

# Reading and Writing Module 1

## 27 QUESTIONS

1

The following text is from Lilliam Rivera's 2020 novel Never Look Back. The text describes the narrator arriving at his father's apartment.

"Pops, I'm here!" I drop my bag and set my guitar case against a wall. I place my keys on the bowl right next to the ceramic elephant Pops got me on one of his trips to Santo Domingo when I was a little kid.

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

- A) Put
- B) Remove
- C) Rank
- D) Unfold

2

One way to \_\_\_\_\_ the importance of a scholar's research is to track how often other scholars refer to that research. For example, Federal Reserve Bank of Cleveland economist Loretta J. Mester, who studies central banking, is among the world's most frequently cited researchers in her field, indicating that her work has been quite significant.

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

- A) diminish
- B) increase
- C) vary
- D) measure

3

Though most hoaxes perpetrated as jokes by mischievous users of Wikipedia, an online encyclopedia that almost anyone can freely edit, have quickly been detected and removed, a few fictitious entries, such as those for the American punk rock band The Deadweights and the 17th-century legislator Nicholas Burkhart, persisted on the site for many years before they were finally recognized as \_\_\_\_\_ and deleted.

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

- A) enhancements
- B) pranks
- C) revelations
- D) analyses

4

There are many famous examples of election pollsters making inaccurate predictions in presidential elections. But neuroscientist and election pollster Sam Wang has said that these prediction failures should not lead campaigns to \_\_\_\_\_ election polling entirely. Polling is about more than just predicting the winner, throughout campaigns, it helps strategists identify where their efforts are most likely to be effective.

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

- A) distort
- B) neglect
- C) supplement
- D) enact

5

The following text is adapted from Virginia Woolf's 1919 novel *Night and Day*. Katharine is the granddaughter of a celebrated poet.

[Katharine's] descent from [a celebrated poet] was no surprise to her, but matter for satisfaction, until, as the years wore on, certain drawbacks made themselves very manifest. Perhaps it is a little depressing to inherit not lands but an example of intellectual virtue; perhaps the conclusiveness of a great ancestor is a little discouraging to those who run the risk of comparison with him.

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

- A) Particular
- B) Involved
- C) Expected
- D) Evident

6

What is a city? The answer depends on where you live! Many countries define an area as a city based on how many people live there. However, not every country uses the same numbers. Albania defines a city as an area with a population of at least 400, while Greece defines a city as having a minimum population of 10,000. Some countries even define cities using other factors, like the number of buildings in the area.

Which choice best describes the overall structure of the text?

- A) It lists the number of cities in one country, then compares that number to the number of cities in another country.
- B) It poses a question, then explains why the question has many answers.
- C) It describes two locations, then explains why only one of the locations is considered a city.
- D) It offers a recommendation, then provides reasons for that recommendation.

7

The following text is from Bram Stoker's 1911 novel *The Lair of the White Worm*. Adam is meeting his great-uncle Richard at a port.

The meeting so auspiciously begun proceeded well. Adam, seeing that the old man was interested in the novelty of the ship, suggested that he should stay the night on board, and that he would himself be ready to start at any hour and go anywhere that the other suggested. This affectionate willingness to fall in with his own plans quite won the old man's heart. He warmly accepted the invitation, and at once they became not only on terms of affectionate relationship, but almost like old friends.

Which choice best states the main purpose of the text?

- A) It describes why Adam and his great-uncle Richard are excited for their upcoming journey on the ship.
- B) It contrasts great-uncle Richard's wary first impressions of Adam with his ultimate affection toward him.
- C) It showcases how Adam's flexibility and consideration strengthen his relationship with his great-uncle Richard.

D) It states the reasons why Adam and his great-uncle Richard decide to sleep on the ship rather than finding lodging on land.

8

A team of researchers discovered that Matabele ants can identify an infected wound in a member of the colony and then treat the infection by covering the wound with antimicrobial secretions that the ants produce. The team found that the mortality rate for Matabele ants with infected injuries was reduced by 90% with this treatment, and they are hopeful that this discovery could aid in the development of new antibiotics for human use.

Which choice best describes the overall structure of the text?

- A) it identifies an issue concerning Matabele ants and then proposes a solution to address the issue.
- B) It summarizes research findings on Matabele ants and then identifies an area for further research.
- C) It describes unique properties of Matabele ants and then speculates on how those properties evolved
- D) It introduces a study of Matabele ants and then explains the research methods used in the study.

9

Archaeologists have observed similarities in the tools, such as bidirectional blades, uncovered at the Neolithic-period Mesopotamian settlement of Cayonu Tepesi and those uncovered at roughly contemporaneous settlements elsewhere in Southwest Asia, including those in the South Levant, Central Anatolia, and Central Zagros. Although similarities in tools could be attributed to imitative behavior or trade, Nefize Ezgi Alunisiket al. found evidence of genetic affinity among the populations of Cayonu Tepesi, Central Anatolia, the South Levant, and-to a lesser extent-Central Zagros.

Information in the text best supports which statement about the finding made by Alunisiket al?

- A) It suggests that in the Neolithic period, people in the South Levant and Central Anatolia imitated tool designs originating in Cayonu Tepesi more frequently than people in Central Zagros did.
- B) It helps explain why contemporaneous Neolithic peoples in Southwest Asia had similar tools but lacked other obvious cultural similarities.
- C) It raises the possibility that similarities in the design of tools found at Neolithic settlements in Southwest Asia emerged due to population blending between those settlements.
- D) It implies that people and tools likely arrived in Cayonu Tepesi from settlements in Central Anatolia and the South Levant at an earlier time than they did from settlements in Central Zagros.

10

The following text is from Mark Haber's 2022 novel *Saint Sebastian's Abyss*. The narrator and Schmidt are both art critics.

When my first wife admitted to Schmidt over dinner that she didn't find art, painting in particular, especially compelling, Schmidt winced, set down his fork, and sighed dramatically; he then excused himself, explaining an appointment he'd forgotten about had suddenly and inexplicably been remembered, while making it abundantly clear there was no appointment at all.

Based on the text, what is notable about Schmidt's behavior?

- A) Schmidt is only given to theatrical behavior when in the company of the narrator and his first wife.
- B) Schmidt conveys his feelings about one of his dining companions without explicitly stating them.
- C) Schmidt's absentmindedness regarding his schedule is uncharacteristic of him.
- D) Schmidt's departure is occasioned by the resumption of a previous disagreement with the narrator's first wife about a particular painting.

11

*Dos Mujeres* (*Salvadora y Herminia*) is a painting by Frida Kahlo, dated 1928. It's part of the full collection of the Museum of Fine Arts, Boston, in Boston, Massachusetts. A digital image of it can also be found in an online collection. In a paper, a student claims that people usually spend more time viewing a work of art in a museum than they do online.

Which finding, if true, would most directly support the underlined claim?

- A) Most people spend about three minutes viewing *Dos Mujeres* (*Salvadora y Herminia*) at the museum and only about one minute viewing it online.
- B) *Dos Mujeres* (*Salvadora y Herminia*) isn't the only work of art by Frida Kahlo that has been put online.
- C) Most people who go to museums in Boston are visiting from other places.
- D) More than one museum has works of art by Frida Kahlo in its full collection.

12

"Aunt Sue's Stories" is a 1926 poem by Langston Hughes. In the poem, the speaker indicates that the stories Aunt Sue tells are based on Aunt Sue's personal experiences, saying that \_\_\_\_\_

Which choice most effectively uses a quotation from "Aunt Sue's Stories" to illustrate the claim?

- A) a listening child "knows that Aunt Sue / Never got her stories out of any book at all./ But that they came / Right out of her own life."
- B) the people in the stories "Mingle themselves softly / In the flow of old Aunt Sue's voice,/ Mingle themselves softly."
- C) dark shadows "cross and recross / Aunt Sue's stories."
- D) the stories are told during "Summer nights on the front porch."

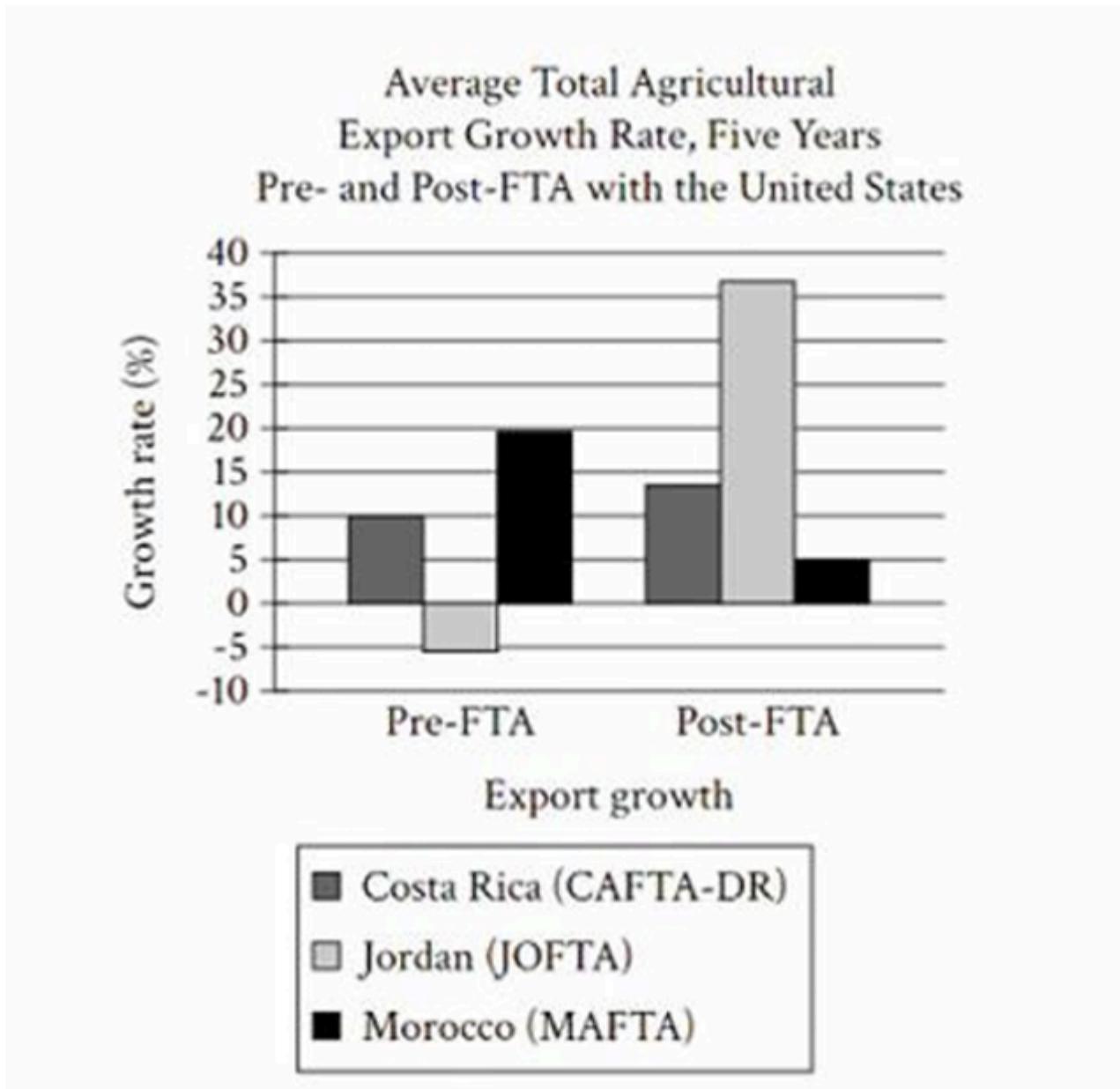
13

Poems is an 1895 collection of poetry by Frances E.W. Harper. In one of Harper's poems, the speaker suggests that those who mistreat people with less privilege will eventually receive divine judgment for it, saying, \_\_\_\_\_

Which quotation from Poems most effectively illustrates the claim?

- A) "Men may tread down the poor and lowly, / May crush them in anger and hate,/But surely the mills of God's justice / Will grind out the grist of their fate," (from "An Appeal to My Countrywomen")
- B) When ye plead for the wrecked and fallen, / The exile from far-distant shores, Remember that men are still wasting /Life's crimson around your own doors."(from "An Appeal to My Countrywomen")
- C) "Say not the age is hard and cold-/I think it brave and grand: / when men of diverse sects and creeds / Are clasping hand in hand," (from "The Present Age")
- D) "God help our native land, / Bring success to her strife, / And shower from thy hand /A more abundant life," (from "God Bless Our Native Land")

14



To measure whether countries in free trade agreements (FTAs) --- agreements among nations to reduce tariffs, duties, and other trade barriers --- experience changes in total agricultural exports, economist Kayode Ajewole and colleagues calculated average export growth rates for several countries over the five years before and the five years after entering an FTA with the United States. The graph shows the results for three countries in the study. Consulting the graph, a student claims that joining an FTA increases the rate of growth of a country's total agricultural exports.

Which choice best describes data from the graph that weaken the student's claim?

- A) All the countries shown had positive growth in agricultural exports over the five years after joining their respective FTAs, but their rates of export growth varied.
- B) Although agricultural exports from Jordan decreased over the five years before JOFTA, a reversal in this trend was observed over the five years after Jordan joined JOFTA.
- C) Over the five years after Costa Rica joined CAFTA-DR, agricultural exports from Costa Rica grew at a rate of about 13.5 percent, which is higher than the rate over the five years before Costa Rica joined the agreement.
- D) Although agricultural exports from Morocco grew over the five years after Morocco joined MAFTA, their growth rate was even higher in the five years before MAFTA.

15

Born in Chile in 1917, artist and ethnomusicologist Violeta Parra was a pioneer in the *nueva canción* Chilean (Chilean New Song) movement that emerged in the late 1950s and then spread throughout Latin America, Portugal, and Spain as *nueva canción*. Parra traveled all over Chile compiling extensive records of authentic folk music as well as recipes, proverbs, and other facets of cultural history. These records formed the foundation for the early movement's revival of traditional Chilean folk forms in new songs that represented modern realities of the working class and strongly advocated for social change. As the movement spread beyond Chile, the breadth of musical traditions incorporated into its foundation also expanded.

Which detail about songs associated with *nueva canción*, if true, would best illustrate the underlined claim?

- A) Many feature political commentary addressing contemporary issues that stemmed from shared experiences of European colonization in Latin American countries.

- B) Many demonstrate the stylistic influence of corrido, a genre of narrative songs from Mexico that had come to be characterized by political themes in the early 1800s.
- C) Many were produced by Argentinian artists in the late 1950s, with others by artists in additional Latin American countries first emerging soon after
- D) Many were written with parts meant to be played on the quena, a traditional flute used across Andean countries, including Chile,

16

The first modern public zoo opened at the height of the French Revolution in 1793. Located in downtown Paris, the zoo was called the Menagerie du Jardin des Plantes. It was filled with living animals that had been confiscated \_\_\_\_\_ the private collections of French aristocrats.

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

- A) from;
- B) from
- C) from:
- D) from,

17

Cy Twombly, a US painter and sculptor, created many largescale abstract works, such as his 10-painting series Fifty Days at Iliam. In these works, Twombly's artistic style is exemplified by his use of graffiti-like \_\_\_\_\_ often incorporate words or phrases from poetry and mythology.

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

- A) scribbles; that
- B) scribbles. That
- C) scribbles that
- D) scribbles: that

18

Kizomba, a genre of dance that originated in Angola, has become an international \_\_\_\_\_ 2022, the Indian dance duo known as Elvis and Namrata defeated performers from around the world to win the annual Olympiads of Kizomba competition held in Paris, France, becoming the first ever Asian winners.

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

- A) phenomenon and in
- B) phenomenon. In
- C) phenomenon, in
- D) phenomenon in

19

While some computer scientists, such as Michael Running Wolf, are optimistic about the use of large language models (LLMs) to preserve endangered Indigenous languages, researchers like Aliya Bhatia of the Center for Democracy and Technology \_\_\_\_\_ that from an archival standpoint, English-based LLMs may do more harm than good, given their propensity for error.

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

- A) fears
- B) has feared

C) fear

D) is fearful

20

As a leader of the National Woman Suffrage Association in the late 1800s, Olympia Brown of \_\_\_\_\_ an important role in the campaign to secure voting rights for Us women.

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

- A) Connecticut. Played
- B) Connecticut played
- C) Connecticut; played
- D) Connecticut: played

21

Generally, sleek vehicles are more aerodynamic than bulkier ones. For example, the streamlined nose of the T-38 Talon jet helps it glide through wind with relative ease. \_\_\_\_\_ a boxy semitruck encounters more wind resistance, making it less aerodynamic.

Which choice completes the text with the most logical transition?

- A) As a result,
- B) Specifically,
- C) In conclusion,
- D) On the other hand,

22

In astrophysics, a ring of debris orbiting a larger object within the object's Roche limit is expected to persist as a ring, whereas a ring of debris orbiting outside this limit would likely accrete into a satellite (e.g., a moon).

Bruno Morgado and colleagues, \_\_\_\_\_ detected a dense ring of material orbiting the trans-Neptunian object Quaoar at a distance of 2,500 miles, well outside the calculated Roche limit of 1,100 miles, that has remained intact.

Which choice completes the text with the most logical transition?

- A) likewise,
- B) for example,
- C) fittingly,
- D) though,

23

A team led by Portuguese researcher Isabel C.F.R. Ferreira found that many species of mushrooms contain chemicals called phenolic compounds, such as protocatechuic acid and biochanin. \_\_\_\_\_ Ferreira detected protocatechuic acid in *Agaricus bisporus* mushrooms and biochanin in *Ganoderma lucidum* mushrooms.

Which choice completes the text with the most logical transition?

- A) Nevertheless,
- B) However,
- C) For this reason,
- D) For example,

24

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

- Hina Hanta is an online archive curated by the Choctaw Nation of Oklahoma.
- It features images of cultural artifacts relevant to the history of the Choctaw people.
- It features household items, including a cup (isht ishko in Choctaw) made from clay.
- The cup was made in 1891.
- Hina Hanta features sports apparel, including a stickball collar (innuchi) made from horsehair.
- The stickball collar was made in 2016.

The student wants to make a generalization about the Hina Hanta archive. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) The Choctaw name for the clay cup is isht ishko.
- B) Included in the Hina Hanta online archive is a clay cup.
- C) The horsehair stickball collar (innuchi) was made in 2016.
- D) Not all artifacts in the Hina Hanta archive are from the 1800s.

25

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

- Most of the plant and bird species in Oahu, Hawaii, are non-native.
- In a 2019 study, researchers wanted to know what role non-native birds play in dispersing plant seeds in Oahu.
- Researchers catalogued plant seeds found in fecal samples from non-native birds.
- Clermontia kakeana, a flowering shrub, was one of fifteen native species catalogued.
- Ardisia elliptica, a tree, was one of twenty-nine non-native species catalogued.
- Researchers concluded that non-native birds play a vital role in dispersing the seeds of native and non-native plants.

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

- A) Seeds from Clermontia kakeana and Ardisia elliptica plants were found in the fecal samples of non-native Hawaiian birds, according to a 2019 study.
- B) A 2019 study catalogued plant seeds found in bird fecal samples in Oahu, Hawaii, to determine what role non-native birds play in seed dispersal.
- C) Most plant species found in Oahu, Hawaii, like Ardisia elliptica, are non-native.
- D) Though Clermontia kakeana and Ardisia elliptica can both be found in Oahu, Hawaii, only the former plant is native.

26

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

- Gianpaolo Bellini is an Italian particle physicist.
- Particle physicists study subatomic particles.
- Neutrinos are some of the least understood subatomic particles.
- Neutrinos were first discovered in the mid-twentieth century.
- Bellini is known for his research on solar and geoneutrinos.

The student wants to provide an example of a particle physicist whose research focuses on neutrinos. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) Neutrinos are a type of subatomic particle that particle physicists are still trying to understand.
- B) By studying solar and geoneutrinos --- to name just one example --- particle physicists can learn more about neutrinos
- C) Particle physicist Gianpaolo Bellini is known for his research on solar and geoneutrinos.
- D) The research done on solar and geoneutrinos exemplifies the work particle physicists do to advance our understanding of subatomic particles.

27

- In a 2003 study, Alexander and Schrag tested the effect of plant litter on seedling emergence in a grassland setting.
- The test site was a mesic grassland in a dry midlatitude climate in the United States.
- The researchers found that in these environmental conditions the presence of plant litter had a positive effect on seedling emergence.
- Seedling emergence is when a seedling sprouts above ground and begins photosynthesis

Which choice most effectively uses information from the given sentences to present the study's findings to an audience already familiar with the concept of seedling emergence?

- A) The findings of Alexander and Schrag's study were published in 2003.
- B) In a 2003 study by Alexander and Schrag, plant litter was found to have a positive effect on seedling emergence, which is when a seedling sprouts and begins photosynthesis
- C) The effect of plant litter, which includes dead leaves and other plant matter, on seedling emergence has been the subject of scientific study.
- D) Alexander and Schrag found that in a mesic grassland and a dry mid-latitude climate the presence of plant litter had a positive effect on seedling emergence.

## Reading and Writing Module 2

27 QUESTIONS

1

Text corpora such as the Brown Corpus are enormous collections of electronically stored texts that can be used for empirical testing of hypotheses regarding the frequency of typical word usage. For example, a linguist who assumes that the word "know" appears quite often in written English could \_\_\_\_\_ that assumption with data from a corpus: "know" is the eighth most commonly used verb.

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

- A) substantiate
- B) entail
- C) transpose
- D) refute

2

Gertrude Ederle, who was the first woman to swim across the English channel, and Wanda Rutkiewicz, who was the first woman to summit K2 (the second tallest mountain in the world), are ensured lasting places in our historical memory. No matter what others may do in the future, nobody can ever \_\_\_\_\_ these women as the first to accomplish these feats.

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

- A) stipulate
- B) induce
- C) supplant
- D) engender

3

During the 2007-2010 financial crisis, the United States furnished billions of dollars to selected countries' central banks via mechanisms called swap lines. Aditi Sahasrabuddhe found that countries' policy environments seem to have been \_\_\_\_\_ swap-line decisions: the probability that banks would be granted swap lines was 0.20 in counties open to foreign-capital inflows and 0.03 in countries with policies restricting such inflows.

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

- A) material to
- B) predicated on
- C) decoupled from
- D) mediated by

4

The Darlington is just one of approximately three million known historical shipwrecks spread throughout the world's oceans, and their impact on sea life and underwater ecosystems is of great interest to researchers. Rachel Moseley and colleagues were particularly curious about the effects of wooden shipwrecks on seafloor microbial communities. The researchers studied two wooden shipwrecks in the Gulf of Mexico by placing pieces of pine and oak between zero and 200 meters away from each shipwreck to collect samples of three kinds of microbes: bacteria, archaea, and fungi. They found that across the three microbial communities, peak diversity and richness was observed on pine and oak samples placed approximately 125 meters from the shipwrecks.

Which choice best describes the overall structure of the text?

- A) It introduces a study of microbial communities near shipwrecks that has received significant scholarly attention, summarizes the results of that study, and then describes a research team's reaction to the study.
- B) It states the number of known shipwrecks, describes the historical significance of one of those shipwrecks, and then comments on the various microbes found at the shipwreck site.
- C) It names a famous historical shipwreck, describes the type of wood used to build that ship, and then explains how that wood type influences underwater microbial communities.
- D) It notes a general scientific interest in shipwrecks' ecological effects, describes a specific study related to that interest, and then states one of the study's findings.

5

The following text is from Yung Wing's 1909 memoir *My Life in China and America*. Yung Wing was the first person from China to graduate from a US university.

Little did f realize when in 1845 I wrote, while in the Morrison school, a composition on "An Imaginary Voyage to New York and up the Hudson," that I was to see New York in reality. This incident leads me to the refection that sometimes our imagination foreshadows what lies uppermost in our minds and brings possibilities within the sphere of realities.

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

- A) It indicates Yung's unwillingness to distinguish between reality and fantasy as a child.
- B) It foreshadows Yung's future difficulties in publishing his writings.
- C) it describes an event in Yung's life that exemplifies a phenomenon.
- D) It illustrates the sense of adventure that Yung developed as a child.

6

Paintings by the Florida Highwaymen --- an informal collective of prolific landscape artists active in Florida during the 1950s and '60s --- are recognizable by their reiteration of the same general compositional structures and subjects: moonlit waters and poinciana trees, to name two. But there was room for individuation: Al Black's Sunset Backater Scene with Egrets, for example, may resemble other Highwaymen paintings at first glance, but his works stand out for their comparative bleakness and minimalism.

Which choice best describes the overall structure of the text?

- A) It describes an aesthetic framework shared by a particular group of artists and then makes and illustrates the claim that individuals introduced variations within that framework.
- B) It describes the common perception that a particular group of artists' works are derivative and then provides a specific piece of evidence that reinforces that perception.
- C) It explains how a particular group of artists began collaborating and then recounts how one member of that group became especially influential among them.
- D) It offers historical context that accounts for a particular group of artists' shared style and then indicates the circumstances under which several members of that group began exploring more unconventional themes.

7

Text 1 is adapted from E M, Forster's 1910 novel Howards End. Text 2 discusses Howards End. King's Cross and St, Pancras are adjacent railway terminals in London from which trains travel to the countryside.

Text 1

To Margaret the station of King's Cross had always suggested Infinity. Its very situation withdrawn a little behind the facile splendours of St, Pancras --- implied a comment on the materialism of life. Those two great arches, colourless, indifferent, shouldering between them an unlovely clock, were fit portals for some eternal adventure, whose issue might be prosperous, but would certainly not be expressed in the ordinary language of prosperity.

Text 2

The interplay between opposing ideological positions in Howards End is broadly articulated in the novel's organization of geographic space. On the one hand, the modern metropolis of London represents capitalism's emphasis on pragmatism and the accumulation of material wealth; on the other, the English countryside, accessible via King's Cross, fosters an idealism that values tradition, authentic personal connection, and the aesthetic --- what the novel calls "the infinite."

Based on the texts, the author of Text 2 would most likely agree with which statement about King's Cross, as it is depicted in Text 1?

- A) As a point of connection between London and the countryside, King's Cross suggests to Margaret the possibility of acquiring the intangible abundance promised by the kinds of authentic engagements that the

novel's rural spaces seem to offer

- B) Because it is situated at the beginning of Margaret's journey from the city to the country, King's Cross emblematises the intrusion of the forces of materialism and modernity into the rural spaces that the novel associates with idealism and tradition.
- C) The austerity conveyed by King's Cross's appearance mirrors Margaret's disillusionment with the prospect of having authentic connections with other people in a world that chiefly values more conventional forms of prosperity.
- D) King's Cross has a relatively unassuming appearance whose sharp contrast with the more aesthetically pleasing appearance of St. Pancras suggests to Margaret the ascendancy of the pragmatic capitalistic outlook among London's inhabitants

8

Though John Crowley, author of *Engine Summer*, is perhaps not as well known as the most commercially successful American writers of the past fifty years, his work has had several influential champions, including the poet John Hollander and the literary critic Harold Bloom. According to journalist Graeme Wood, Bloom claimed to have read Crowley's novel *Little, Big* at least forty-six times, and in his posthumously published afterword to a 2022 edition of the book, Bloom rhetorically asked: "How many living authors of prose romance are universally relevant? Only Crowley."

What is the main topic of the text?

- A) The similarities between the prose of John Crowley and the poetry of John Hollander
- B) The characteristics of John Crowley's work that make it universally relevant
- C) The reason why the work of John Crowley is not as commercially successful as it deserves to be
- D) The reception of the work of John Crowley

9

Minimum and Maximum Depths of Stony Coral Species in Caribbean and Indo-Pacific Waters

Species	Minimum depth (meters)	Maximum depth (meters)
<i>Agaricia grahamae</i>	20	115
<i>Acropora striata</i>	10	25
<i>Danafungia scruposa</i>	1	27
<i>Acropora anthocercis</i>	5	10

Some scientists have suggested that as ocean temperatures rise, many fish and corals found in the shallow zone (less than 30 meters below the surface) could take refuge in the cooler, darker mesophotic zone (30 to 150 meters below the surface). However, it isn't clear that all such species will be able to tolerate mesophotic conditions. In 2018, Hudson Pinheiro and colleagues studied stony corals in the two zones in Caribbean and Indo-Pacific waters. Based on the depths at which those corals are now found, the species that seems least suited to a full migration to the mesophotic zone is \_\_\_\_\_

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

- A) *Agaricia grahamae*, because its minimum depth of 20 meters is in the shallow zone.
- B) *Acropora anthocercis*, because its maximum depth of 10 meters is furthest from the mesophotic zone.

C) *Acropora striata*, because its maximum depth of 25 meters is close to but doesn't reach the mesophotic zone.

D) *Danafingia scruposa*, because its minimum depth of 1 meter is the shallowest of those listed.

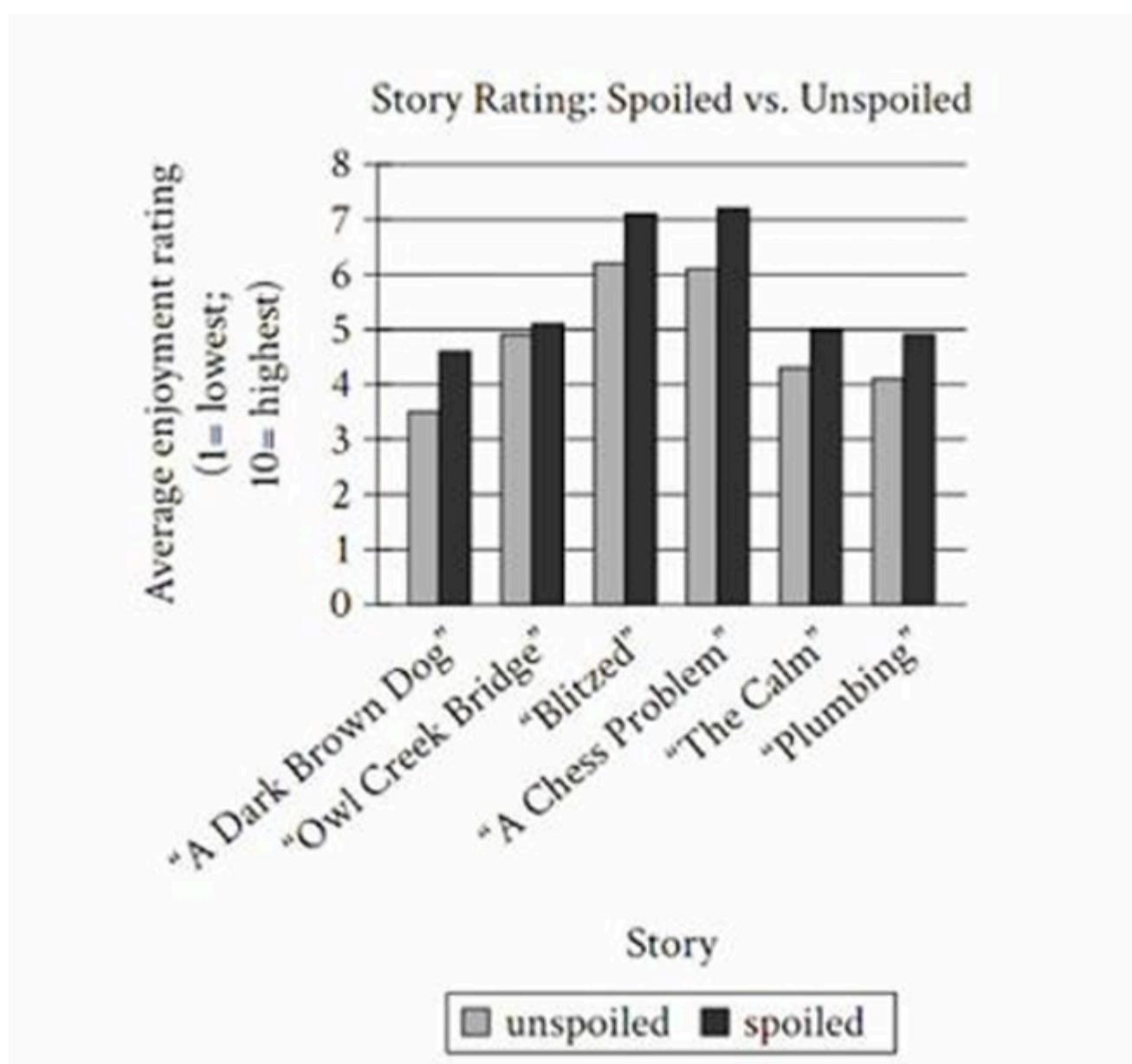
10

Rafael Núñez and colleagues studied how members of the Yupno, an indigenous group in Papua New Guinea, conceptualize time in both spoken language and gestures. The researchers recorded Yupno speakers explaining certain temporal words and phrases, such as *jare*, a past-oriented expression that translates to "day before yesterday," and coded each speaker's manual gestures. Previous research has found a tendency in many cultures to make temporal distinctions along imagined linear axes: for instance, Hebrew speakers often refer to the right/left axis to describe events in time, some researchers believe this tendency is universal, but Núñez and colleagues claim this is not the case.

Which finding, if true, would most directly support Núñez and colleagues' claim?

- A) Yupno speakers typically use their left hand to make temporal gestures regardless of whether the gestures are past oriented or future oriented
- B) Future-oriented gestures used by Yupno speakers do not, on average, point in the opposite linear direction of past-oriented gestures.
- C) Some Yupno grammatical structures used when talking about time are also used in Hebrew.
- D) Yupno speakers were observed making temporal gestures both indoors and outdoors, though with greater frequency when indoors.

11



Researchers investigated how enjoyment of a story is affected when it has been spoiled (when the reader has foreknowledge of an important plot development). As part of the study, participants rated their enjoyment of one story that was spoiled before they read it and one story that was unspoiled. For each story, participants who had been given a spoiler reported greater enjoyment than did those who hadn't received a spoiler. But the degree of this difference varied across the stories, as is best illustrated by the enjoyment ratings for \_\_\_\_\_

Which choice most effectively uses data from the graph to complete the statement?

- A) "Owl Creek Bridge" and "A Chess Problem."
- B) "The Calm" and "Plumbing."
- C) "Blitzed" and "Plumbing."
- D) "Blitzed" and "A Chess Problem."

12

Piezoelectric harvesters convert kinetic energy (resonance) to electrical energy, precluding the need for external electrical sources. The vibration of a spacecraft, for example, can provide sufficient energy to power many of its sensors piezoelectrically. A newly designed piezoelectric harvester incorporating a highly conductive carbon-fiber-reinforced polymer (CFRP) electrode has been shown to provide steady energy loads during resonance, an absolute prerequisite for wireless communication devices to be powered piezoelectrically.

Which finding, if true, would most directly support the text's claim about wireless communication devices?

- A) Intermittent or unpredictable electrical supply undermines the efficacy of wireless communication devices.
- B) The near-constant kinetic vibration of a spacecraft makes it possible to power its wireless communication devices using only non-CFRP piezoelectric harvesters
- C) The CFRP electrode is incompatible with most wireless communication devices.
- D) The high conductivity of the CFRP is what makes the energy output from a piezoelectric harvester sufficient for wireless communication devices.

13

Like many other genera of wild bees, bumblebees have in recent decades experienced population collapse caused by, among other factors, habitat destruction and climate variation. Bumblebees are also one of the most researched bee genera, second only to honeybees. As a result, ecologists have gained much of their insight about wild-bee declines from bumblebees. In a 2021 paper, zoologist Guillaume Ghisbain notes that bumblebees are among the relatively few wild bee genera that display social behaviors and dietary generalism (ability to obtain nectar and pollen from a diversity of plant species), two traits that are associated with increased resilience to some specific environmental changes. Ghisbain therefore contends that \_\_\_\_\_

Which choice most logically completes the text?

- A) because bumblebees and other bees with generalist diets are less negatively affected by environmental stress than bees with specialized diets are, they are less likely to experience major population changes in the future than bees with specialized diets are.
- B) although bumblebees have been more extensively studied than most wild bees, researchers should not use bumblebees to draw conclusions about the decline of other wild bees, even ones with feeding patterns and levels of sociability that are similar to those of bumblebees.
- C) although bumblebees and many other wild bees have experienced similar population declines in the past, compared with other wild bees, bumblebees are likely at greater risk of being harmed by climate variation than by habitat destruction.
- D) because the responses of bumblebees and other wild bees to environmental treats are not always comparable, researchers need to exercise caution when extrapolating information about wild bee population declines from bumblebees.

14

Microbial fuel cells (MFCs) capitalize on the ability of some species of bacteria to metabolize metal, liberating electrons. The bacteria form a dense biofilm on the surface of an electron-collecting anode, but moving the electrons from the bacterial cytoplasm to an external electrode requires that the electrons pass through a series of inefficient oxidation reduction (redox) reactions. Accordingly, MFC power output rarely exceeds a

density of 0.30 milliwatts per square centimeter (mW/cm<sup>2</sup>). In an experiment, researchers added silver nanoparticles to carbon paper covering the anode in an MFC. The resulting power density was 0.66 mW/cm<sup>2</sup>. Since metals such as silver exhibit high electrical conductivity, the researchers hypothesized that \_\_\_\_\_

Which choice most logically completes the text?

- A) silver nanoparticles may increase the metabolic processes of the bacteria, thereby increasing the number of free electrons available to transfer to the electrode.
- B) as the density of the biofilm increases, the series of redox reactions may accelerate independent of the presence of the silver nanoparticles,
- C) silver nanoparticles may allow electrons to bypass the series of redox reactions and transfer directly to the electrode
- D) electrons may be conducted directly to the electrode before the silver nanoparticles catalyze the redox reactions.

15

The ratio of methane to other atmospheric constituents --- represented by a measure called the methane mole fraction --- influences a variety of meteorological phenomena, notably precipitation and humidity. For Titan, Saturn's largest moon, the observational data that exist are too sparse and discrepant to fully constrain the range of the methane mole fraction at various atmospheric levels. Juan Lora and colleagues point out that outputs of the LPSL atmospheric model of Titan, which track closely to observations in some respects, reflect how the model's developers responded to this challenge: by prescribing a uniform methane mole fraction for the lowest level of the atmosphere. It is therefore important to note that \_\_\_\_\_

Which choice most logically completes the text?

- A) some disagreements between the model's simulations of Titan's precipitation and humidity and the moon's actual precipitation and humidity are to be expected.
- B) even though the model's outputs sometimes agree with observational data, Titan's real methane mole fraction is likely higher than the methane mole fraction used in the model
- C) further observations of Titan may clarify the moon's methane mole fraction sufficiently for the model to employ a single value rather than a range.
- D) inconsistencies across the model's simulations of Titan's precipitation and humidity could be attributable to variations in the moon's methane mole fraction.

16

An emulsifier is a type of compound that serves to stabilize an emulsion --- a mixture of two or more liquids that otherwise would not easily blend together. In the cosmetics industry, emulsifiers such as cetyl hydroxyethylcellulose \_\_\_\_\_ to blend oil and water into homogeneous formulations, like lotions and perfumes.

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

- A) are employed
- B) employed
- C) that they employ
- D) being employed

17

Proto-Nilotic is a hypothesized ancestor of the Niloctic family of languages, and, as such, its theoretical linguistic properties \_\_\_\_\_ those traits common among its fifty-five Niloctic descendants, traits identified and compiled by way of comparative analyses.

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

- A) having reflected
- B) reflect
- C) reflecting
- D) that reflect

18

At the Actors Gymnasium in Chicago, Illinois, students can study the Meisner technique. Developed in the mid-1900s by acting instructor Sanford Meisner, the technique emphasizes spontaneous reaction to an actor's environment, and \_\_\_\_\_ methodology includes repetitive improvisation exercises to refine an actor's natural responses.

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

- A) they're
- B) its
- C) it's
- D) their

19

Author Jeffrey Auerbach disputes claims that London's Great Exhibition of 1851 was a show of Victorian-era England's economic \_\_\_\_\_ citing previously unpublished records of the exhibition's planning commission. Auerbach makes the compelling argument that the event was foremost an attempt to boost a stagnating economy, not celebrate its supremacy.

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

- A) might and
- B) might,
- C) might by
- D) might;

20

Although P/2019 1D2 (Atas) and 121725 Aphidas are both classified as centaur objects --- outer solar system bodies in unstable orbits --- they exhibit striking differences in \_\_\_\_\_. Object P/2019 LD2 (Atas) is considered an active centaur, showing sporadic comet-like activity (such as clouds of dust and gas on its surface), 121725 Aphidas, showing no such activity, is considered dormant.

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

- A) behavior The
- B) behavior, while the
- C) behavior; the
- D) behavior: while the

21

The parks of Dallas, Texas, seem to be making people happier. In a 2022 study, researchers studying connections between the physical location in which a social media post was \_\_\_\_\_ analyzed geotagged social media posts from various locations in Dallas. They found that posts from the city's parks contained more words associated with happiness than other posts did.

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

- A) created, and the post's content
- B) created and the post's content
- C) created, and the post's content,
- D) created and the post's content,

22

Kyudo, a form of archery that originated in Japan, was not a medal sport at the 1964 Tokyo Summer Olympic Games. \_\_\_\_\_ kyudó was featured at the Games as a demonstration sport. Demonstration sports have been featured at past Olympics to showcase lesser-known or regionally significant sports.

Which choice completes the text with the most logical transition?

- A) Thus,
- B) Rather,
- C) Additionally,
- D) For example,

23

As can be seen in the case of "Publius" --- a pseudonym adopted by a trio of writers that included Alexander Hamilton --- historians have deduced the likely authorship of many pseudonymous political essays published in the years following the American Revolutionary War; pen names such as "Democritus" and "Obadiah Spriggins," \_\_\_\_\_ remain as elusive as they once were to eighteenth-century audiences.

Which choice completes the text with the most logical transition?

- A) indeed,
- B) though,
- C) likewise,
- D) for example,

24

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

- Documentary TV programs in the slow TV genre consist of uninterrupted broadcasts of ordinary events in real time.
- Flamsbana: Minutt for Minutt (running time: 1 hour) is a Norwegian slow TV program that aired in 2010.
- It documented a train ride from Myrdal station down to Flám.
- Hihna 247 (running time: 12 hours) is a Finnish slow TV program that aired in 2017.
- It documented a supermarket checkout aisle of the Prisma Kaari grocery store.

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

- A) While Flamsbana: Minutt for Minutt depicts a train ride from Myrdal station down to Flam, Hihna 247 depicts a supermarket checkout aisle of the Prisma Kaari grocery store.
- B) Documenting ordinary events in real time, Flamsbana: Minutt for Minutt and Hihna 247 are both documentary programs in the slow TV genre.
- C) Compared to the 12-hour-long Hihna 247, the slow TV program Flamsbana: Minutt for Minutt is relatively short, at 1 hour.

D) A prime example of the slow TV genre can be seen in Flamsbana: Minutt for Minutt, a 1-hour Norwegian TV documentary program documenting a train ride from Myrdal station down to Flán.

25

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

- In a 2004 study, researchers Jorge E. López and C. Vaughan wanted to explore the effects of ingestion by bats on the germination of *Piper sancti-felicitis* seeds in Costa Rica.
- The team of researchers tested 125 *Piper sancti-felicitis* seeds that had been ingested by chestnut short-tailed bats.
- Of these, 82 seeds (66%) germinated.
- As a control, J.E. López and C. Vaughan tested 125 *Piper sancti-felicitis* seeds that had not been ingested by chestnut short-tailed bats.
- Of these, 88 seeds (70%) germinated.

The student wants to describe the study's research methodology. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) J.E. López and C. Vaughan wanted to explore the effects of chestnut short-tailed bats ingestion on *Piper sancti-felicitis* seed germination.
- B) In the study, a lower percentage of *Piper sancti-felicitis* seeds ingested by bats germinated than those that had not been ingested by bats.
- C) The team of researchers tested the germination of 125 *Piper sancti-felicitis* seeds that had been ingested by chestnut short-tailed bats and 125 *Piper sancti-felicitis* seeds that had not been ingested.
- D) Research by J.E. López and C. Vaughan revealed that 82 of 125 --- that is, 66% --- of the *Piper sancti-felicitis* seeds that had been ingested by the bats germinated.

26

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

- Modularity of mind is the notion that the mind is at least partly composed of innate neural structures (modules) that perform fast, necessary tasks.
- 1983: cognitive scientist Jerry Fodor hypothesized that low-level cognitive systems (e.g., perception, language) are modular.
- In Fodorian modularity, high-level systems (e.g., reasoning) are not modular.
- 2003: cognitive scientist Peter Carruthers proposed the massive modularity hypothesis (MMH).
- MMH expands modularity to include all cognitive systems.

The student wants to compare Fodor's hypothesis with Carruthers's. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) In considering some but not all cognitive systems modular, Fodorian modularity is not as expansive in its definition of modularity as MMH is.
- B) Following Fodor's 1983 hypothesis, Carruthers proposed that modularity of mind includes all cognitive systems.
- C) The hypotheses of Fodor and Carruthers differ in whether they consider low-level cognitive systems, such as perception and language, modular.
- D) In 2003, Carruthers proposed the massive modularity hypothesis, disagreeing with Fodor's earlier hypothesis that the mind is composed of innate neural structures.

27

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

- Digital Light Synthesis (DLS) is a form of additive manufacturing that utilizes light to rapidly cure liquid resin into high-quality, 3D objects.
- Step 1: Ultraviolet (UV) light images are projected up into a pool of liquid resin, where the object's first layer takes shape.
- Step 2: The partially cured resin object is raised, leaving a thin space (a "dead zone") beneath it for oxygen and liquid resin to flow through.
- Step 3: The UV light passes through the dead zone --- maintaining the flow of resin --- and partially cures additional layers of the object
- Step 4: When the resin object is complete, it is baked in an oven to complete the curing.

The student wants to describe how DLS cures 3D objects. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) DLS cures 3D objects by passing through a "dead zone," adding layers to the object, then curing the object in an oven.
- B) In DLS, UV light is projected into layers of liquid resin until the resin solidifies and passes through a "dead zone," wherein the curing is completed.
- C) In DLS, UV light images are projected into a liquid resin pool to cure a 3D object layer by layer, once solidified, the object is baked in an oven.
- D) DLS is a form of additive manufacturing that creates a "dead zone" in which UV light solidifies layer by layer before being baked in an oven, creating a high-quality, 3D object.

# Math Module 1

## 22 QUESTIONS

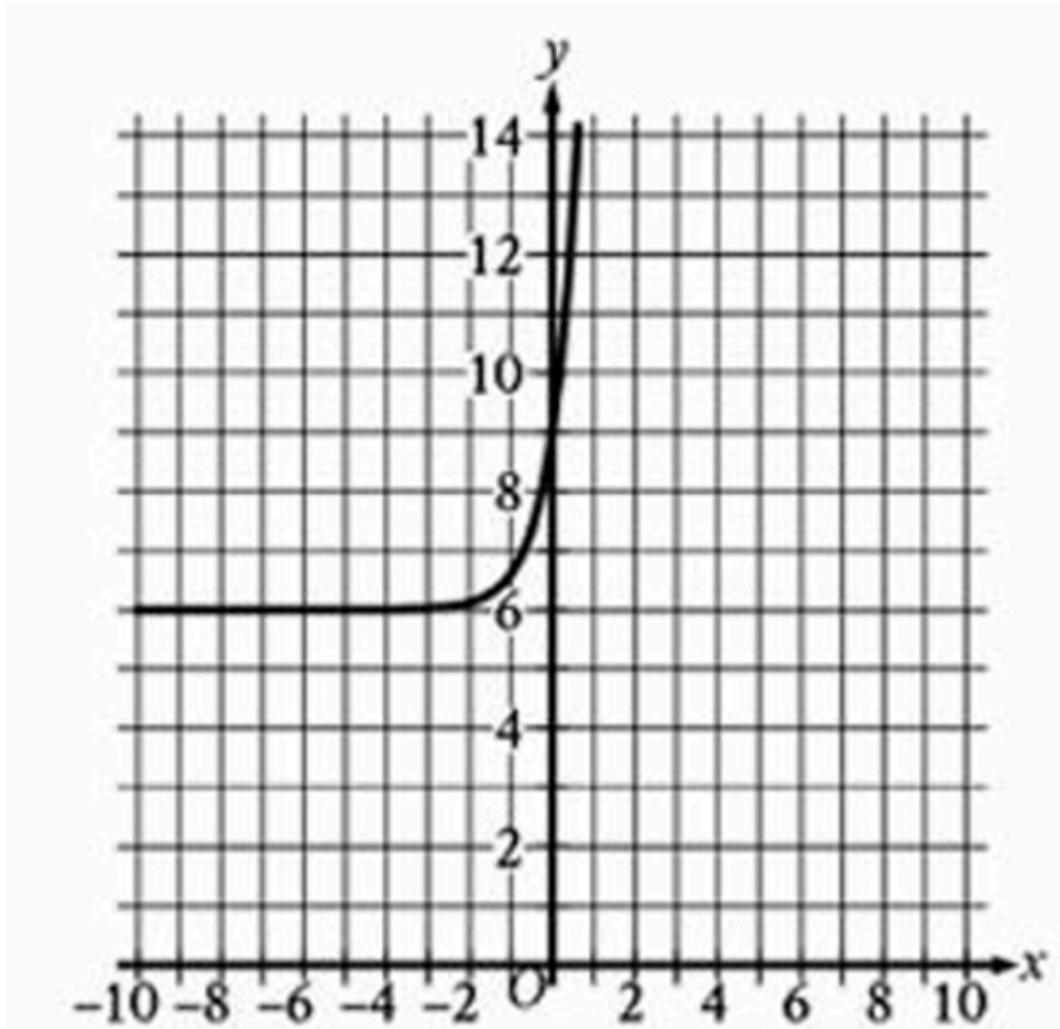
1

$$s=10+4t$$

The equation gives the speed  $s$ , in miles per hour, of a certain car  $t$  seconds after it began to accelerate. What is the speed, in miles per hour, of the car 5 seconds after it began to accelerate?

- A) 10
- B) 14
- C) 15
- D) 30

2



What is the  $y$ -intercept of the graph shown?

- A)  $(-9, 0)$
- B)  $(-6, 0)$
- C)  $(0, 6)$
- D)  $(0, 9)$

3

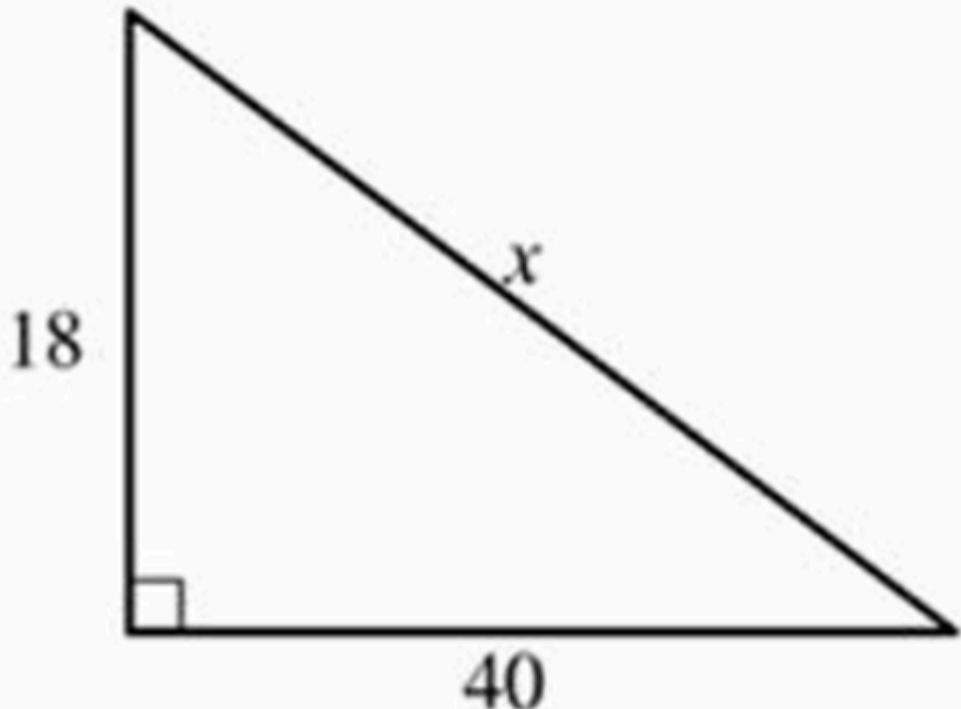
The width of a rectangle is 5 centimeters. The length of the rectangle is 30 centimeters longer than the width. What is the area, in square centimeters, of this rectangle?

- A) 175
- B) 40
- C) 10
- D) 5

4

If  $6 + x = 3$ , what is the value of  $42 + 7x$ ?

5



Note: Figure not drawn to scale.

In the right triangle shown, what is the value of  $x$ ?

- A)  $\sqrt{58}$
- B)  $\sqrt{116}$
- C)  $\sqrt{720}$
- D)  $\sqrt{1924}$

6

If  $x/y = 87$  and  $cx / 3y = 87$ , what is the value of  $c$ ?

7

In right triangle RST, the sum of the measures of angle R and angle S is 90 degrees. The value of  $\sin(R)$  is  $4\sqrt{2} / 9$ , what is the value of  $\cos(S)$ ?

←

- A)  $4\sqrt{2} / 9$
- B)  $4\sqrt{2} / 7$
- C)  $7\sqrt{2} / 8$
- D)  $9\sqrt{2} / 8$

8

Antwon's hair will grow at a constant rate from a length of 3 inches to a length of 5 inches. The equation  $0.3t + 3 = 5$  describes this situation, where  $t$  is the number of months it will take for Antwon's hair to reach a length of 5 inches. Which of the following is the best interpretation of 0.3 in this context?

- A) The time, in months, it will take Antwon's hair to grow 1 inch
- B) The length, in inches, Antwon's hair will grow each month
- C) The time, in months, it will take Antwon's hair to reach a length of 5 inches

D) The length, in inches, Antwon's hair will grow in 5 months

9

Which of the following lists represents a data set with the smallest standard deviation?

- A) 72, 73, 75, 77, 78
- B) 73, 73, 75, 77, 77
- C) 73, 74, 75, 76, 77
- D) 74, 75, 75, 75, 76

10

In the linear function  $f$ ,  $f(0)=7$  and  $f(2)=7$ . Which equation defines  $f$ ?

- A)  $f(x)=0$
- B)  $f(x)=2$
- C)  $f(x)=7$
- D)  $f(x)=x+7$

11

The product of a positive number  $x$  and the number that is 1 less than  $x$  is equal to 272. What is the value of  $x$ ?

- A) 0.5
- B) 17
- C) 271
- D) 273

12

$$4x^2 - x = 18 \leftarrow$$

$\leftarrow$

What is the positive solution to the given equation?  $\leftarrow$

$\leftarrow$

13

A sample of a certain isotope takes 29 years to decay to half its original mass. The function  $s(t)=184$  gives the approximate mass of this isotope, in grams, that remains  $t$  years after a 184-gram sample starts to decay. Which statement is the best interpretation of  $s(58)=46$  in this context?

- A) Approximately 46 grams of the sample remains 58 years after the sample starts to decay.
- B) The mass of the sample has decreased by approximately 46 grams 58 years after the sample starts to decay.
- C) The mass of the sample has decreased by approximately 58 grams 46 years after the sample starts to decay.
- D) Approximately 58 grams of the sample remains 46 years after the sample starts to decay

14

Tanya drove on the highway and on local roads to complete a trip of 290 miles. The drive took 5 hours. She drove an average speed of 65 miles per hour (mph) on the highway and an average speed of 30 mph on local roads. If  $x$  is the time, in hours, Tanya drove on the highway and  $y$  is the time, in hours, she drove on local roads, which system of equations represents this situation?

- A)  $65x + 30y = 5x + y = 290$
- B)  $65x + 30y = 290x + y = 5$
- C)  $30x + 65y = 5x + y = 290$
- D)  $30x + 65y = 290x + y = 5$

15

$$y < -2x + 14$$

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

- A)  $(0, 15)$
- B)  $(-1, 17)$
- C)  $(-2, 0)$
- D)  $(8, -1)$

16

$$(x - 35)^2 = 1 \leftarrow$$

What is the sum of the solutions to the given equation?  $\leftarrow$

$\leftarrow$

17

A dance studio charges an introductory fee for the first 3 lessons and then charges a fixed fee for each additional lesson. One student took 6 lessons and was charged \$150. Another student took 17 lessons and was charged \$480. Which function  $f$  gives the total charge, in dollars, for any student who took  $x$  lessons, where  $x > 2$ ?

- A)  $f(x) = 25x$
- B)  $f(x) = 25x + 55$
- C)  $f(x) = 30x$
- D)  $f(x) = 30x - 30$

18

How many centimeters are equivalent to 35 meters? (1 meter = 100 centimeters)

$\leftarrow$

19

A researcher observes a sample of a nuclide. An exponential model estimates that the mass, in grams, of the sample decreases by 23% every 11.69 minutes. Which of the following equations could represent this model, where  $M$  is the estimated mass, in grams, of the sample  $t$  minutes after the researcher began observing the sample?

- A)  $M = 100 (0.77)^{t/11.69} \leftarrow$

B)  $M = 100 (0.77)^{t+11.69} \leftarrow$

C)  $M = 100 (0.23)^{t/11.69} \leftarrow$

D)  $M = 100 (0.23)^{t+11.69} \leftarrow$

20

Data set A: 8, 11, 12, 15, 21, 27

Data set B: 9, 12, 13, 16, 22, h

Data sets A and B each consist of 6 values as shown, where h is a constant. If the standard deviation of data set A is greater than the standard deviation of data set B, which of the following could be the value of h?

I. 23

II. 28

III. 29

A) I only

B) II only

C) III only

D) II or III

21

In triangle RST, the measure of angle R is  $50^\circ$ , the measure of angle S is  $x^\circ$ , and the measure of angle T is  $(4x - 5)^\circ$ . Point L lies on RS, point K lies on ST, and LK is parallel to RT. What is the measure, in degrees, of angle SKL? (Disregard the degree symbol when entering your answer)

22

--

$$f(x) = \sqrt{6x + 7} \leftarrow$$

$\leftarrow$

The function f is defined by the given equation. If  $f(a) = -9a$ , where a is a constant, what is the value of a?  $\leftarrow$

A)  $-1/3$

B)  $-7/27$

C)  $7/27$

D)  $1/3$

## Math Module 2

22 QUESTIONS

1

The function f is defined by  $f(x) = 6x - 1/8$ . What is the y-intercept of the graph of  $y = f(x)$  in the xy-plane?

A)  $(0, -1/8)$

- B) (0, -6)
- C) (0, 6)
- D) (0, 8)

2

Which expression is equivalent to  $(57y)^{1/2}$ , where  $y > 1$ ?

- A)  $57\sqrt{y}$
- B)  $\sqrt{57} y$
- C)  $\sqrt{57y}$
- D)  $\sqrt{(57y)^2}$

3

Luis has \$150 in an account. Each year he expects to have 1.1% more money in the account than he had the previous year. Which of the following models best describes how Luis expects the money in his account to change over time?

- A) Decreasing exponential
- B) Decreasing linear
- C) Increasing exponential
- D) Increasing linear

4

The function  $m$  is defined by  $m(x) = 5x + 3$ , and the function  $p$  is defined by  $p(x) = 3 - x$ . What is the value of  $2m(3) - p(3)$ ?

5

The number of bacteria in a liquid medium doubles every day. There are 48,000 bacteria in the liquid medium at the start of an observation. Which of the following represents the number of bacteria,  $y$ , in the liquid medium  $t$  days after the start of the observation?

- A)  $y = 1/2 (48000)^t$
- B)  $y = 2 (48000)^t$
- C)  $y = 48000 (1/2)^t$
- D)  $y = 48000 (2)^t$

6

$$y = x/4 + 6$$

$$y = -x/4 + 30$$

The solution to the given system of equations is  $(x, y)$ . What is the value of  $2y$ ?

- A) 6
- B) 24
- C) 30
- D) 36

7

$$f(x) = (2x - 3)(x + 8)$$

$$g(x) = 3(6x - 9)$$

The functions  $f$  and  $g$  are defined by the equations shown. Which of the following is equivalent to  $f(x) - g(x)$ ?

- A)  $2x^2 + 7x - 15$  ↗
- B)  $2x^2 - 5x + 3$  ↗
- C)  $2x^2 - x - 3$  ↗
- D)  $2x^2 + 31x - 51$  ↗

8

In right triangle ABC, angles A and B are acute, side AC has a length of 23.3, and  $\tan B = 1/4$ . What is the length of side BC, rounded to the nearest tenth?

- A) 4.8
- B) 5.8
- C) 93.2
- D) 542.9

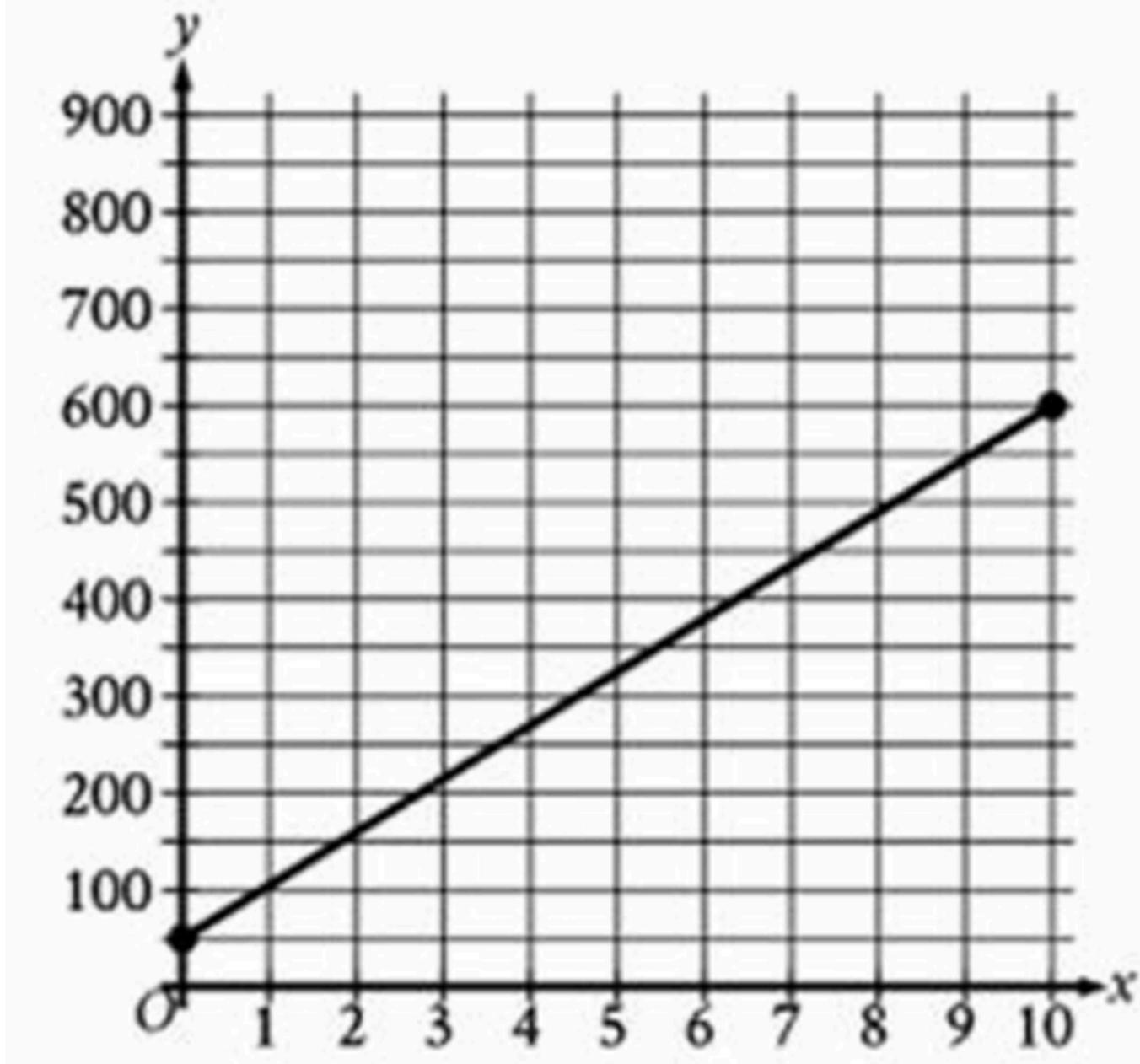
9

$$-3 \mid 5x + 7 \mid + 9 = -12$$

What are all solutions to the given equation?

- A) 0
- B) 0 and  $-6/5$
- C) 0 and  $-14/5$
- D) There is no solution.

10



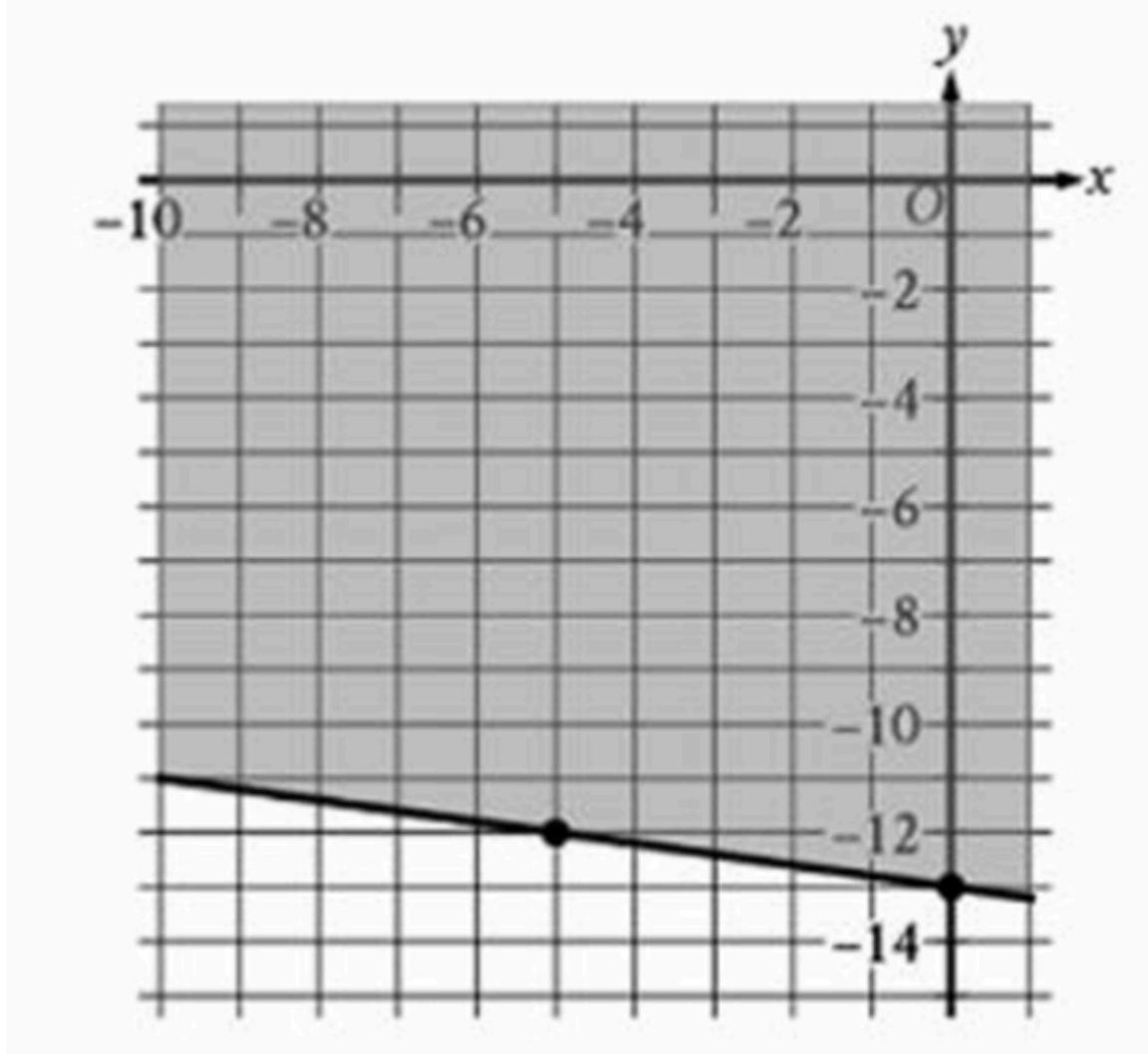
While walking on a path, Maksim stopped at a water fountain. The graph shows the total distance  $y$ , in meters, Maksim had walked on the path  $x$  minutes after leaving the water fountain. What distance, in meters, did Maksim walk on the path in the 10 minutes after he left the water fountain?

11

The positive number  $a$  is 2,106% of the sum of the positive numbers  $b$  and  $c$ , and  $b$  is 81% of  $c$ . What percent of  $b$  is  $a$ ?

- A) 4,706%
- B) 2,600%
- C) 38.12%
- D) 21.87%

12



The shaded region shown represents the solutions to  $rx + ty \geq -65$ , where  $r$  and  $t$  are constants. What is the value of  $r + t$ ?

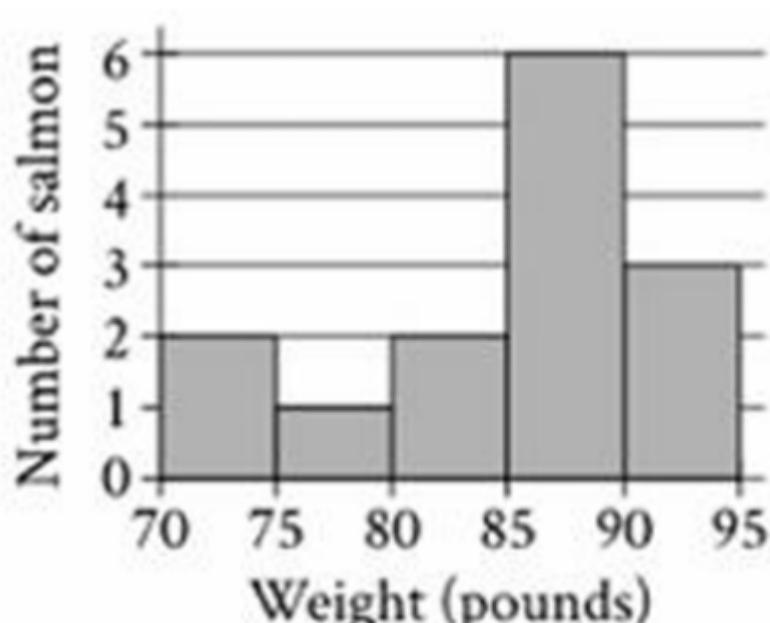
- A) 6
- B) 4
- C) -4
- D) -5

13

In the  $xy$ -plane, line  $k$  and line  $l$  are perpendicular and intersect at the point  $(7, 5)$ . If line  $k$  is defined by the equation  $y = mx + b$ , where  $m$  and  $b$  are constants and  $m > 1$ , which of the following points lies on line  $l$ ?

- A)  $(8, 5 - 1/m)$
- B)  $(8, 5 + 1/m)$
- C)  $(8, 5 - m)$
- D)  $(8, 5 + m)$

14



The histogram summarizes a data set of the weights, in pounds, of 14 salmon. If an additional weight of 32 pounds is added to the original data set to create a new data set of 15 weights, which of the following measures must be less for the new data set than for the original data set?

I. The median

II. The mean

- A) I only
- B) II only
- C) I and II
- D) Neither I nor II

15

For the function  $f$ , for every increase of 2 in the value of  $x$ , the value of  $f(x)$  increases by a factor of  $c$ , where  $c$  is a constant. Which of the following equivalent forms of function  $f$  displays the value of  $c$  as the base or the coefficient?

- A)  $f(x) = 42 \cdot (2)^{6x}$
- B)  $f(x) = 42 \cdot (8)^{2x}$
- C)  $f(x) = 42 \cdot (64)^x$
- D)  $f(x) = 42 \cdot (4,096)^{x/2}$

16

To investigate the effect of magnesium supplementation on the sleep quality of adults, a researcher selected 190 adults at random from a community center to participate in a study. The researcher first measured the sleep efficiency of each participant. Each participant was then randomly assigned to take a magnesium supplement or a placebo each day for 6 weeks. At the end of the 6 weeks, the researcher measured the sleep efficiency of all participants again and found that the magnesium supplement caused statistically significant improved sleep quality for the adults at the community center. What feature of this study allowed the researcher to conclude that the magnesium supplement caused the improved sleep quality?

- A) There were more than 100 participants in the study.
- B) The participants were selected at random from the community center
- C) The sleep efficiency of each participant was measured again at the end of 6 weeks.
- D) Each participant was randomly assigned to take a magnesium supplement or a placebo.

17

A circle in the  $xy$ -plane has its center at  $(-1, 1)$ . Line  $t$  is tangent to this circle at the point  $(7, -6)$ . Which of the following points also lies on line  $t$ ?

- A)  $(0, 8/7)$
- B)  $(6, 9)$
- C)  $(14, 2)$
- D)  $(15, 1)$

18

The function  $f$  is defined by  $f(x) = (x^2 + ax + b) / (2x + c)$ , where  $a$ ,  $b$ , and  $c$  are constants. The graph of the function  $f$  in the  $xy$ -plane, where  $y = f(x)$ , does not intersect the line  $x = 4$ . If  $f(5) = f(6) = 0$ , what is the value of  $a + b + c$ ? $\leftarrow$

$\leftarrow$

19

If  $4x + 7 = 15$ , what is the value of  $8x - 3$ ?

20

$$kx^2 - 16x = 24x^2 - 8 \leftarrow$$

In the given equation,  $k$  is an integer constant. If the equation has two distinct real solutions, what is the greatest possible value of  $k$ ?  $\leftarrow$

 $\leftarrow$ 

21

Right rectangular prism X is similar to right rectangular prism Y. The surface area of right rectangular prism X is 56 square centimeters ( $\text{cm}^2$ ), and the surface area of right rectangular prism Y is  $896 \text{ cm}^2$ . The volume of right rectangular prism Y is  $1,536$  cubic centimeters ( $\text{cm}^3$ ). What is the sum of the volumes, in  $\text{cm}^3$ , of right rectangular prism X and right rectangular prism Y?

22

In triangle ABC, the measure of angle B is  $90^\circ$  and BD is an altitude of the triangle. The length of AB is 24 and the length of AC is 13 greater than the length of AB. What is the value of  $BC/BD$ ?

- A)  $13/24$
- B)  $24/37$
- C)  $37/24$
- D)  $24/13$

## Reading and Writing Module 1 Answers

1. A
2. D
3. B
4. B
5. D
6. B
7. C
8. B
9. C
10. B
11. A
12. A
13. A
14. D
15. B
16. B
17. C
18. B

- 19. C
- 20. B
- 21. D
- 22. D
- 23. D
- 24. D
- 25. D
- 26. C
- 27. D

## Reading and Writing Module 2 Answers

- 1. A
- 2. C
- 3. A
- 4. D
- 5. C
- 6. A
- 7. A
- 8. D
- 9. B
- 10. B
- 11. A
- 12. D
- 13. D
- 14. C
- 15. A
- 16. A
- 17. B
- 18. B
- 19. D
- 20. D
- 21. B
- 22. B
- 23. B
- 24. B
- 25. C
- 26. A
- 27. C

## Math Module 1 Answers

- 1. D
- 2. D
- 3. A
- 4. 21
- 5. D

6. 3  
7. A  
8. B  
9. D  
10. C  
11. B  
12.  $2.25; 9/4$   
13. A  
14. B  
15. C  
16. 70  
17. D  
18. 3500  
19. A  
20. A  
21. 103  
22. B

## Math Module 2 Answers

1. A  
2. C  
3. C  
4. 36  
5. D  
6. D  
7. B  
8. C  
9. C  
10. 600  
11. A  
12. A  
13. A  
14. B  
15. D  
16. D  
17. C  
18. 11  
19. 13  
20. 31  
21. 1560  
22. C