the value of $a^{-2}b$ rather than the value of ab. **Choice B** is incorrect and may result from conceptual or calculation errors. **Choice D** is incorrect and may result from correctly finding the value of a as 6, but multiplying it by the y-value in the first ordered pair rather than by the value of b.

Math question 9

$$(x - 1)^2 = -4$$

How many distinct real solutions does the given equation have?

A) Exactly one

B) Exactly two

C) Infinitely many

D) Zero

Key	D
Domain	Advanced Math
Skill	*Nonlinear equations in one variable and systems of equations in two variables*
	Determine the conditions under which a quadratic equation has zero, one, two, or infinitely many real solutions

Key Explanation: Choice D is correct. Any quantity that is positive or negative in value has a positive value when squared. Therefore, the left-hand side of the given equation is either positive or zero for any value of *x*. Since the right-hand side of the given equation is negative, there is no value of *x* for which the given equation is true. Thus, the number of distinct real solutions for the given equation is zero.

Distractor Explanations: Choices A, B, and **C** are incorrect and may result from conceptual errors.

Math question 10

Which expression is equivalent to $\frac{4}{4x-5} - \frac{1}{x+1}$?

A) $\frac{9}{(x+1)(4x-5)}$

B) $\frac{3}{3x-6}$

C) $\frac{1}{(x+1)(4x-5)}$

D) $-\frac{1}{(x+1)(4x-5)}$

Key	A
Domain	Advanced Math
Skill	*Equivalent expressions*
	Rewrite a rational expression

Key Explanation: Choice A is correct. To subtract one rational expression from another, the denominators of the expressions must be the same. Since $4x - 5$

and $x + 1$ do not have any common factors, each rational expression should be rewritten with a denominator of $(x + 1)(4x - 5)$. Multiplying $\frac{4}{(4x-5)}$ by $\frac{x+1}{x+1}$ and multiplying $\frac{1}{(x+1)}$ by $\frac{4x-5}{4x-5}$ yields $\frac{4(x+1)}{(x+1)(4x-5)} - \frac{4x-5}{(x+1)(4x-5)}$. This expression can be rewritten using the distributive property, which yields $\frac{4x+4}{(x+1)(4x-5)} - \frac{4x-5}{(x+1)(4x-5)}$. Since the denominators are the same, this expression is equivalent to $\frac{4x+4-4x+5}{(x+1)(4x-5)}$, or $\frac{9}{(x+1)(4x-5)}$.

Distractor Explanations: Choices B, C, and **D** are incorrect and may result from conceptual or calculation errors.

Math question 11

For the function f, $f(0) = 86$, and for each increase in x by 1, the value of $f(x)$ decreases by 80%. What is the value of $f(2)$?

Key	3.44, 86/25
Domain	Advanced Math
Skill	*Nonlinear functions*
	Create and use quadratic or exponential functions

Key Explanation: The correct answer is 3.44. It's given that $f(0) = 86$ and that for each increase in *x* by 1, the value of $f(x)$ decreases by 80%. Because the output of the function decreases by a constant percentage for each 1-unit increase in the value of *x*, this relationship can be represented by an exponential function of the form $f(x) = a(b)^x$, where *a* represents the initial value of the function and *b* represents the rate of decay, expressed as a decimal. Because $f(0) = 86$, the value of *a* must be 86. Because the value of $f(x)$ decreases by 80% for each 1-unit increase in *x*, the value of *b* must be $(1 - 0.80)$, or 0.2. Therefore, the function *f* can be

defined by $f(x) = 86(0.2)^x$. Substituting 2 for x in this function yields $f(2) = 86(0.2)^2$, which is equivalent to $f(2) = 86(0.04)$, or $f(2) = 3.44$. Either 3.44 or 86/25 may be entered as the correct answer.

Alternate approach: It's given that $f(0) = 86$ and that for each increase in x by 1, the value of $f(x)$ decreases by 80%. Therefore, when $x = 1$, the value of $f(x)$ is $(100 - 80)\%$, or 20%, of 86, which can be expressed as $(0.20)(86)$. Since $(0.20)(86) = 17.2$, the value of $f(1)$ is 17.2. Similarly, when $x = 2$, the value of $f(x)$ is 20% of 17.2, which can be expressed as $(0.20)(17.2)$. Since $(0.20)(17.2) = 3.44$, the value of $f(2)$ is 3.44. Either 3.44 or 86/25 may be entered as the correct answer.

Math question 12

In the xy-plane, a line with equation $2y = 4.5$ intersects a parabola at exactly one point. If the parabola has equation $y = -4x^2 + bx$, where b is a positive constant, what is the value of b?

| Key	6
Domain	Advanced Math
Skill	*Nonlinear equations in one variable and systems of equations in two variables* Solve systems of linear and nonlinear equations in two variables

Key Explanation: The correct answer is 6. It's given that a line with equation $2y = 4.5$ intersects a parabola with equation $y = -4x^2 + bx$, where b is a positive constant, at exactly one point in the xy-plane. It follows that the system of equations consisting of $2y = 4.5$ and $y = -4x^2 + bx$ has exactly one solution. Dividing both sides of the equation of the line by 2 yields $y = 2.25$. Substituting 2.25 for y in the equation of the parabola yields $2.25 = -4x^2 + bx$. Adding $4x^2$ and subtracting bx from both sides of this equation yields $4x^2 - bx + 2.25 = 0$. A quadratic equation in the form of $ax^2 + bx + c = 0$, where a, b, and c are constants, has exactly one solution when the discriminant, $b^2 - 4ac$, is equal to zero. Substituting 4 for a and 2.25

for c in the expression $b^2 - 4ac$ and setting this expression equal to 0 yields $b^2 - 4(4)(2.25) = 0$, or $b^2 - 36 = 0$. Adding 36 to each side of this equation yields $b^2 = 36$. Taking the square root of each side of this equation yields $b = \pm 6$. It's given that b is positive, so the value of b is 6.

Math question 13

The scatterplot shows the relationship between two variables, x and y. A line of best fit for the data is also shown.
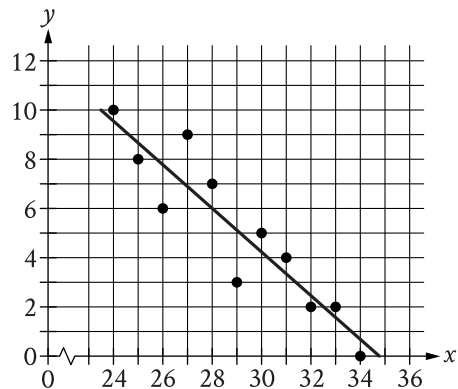
At $x = 32$, which of the following is closest to the y-value predicted by the line of best fit?

A) 0.4

B) 1.5

C) 2.4

D) 3.3

Key	C
Domain	Problem-Solving and Data Analysis
Skill	*Two-variable data: Models and scatterplots* Analyze and interpret data in a scatterplot

Key Explanation: Choice C is correct. At $x = 32$, the line of best fit has a y-value between 2 and 3. The only choice with a value between 2 and 3 is choice C.

Distractor Explanations: Choice A is incorrect. This is the difference between the y-value predicted by the line of best fit and the actual y-value at $x = 32$ rather than the y-value predicted by the line of best fit at $x = 32$. **Choice B** is incorrect. This is the y-value predicted by the line of best fit at $x = 31$ rather than at $x = 32$. **Choice D** is incorrect. This is the y-value predicted by the line of best fit at $x = 33$ rather than at $x = 32$.

Math question 14

In a group, 40% of the items are red. Of all the red items in the group, 30% also have stripes. What percentage of the items in the group are red and have stripes?

A) 10%

B) 12%

C) 70%

D) 75%

Key	B
Domain	Problem-Solving and Data Analysis
Skill	*Percentages* Use percentages to solve problems

Key Explanation: Choice B is correct. It's given that in a group, 40% of the items are red. It follows that the number of red items in the group can be represented by $0.4x$, where x represents the total number of items in the group. It's also given that of all the red items in the group, 30% also have stripes. It follows that the number of items in the group that are red and have stripes can be represented by $0.3(0.4x)$, or $0.12x$. The expression $0.12x$ represents 12% of x. Since x represents the total number of items in the group, it follows that 12% of the items in the group are red and have stripes.

Distractor Explanations: Choice A is incorrect and may result from subtracting 30% from 40% rather than

calculating 30% of 40%. **Choice C** is incorrect and may result from adding 30% and 40% rather than calculating 30% of 40%. **Choice D** is incorrect and may result from calculating the percentage that 30% is of 40% rather than calculating 30% of 40%.

Math question 15

The density of a certain type of wood is 353 kilograms per cubic meter. A sample of this type of wood is in the shape of a cube and has a mass of 345 kilograms. To the nearest hundredth of a meter, what is the length of one edge of this sample?

A) 0.98

B) 0.99

C) 1.01

D) 1.02

Key	B
Domain	Problem-Solving and Data Analysis
Skill	*Ratios, rates, proportional relationships, and units* Solve problems involving derived units

Key Explanation: Choice B is correct. It's given that the density of a certain type of wood is 353 kilograms per cubic meter (kg/m^3), and a sample of this type of wood has a mass of 345 kg. Let x represent the volume, in m^3, of the sample. It follows that the relationship between the density, mass, and volume of this sample can be written as $\frac{353 \text{ kg}}{1 \text{ m}^3} = \frac{345 \text{ kg}}{x \text{ m}^3}$, or $353 = \frac{345}{x}$. Multiplying both sides of this equation by x yields $353x = 345$. Dividing both sides of this equation by 353 yields $x = \frac{345}{353}$. Therefore, the volume of this sample is $\frac{345}{353}$ m^3.

Since it's given that the sample of this type of wood is a cube, it follows that the length of one edge of this sample can be found using the volume formula for a cube, $V = s^3$, where V represents the volume, in m^3, and s represents the length, in m, of one edge of

the cube. Substituting $\frac{345}{353}$ for *V* in this formula yields

$\frac{345}{353} = s^3$. Taking the cube root of both sides of this

equation yields $\sqrt[3]{\frac{345}{353}} = s$, or $s \approx 0.99$. Therefore, the

length of one edge of this sample to the nearest hundredth of a meter is 0.99.

Distractor Explanations: Choices A, C, and **D** are incorrect and may result from conceptual or calculation errors.

Math question 16

Two nearby trees are perpendicular to the ground, which is flat. One of these trees is 10 feet tall and has a shadow that is 5 feet long. At the same time, the shadow of the other tree is 2 feet long. How tall, in feet, is the other tree?

A) 3

B) 4

C) 8

D) 27

Key	B
Domain	Geometry and Trigonometry
Skill	*Lines, angles, and triangles* Use concepts of congruence and similarity of triangles to solve problems

Key Explanation: Choice B is correct. Each tree and its shadow can be modeled using a right triangle, where the height of the tree and the length of its shadow are the legs of the triangle. At a given point in time, the right triangles formed by two nearby trees and their respective shadows will be similar. Therefore, if the height of the other tree is *x*, in feet, the value of *x* can be calculated by solving the proportional relationship

$\frac{10 \text{ feet tall}}{5 \text{ feet long}} = \frac{x \text{ feet tall}}{2 \text{ feet long}}$. This equation is equivalent to

$\frac{10}{5} = \frac{x}{2}$, or $2 = \frac{x}{2}$. Multiplying each side of the equation

$2 = \frac{x}{2}$ by 2 yields $4 = x$. Therefore, the other tree is 4 feet tall.

Distractor Explanations: Choice A is incorrect and may result from calculating the difference between the lengths of the shadows, rather than the height of the other tree. **Choice C** is incorrect and may result from calculating the difference between the height of the 10-foot-tall tree and the length of the shadow of the other tree, rather than calculating the height of the other tree. **Choice D** is incorrect and may result from a conceptual or calculation error.

Math question 17

The length of a rectangle's diagonal is $5\sqrt{17}$, and the length of the rectangle's shorter side is 5. What is the length of the rectangle's longer side?

A) $\sqrt{17}$

B) 20

C) $15\sqrt{2}$

D) 400

Key	B
Domain	Geometry and Trigonometry
Skill	*Right triangles and trigonometry* Use the Pythagorean theorem to solve problems

Key Explanation: Choice B is correct. A rectangle's diagonal divides a rectangle into two congruent right triangles, where the diagonal is the hypotenuse of both triangles. It's given that the length of the diagonal is $5\sqrt{17}$ and the length of the rectangle's shorter side is 5. Therefore, each of the two right triangles formed by the rectangle's diagonal has a hypotenuse with length $5\sqrt{17}$, and a shorter leg with length 5. To calculate the length of the longer leg of each right triangle, the Pythagorean theorem, $a^2 + b^2 = c^2$, can be used, where *a* and *b* are the lengths of the legs and *c* is the length of the hypotenuse of the triangle. Substituting 5 for *a* and $5\sqrt{17}$ for *c* in the equation $a^2 + b^2 = c^2$

yields $5^2 + b^2 = \left(5\sqrt{17}\right)^2$, which is equivalent to $25 + b^2 = 25(17)$, or $25 + b^2 = 425$. Subtracting 25 from each side of this equation yields $b^2 = 400$. Taking the positive square root of each side of this equation yields $b = 20$. Therefore, the length of the longer leg of each right triangle formed by the diagonal of the rectangle is 20. It follows that the length of the rectangle's longer side is 20.

Distractor Explanations: Choice A is incorrect and may result from dividing the length of the rectangle's diagonal by the length of the rectangle's shorter side, rather than substituting these values into the Pythagorean theorem. **Choice C** is incorrect and may result from using the length of the rectangle's diagonal as the length of a leg of the right triangle, rather than the length of the hypotenuse. **Choice D** is incorrect. This is the square of the length of the rectangle's longer side.

Key Explanation: Choice D is correct. It's given that the measure of arc AB is 45° and the length of arc AB is 3 inches. The arc measure of the full circle is 360°. If x represents the circumference, in inches, of the circle, it follows that $\frac{45°}{360°} = \frac{3 \text{ inches}}{x \text{ inches}}$. This equation is equivalent to $\frac{45}{360} = \frac{3}{x}$, or $\frac{1}{8} = \frac{3}{x}$. Multiplying both sides of this equation by $8x$ yields $1(x) = 3(8)$, or $x = 24$.

Therefore, the circumference of the circle is 24 inches.

Distractor Explanations: Choice A is incorrect. This is the length of arc AB. **Choice B** is incorrect and may result from multiplying the length of arc AB by 2. **Choice C** is incorrect and may result from squaring the length of arc AB.

Math question 18

A circle has center O, and points A and B lie on the circle. The measure of arc AB is 45° and the length of arc AB is 3 inches. What is the circumference, in inches, of the circle?

A) 3

B) 6

C) 9

D) 24

Key	D
Domain	Geometry and Trigonometry
Skill	*Circles* Use definitions, properties, and theorems relating to circles to solve problems