

# PSAT 8/9 Practice Test #2

Exam Materials  
Pages 2 - 45

Answer Key Materials  
Pages 46 - 90



# PSAT<sup>™</sup> 8/9

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# Practice Test #2

**Make time to take the practice test.**

It is one of the best ways to get ready for the PSAT 8/9.

After you have taken the practice test, score it right away at [psat.org/8-9-scoring](https://psat.org/8-9-scoring).

This version of the PSAT 8/9 Practice Test is for students who will be taking the digital PSAT 8/9 in nondigital format.



**PSAT<sup>™</sup> 8/9**

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# PSAT<sup>™</sup> 8/9

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## GENERAL DIRECTIONS

- You may work on only one module at a time.
- If you finish a module before time is called, check your work on that module only. You may NOT turn to any other module.

## TIMING

Reading and Writing, Module 1: 39 minutes

Reading and Writing, Module 2: 39 minutes

*10-minute break*

Math, Module 1: 43 minutes

Math, Module 2: 43 minutes

The above are standard times. If you are approved for accommodations involving additional time, you should give yourself that time when you practice.

## MARKING YOUR ANSWERS

- Be sure to answer your questions properly in this book.
- Circle only one answer to each question. If you change your mind, completely erase the circle. You will not get credit for questions with more than one answer circled, or for questions with no answers circled.

## USING YOUR TEST BOOK

- You may use the test book for scratch work.
- You may not fold or remove pages or portions of a page from this book, or take the book from the testing room.

# Reading and Writing

## 33 QUESTIONS

### DIRECTIONS

The questions in this section address a number of important reading and writing skills. Each question includes one or more passages, which may include a table or graph. Read each passage and question carefully, and then choose the best answer to the question based on the passage(s).

All questions in this section are multiple-choice with four answer choices. Each question has a single best answer.

1

The following text is adapted from Lewis Carroll’s 1871 novel *Through the Looking-Glass, and What Alice Found There*. Alice, a child, is talking to her cat.

“Do you hear the snow against the window-panes, Kitty? How nice and soft it sounds! Just as if someone was kissing the window all over outside.”

As used in the text, what does the word “soft” most nearly mean?

- A) Gentle
- B) Sensitive
- C) Shapeless
- D) Bland

2

The following text is adapted from Charles Chesnutt’s 1899 story “The Wife of His Youth.” Mr. Ryder is hosting a formal gathering where he will propose marriage to the woman he has been courting.

[A] younger and less cautious man would long since have spoken. But he had made up his mind, and had only to determine the time when he would ask her to be his wife. He decided to give a ball in her honor, and at some time during the evening of the ball to offer her his heart and hand.

As used in the text, what does the word “determine” most nearly mean?

- A) Choose
- B) Influence
- C) Demonstrate
- D) Measure

3

It would be a mistake to \_\_\_\_\_ the exhibit that artist and curator Joe Baker, who is a member of the Lenape (Delaware) people, has organized at the Brooklyn Public Library. The exhibit, which includes Lenape beadwork from the 1850s as well as modern works that use traditional patterns, is essential viewing.

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

- A) complicate
- B) amplify
- C) overlook
- D) assemble

4

Archaeologist Erika Karuzas works with the Confederated Salish and Kootenai Tribes of Montana to preserve culturally significant sites. In 2015 they decided that creating a new national trail connecting many of these sites would \_\_\_\_\_ their preservation efforts, because the US government provides some protections to national trails that aren't given to other areas.

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

- A) inspire
- B) ignore
- C) promote
- D) reduce

5

Researcher Lucy Salazar is using radiocarbon dating to study Machu Picchu, an ancient Incan fortress in the Andes Mountains. She and her colleagues have found that the site's age differs from the \_\_\_\_\_ estimate: it is approximately 20 years older than scholars thought when first encountering Machu Picchu in 1911.

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

- A) genuine
- B) intentional
- C) independent
- D) original

6

The following text is adapted from Jason Reynolds's 2016 novel *Ghost*. The narrator, who is in middle school, is at a bus stop.

I just go there [to the bus stop] to look at the people working out. See, the gym across the street has this big window—like the whole wall is a window—and they have those machines that make you feel like you walking up steps and so everybody just be facing the bus stop, looking all crazy like they're about to pass out. And trust me, there ain't nothing funnier than that. So I check that out for a little while like it's some kind of movie: *The About to Pass Out Show*, starring stair-stepper person one through ten.

©2016 by Jason Reynolds

Which choice best states the main purpose of the text?

- A) To give a reason why the narrator is excited to start middle school
- B) To describe an activity that the narrator finds amusing
- C) To explain a problem that the narrator has overcome
- D) To discuss a movie that the narrator saw in a theater

7

In 2020, rap artist and professor A.D. Carson published the first peer-reviewed rap album about his experiences with Black masculinity called “i used to love to dream.” Typically in peer review, experts evaluate scholarly articles prior to publication. For Carson’s album, dubbed a “mixtape/e/essay,” peer review involved both scholars and rap artists. In combining elements of a mixtape album with scholarly essays that connect Carson’s lyrics to historical and contemporary contexts for listeners both inside and outside academia, Carson’s album helped redefine how scholarship is created and shared.

Which choice best states the main purpose of the text?

- A) To compare the relative public impact of scholarly articles and albums
- B) To capture one scholar’s opinion of a new rap album
- C) To explain why a certain rap album is particularly innovative
- D) To describe how each step of the peer review process unfolds

8

Historians have argued that a crucial component of the Civil Rights Movement’s success in the 1960s was the Southern Christian Leadership Conference’s Citizen Education Program (CEP), which invited promising activists from across the South to its one-week training sessions in Dorchester, Georgia. Led by experienced organizers such as Dorothy Cotton and Septima Clark, CEP attendees—more than 7,000 in all—participated in workshops on topics ranging from public speaking to legal doctrine before returning home and using their newly acquired knowledge to spearhead local civil rights initiatives.

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

- A) It underscores the extent of the CEP’s impact on the Civil Rights Movement of the 1960s.
- B) It illustrates the CEP organizers’ efforts to educate participants on a wide variety of topics.
- C) It suggests that CEP attendees held a diverse array of opinions about the Southern Christian Leadership Conference’s political philosophy.
- D) It establishes that criticism of the CEP was limited to a few individuals in the Southern Christian Leadership Conference.

9

**Text 1**

Flamingos are known for their vibrant pink coloring, but they're actually born with gray feathers. Their pink color comes from eating brine shrimp, but brine shrimp aren't naturally pink either. Animals can't produce carotenoids, the pigments that provide the pink hue. The algae that brine shrimp feed on, however, can produce these pigments. Thus, the pinker the flamingo, the more shrimp it has eaten.

**Text 2**

Ecologist Juan Amat has found that flamingos apply a kind of makeup to make themselves appear pinker. A gland near their tail contains pigments that come from the food they eat. When the flamingos groom themselves using the pigments, their feathers become pinker. Flamingos may do this to improve their success during mating season, when they would benefit from looking pinker.

Based on the texts, how would the ecologist in Text 2 most likely respond to the author's conclusion in Text 1?

- A) By emphasizing that flamingos' tail feathers are pinker than their other feathers are
- B) By claiming that the coloring of flamingos' feathers doesn't change significantly enough for most observers to notice
- C) By pointing out that the amount of shrimp eaten isn't the only thing that influences flamingos' coloring
- D) By arguing that flamingos' diet doesn't include much shrimp except during mating season

10

The following text is from Beatrice Harraden's 1894 novel *Ships that Pass in the Night*.

In an old second-hand bookshop in London, an old man sat reading Gibbon's *History of Rome*. He did not put down his book when the postman brought him a letter. He just glanced indifferently at the letter, and impatiently at the postman. Zerviah Holme did not like to be interrupted when he was reading Gibbon; and as he was always reading Gibbon, an interruption was always regarded by him as an insult.

Based on the text, how did Zerviah Holme most likely feel when the letter was delivered?

- A) He felt relieved because he had been expecting an important letter.
- B) He felt excited because the letter was from a good friend.
- C) He felt sad because the postman did not stop to talk with him before leaving.
- D) He felt annoyed because he was interrupted while reading his favorite author.

11

During the World War II era, some Mexican American women adopted a striking new look called *pachuca* style. They wore altered men's jackets or zoot suits (wide-legged, long-coated suits) and dramatic makeup, and they combed their hair into high, rounded shapes. Some people criticized *pachuca* style, saying it was dangerous and women should dress traditionally. But historians see things differently. They see *pachuca* style as a form of rebellion against the era's rigid social expectations for women. They say that it showed a desire for self-expression and freedom on the part of women who adopted the style.

According to the text, how do historians view *pachuca* style?

- A) They think that *pachuca* style was such a popular trend that it continues to influence fashion in the United States to the present day.
- B) They think that *pachuca* style was a way for some Mexican American women to express themselves and resist strict social expectations.
- C) They think that *pachuca* style was celebrated because it enabled some Mexican American women to show their support for the United States during World War II.
- D) They think that *pachuca* style was similar to other fashion trends that different groups of women adopted in the same period.

12

Paleontologist Alan Tennyson and colleagues studied fossil bones found in New Zealand that are more than 55 million years old. The researchers determined that the fossil bones belonged to two previously unknown species of prehistoric penguins. Moreover, they estimated that one of the two penguin species was more than three times the size of the emperor penguin, which is the largest penguin species that exists today.

Based on the text, which choice best describes the two previously unknown penguin species?

- A) They are frequently studied by paleontologists.
- B) They are no longer living species.
- C) They were smaller than penguin species that exist today.
- D) They spent little of their lives in water.

13

Using the Stratospheric Observatory for Infrared Astronomy (SOFIA), a team of astronomers mapped out the magnetic field of G47, one of the Milky Way's galactic bones (dense clouds of gas and dust that run through the middle of the arm of a spiral galaxy). Surprisingly, the map revealed a magnetic field with no clear pattern or direction. The researchers had expected the magnetic field to be similar to the more uniform fields seen in galactic bones in other arms of the Milky Way.

According to the text, what was surprising about the researchers' mapping of the magnetic field of galactic bone G47?

- A) It showed a weaker magnetic field than expected.
- B) It implied that previous mappings of the magnetic field were inaccurate.
- C) It produced magnetic field measurements similar to those for other galactic bones.
- D) It revealed a magnetic field that wasn't uniform.



14

Artificial leaves are a developing renewable energy technology that mimics the process of photosynthesis in plants. These devices are silicon-based solar cells coated in chemical catalysts that activate reactions that split water molecules into hydrogen and oxygen gas. The technology, while generating lots of interest, is not yet commercially viable as a large-scale energy source. To meet this challenge, scientists from many fields are researching ways to store, transport, and distribute the energy the devices produce while other scientists are working to improve the cost and efficiency of the devices.

Which choice best states the main idea of the text?

- A) Continued research and development in artificial-leaf technology is needed before the devices can be widely used as an energy source.
- B) The recent increase in the commercial use of artificial leaves as an energy source has encouraged many scientists to research ways to improve the technology.
- C) Artificial leaves split water molecules into oxygen and hydrogen gas using catalysts more efficiently than plants do using the process of photosynthesis.
- D) Artificial leaves were developed to mimic the natural process of photosynthesis in plants in order to store energy for long-term commercial use.

15

Number of Museum Visits (in Millions)  
from 2016 to 2019

Museum	2016	2017	2018	2019
National Museum of the American Indian	1.1	1.2	1.1	0.96
National Museum of African American History and Culture	0.73	2.4	1.9	2.0

A student is researching the number of visits each year to two museums, the National Museum of the American Indian and the National Museum of African American History and Culture. Of the four years included in the table, the year when both museums had the highest number of visits was \_\_\_\_\_

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

- A) 2016.
- B) 2018.
- C) 2019.
- D) 2017.

16

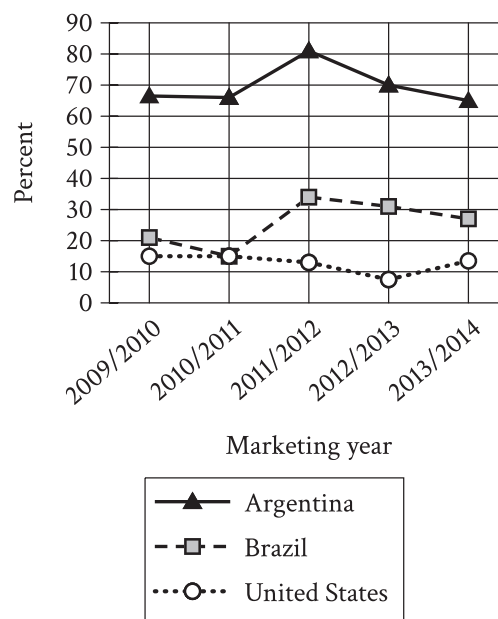
Researchers Narelle Haworth and Amy Schramm studied bicycling behavior in Queensland, Australia. Haworth and Schramm asked adult bike riders questions about their level of experience, reasons for riding a bike, and route preferences. The researchers claim that experienced riders who mainly bike to work tend to prefer routes that reduce their travel time.

Which survey response from a bike rider in Queensland would best support the underlined claim?

- A) "I have a bike, but I don't ride it very often. When the weather is nice, I sometimes use my bike to go into town to do some shopping."
- B) "I just got a new bike, and I'm looking forward to going on rides with my friends soon."
- C) "I bike to my job every day. There's a nice bike path that goes through a park, but I use the bike lane on the main road because it's faster."
- D) "I usually bike to work, but I'm taking the bus now because my bike has a broken part that needs to be fixed."

17

Percentage of Maize Exported  
by Three Countries for Marketing  
Years 2009/2010–2013/2014



Argentina, Brazil, and the United States are among the world's leading producers of maize (corn), and each country exports a certain percentage of maize each marketing year, which runs from March to February in Argentina and Brazil and from September to August in the United States. A student is researching those percentages and finds that for the marketing year 2012/2013, the percentage of maize exported by \_\_\_\_\_

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

- A) Brazil increased from the previous marketing year but remained lower than the percentage exported by the United States.
- B) Brazil exceeded the percentage exported by Argentina for the first time.
- C) Argentina decreased from the previous marketing year but remained the highest among the three countries.
- D) the United States reached its highest point during the five marketing years.

18

Marine archaeologists have found much of the wooden hull of a sixteenth-century ship in a flooded quarry in southeast England. When it is exposed to air and water, wood rots quickly unless it is protected by sediment that shields it from oxygen. Therefore, the discovered ship was likely \_\_\_\_\_

Which choice most logically completes the text?

- A) covered by a protective sediment layer in the quarry.
- B) one of several other ships buried in the same quarry.
- C) a confirmation of previous theories about the type of wood that was used in sixteenth-century ships.
- D) first constructed much earlier than previously thought.

19

In 2009, researchers determined that pottery fragments from a cave in China were close to 18,000 years old. These are some of the oldest \_\_\_\_\_ of pottery ever found.

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

- A) pieces:
- B) pieces,
- C) pieces
- D) pieces—

20

Azulejos, mosaics made of glazed ceramic tiles, can be found throughout Portugal. These mosaics beautify places such as \_\_\_\_\_ stations, and public squares.

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

- A) libraries train
- B) libraries: train
- C) libraries—train
- D) libraries, train

21

Located in the northern United States, the Great Lakes Basin contains roughly 35,000 islands. Lake Superior has Grand Island, for example. Lake Michigan has Belle Isle. Lake Huron, though, is home \_\_\_\_\_ the largest island of them all: Manitoulin Island.

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

- A) to;
- B) to—
- C) to
- D) to,

22

The First Folio, published in 1623, is the first collection of William Shakespeare's plays. The collection \_\_\_\_\_ 18 plays that might otherwise have been lost, such as *Julius Caesar* and *Macbeth*.

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

- A) to be including
- B) including
- C) to include
- D) includes

23

Multiple newspapers \_\_\_\_\_ the Spanish-speaking population of Washington, DC, including *El Tiempo Latino* and *Washington Hispanic*.

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

- A) serve
- B) having served
- C) to serve
- D) serving

24

In the Inca Empire (1438–1533), ayllus \_\_\_\_\_ family clans that ranged in size from small groups to thousands of people.

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

- A) is
- B) was
- C) has been
- D) were

25

The city of Amsterdam partnered with consultants to develop Public Eye—an ethical AI-powered crowd-monitoring \_\_\_\_\_ video streamed from cameras in heavily touristed areas, the AI algorithm determines crowd sizes without, in the interest of protecting individuals' privacy, retaining the footage.

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

- A) system—analyzing
- B) system, analyzing
- C) system. Analyzing
- D) system analyzing

26

Ballet dancer Misty Copeland has accomplished a lot. She has appeared on Broadway, toured with Prince, and even served on the President’s Council on Sports, Fitness & Nutrition. \_\_\_\_\_ according to Copeland, nothing in her career matches the honor of being the first African American woman named principal dancer at the prestigious American Ballet Theatre.

Which choice completes the text with the most logical transition?

- A) Thus,
- B) However,
- C) For example,
- D) Second of all,

27

Preston Singletary is a Tlingit glass artist who often collaborates with other artists. \_\_\_\_\_ he has worked with Tewa pottery artist Jody Naranjo several times. Together, Singletary and Naranjo have created pottery-inspired glass pieces such as *Sunset Stampede* and *Kiva Steps*.

Which choice completes the text with the most logical transition?

- A) In conclusion,
- B) For example,
- C) However,
- D) In comparison,

28

The 435 state districts in the US House of Representatives are designed to be roughly equal in population. These districts average around 760,000 people in size. However, only about 730,000 people live in the state of Alaska. \_\_\_\_\_ Alaska has just one House district, encompassing the entire state.

Which choice completes the text with the most logical transition?

- A) As a result,
- B) Instead,
- C) Finally,
- D) For instance,

29

A 2022 study by researchers Hala Altamimi and Qiaozhen Liu investigated the relationship between nonprofit arts organizations’ spending and performance. \_\_\_\_\_ the researchers examined the correlation between how much 22,328 US arts nonprofits spent on overhead—operational costs such as equipment and fundraising—and how many people attended their events (a measure of overall success).

Which choice completes the text with the most logical transition?

- A) Thus,
- B) In addition,
- C) By comparison,
- D) Specifically,

30

Ugandan American professor Peter Nazareth believed that Elvis Presley’s music is best understood not as a homogeneous collection but as an anthology (because Elvis showcased the contributions of a wide range of gospel, blues, and rock artists). \_\_\_\_\_

Nazareth entitled his college course on Elvis and his music, which focused on Elvis’s many musical influences, “Elvis as Anthology.”

Which choice completes the text with the most logical transition?

- A) To that end,
- B) In sum,
- C) That is,
- D) In addition,

31

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

- In 1897, twenty Black US Army infantrymen rode bicycles from Montana to Missouri.
- The 1,900-mile journey took forty-one days.
- The goal was to test the idea of forming a military bicycle corps.
- In 2022, Erick Cedeño, a Black long-distance cyclist, reenacted the journey.
- Cedeño wanted to honor the infantrymen on the journey’s 125th anniversary.

The student wants to emphasize how far the infantrymen traveled. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) The US infantrymen rode their bicycles from Montana to Missouri—traveling a total of 1,900 miles.
- B) The 125th anniversary of the infantrymen’s journey was in 2022.
- C) The goal of the 1897 journey was to test the idea of forming a military bicycle corps.
- D) Over a century later, Erick Cedeño honored the infantrymen by reenacting their 1897 journey.

32

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

- Crown shyness is a phenomenon in which the tops (crowns) of neighboring trees grow close together but don't overlap.
- To explain how this happens, Australian forester M.R. Jacobs proposes the mutual abrasion theory.
- According to Jacobs's theory, when trees brush against one another, branches break off.
- Malaysian scholar Francis S.P. Ng posits the mutual shade avoidance theory.
- According to Ng's theory, when tree branches detect shade from nearby trees' branches, they stop growing.

The student wants to compare the causes of crown shyness proposed in the two theories. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) While Jacobs proposes that crown shyness is caused by neighboring tree branches brushing against one another, Ng posits that it occurs when branches detect shade from nearby trees' branches.
- B) Both Jacobs and Ng have proposed theories to explain what causes crown shyness.
- C) Ng posits the mutual shade avoidance theory, whereas Jacobs proposes an alternative theory.
- D) Jacobs's mutual abrasion theory proposes that when neighboring trees brush against one another, branches break off, resulting in a phenomenon in which the tops of trees grow close together but don't overlap.

33

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

- Thailand's annual Songkran Water Festival is held each April.
- It marks Songkran, the traditional Thai New Year.
- People splash and spray each other for fun at the festival's community-wide water fights.
- In Bangkok, thousands gather along Silom Road for the city's largest water fight.
- In Chiang Mai, thousands gather at a historical monument called the Tha Phae Gate for the city's largest water fight.

The student wants to emphasize a similarity in how people in Bangkok and Chiang Mai celebrate Songkran. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) The largest water fight in Bangkok takes place along a city street, whereas the largest water fight in Chiang Mai takes place at a historical monument.
- B) In both Bangkok and Chiang Mai, thousands gather to celebrate Songkran with water fights.
- C) People in both Bangkok and Chiang Mai celebrate Songkran, but they don't do so in exactly the same way.
- D) Each April, people in Thailand celebrate Songkran, the traditional Thai New Year.

**STOP**

**If you finish before time is called, you may check your work on this module only.  
Do not turn to any other module in the test.**

# Reading and Writing

## 33 QUESTIONS

### DIRECTIONS

The questions in this section address a number of important reading and writing skills. Each question includes one or more passages, which may include a table or graph. Read each passage and question carefully, and then choose the best answer to the question based on the passage(s).

All questions in this section are multiple-choice with four answer choices. Each question has a single best answer.

1

When marine biologist Brittany Williams played different ocean recordings to groups of oyster larvae, groups that heard sounds of a healthy oyster reef were the most \_\_\_\_\_. They were twice as likely as other groups to show signs of making a permanent home. This suggests that playing recordings of a healthy ocean reef may encourage oysters to create such a reef.

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

- A) responsive
- B) inactive
- C) liked
- D) distressed

2

The following text is from Darcie Little Badger’s 2021 novel *A Snake Falls to Earth*. Nina is looking at old family photographs.

Nina couldn’t stop looking at the sepia-toned photograph in an oak frame. Propped on the window ledge, it featured a portrait of Great-Great-Grandmother Rosita as a young woman.

©2021 by Darcie Little Badger

As used in the text, what does the word “featured” most nearly mean?

- A) Displayed
- B) Questioned
- C) Approved
- D) Ignored



3

The following text is from Mark Oshiro's 2018 novel *Anger Is a Gift*. In the novel, Moss and his friends are on a subway train in Northern California.

Lights from the outside world then filled the train car as it rose out of the ground and climbed the elevated track. As long as Moss had lived in West Oakland, he'd never tired of this specific view, so he pointed toward the windows. "Check it," he said, and the Port of Oakland began to pass by them.

©2018 by Mark Oshiro

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

- A) Imaginary
- B) Energetic
- C) Correct
- D) Particular

4

Manul cats are small, shy felines. They live mostly alone in out-of-the-way parts of Asia, such as on Mount Everest. These cats have been difficult to research because their habitats are so \_\_\_\_\_ large populations of humans.

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

- A) full of
- B) drawn to
- C) responsible for
- D) distant from

5

The following text is adapted from José Martí's 1891 poem "At the Salon" (translated by Cecil Charles in 1898). The speaker describes a painting featuring a female figure.

From the sterile soil no ray  
Of hope in a blade of green,  
Nor sheltering roof is seen—  
Though the skies are heavy and gray.

Ah, this is the woman fair  
Who stole away my heart  
In the splendid halls of art  
Yester-e'en as I wandered there!

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

- A) Protective
- B) Restrictive
- C) Affectionate
- D) Suspicious

6

Were penguins always flightless? Theresa Cole and her team argue that penguins could fly at some point, but that they lost that ability more than 60 million years ago as they adapted to marine life. After examining various penguin fossils and genetic information, the researchers concluded that over time penguins developed underwater vision, blood oxygenation, and bone density better suited for swimming than flying. Thus, environmental conditions might have driven penguins to change from flyers to swimmers.

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

- A) It defines a scientific term used in the sentence that follows.
- B) It contradicts a description in the sentence that follows.
- C) It provides an answer to the question in the previous sentence.
- D) It notes that the question in the previous sentence has not been researched.

7

Very little is known about the role nocturnal insects, such as moths, play in flower pollination because it is difficult to monitor insects at night. To address this problem, a team of scientists used time-lapse cameras to record pollinator visits to red clover all day and night. The recordings showed that while most pollinator visits were by bumblebees, one-third of visits were by moths. Additionally, flowers that were visited by both moths and bees produced more seeds than flowers that were only visited by bees.

Which choice best states the function of the underlined sentence?

- A) To describe an approach a team of scientists used to study pollinators
- B) To question a claim scientists make about pollinators
- C) To explain why moths prefer red clover to other flowers
- D) To announce an unexpected research finding about red clover

8

The following text is adapted from Louise Erdrich's 2020 novel *The Night Watchman*. Louis Pipestone is collecting signatures for a petition from fellow members of the Turtle Mountain Band of Chippewa on the tribe's reservation in North Dakota.

Louis Pipestone tended the petition like a garden. He kept it with him at all times. In town, his eyes sharpened when he noticed a tribal member who hadn't yet signed. Wherever they were—at the gas pump, mercantile [general store], at Henry's [Café], on the road, or outside the clinic and hospital—Louis cornered them. If they were waiting for a baby to be born, he'd have them sign. If they were laughing, if they were arguing. If they were taking a child home from school, they signed.

©2020 by Louise Erdrich

Which choice best states the main purpose of the text?

- A) To suggest that some tribal members refuse to sign the petition because they dislike Louis Pipestone
- B) To show that attitudes toward the petition within the tribal community change over time
- C) To demonstrate that most tribal members are enthusiastic about signing the petition
- D) To portray Louis Pipestone's strong commitment to collecting signatures for the petition

9

Today composer Scott Joplin is mainly celebrated for his catchy ragtime pieces “Maple Leaf Rag” and “The Entertainer.” However, by overlooking his less famous works, listeners will miss the full range of Joplin’s creativity. For instance, his waltz “Pleasant Moments” and his opera *Treemonisha* skillfully blend ragtime and classical music. These masterpieces deserve as much fame as Joplin’s biggest hits.

Which choice best states the main purpose of the text?

- A) To describe the similarities and differences between ragtime music and opera
- B) To argue that more attention should be given to Joplin’s lesser-known works
- C) To encourage music lovers to listen to music by many different composers
- D) To explain how Joplin learned to compose and perform ragtime music

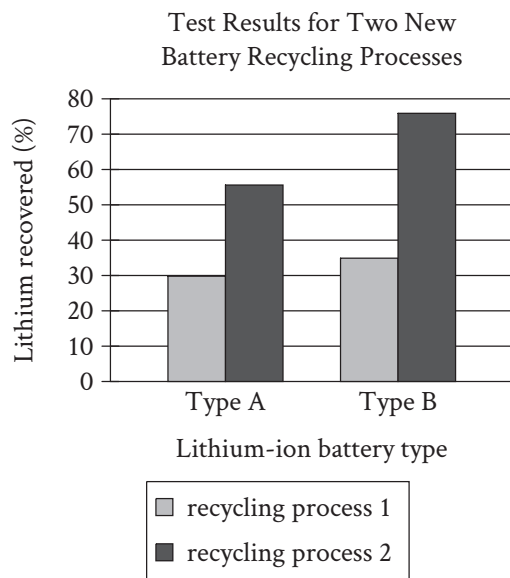
10

A contraction of “you all,” the pronoun “y’all” has long been used as a plural version of “you” in the South and in Black communities around the US. In recent decades, most other English-speaking communities in the US have begun to use “y’all.” What explains its rise in popularity? Many varieties of English have no pronoun that specifically addresses more than one person and instead must use “you” to address both one person and more than one. But “y’all” always refers to two or more people. As a result, it conveys the speaker’s meaning more precisely than “you” can.

Which question does the text most directly attempt to answer?

- A) How many other plural versions of the pronoun “you” are there in English, besides “y’all”?
- B) Why has the pronoun “y’all” become more widely used in the US?
- C) When was the first recorded use of the pronoun “y’all” in the English language?
- D) Is “y’all” commonly used in English-speaking regions of the world besides the US?

11



A team of scientists wants to improve the recycling of two of the most common types of lithium-ion batteries used in electronic devices. The team tested two new processes that involve grinding battery materials and aluminum foil together. The highest percentage of lithium recovered in the tests was closest to \_\_\_\_\_

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

- A) 75%.
- B) 10%.
- C) 45%.
- D) 20%.

12

Estimated Impacts of Invasive Predator Species on Threatened Birds, Mammals, and Reptiles

Invasive predator species	Estimated impact on threatened birds	Estimated impact on threatened mammals	Estimated impact on threatened reptiles
Mongoose	0.66	0.75	0.44
Dogs	0.67	0.57	0.44
Cats	0.74	0.61	0.52

How harmful are invasive predators to threatened species? To find out, researchers assigned values from 0.25 to 1.00 to various harms caused by invasive predators. The researchers then used these values to estimate the extent to which several invasive predator species have harmfully impacted threatened birds, mammals, and reptiles. In the table, higher numbers represent greater impacts. The estimated impact of invasive mongooses on threatened mammals is \_\_\_\_\_

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

- A) 0.35.
- B) 0.61.
- C) 0.75.
- D) 0.52.

13

Biologists have generally believed that the diet of jaguars consists mostly of land-based mammals, but researchers studying a population of jaguars living in the Brazilian Pantanal, a tropical wetland, claim that jaguars can survive on a diet of more fish and aquatic reptiles than mammals.

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

- A) Aquatic reptile and fish remains were detected more often than were mammal remains in an analysis of jaguar waste matter found in the area.
- B) Exceptionally high numbers of yacare caiman, an aquatic reptile, were found living in the area.
- C) Aquatic prey like the reptiles and fish in the area provide a source of omega-3 fatty acids that aren't often found in land mammals.
- D) When jaguars in the area preyed on mammals, they tended to prefer semiaquatic ones like capybaras.

14

East Australian humpback whales migrate up to 10,000 kilometers each year to reach their breeding grounds. Researchers long believed that migrating whales live only on the extra energy they stored up during the feeding season. But marine biologist Vanessa Pirotta and her team aren't so sure. They analyzed 20 years of observations of the migrating whales made by citizen scientists (members of the public who help collect data for scientific research). The team claims that the whales may not live only on their stored energy during migration.

Which finding, if true, would most directly support the team's claim?

- A) Citizen scientists have observed many different types of marine animals feeding alongside the whales.
- B) Citizen scientists have made many observations of the whales feeding as they migrate to their breeding grounds.
- C) Citizen scientists have made more observations of the whales migrating to their breeding grounds than of the whales returning to their feeding grounds.
- D) Citizen scientists have recently begun to observe the whales migrating to their breeding grounds earlier in the year.

15

In countries with right-hand traffic, drivers who want to make a left turn at a traffic intersection with stoplights have to wait for either a gap in oncoming traffic or a designated left-turn signal to turn green. At busy intersections, this often causes a backup of vehicles waiting to turn left or being prevented from proceeding by left-turning vehicles in front of them. Transportation researcher Vikash V. Gayah claims that in urban areas eliminating the option to turn left at busy intersections—both with and without dedicated left-turn signals—would improve traffic flow and, as a result, reduce overall travel times even if such a restriction would require drivers to sometimes travel a slightly longer distance.

Which finding, if true, would most directly support the researcher's claim?

- A) In a town that installed left-turn signals at all busy intersections, seven out of ten survey respondents agreed with the statement “the streets in my community are easier to navigate by motor vehicle than before.”
- B) A traffic study of intersections in a large city shows that on average drivers wait longer to make a left turn at intersections without left-turn signals than at intersections with such signals.
- C) After a city eliminated left turns at busy intersections, a package-delivery company reports that its drivers have been able to reach more addresses in the city daily, on average, and therefore deliver more packages there annually.
- D) Statistics reveal that school buses in a city that eliminated left turns at most intersections took on average two minutes longer to complete their routes after the restriction took effect than they did before.

16

Zines are small-scale, self-printed magazines. They have been around since the Black literary zine *Fire!!* was created in the 1920s. Since then, zines have appealed to creators looking for an inexpensive form of expression to share with a select audience. Zine creators often mix art with social commentary and challenge mainstream culture. At first, the internet appeared to replace the zine, but this old form persists. Today, there are enough zines in the United States to support annual zine festivals. This suggests that \_\_\_\_\_

Which choice most logically completes the text?

- A) creators can reach a larger audience by posting online.
- B) zines are still a meaningful form of expression.
- C) creators can continue to explore new art forms.
- D) zines are good sources of mainstream culture.

17

In a three-year study of parasitic infections by *Anomotaenia brevis* tapeworms in *Temnothorax nylander* ants, entomologist Susanne Foitzik and colleagues found something unexpected: rather than reducing its host's fitness, as is typical of parasites, *A. brevis* greatly extends the lifespan of a *T. nylander* worker ant and seems to halt the effects of aging. Furthermore, those infected receive special treatment, ceasing their share of labor to sustain the colony and remaining in the nest as uninfected workers feed, groom, and transport them. By contrast, the researchers observed that uninfected workers in parasitized colonies have shortened lifespans, most likely because the \_\_\_\_\_

Which choice most logically completes the text?

- A) uninfected workers are at high risk for direct exposure to *A. brevis* in the course of providing social care to the infected workers in the nest.
- B) need to compensate for reduced contributions within the colony while also caring for infected workers is burdensome to the uninfected workers.
- C) high level of activity maintained by the uninfected workers makes them better able than infected workers to quickly disperse when the nest is attacked by a predator.
- D) average lifespan of *T. nylander* worker ants in colonies without parasitic activity typically falls well below three years, the range covered by the study.

18

During their larval phase, numerous species of coral reef fish are drawn toward areas where light is present. To better understand how artificial light at night (ALAN) might affect some coral reef fish, researchers explored the effect of exposure to low levels of ALAN on the reproductive success of the common clownfish (*Amphiprion ocellaris*). While exposure to low levels of ALAN had no significant effect on spawning frequency and egg fertilization in *A. ocellaris*, incubation in the presence of ALAN completely inhibited hatching. These findings suggest that \_\_\_\_\_

Which choice most logically completes the text?

- A) *A. ocellaris* that settle in areas with low levels of ALAN have significantly higher rates of successful egg fertilization than *A. ocellaris* that settle in areas without ALAN do.
- B) the reproductive success of *A. ocellaris* would be at risk if they were to selectively settle in regions that are regularly exposed to low levels of ALAN.
- C) the reproductive success of *A. ocellaris* is more greatly affected by the presence of low levels of ALAN during incubation than the reproductive success of other species of coral reef fish is.
- D) the spawning frequency of *A. ocellaris* was more strongly affected by the presence of low levels of ALAN than egg fertilization was, though both were less affected than incubation.

19

The element carbon has the highest melting point \_\_\_\_\_ all the elements on the periodic table—3,500 degrees Celsius.

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

- A) of
- B) of—
- C) of,
- D) of:

20

By analyzing ice cores from Greenland and Antarctica, a research team at Sweden's Lund University discovered evidence of a solar storm that occurred 9,200 years ago. Scientists had previously thought the Sun to be in a relatively "quiet" phase at that \_\_\_\_\_ the Lund team's finding suggests otherwise.

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

- A) time but
- B) time, but
- C) time,
- D) time

21

According to the traditional RYB (red-yellow-blue) color model, yellow is a complementary color to purple. However, yellow \_\_\_\_\_ considered complementary to blue in modern color theory.

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

- A) is
- B) having been
- C) to be
- D) being

22

With residents from Mexico, China, El Salvador, and many other countries, Los Angeles has long been a city of cultural diversity. Even back in the 1860s, nearly 30% of the city's population \_\_\_\_\_ from outside the United States.

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

- A) is being
- B) was
- C) is
- D) will be

23

According to the University of Hawai'i at Mānoa, aloha 'āina is "a recognition, commitment, and practice sustaining the ea—or life breath" between the Hawaiian people and their natural environments. The concept has been proudly embodied \_\_\_\_\_ Native Hawaiians for generations, contributing to the lush flora and renowned beauty of the islands.

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

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

24

The algaita is a double reed wind instrument from West Africa. The reed of a wind instrument is the mouthpiece \_\_\_\_\_ A double reed contains two pieces of cane that vibrate and produce sound as air passes between them.

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

- A) where sound is made?
- B) where is sound made.
- C) where sound is made.
- D) where is sound made?

25

Many Samoans enjoy a sport called kilikiti. This bat-and-ball game was derived from \_\_\_\_\_ kilikiti differs from cricket in a few key ways.

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

- A) cricket but:
- B) cricket but,
- C) cricket, but
- D) cricket, but,



26

In a rural area along the border between Oklahoma and Texas, amateur astronomers gather each year to observe the night sky at the Okie-Tex Star Party. Like most star parties, Okie-Tex takes place in an area with low light pollution, \_\_\_\_\_ dark skies and ideal stargazing conditions.

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

- A) ensuring
- B) this will ensure
- C) ensures
- D) it ensures

27

In the 1950s, novel audio technologies allowed the addition of another instrument to jazz and swing \_\_\_\_\_ relatively quiet instrument, its full range of sound was finally audible alongside the blaring brass instruments of the time, allowing flautists like Bennie Maupin and Bobbi Humphrey to perform with other jazz greats.

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

- A) music, the flute, a
- B) music. The flute, a
- C) music; the flute, a
- D) music: the flute. A

28

Many butterfly species have bold, brightly colored wings. \_\_\_\_\_ some butterfly species have wings that are almost completely colorless and transparent. Glasswing butterflies, for example, have see-through wings that make them nearly invisible.

Which choice completes the text with the most logical transition?

- A) Similarly,
- B) Previously,
- C) In other words,
- D) However,

29

Following the Mata Ortiz pottery technique, Mexican sculptor Juan Quezada Celado starts by creating the base of the pot with a slab of clay. \_\_\_\_\_ he builds the pot walls by layering coils of clay around the perimeter of the base. Celado then smooths out the pot's walls with a hacksaw blade. At last, the pot is ready to be painted.

Which choice completes the text with the most logical transition?

- A) For example,
- B) However,
- C) By contrast,
- D) Next,

30

Scientists long debated the origins of chondrules, tiny glass beads that formed in meteors billions of years ago. For decades, different theories were proposed, from lightning strikes to powerful rock collisions, but none had sufficient evidentiary support. \_\_\_\_\_ scientists found strong evidence that chondrules were formed by shock waves in nearby nebulae.

Which choice completes the text with the most logical transition?

- A) For example,
- B) Therefore,
- C) Similarly,
- D) Finally,

31

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

- Mary Kang is a Korean American portrait photographer.
- She is based in New York City and in Austin, Texas.
- One of Kang's photographs features artist Dominique Fung.
- In the portrait, Fung is seated on the floor.
- Five of Fung's paintings are resting against the wall behind her.

The student wants to describe where Fung is in the photograph to an audience already familiar with Kang and Fung. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) Dominique Fung is in a photograph by Mary Kang, a portrait photographer based in New York City and Austin, Texas.
- B) Mary Kang is a photographer based in both New York City and Austin, Texas.
- C) Five paintings by artist Dominique Fung can be seen in the background of Mary Kang's photograph.
- D) In Kang's portrait of her, Fung is seated on the floor, with five of her paintings resting against the wall behind her.

32

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

- The international Slow Food movement was founded in 1989 with the signing of the “Slow Food Manifesto.”
- The movement promotes universal access to healthy, high-quality food.
- It calls for sustainable food production practices that protect local environments, ecosystems, and biodiversity.
- It advocates for fair treatment of and compensation for food production workers.
- The Slow Food USA organization was founded in 2000.

The student wants to introduce the Slow Food movement to a new audience. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) The international Slow Food movement, founded in 1989, promotes universal access to healthy, high-quality food that is produced sustainably by workers who are treated and compensated fairly.
- B) The signing of the “Slow Food Manifesto” in 1989 marked the founding of the international Slow Food movement, while the Slow Food USA organization was founded in 2000.
- C) The Slow Food movement advocates for food production workers.
- D) Goals of the movement include universal access to healthy, high-quality food and sustainable food practices.

33

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

- In meteorology, an air mass is a large body of air with generally uniform humidity and temperature.
- Air masses are commonly classified by two-letter names.
- The first letter indicates the humidity of the air mass, while the second letter indicates the temperature.
- cA (continental arctic) means dry and cold, for example.
- mT (maritime tropical) means moist and warm.
- This classification system is based on the work of a Swedish meteorologist named Tor Bergeron (1891–1977).

The student wants to provide an example of an air mass. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) Air masses are large bodies of air with generally uniform humidity and temperature.
- B) The air mass classification system uses two-letter names and is based on the work of Tor Bergeron, a Swedish meteorologist.
- C) Air masses are commonly classified by a two-letter name that indicates humidity and temperature.
- D) One type of air mass is known as a cA, or continental arctic, air mass because it is dry and cold.

**STOP**

**If you finish before time is called, you may check your work on this module only.  
Do not turn to any other module in the test.**

# Math

## 27 QUESTIONS

### DIRECTIONS

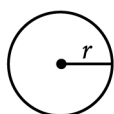
The questions in this section address a number of important math skills.  
Use of a calculator is permitted for all questions.

### NOTES

Unless otherwise indicated:

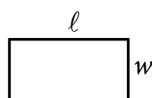
- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

### REFERENCE

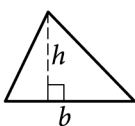


$$A = \pi r^2$$

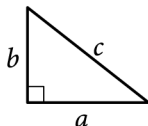
$$C = 2\pi r$$



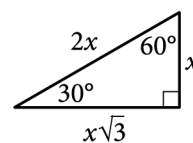
$$A = \ell w$$



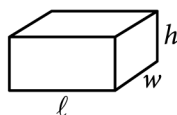
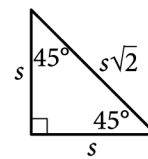
$$A = \frac{1}{2}bh$$



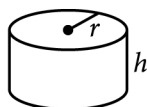
$$c^2 = a^2 + b^2$$



Special Right Triangles



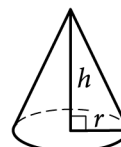
$$V = \ell wh$$



$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

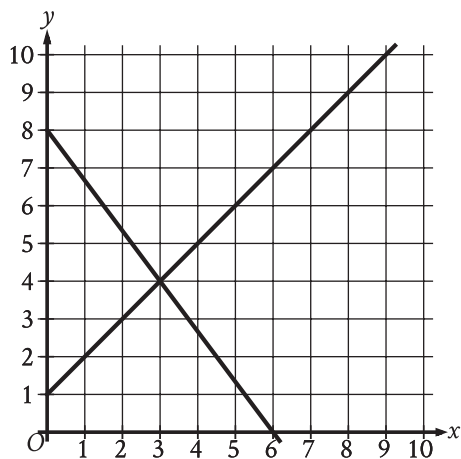
The sum of the measures in degrees of the angles of a triangle is 180.

**For multiple-choice questions**, solve each problem, choose the correct answer from the choices provided, and then circle your answer in this book. Circle only one answer for each question. If you change your mind, completely erase the circle. You will not get credit for questions with more than one answer circled, or for questions with no answers circled.

**For student-produced response questions**, solve each problem and write your answer next to or under the question in the test book as described below.

- Once you've written your answer, circle it clearly. You will not receive credit for anything written outside the circle, or for any questions with more than one circled answer.
- If you find **more than one correct answer**, write and circle only one answer.
- Your answer can be up to 5 characters for a **positive** answer and up to 6 characters (including the negative sign) for a **negative** answer, but no more.
- If your answer is a **fraction** that is too long (over 5 characters for positive, 6 characters for negative), write the decimal equivalent.
- If your answer is a **decimal** that is too long (over 5 characters for positive, 6 characters for negative), truncate it or round at the fourth digit.
- If your answer is a **mixed number** (such as  $3\frac{1}{2}$ ), write it as an improper fraction ( $\frac{7}{2}$ ) or its decimal equivalent (3.5).
- Don't include **symbols** such as a percent sign, comma, or dollar sign in your circled answer.

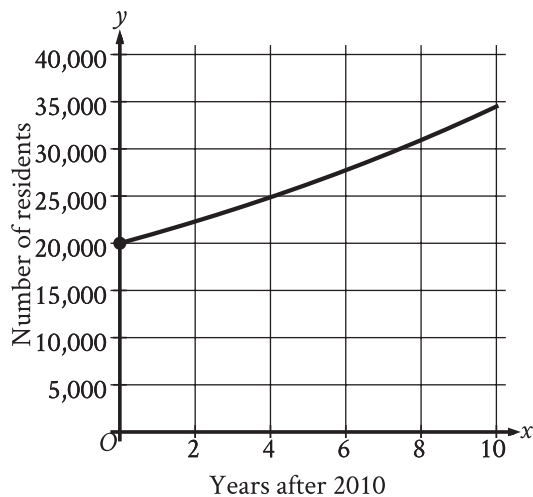
1



The graph of a system of linear equations is shown. What is the solution  $(x, y)$  to the system?

- A) (2, 3)
- B) (3, 4)
- C) (4, 5)
- D) (5, 6)

2

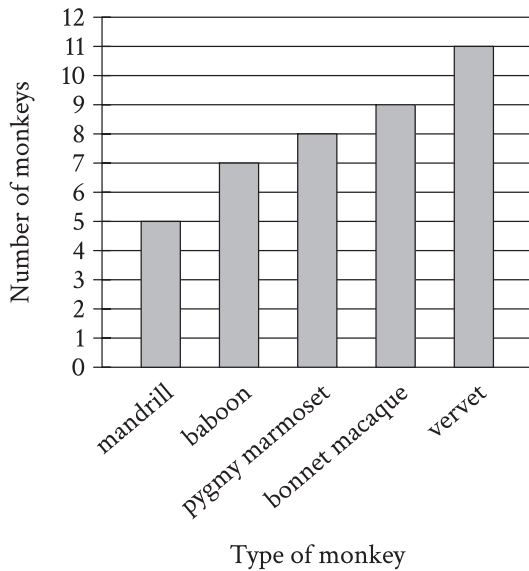


The graph shown models the number of residents of a certain city  $x$  years after 2010. How many residents does this model estimate the city had in 2010?

- A) 0
- B) 2,000
- C) 20,000
- D) 25,000

3

The bar graph shows the number of each type of monkey in a sanctuary.



How many more vervets are in this sanctuary than mandrills?

- A) 11
- B) 6
- C) 5
- D) 3

4

$$3x + 5(x + 4) = 76$$

What value of  $x$  is the solution to the given equation?

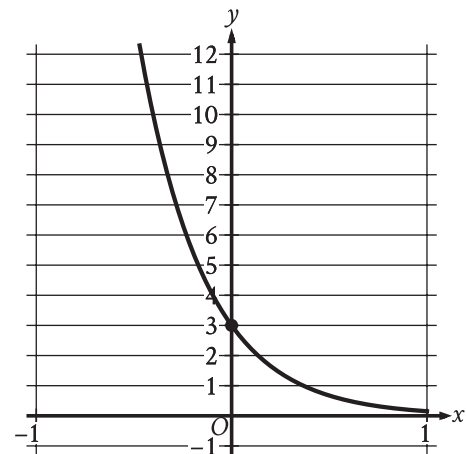
- A) 7
- B) 8
- C) 56
- D) 72

5

The function  $f$  is defined by  $f(x) = \frac{16}{x}$ . What is the value of  $f(x)$  when  $x = 17$ ?

- A)  $\frac{16}{17}$
- B)  $\frac{17}{16}$
- C) 16
- D) 17

6



The graph of the exponential function  $f$  is shown, where  $y = f(x)$ . The  $y$ -intercept of the graph is  $(0, y)$ . What is the value of  $y$ ?

7

For a party, 50 dinner rolls are needed. Dinner rolls are sold in packages of 12. What is the minimum number of packages that should be bought for the party?

8

21 is 21% of what number?

- A) 0
- B) 1
- C) 42
- D) 100

9

To repair a refrigerator, a technician charges \$60 per hour for labor plus \$120 for parts. Which function  $f$  represents the total amount, in dollars, the technician will charge for this job if it takes  $x$  hours?

- A)  $f(x) = x + 120$
- B)  $f(x) = 60x$
- C)  $f(x) = 60x + 120$
- D)  $f(x) = 60x - 120$

10

The function  $f$  is defined by  $f(x) = 80 - 6x$ . What is the value of  $f(7)$  ?

- A) 13
- B) 38
- C) 74
- D) 81

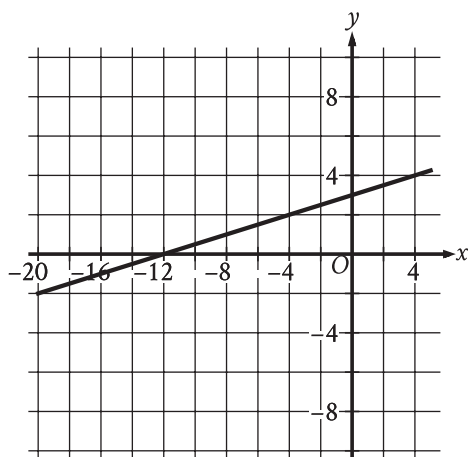
11

Naomi bought both rabbit snails and nerite snails for a total of \$52. Each rabbit snail costs \$8 and each nerite snail costs \$6. If Naomi bought 2 nerite snails, how many rabbit snails did she buy?

- A) 5
- B) 12
- C) 14
- D) 50



12



The graph of the linear function  $f$  is shown, where  $y = f(x)$ . What is the  $x$ -intercept of the graph of  $f$ ?

- A)  $(-12, 0)$
- B)  $(0, 0)$
- C)  $\left(\frac{1}{4}, 0\right)$
- D)  $(12, 0)$

13

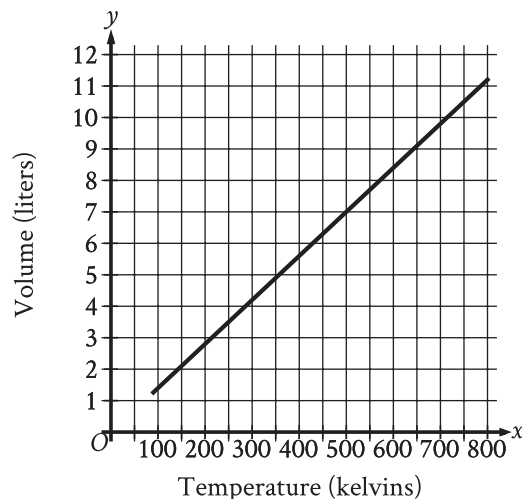
A triangle has a base length of 40 centimeters and a height of 90 centimeters. What is the area, in square centimeters, of the triangle?

14

A participant in a bicycle race completes the race with an average speed of 24,816 yards per hour. What is this average speed, in miles per hour? (1 mile = 1,760 yards)

15

Hydrogen is placed inside a container and kept at a constant pressure. The graph shows the estimated volume  $y$ , in liters, of the hydrogen when its temperature is  $x$  kelvins.



What is the estimated volume, in liters, of the hydrogen when its temperature is 500 kelvins?

- A) 0
- B)  $\frac{7}{500}$
- C) 7
- D)  $\frac{500}{7}$

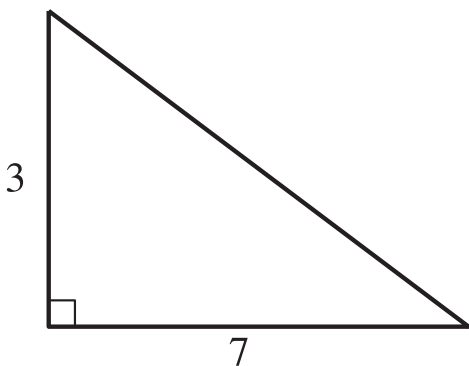
16

$$p + 34 = q + r$$

The given equation relates the variables  $p$ ,  $q$ , and  $r$ . Which equation correctly expresses  $p$  in terms of  $q$  and  $r$ ?

- A)  $p = q + r + 34$
- B)  $p = q + r - 34$
- C)  $p = -q - r + 34$
- D)  $p = -q - r - 34$

17



Note: Figure not drawn to scale.

The lengths of the legs of a right triangle are shown. Which of the following is closest to the length of the triangle's hypotenuse?

- A) 3.2
- B) 5
- C) 7.6
- D) 20

18

The number of coins in a collection increased from 9 to 90. What was the percent increase in the number of coins in this collection?

- A) 10%
- B) 81%
- C) 90%
- D) 900%

19

$$2x + y = 37$$

In triangle  $QRS$ , sides  $QR$  and  $RS$  each have a length of  $x$  centimeters and side  $SQ$  has a length of  $y$  centimeters. The given equation represents this situation. Which of the following is the best interpretation of 37 in this context?

- A) The difference, in centimeters, between the lengths of sides  $QR$  and  $SQ$
- B) The difference, in centimeters, between the lengths of sides  $QR$  and  $RS$
- C) The sum of the lengths, in centimeters, of the three sides of the triangle
- D) The length, in centimeters, of one of the two sides of equal length

20

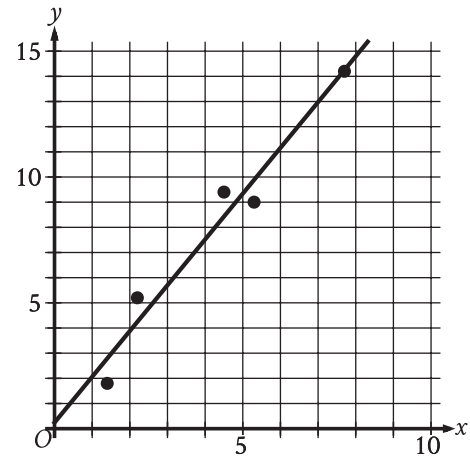
What is the slope of the graph of  $y = \frac{5x}{13} - 23$  in the  $xy$ -plane?

21

To study fluctuations in composition, samples of pumice were taken from 29 locations and cut in the shape of a cube. The length of the edge of one of these cubes is 3.000 centimeters. This cube has a density of 0.230 grams per cubic centimeter. What is the mass of this cube, in grams?

22

In the given scatterplot, a line of best fit for the data is shown.



Which of the following is closest to the slope of the line of best fit shown?

- A) 0.2
- B) 0.7
- C) 1.8
- D) 2.6

23

The length of a rectangle is 50 inches and the width is  $x$  inches. The perimeter is at most 210 inches. Which inequality represents this situation?

- A)  $2x + 100 \leq 210$
- B)  $2x + 100 \geq 210$
- C)  $2x + 50 \leq 210$
- D)  $2x + 50 \geq 210$

24

Which of the following expressions is equivalent to  $8x^{10} - 8x^9 + 88x$  ?

- A)  $x(7x^{10} - 7x^9 + 87x)$
- B)  $x(8^{10} - 8^9 + 88)$
- C)  $8x(x^{10} - x^9 + 11x)$
- D)  $8x(x^9 - x^8 + 11)$

25

$$\frac{3}{5}x + \frac{3}{4}y = 7$$

Which table gives three values of  $x$  and their corresponding values of  $y$  for the given equation?

A)

$x$	$y$
1	$\frac{113}{20}$
2	$\frac{101}{20}$
4	$\frac{77}{20}$

B)

$x$	$y$
1	$\frac{47}{5}$
2	$\frac{44}{5}$
4	$\frac{38}{5}$

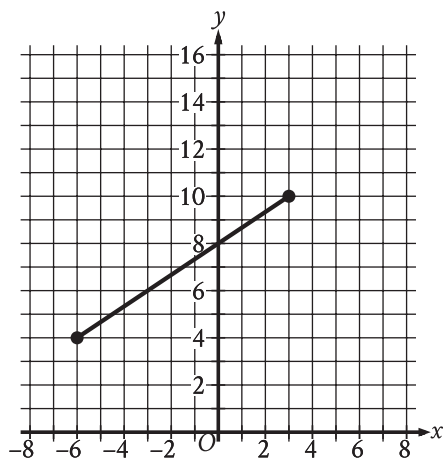
C)

$x$	$y$
1	$\frac{148}{15}$
2	$\frac{136}{15}$
4	$\frac{112}{15}$

D)

$x$	$y$
1	$\frac{128}{15}$
2	$\frac{116}{15}$
4	$\frac{92}{15}$

26



The line segment shown in the  $xy$ -plane represents one of the legs of a right triangle. The area of this triangle is  $36\sqrt{13}$  square units. What is the length, in units, of the other leg of this triangle?

- A) 12
- B) 24
- C)  $3\sqrt{13}$
- D)  $18\sqrt{13}$

27

The solutions to  $x^2 + 6x + 7 = 0$  are  $r$  and  $s$ , where  $r < s$ . The solutions to  $x^2 + 8x + 8 = 0$  are  $t$  and  $u$ , where  $t < u$ . The solutions to  $x^2 + 14x + c = 0$ , where  $c$  is a constant, are  $r + t$  and  $s + u$ . What is the value of  $c$ ?

**STOP**

**If you finish before time is called, you may check your work on this module only.  
Do not turn to any other module in the test.**

# Math

## 27 QUESTIONS

### DIRECTIONS

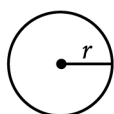
The questions in this section address a number of important math skills.  
Use of a calculator is permitted for all questions.

### NOTES

Unless otherwise indicated:

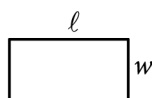
- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

### REFERENCE

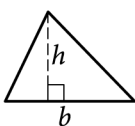


$$A = \pi r^2$$

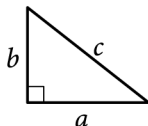
$$C = 2\pi r$$



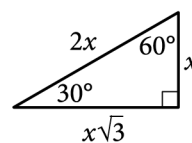
$$A = \ell w$$



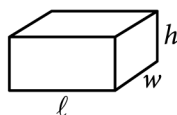
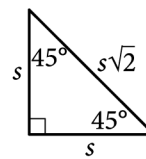
$$A = \frac{1}{2}bh$$



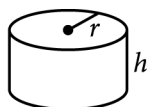
$$c^2 = a^2 + b^2$$



Special Right Triangles



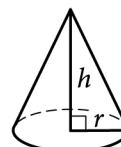
$$V = \ell wh$$



$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.

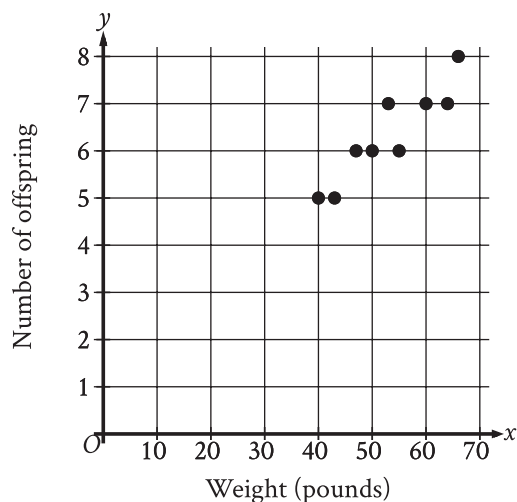
**For multiple-choice questions**, solve each problem, choose the correct answer from the choices provided, and then circle your answer in this book. Circle only one answer for each question. If you change your mind, completely erase the circle. You will not get credit for questions with more than one answer circled, or for questions with no answers circled.

**For student-produced response questions**, solve each problem and write your answer next to or under the question in the test book as described below.

- Once you've written your answer, circle it clearly. You will not receive credit for anything written outside the circle, or for any questions with more than one circled answer.
- If you find **more than one correct answer**, write and circle only one answer.
- Your answer can be up to 5 characters for a **positive** answer and up to 6 characters (including the negative sign) for a **negative** answer, but no more.
- If your answer is a **fraction** that is too long (over 5 characters for positive, 6 characters for negative), write the decimal equivalent.
- If your answer is a **decimal** that is too long (over 5 characters for positive, 6 characters for negative), truncate it or round at the fourth digit.
- If your answer is a **mixed number** (such as  $3\frac{1}{2}$ ), write it as an improper fraction ( $\frac{7}{2}$ ) or its decimal equivalent (3.5).
- Don't include **symbols** such as a percent sign, comma, or dollar sign in your circled answer.

1

The scatterplot shows the relationship between the weight, in pounds, of each of 9 female gray wolves on April 30 and the number of offspring each gray wolf produced.



How many offspring did the 50-pound gray wolf produce?

- A) 8
- B) 7
- C) 6
- D) 5

2

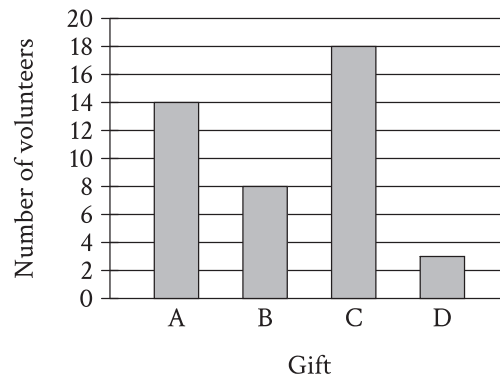
$$y = 4$$

$$x = y + 6$$

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

- A) 10
- B) 6
- C) 4
- D) 2

3



In April, there were 43 volunteers in a cleanup project. Each volunteer was asked to choose a small gift labeled A, B, C, or D. The bar graph shows the number of volunteers who chose each gift. How many volunteers chose gift C?

- A) 3
- B) 8
- C) 14
- D) 18

4

$-13, 4, 23$

A data set of three numbers is shown. If a number from this data set is selected at random, what is the probability of selecting a negative number?

- A) 0
- B)  $\frac{1}{3}$
- C)  $\frac{2}{3}$
- D) 1



5

A line in the  $xy$ -plane has a slope of  $-\frac{1}{2}$  and passes through the point  $(0, 3)$ . Which equation represents this line?

- A)  $y = -\frac{1}{2}x - 3$
- B)  $y = -\frac{1}{2}x + 3$
- C)  $y = \frac{1}{2}x - 3$
- D)  $y = \frac{1}{2}x + 3$

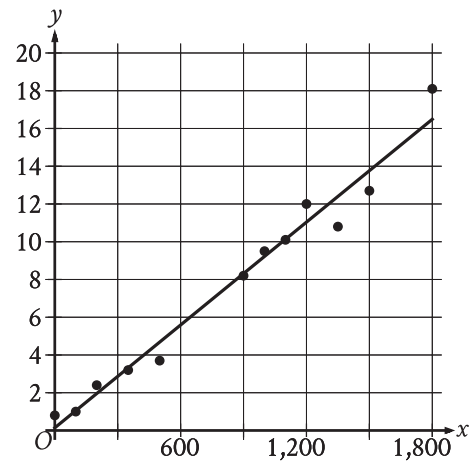
6

A product costs 11.00 dollars per pound. What is the cost, in dollars, for 6 pounds of the product?

7

The equation  $46 = 2x + 2y$  gives the perimeter of a rectangular rug that has length  $x$ , in feet, and width  $y$ , in feet. The width of the rug is 8 feet. What is the length, in feet, of the rug?

8



Twelve data points are shown in the scatterplot. A line of best fit for the data is also shown. At  $x = 1,200$ , which of the following is closest to the  $y$ -value predicted by the line of best fit?

- A) 16
- B) 14
- C) 11
- D) 6

9

Which expression is equivalent to  $(8yz)(y)(7z)$ ?

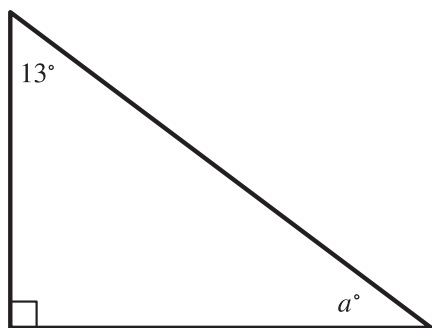
- A)  $56y^2z^2$
- B)  $56y^2z$
- C)  $56yz$
- D)  $16yz$

10

A food truck buys forks for \$0.04 each and plates for \$0.48 each. The total cost of  $x$  forks and  $y$  plates is \$661.76. Which equation represents this situation?

- A)  $0.48x - 0.04y = 661.76$
- B)  $0.04x - 0.48y = 661.76$
- C)  $0.48x + 0.04y = 661.76$
- D)  $0.04x + 0.48y = 661.76$

11



Note: Figure not drawn to scale.

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

- A) 13
- B) 77
- C) 90
- D) 103

12

Gabriella deposits \$35 in a savings account at the end of each week. At the beginning of the 1st week of a year there was \$600 in that savings account. How much money, in dollars, will be in the account at the end of the 4th week of that year?

- A) 460
- B) 635
- C) 639
- D) 740

13

$$x^2 = (22)(22)$$

What is the positive solution to the given equation?

14

The ratio 140 to  $m$  is equivalent to the ratio 4 to 28. What is the value of  $m$  ?

15

If  $3x - 27 = 24$ , what is the value of  $x - 9$  ?

- A) 1
- B) 8
- C) 24
- D) 35

16

For the linear function  $f$ ,  $f(0) = 17$  and  $f(1) = 17$ . Which equation defines  $f$ ?

- A)  $f(x) = \frac{1}{17}$
- B)  $f(x) = 1$
- C)  $f(x) = 17$
- D)  $f(x) = 34$

17

The function  $f(x) = 55.20 - 0.16x$  gives the estimated surface water temperature  $f(x)$ , in degrees Celsius, of a body of water on the  $x$ th day of the year, where  $220 \leq x \leq 360$ . Based on the model, what is the estimated surface water temperature, in degrees Celsius, of this body of water on the 326th day of the year?

- A) 55.20
- B) 3.04
- C) -0.16
- D) -52.16

18

$$y = -\frac{1}{5}x$$
$$y = \frac{1}{7}x$$

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

- A) -5
- B) 0
- C) 2
- D) 7

19

A sample of a certain isotope takes 29 years to decay to half its original mass. The function  $s(t) = 184(0.5)^{\frac{t}{29}}$  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  $s(87) = 23$  in this context?

- A) Approximately 23 grams of the sample remains 87 years after the sample starts to decay.
- B) The mass of the sample has decreased by approximately 23 grams 87 years after the sample starts to decay.
- C) The mass of the sample has decreased by approximately 87 grams 23 years after the sample starts to decay.
- D) Approximately 87 grams of the sample remains 23 years after the sample starts to decay.

20

How many fluid ounces are equivalent to 76 quarts?  
(8 fluid ounces = 1 cup and 4 cups = 1 quart)

21

A piece of wire with a length of 32 inches is cut into two parts. One part has a length of  $x$  inches, and the other part has a length of  $y$  inches. The value of  $x$  is 4 more than 3 times the value of  $y$ . What is the value of  $x$ ?

22

The table gives the perimeters of similar triangles  $TUV$  and  $XYZ$ , where  $\overline{TU}$  corresponds to  $\overline{XY}$ . The length of  $\overline{TU}$  is 18.

	Perimeter
Triangle $TUV$	37
Triangle $XYZ$	333

What is the length of  $\overline{XY}$ ?

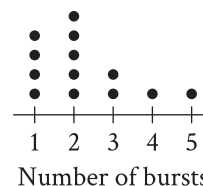
- A) 2
- B) 18
- C) 55
- D) 162

23

A sphere has a radius of  $\frac{17}{5}$  feet. What is the volume, in cubic feet, of the sphere?

- A)  $\frac{5\pi}{17}$
- B)  $\frac{68\pi}{15}$
- C)  $\frac{32\pi}{5}$
- D)  $\frac{19,652\pi}{375}$

24



The dot plot represents a data set of the number of bursts for 13 eruptions of a steam vent. If an additional eruption with 11 bursts is added to this data set to create a new data set of 14 eruptions, which of the following measures will be greater for the new data set than for the original data set?

- I. The median number of bursts
  - II. The mean number of bursts
- A) I and II
  - B) I only
  - C) II only
  - D) Neither I nor II

25

A factory makes 9-inch, 7-inch, and 4-inch concrete screws. During a certain day, the number of 9-inch concrete screws that the factory makes is 5 times the number  $n$  of 7-inch concrete screws, and the number of 4-inch concrete screws is 22. During this day, the factory makes 100 concrete screws total. Which equation represents this situation?

- A)  $9(5n) + 7n + 4(22) = 100$
- B)  $9n + 7n + 4n = 100$
- C)  $5n + 22 = 100$
- D)  $6n + 22 = 100$

26

The number  $a$  is 190% greater than the number  $b$ . The number  $b$  is 80% less than 24. What is the value of  $a$ ?

- A) 9.12
- B) 13.92
- C) 26.40
- D) 36.48

27

A right square prism has a height of 14 units. The volume of the prism is 2,016 cubic units. What is the length, in units, of an edge of the base?

**STOP**

**If you finish before time is called, you may check your work on this module only.  
Do not turn to any other module in the test.**

# PSAT<sup>™</sup> 8/9

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# Practice Test #2

## ANSWER EXPLANATIONS

These answer explanations are for students taking the digital PSAT 8/9 in nondigital format.



# Reading and Writing

## Module 1

(33 questions)

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### QUESTION 1

**Choice A** is the best answer because as used in the text, “soft” most nearly means gentle. The text portrays Alice speaking about the snow falling against the window, describing it as sounding “nice” and similar to someone “kissing the window.” These details most strongly suggest that Alice thinks the sound made by the snow falling against the window is gentle.

**Choice B** is incorrect. Although in some contexts, “gentle” can mean sensitive, or caring about others’ feelings, that isn’t the meaning in this context; it doesn’t make sense to say that Alice thinks the sound of the snow cares about anything. **Choice C** is incorrect because the text doesn’t suggest that Alice thinks the sound of the snow is shapeless, or lacks a definite shape; she isn’t indicating how anything looks or feels but, rather, is describing how “nice” and gentle the snow sounds. **Choice D** is incorrect because the text doesn’t suggest that Alice thinks the sound of the snow is bland, or uninteresting; rather, she notices the sound and comments on how “nice” it is.

### QUESTION 2

**Choice A** is the best answer because as used in the text, “determine” most nearly means choose or decide. The text indicates that Mr. Ryder “had made up his mind” to ask a woman to marry him but had not yet “spoken”—that is, he had not yet asked her. The text also indicates that Mr. Ryder “decided” to throw a party for the woman and ask her during it. This context conveys that after making up his mind to propose, what Mr. Ryder had to do was determine, or choose, the time to do it.

**Choice B** is incorrect because in this context, “determine” doesn’t mean influence, or affect or control. The text isn’t indicating that Mr. Ryder is controlling time itself; such a thing isn’t possible. Rather, the text conveys that after making up his mind to ask a woman to marry him, Mr. Ryder had to make another decision about his own actions by selecting a time to propose. **Choice C** is incorrect. The text

focuses on Mr. Ryder's plan to ask a woman to marry him and his decision about when to ask her. This context conveys that after making up his mind to propose, Mr. Ryder had to choose the time, not that he had to demonstrate, or show, the time; it's not clear what it would mean to demonstrate a time. *Choice D* is incorrect because in this context, "determine" doesn't mean measure, or control with careful restraint. The text isn't indicating that Mr. Ryder is carefully controlling time itself; such a thing isn't possible. Rather, the text conveys that after making up his mind to ask a woman to marry him, Mr. Ryder had to make another decision about his own actions by selecting a time to propose; it's Mr. Ryder's decision that is measured, not the time he eventually chooses.

### QUESTION 3

**Choice C** is the best answer because it most logically completes the text's discussion of an exhibit at the Brooklyn Public Library. In this context, "overlook" means to ignore or to miss. The text states that artist and curator Joe Baker organized an exhibit that features Lenape beadwork in historical and modern works. The text describes the exhibit as "essential viewing," suggesting that it's an important exhibit that people should make an effort to visit; this context conveys that it would be a mistake to overlook the exhibit.

*Choice A* is incorrect. In this context, "complicate" would mean to add difficulty, and there's no reason to think the text would need to directly caution against complicating Baker's exhibit; the text focuses on the idea that the exhibit is "essential viewing," not on the idea of a potential difficulty that could be raised.

*Choice B* is incorrect. In this context, "amplify" means to increase, and there's no reason to believe the text would indicate that it would be a mistake to increase an exhibit the text describes as "essential viewing." *Choice D* is incorrect because it wouldn't make sense to say that it would be a mistake to "assemble," or put together, Baker's exhibit: the text makes it clear that the exhibit has already been put together and, further, praises the exhibit as "essential viewing."

### QUESTION 4

**Choice C** is the best answer because it most logically completes the text's discussion of the preservation efforts undertaken by Erika Karuzas and the Confederated Salish and Kootenai Tribes of Montana. In this context, "promote" means play a part in the success or growth of something or someone. The text indicates that Karuzas and the Confederated Salish and Kootenai Tribes work to preserve culturally important sites. It goes on to say that their decision to create a national trail connecting the sites was motivated by the fact that such a trail would receive protections from the US government that the sites wouldn't otherwise receive. Thus, such a decision would promote the preservation efforts.

*Choice A* is incorrect because "inspire" means motivate or influence, which wouldn't make sense in context. The text establishes that Karuzas and the Confederated Salish and Kootenai Tribes of Montana work to preserve culturally significant sites and that their decision to create a new national trail occurred as a result of a desire to add protections to the sites that they wouldn't otherwise receive. Thus, creating the trail wouldn't inspire the efforts to preserve the sites; instead, it would promote the efforts. *Choice B* is incorrect because "ignore" means overlook, which wouldn't make sense in context. The text indicates that



Karuzas and the Confederated Salish and Kootenai Tribes of Montana work to preserve culturally significant sites and that they decided to create a national trail connecting the sites because such a trail would receive protections from the US government that the sites wouldn't otherwise receive. Thus, the creation of the trail would promote, not ignore, the preservation efforts. *Choice D* is incorrect because "reduce" means decrease or restrict, which wouldn't make sense in context. The text indicates that Karuzas and the Confederated Salish and Kootenai Tribes of Montana work to preserve culturally significant sites and that they decided to create a national trail connecting the sites because such a trail would receive protections from the US government that the sites wouldn't otherwise receive. The decision would therefore promote, not reduce, the preservation efforts.

## QUESTION 5

**Choice D** is the best answer because it most logically completes the text's discussion of the dating of Machu Picchu. In this context, "original" means first or initial. The text indicates that Lucy Salazar and her colleagues have determined the age of Machu Picchu and that the age differs from another estimate of the site's age, explaining that the site is about 20 years older than scholars thought in 1911 when they initially encountered Machu Picchu. In other words, Salazar and her team found that the site's age differs from the first estimate.

*Choice A* is incorrect. The text's structure indicates that the missing word describes the estimate made by scholars when they first encountered Machu Picchu in 1911 in relation to the age determined by Salazar and her colleagues. It wouldn't make sense to suggest that the estimate by earlier scholars was "genuine," or actual and true, while the one by Salazar's team wasn't, since the text treats the finding by Salazar's team as true and as invalidating the earlier estimate ("it is approximately 20 years older than scholars thought"). *Choice B* is incorrect. The text's structure indicates that the missing word describes the estimate made by scholars when they first encountered Machu Picchu in 1911 in relation to the age determined by Salazar and her colleagues. It wouldn't make sense to suggest that the estimate by earlier scholars was "intentional," or done on purpose, while the one by Salazar's team wasn't; the text indicates that Salazar and her colleagues were deliberately using radiocarbon dating to study Machu Picchu. *Choice C* is incorrect. The text's structure indicates that the missing word describes the estimate made by scholars when they first encountered Machu Picchu in 1911 in relation to the age determined by Salazar and her colleagues. There's no reason to suggest that the estimate by earlier scholars was "independent," or not controlled by or affiliated with others, while the one by Salazar's team wasn't; there's no mention of any outside influence on the work by Salazar and her team or by scholars in 1911.

## QUESTION 6

**Choice B** is the best answer because it most accurately describes the main purpose of the text. The text describes how the narrator watches people working out at a gym through a window near a bus stop. The narrator says that “there ain’t nothing funnier” than watching people try to work out on the stair climber machine. Thus, the main purpose of the text is to describe an activity that the narrator finds amusing.

*Choice A* is incorrect because the text isn’t about the narrator beginning middle school. The text describes how the narrator finds people working out at a gym amusing and makes no mention of school life. *Choice C* is incorrect because the text doesn’t mention any problems that the narrator currently has or has overcome. It just describes how the narrator finds watching people work out amusing. *Choice D* is incorrect because the narrator invents the made-up movie mentioned in the text. The text doesn’t indicate that the narrator has seen a movie in a theater. The focus of the text is on the narrator watching people at the gym, not watching a movie.

## QUESTION 7

**Choice C** is the best answer because it best describes the main purpose of the text, which is to explain why a certain rap album is particularly innovative. The text mentions rap artist and professor A.D. Carson, who published “the first peer-reviewed rap album.” The text also describes the unusual process of having the work evaluated by both scholars and rap artists before its release, and details how the album combines elements of a mixtape album with elements of scholarly essays. All of these characteristics of the album and the way in which it was developed help to demonstrate the album’s novelty.

*Choice A* is incorrect because though the text mentions an album that combines elements of scholarly essays and mixtapes, it does not compare the relative public impact of scholarly articles and albums. *Choice B* is incorrect because the text does not present the opinion of a scholar regarding the rap album. *Choice D* is incorrect because though the text mentions that the album was peer reviewed, it does not detail the steps of the review.

## QUESTION 8

**Choice A** is the best answer because it most accurately describes how the underlined portion functions in the text as a whole. The first sentence of the text states that the CEP had a positive impact on the Civil Rights Movement in the 1960s. The next sentence explains that the CEP organized workshops for attendees, who later used the knowledge they gained to lead civil rights initiatives. And the underlined portion indicates the number of activists—more than 7,000—who participated in the workshops. Thus, the underlined portion provides a number that underscores the extent of the CEP’s impact on the Civil Rights Movement in the 1960s.

*Choice B* is incorrect. Although the sentence that contains the underlined portion mentions some CEP workshop topics, the underlined portion itself addresses the

number of participants in the CEP workshops, not the number of topics covered. *Choice C* is incorrect. Although the underlined portion refers to attendees of the CEP workshops, nothing in the underlined portion or the text as a whole addresses the Southern Christian Leadership Conference's philosophy or the attendees' opinions thereof. *Choice D* is incorrect because neither the underlined portion nor the text as a whole mentions any criticism of the CEP by members of the Southern Christian Leadership Conference.

## QUESTION 9

**Choice C** is the best answer because it describes how the ecologist in Text 2 would most likely respond to the author's conclusion in Text 1 based on the information provided. The author of Text 1 states that the pink color of flamingo feathers comes from pigments carried by the brine shrimp flamingos consume. The author of Text 1 concludes that this means that a flamingo that is pinker than another flamingo must have eaten more shrimp. However, according to Text 2, ecologist Juan Amat has found that flamingos can also affect how pink they look through grooming, when they move ingested pigments from a gland near the tail to their feathers. This indicates that not all the pigments available from the shrimp a flamingo has eaten automatically end up coloring the flamingo's feathers; some may or may not be applied later. Since grooming is also a factor, the ecologist (Amat) in Text 2 would most likely respond to the conclusion in Text 1 that pinker flamingos have eaten more shrimp by pointing out that the amount of shrimp eaten isn't the only thing that influences flamingos' coloring.

*Choice A* is incorrect. Although Text 2 states that the ecologist has found that flamingos can move pigments to their feathers from a gland near their tail, there is no indication that their tail feathers are pinker than their other feathers. Moreover, the point that tail feathers are pinker than other feathers wouldn't logically address the idea that the quantity of shrimp eaten is what determines a flamingo's coloring. *Choice B* is incorrect because Text 2 indicates that the ecologist has found that flamingos' feathers do sometimes look pinker and gives no indication that this change in color is particularly subtle. Moreover, the point that most observers wouldn't notice a change wouldn't logically address the idea that the quantity of shrimp eaten is what determines a flamingo's coloring. *Choice D* is incorrect because nothing in Text 2 suggests that the ecologist would argue about flamingos' shrimp consumption. Although Text 2 indicates that the ecologist has found that flamingos may make themselves look pinker during mating season, this is addressed in terms of grooming habits; apart from referring to food as a source of pigments, Text 2 doesn't discuss the diet of flamingos at all.

## QUESTION 10

**Choice D** is the best answer because it presents a description of how Zerviah Holme felt that is directly supported by the text. The text states that Holme "did not like to be interrupted" while reading Gibbon and that he considered interruptions to be "an insult." Furthermore, the text suggests that Gibbon is Holme's favorite author because, as the text states, "he was always reading Gibbon." Thus, Holme would have felt annoyed at having been interrupted when the letter was delivered.

*Choice A* is incorrect because the text doesn't suggest that Holme is relieved to receive the letter. Instead, the text states that Holme "just glanced indifferently at the letter," suggesting that the letter wasn't important to him. *Choice B* is incorrect because the text doesn't suggest that Holme is excited to receive the letter. Instead, the text states that Holme didn't put down his book to receive the letter and that he looked at the letter "indifferently" and at the postman "impatiently." This suggests that Holme isn't excited. Also, there is no mention that Holme knows who sent the letter. *Choice C* is incorrect because the text doesn't indicate that Holme is sad or that he wants to speak with the postman. Instead, the text describes Holme as looking "impatiently at the postman," which suggests that he wants the postman to leave.

## QUESTION 11

**Choice B** is the best answer because it presents a statement about how historians view *pachuca* style that is supported by the text. The text first describes the distinctive *pachuca* style of dress adopted by some Mexican American women during World War II, saying that some criticized it and asserted that women should dress traditionally. The text then goes on to contrast this position with that of historians, who "see things differently": according to these historians, the *pachuca* style showed a wish for freedom and self-expression, and it acted as a kind of rebellion against what society expected of women at the time. Therefore, according to the text, historians think that the *pachuca* style was a way for Mexican women to express themselves and resist strict social expectations.

*Choice A* is incorrect because the text explicitly describes the *pachuca* style as a distinctive look adopted during the World War II era. It does not indicate that the *pachuca* style influences fashion in the United States in the present day. *Choice C* is incorrect because the text does not indicate that Mexican American women wore the *pachuca* style to show support for the United States during World War II; rather, the style was a means of self-expression and rebellion against social expectations. *Choice D* is incorrect because the text does not compare the *pachuca* style to other fashion trends: the *pachuca* style is the only style mentioned.

## QUESTION 12

**Choice B** is the best answer because it presents a statement about the two previously unknown penguin species that is supported by the text. According to the text, Alan Tennyson and colleagues studied fossil bones belonging to two previously unknown penguin species that are described as prehistoric, or ancient. The text goes on to say that one of the two species was considerably larger than the emperor penguin, which is currently the largest penguin in existence. Thus, the text indicates that the other species aren't in existence today, or that the two previously unknown penguin species are no longer living species.

*Choice A* is incorrect. Although the text states that Alan Tennyson is a paleontologist who studied the fossils of two previously unknown penguin species, it doesn't say whether these penguins are frequently studied by paleontologists. *Choice C* is incorrect because the text says that one of the two

previously unknown penguin species was three times larger than the emperor penguin (a penguin alive today), not that they were both smaller than penguin species that exist today. *Choice D* is incorrect because the text doesn't discuss whether the two previously unknown penguin species spent any time in water.

## QUESTION 13

**Choice D** is the best answer because it presents the point about the magnetic field mapping that the text describes as surprising. The text indicates that a team of astronomers mapped the magnetic field of G47, a galactic bone in the Milky Way, and that the mapping "surprisingly" revealed "no clear pattern or direction" in the magnetic field. The text then adds that the researchers had thought the magnetic field would be as uniform as the magnetic fields of other galactic bones in the Milky Way are. In other words, the researchers were surprised that the mapping revealed a magnetic field that wasn't uniform.

*Choice A* is incorrect because the text doesn't indicate that the mapping surprisingly showed a weaker magnetic field than the researchers had expected. The text makes no mention of the magnetic field's strength, only its lack of a clear pattern or direction. *Choice B* is incorrect because the text doesn't indicate that the magnetic field mapping suggested to researchers that previous mappings were inaccurate. Although the text states that the mapping didn't show what researchers had expected based on their knowledge of other magnetic fields, there's no indication that G47's magnetic field had ever been mapped before. *Choice C* is incorrect because the text indicates that the researchers were surprised that the magnetic field was different from, not similar to, the magnetic fields of other galactic bones; the text states that because other galactic bones in the Milky Way are more uniform, the researchers had expected the magnetic field of G47 to be more uniform than it turned out to be.

## QUESTION 14

**Choice A** is the best answer because it most accurately states the main idea of the text. According to the text, artificial leaves are a renewable energy technology that's in development and generating interest. The text goes on to state that artificial-leaf technology "is not yet commercially viable as a large-scale energy source" and that scientists from several fields are doing additional research to refine the technology. Thus, the main idea is that continued research and development in artificial-leaf technology is needed before the devices can be widely used as an energy source.

*Choice B* is incorrect. While the text does state that scientists from many fields are researching artificial leaves, they're doing so to address the fact that the leaves are not yet commercially viable, rather than in response to an increase in commercial use. *Choice C* is incorrect. Although the text does explain that artificial leaves help split water molecules into oxygen and hydrogen gas using catalysts, it doesn't argue that this process is more efficient than photosynthesis. This is merely a detail of the text and not the main idea, which is about the additional research needed to improve the cost and efficiency of these artificial leaves. *Choice D* is incorrect. Although the text indicates that artificial leaves

mimic photosynthesis in plants, this is an incidental detail in support of the main idea that additional research is needed to make artificial leaves commercially viable.

## QUESTION 15

**Choice D** is the best answer because it most effectively uses data from the table to complete the statement about the year when both museums had the highest number of visits. The table shows the number of visits (in millions) from 2016 to 2019 to two museums: the National Museum of the American Indian and the National Museum of African American History and Culture. It indicates that the highest number of visits to the National Museum of the American Indian was 1.2 million in 2017 and that the highest number of visits to the National Museum of African American History and Culture was 2.4 million, also in 2017.

**Choice A** is incorrect because the table shows that in 2016, the National Museum of the American Indian had 1.1 million visits and that the National Museum of African American History and Culture had 0.73 million visits, both of which are lower than the number of visits these museums had in 2017. **Choice B** is incorrect because the table shows that in 2018, the National Museum of the American Indian had 1.1 million visits and that the National Museum of African American History and Culture had 1.9 million visits, both of which are lower than the number of visits these museums had in 2017. **Choice C** is incorrect because the table shows that in 2019, the National Museum of the American Indian had 0.96 million visits and that the National Museum of African American History and Culture had 2.0 million visits, both of which are lower than the number of visits these museums had in 2017.

## QUESTION 16

**Choice C** is the best answer because it presents a response that best supports the underlined claim that experienced riders who mainly bike to work tend to prefer routes that reduce their travel time. The bike rider responds that they bike to work every day and that they use the bike lane because it is faster; thus, it is reasonable to assume that they are an experienced rider who prefers routes that reduce their travel time to work.

**Choice A** is incorrect because this response does not address the claim. The claim is about experienced riders preferring to take routes that reduce their travel time on the way to work; however, this response is from an inexperienced rider who is discussing biking for personal reasons. **Choice B** is incorrect because this response is not related to the underlined claim. The response from this rider does not establish the level of experience they have with riding, nor does it state that the rider uses a bike to get to work. **Choice D** is incorrect. Although this response is from an experienced rider who mainly bikes to work, the response also mentions that the rider's bike is broken, which is not related to any route preference.

## QUESTION 17

**Choice C** is the best answer because it most effectively uses data from the graph to complete the text's discussion of the percentages of maize exported in the marketing year 2012/2013. The graph presents percentages of maize exported by Argentina, Brazil, and the United States in marketing years 2009/2010 to 2013/2014 and indicates that for the marketing year 2012/2013, the percentage of maize exported by Argentina decreased to about 70 percent from about 80 percent in the previous marketing year. The graph also shows that the percentage of maize exported by Argentina remained highest among the three countries in the marketing year 2012/2013, surpassing the percentage exported by Brazil (about 31 percent) and by the United States (about 8 percent).

**Choice A** is incorrect because for the marketing year 2012/2013, the graph indicates that the percentage of maize exported by Brazil didn't increase from the previous year; rather, it decreased from about 34 percent to about 31 percent. Moreover, the graph shows that the percentage of maize exported by Brazil remained higher, not lower, than the percentage exported by the United States in the marketing year 2012/2013. **Choice B** is incorrect because the graph indicates that the percentage of maize exported by Brazil never exceeded the percentage exported by Argentina for any of the marketing years represented. **Choice D** is incorrect because the graph indicates that the percentage of maize exported by the United States reached its lowest point, not its highest, during the five marketing years in 2012/2013, with the United States exporting only about 8 percent of its maize in that marketing year.

## QUESTION 18

**Choice A** is the best answer because it most logically completes the text's discussion of the discovered ship. The text states that much of the ship's wooden hull was found in a quarry. The text also states that wood rots quickly unless it is protected by sediment, which shields the wood from exposure to oxygen. It is therefore reasonable to infer that the surviving portion of the ship's hull was covered by an oxygen-shielding layer of sediment.

**Choice B** is incorrect because nothing in the text suggests other ships have been or are likely to be found in the same quarry. The fact that much of this ship's wood survived for centuries in the quarry does raise the possibility that there might be other preserved ships, but the text provides no support for such a conclusion. **Choice C** is incorrect because the text does not address the type of wood used in sixteenth-century ships or any theories pertaining to wood choice in ships. **Choice D** is incorrect because the text states only that the ship is from the sixteenth century, with no other dates offered for its construction, and thus there is no basis to consider alternative ages for the ship. Additionally, even if the ship was constructed earlier, it is not logically connected to the text's discussion of how it was preserved.

## QUESTION 19

**Choice C** is the best answer. The convention being tested is punctuation use between a noun and a prepositional phrase. No punctuation is needed between the noun “pieces” and the prepositional phrase “of pottery.” The prepositional phrase provides essential information about what kind of pieces were found, so it shouldn’t be separated from the rest of the noun phrase (“some of the oldest pieces”) with punctuation.

*Choice A* is incorrect because no punctuation is needed between the noun phrase “some of the oldest pieces” and the prepositional phrase “of pottery.”

*Choice B* is incorrect because no punctuation is needed between the noun phrase “some of the oldest pieces” and the prepositional phrase “of pottery.” *Choice D* is incorrect because no punctuation is needed between the noun phrase “some of the oldest pieces” and the prepositional phrase “of pottery.”

## QUESTION 20

**Choice D** is the best answer. The convention being tested is the punctuation of items in a simple series. The comma after “libraries” is used conventionally to separate the first and second items (“libraries” and “train stations”) in the series.

*Choice A* is incorrect because it fails to separate the first two items (“libraries” and “train stations”) in the series. *Choice B* is incorrect because a colon can’t be used in this way to separate items in a simple series. *Choice C* is incorrect because a dash can’t be used in this way to separate items in a simple series.

## QUESTION 21

**Choice C** is the best answer. The convention being tested is punctuation use between a preposition and its complement. No punctuation is needed between the preposition “to” and its complement “the largest island of them all.” The complement completes the meaning of the preposition in the phrase “home to the largest island of them all,” and any punctuation within it results in an ungrammatical sentence.

*Choice A* is incorrect because no punctuation is needed between the preposition and its complement. *Choice B* is incorrect because no punctuation is needed between the preposition and its complement. *Choice D* is incorrect because no punctuation is needed between the preposition and its complement.

## QUESTION 22

**Choice D** is the best answer. The convention being tested is the use of verb forms within a sentence. A main clause requires a finite (tensed) verb to perform the action of the subject (in this case, “the collection”), and this choice supplies the finite present tense verb “includes” to indicate what is in the collection.

*Choice A* is incorrect because it results in an ungrammatical sentence. The nonfinite to-infinitive “to be including” doesn’t supply the main clause with a finite verb. *Choice B* is incorrect because it results in an ungrammatical sentence. The nonfinite participle “including” doesn’t supply the main clause with a finite



verb. *Choice C* is incorrect because it results in an ungrammatical sentence. The nonfinite to-infinitive “to include” doesn’t supply the main clause with a finite verb.

## QUESTION 23

**Choice A** is the best answer. The convention being tested is the use of verb forms within a sentence. A main clause requires a finite (tensed) verb to perform the action of the subject (in this case, “multiple newspapers”), and this choice supplies the finite present tense verb “serve” to indicate that there are multiple newspapers serving the Spanish-speaking population of Washington, DC.

*Choice B* is incorrect because it results in an ungrammatical sentence. The nonfinite participle “having served” doesn’t supply the main clause with a finite verb. *Choice C* is incorrect because it results in an ungrammatical sentence. The nonfinite to-infinitive “to serve” doesn’t supply the main clause with a finite verb. *Choice D* is incorrect because it results in an ungrammatical sentence. The nonfinite participle “serving” doesn’t supply the main clause with a finite verb.

## QUESTION 24

**Choice D** is the best answer. The convention being tested is subject-verb agreement. The plural verb “were” agrees in number with the plural subject “ayllus,” which are described as plural “family clans.”

*Choice A* is incorrect because the singular verb “is” doesn’t agree in number with the plural subject “ayllus.” *Choice B* is incorrect because the singular verb “was” doesn’t agree in number with the plural subject “ayllus.” *Choice C* is incorrect because the singular verb “has been” doesn’t agree in number with the plural subject “ayllus.”

## QUESTION 25

**Choice C** is the best answer. The convention being tested is punctuation use between sentences. In this choice, the period is used correctly to mark the boundary between one sentence (“The city...system”) and another (“Analyzing... footage”). The participial phrase beginning with “analyzing” modifies the subject of the second sentence, “the AI algorithm.”

*Choice A* is incorrect. Placing a dash before “analyzing” creates a confusing and ambiguous modifying element (“analyzing...areas”) and a comma splice between “areas” and “the AI algorithm.” (A comma can’t be used in this way to mark the boundary between sentences.) *Choice B* is incorrect because it results in a comma splice. A comma can’t be used in this way to mark the boundary between sentences. *Choice D* is incorrect because it results in a run-on sentence. The sentences (“The city...system” and “analyzing... footage”) are fused without punctuation and/or a conjunction.

## QUESTION 26

**Choice B** is the best answer. “However” logically signals that the information in this sentence—that nothing in Copeland’s career matches her accomplishment of being the first African American woman named principal dancer at the American Ballet Theatre—offers a contrast or exception to the previous information about Copeland’s accomplishments.

*Choice A* is incorrect because “thus” illogically signals that the information that follows is a result of the previous information about Copeland’s accomplishments. Instead, the statement that nothing in Copeland’s career matches this accomplishment offers a contrast or exception to that information.

*Choice C* is incorrect because “for example” illogically signals that Copeland’s statement about her greatest accomplishment exemplifies the claim about her accomplishments in the previous sentence. Instead, it offers a contrast or exception to that information. *Choice D* is incorrect because “second of all” illogically signals that the information in this sentence is a second, separate claim from the previous sentence’s information about her accomplishments. Instead, the statement that nothing in Copeland’s career matches this accomplishment offers a contrast or exception to that information.

## QUESTION 27

**Choice B** is the best answer. “For example” logically signals that this sentence—noting Singletary’s work with Jody Naranjo—provides an example supporting the previous point about Singletary’s collaborations with other artists.

*Choice A* is incorrect because “in conclusion” illogically signals that the information in this sentence concludes or summarizes the previous point about Singletary’s collaborations with other artists. Instead, it provides an example in support of that point. *Choice C* is incorrect because “however” illogically signals that the information in this sentence contrasts with the previous point about Singletary’s collaborations with other artists. Instead, it provides an example in support of that point. *Choice D* is incorrect because “in comparison” illogically signals that the information in this sentence is being compared to the previous point about Singletary’s collaborations with other artists. Instead, it provides an example in support of that point.

## QUESTION 28

**Choice A** is the best answer. “As a result” logically signals that the information in the sentence—that, in the US House of Representatives, the entire state of Alaska has just one district—is the result or consequence of Alaska having only about 730,000 people. This is slightly below the average for House districts, which are designed to have roughly equal populations.

*Choice B* is incorrect because “instead” illogically signals that Alaska having just one state district is an alternative to the information about the state’s population in the previous sentence. Rather, the fact that Alaska has just one district is a result or consequence of the entire state having slightly fewer people than an average-sized district. *Choice C* is incorrect because “finally” illogically signals

that the information in this sentence about Alaska having just one district indicates a last step in a process or a concluding summary. Instead, the fact that Alaska has just one district is a result or consequence of the entire state having slightly fewer people than an average-sized district. *Choice D* is incorrect because “for instance” illogically signals that the information in this sentence about Alaska having just one district exemplifies the information about the state’s population in the previous sentence. Instead, the fact that Alaska has just one district is a result or consequence of the entire state having slightly fewer people than an average-sized district.

## QUESTION 29

**Choice D** is the best answer. “Specifically” logically signals that the information in this sentence—that the researchers examined the overhead costs and attendance at events of 22,328 nonprofits—provides specific, precise details elaborating on how the researchers investigated the relationship between nonprofits’ spending and performance.

*Choice A* is incorrect. “Thus” illogically signals that the information in this sentence is a result or consequence of the researchers’ investigation of nonprofits’ spending and performance. Instead, it specifies how they examined that correlation. *Choice B* is incorrect. “In addition” illogically signals that the information in this sentence is merely an additional fact about the researchers’ investigation of nonprofits’ spending and performance. Instead, it specifies how they examined that correlation. *Choice C* is incorrect. “By comparison” illogically signals that the information in this sentence is being compared to the researchers’ investigation of nonprofits’ spending and performance. Instead, it specifies how they examined that correlation.

## QUESTION 30

**Choice A** is the best answer. “To that end” logically signals that the activity described in this sentence—Nazareth titling his course “Elvis as Anthology”—is meant to further Nazareth’s goal of helping others understand Presley’s music as an anthology with a wide range of influences.

*Choice B* is incorrect. “In sum” illogically signals that the activity described in this sentence summarizes Nazareth’s view of Presley’s music as an anthology. Instead, titling his course “Elvis as Anthology” is a way for him to promote this view. *Choice C* is incorrect. “That is” illogically signals that the activity described in this sentence is a clarification or interpretation of Nazareth’s view of Presley’s music as an anthology. Instead, titling his course “Elvis as Anthology” is a way for him to promote this view. *Choice D* is incorrect. “In addition” illogically signals that the activity described in this sentence is merely an additional fact about Nazareth. Instead, titling his course “Elvis as Anthology” is a way for him to promote his view of Presley’s music as an anthology.

## QUESTION 31

**Choice A** is the best answer. The sentence emphasizes how far the infantrymen traveled, indicating that they rode their bicycles from Montana to Missouri, a total of 1,900 miles.

**Choice B** is incorrect because the sentence mentions when the anniversary of the journey occurred; it doesn't emphasize how far the infantrymen traveled. **Choice C** is incorrect because the sentence discusses the goal of the journey; it doesn't emphasize how far the infantrymen traveled. **Choice D** is incorrect because the sentence notes that Cedeño honored the infantrymen by reenacting their journey; it doesn't emphasize how far the infantrymen traveled.

## QUESTION 32

**Choice A** is the best answer. The sentence compares the two proposed causes of crown shyness, noting the theories' differences: Jacobs cites branches brushing against one another as the cause, while Ng cites branches detecting shade from other branches as the cause.

**Choice B** is incorrect. The sentence merely identifies the existence of two theories for crown shyness; it doesn't compare the causes proposed by each theory. **Choice C** is incorrect. The sentence merely indicates that there are two different theories for crown shyness; it doesn't compare the causes proposed by each theory. **Choice D** is incorrect. The sentence merely explains one theory for crown shyness; it doesn't compare two theories.

## QUESTION 33

**Choice B** is the best answer. The sentence emphasizes a similarity in how people in Bangkok and Chiang Mai celebrate Songkran, indicating that people in both cities gather to celebrate with water fights.

**Choice A** is incorrect. The sentence notes the different locations of the largest water fight in Bangkok and the largest water fight in Chiang Mai; it doesn't emphasize a similarity in how people in Bangkok and Chiang Mai celebrate Songkran. **Choice C** is incorrect. The sentence indicates that people in Bangkok and Chiang Mai don't celebrate Songkran in exactly the same way; it doesn't emphasize a similarity in how people in the two cities celebrate Songkran.

**Choice D** is incorrect. The sentence explains when people in Thailand celebrate Songkran; it doesn't emphasize a similarity in how people in Bangkok and Chiang Mai celebrate Songkran.

# Reading and Writing

## Module 2

(33 questions)

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### QUESTION 1

**Choice A** is the best answer because it most logically completes the text's discussion of oysters and ocean recordings. As used in this context, "responsive" means reacting positively. The text presents a finding and describes it as suggesting that healthy ocean sounds may encourage oyster larvae to establish a reef (a permanent home): groups of oyster larvae that heard recorded sounds of a healthy oyster reef were two times more likely to show signs of forming their own reef than groups that heard different ocean recordings were. This context conveys that the groups that heard healthy reef sounds had a more positive reaction than the other groups did—that is, they were the most responsive.

**Choice B** is incorrect because the text doesn't indicate that hearing sounds of a healthy oyster reef caused some groups of oyster larvae to become "inactive," or to stop engaging in work or activity. Instead, the text conveys that the groups that heard those sounds were observed engaging in activity: they were two times more likely to create a reef (a permanent home) than groups that heard different ocean sounds were. **Choice C** is incorrect because describing the groups of oyster larvae that heard sounds of a healthy oyster reef as most "liked," or regarded with pleasure, wouldn't make sense in context. The text focuses on the idea that a study found that healthy reef sounds may encourage groups of oyster larvae to form reefs (permanent homes), not on the idea that some of the groups in the study were liked more than others. **Choice D** is incorrect because the text doesn't indicate that hearing sounds of a healthy oyster reef caused some groups of oyster larvae to be "distressed," or to experience difficulty or begin to decline. Instead, the text indicates that the sounds increased the likelihood that groups of larvae would establish a reef (a permanent home), suggesting that the sounds had a positive effect on the larvae.

## QUESTION 2

**Choice A** is the best answer because as used in the text, “featured” most nearly means displayed. The text describes Nina’s fascination with a framed photograph. It then goes on to describe what the photograph showed, or displayed, which is a portrait of Nina’s great-great-grandmother Rosita as a young woman. Thus, the text indicates that the photograph displayed a portrait of Rosita.

*Choice B* is incorrect because the text identifies the person shown in the photograph as Nina’s great-great-grandmother; it gives no indication that the contents of the photograph were questioned, or asked about. *Choice C* is incorrect because approved means expressed a favorable opinion of, and there’s nothing to suggest that the photograph of Nina’s great-great-grandmother has received approval or been viewed favorably, only that Nina is unable to stop looking at it. *Choice D* is incorrect because nothing in the text suggests that the photograph Nina is fascinated with ignored, or refused to take notice of, Nina’s great-great-grandmother Rosita. Rather, the text indicates that the photograph was a portrait of Rosita.

## QUESTION 3

**Choice D** is the best answer because as used in the text, “specific” most nearly means particular. The text is referring to the particular view of the Port of Oakland as seen from a subway train as it rises from underground. This specific, or particular, view has always been special to Moss, a lifetime resident of West Oakland.

*Choice A* is incorrect. Although the text itself is a work of fiction, the view is something Moss can point out to his companions on the train, so the view itself is presumably not imaginary. *Choice B* is incorrect. Although this view of the Port of Oakland is significant to Moss, nothing in the text describes the view as particularly energetic as opposed to calming, for example. *Choice C* is incorrect. The point of the text is that the view of the Port of Oakland from the subway train as it rises from underground is significant to Moss, not whether it is described as being correct, which the text does not address.

## QUESTION 4

**Choice D** is the best answer because it most logically completes the text’s discussion of manul cats. The text states that manul cats live in “out-of-the-way parts of Asia” (citing the famously remote Mount Everest as an example) and indicates that it is difficult to research the cats because of the location of their habitats. By emphasizing that the habitats are remote in relation to humans, the text conveys that being “distant from,” or far from, large groups of humans makes manul cats challenging to study.

*Choice A* is incorrect because saying that the habitats of manul cats are “full of large populations of humans” would indicate that the cats cohabitate with many humans, which would directly contradict the text’s claim that the cats live in “out-of-the-way” areas. *Choice B* is incorrect because the missing words describe an aspect of manul cats’ habitats, or the areas where they live, and it wouldn’t

make sense to say that areas could be “drawn to,” or attracted by, large groups of humans. *Choice C* is incorrect. In this context, “responsible for” would mean either having an obligation to care for something or being the cause of something, and it wouldn’t make sense to say that the habitats of manul cats (the areas where the cats live) would need to care for humans or that the habitats somehow created large human populations.

## QUESTION 5

**Choice A** is the best answer because as used in the text, “sheltering” most nearly means protective. In the text, the speaker describes a painting featuring a female figure. The speaker ultimately confesses to falling in love with the woman in the painting, who has “stole[n] away” the speaker’s heart, but first the speaker describes elements of the painting’s setting. These include sterile soil, barren fields with “no ray / Of hope in a blade of green”—a description that conveys a mood of melancholy and forlornness, possibly reflecting the speaker’s own sadness at falling in love with an image that can’t return the speaker’s love. The text continues by stating that there’s no “sheltering roof” in the painting, even though the “skies are heavy and gray,” showing signs of an impending storm. Generally, a roof’s intended purpose is to provide protection from the elements, and in this context, a roof would offer shelter and protection from the gathering storm.

*Choice B* is incorrect because nothing in the text suggests that a roof would be restrictive—that is, that it would limit or restrain something in some way. Although a roof would provide some cover from stormy winds and rain, it wouldn’t limit the wind and rain, only deflect them. *Choice C* is incorrect because there’s nothing in the text to suggest that if a “sheltering roof” were present in the painting, it would be affectionate, or loving and tender. In the text, the immediate context in which the word “sheltering” appears refers to the absence of a roof that would provide protection from the oncoming storm depicted in the painting, not to the idea that such a shelter would be loving and tender if it were present. *Choice D* is incorrect because in this context, suspicious would mean questionable or dubious, and there’s nothing in the text to suggest that if any roofs were present in the painting, they would be questionable or cause any suspicion.

## QUESTION 6

**Choice C** is the best answer because it best describes how the underlined sentence functions in the text as a whole. The text begins with a question: have penguins always been unable to fly? The underlined sentence then presents an answer that has been offered by researchers, indicating that Theresa Cole and her team believe that penguins were once able to fly but lost that ability long ago as they began living in the sea. The text then describes the research that led to that answer. Thus, the function of the underlined sentence is to provide an answer to the question in the previous sentence.

*Choice A* is incorrect because none of the terms used in the sentence that follows are defined in the underlined sentence; no definitions are given at all. Instead, the sentence presents Theresa Cole and her team’s answer to the earlier

question about penguins' ability to fly. *Choice B* is incorrect because there is no contradiction between the underlined sentence and the sentence that follows since both convey that at some point penguins underwent adaptations that limited their ability to fly and helped them swim and live in the sea. Instead of contradicting later information, the underlined sentence presents an answer to the earlier question about penguins' ability to fly. *Choice D* is incorrect because the question in the previous sentence is about penguins' ability to fly and the underlined sentence presents Theresa Cole and her team's answer to that question based on their research into penguin flight, which is described in the rest of the text.

## QUESTION 7

**Choice A** is the best answer because it most accurately describes the function of the underlined sentence. The sentence indicates that scientists used time-lapse photography during both day and night to detect pollinators visiting red clover. Therefore, the underlined sentence has the function of describing an approach scientists used in the pollinator study discussed in the text.

*Choice B* is incorrect because the underlined sentence discusses equipment the scientists used to conduct their study, and the text provides nothing to suggest these elements of their experimental design could, by themselves, question claims resulting from the study. *Choice C* is incorrect because nothing in either the underlined sentence or the rest of the text addresses whether moths have a preference for red clover or any other flowers. *Choice D* is incorrect. Although the sentences that follow the underlined sentence discuss research findings, nothing in the text suggests that these findings were unexpected. Moreover, the underlined sentence describes part of the scientists' experimental design (day and night time-lapse photography), not a finding of the scientists' study.

## QUESTION 8

**Choice D** is the best answer because it most accurately states the text's main purpose. The text indicates that Louis always had his petition with him, asked everyone he encountered to sign it if they hadn't already, and lists several comical circumstances in which he might try to get someone to sign. Thus, the main purpose of the text is to illustrate Louis's dedicated focus on getting people to sign the petition.

*Choice A* is incorrect. Although the text suggests that Louis was aggressive in seeking signatures for the petition—for example, saying that he “cornered” people—nothing in the text addresses how those people feel toward Louis, let alone that they are refusing his request. *Choice B* is incorrect because, other than portraying Louis's commitment to gathering signatures, the text doesn't discuss community members' attitudes toward Louis or the petition. *Choice C* is incorrect because the text never mentions the attitudes of the people Louis approaches toward the petition, but the text does indicate that he “cornered” prospective signatories, strongly suggesting that their enthusiasm was neither needed nor considered.



## QUESTION 9

**Choice B** is the best answer because it best states the main purpose of the text, which is to make a case for the importance of Scott Joplin's less famous works. The text begins by introducing Joplin's most popular works and then goes on to assert that gaining a full understanding of Joplin's creativity requires a consideration of his lesser-known pieces as well. The text concludes by characterizing the lesser-known works "Pleasant Moments" and *Treemonisha* as masterpieces that deserve to be famous. These details indicate that the text's main purpose is to argue that more attention should be given to Joplin's lesser-known works.

**Choice A** is incorrect. Although the text discusses some of the ragtime music and an opera that Joplin composed, it does not compare the two types of music in general. Instead, the text argues that Joplin's lesser-known works, including his opera, deserve as much attention as his more famous ragtime pieces receive. **Choice C** is incorrect because the text discusses only Joplin's music and does not ask music lovers to listen to a variety of composers. Instead, the text encourages listeners to pay attention to Joplin's lesser-known works in order to gain a full understanding of his creativity. **Choice D** is incorrect because the text does not discuss how Joplin learned to compose and perform ragtime music. Instead, the text focuses on Joplin's less famous works and makes a case for their importance.

## QUESTION 10

**Choice B** is the best answer because it presents a question that the text is attempting to answer: why has the pronoun "y'all" become more widely used in the US? The text begins by explaining where and how the plural pronoun "y'all" originated and then goes on to state that its use has been rising in popularity, even in areas outside of its place of origin. The text then attributes this rise in popularity to the fact that many varieties of English do not have a pronoun to address more than one person, and thus "you" must function as both a singular and plural pronoun.

**Choice A** is incorrect because while the text states that "y'all" is used as a plural of "you" in English, it does not discuss other plural forms of the word. **Choice C** is incorrect because while the text discusses the general origins of the pronoun "y'all," it does not state when the use of the pronoun was first recorded in the English language. **Choice D** is incorrect because though the text addresses the use of the pronoun "y'all" within English-speaking communities in the US, it does not address its use outside of that geographic area.

## QUESTION 11

**Choice A** is the best answer because it most effectively uses data from the graph to complete the statement. The graph shows test results for two new battery recycling processes used with two types of lithium-ion batteries, type A and type B. According to the graph, recycling process 2 recovered the highest percentage of lithium in the tests: recovering about 75% from lithium-ion battery type B.

*Choice B* is incorrect because, according to the graph, the highest percentage of lithium recovered in the tests was 75%, not 10%. In fact, none of the tests recovered exactly 10% of lithium from a recycling process. *Choice C* is incorrect because, according to the graph, the highest percentage of lithium recovered in the tests was 75%, not 45%. In fact, none of the tests recovered exactly 45% of lithium from a recycling process. *Choice D* is incorrect because, according to the graph, the highest percentage of lithium recovered in the tests was 75%, not 20%. In fact, none of the tests recovered exactly 20% of lithium from a recycling process.

## QUESTION 12

**Choice C** is the best answer because it effectively uses data from the table to complete the example of the estimated impact of invasive mongooses on threatened mammals. The table shows the values for the estimated harmful impact of three invasive predator species (mongooses, dogs, and cats) on threatened birds, mammals, and reptiles. The text states that the values are on a scale from 0.25 (less impact) to 1.00 (greater impact). The table shows that the value for the estimated impact of invasive mongooses on threatened mammals is 0.75.

*Choice A* is incorrect because the table shows that the value for the estimated impact of mongooses on threatened mammals is 0.75, not 0.35. The value 0.35 is not assigned to any of the categories in the table. *Choice B* is incorrect because the table shows that 0.61 is the value for the estimated impact of cats, not mongooses, on threatened mammals. *Choice D* is incorrect because the table shows that 0.52 is the value for the estimated impact of cats on threatened reptiles, not of mongooses on threatened mammals.

## QUESTION 13

**Choice A** is the best answer because it presents a finding that, if true, would support the researchers' claim about the diets of jaguars in the Brazilian Pantanal. The text notes that jaguars generally eat land-based mammals, but researchers claim that jaguars in the Pantanal can survive on a diet that includes more fish and aquatic reptiles than mammals. Finding that the remains of aquatic reptiles and fish appear more often in these jaguars' waste than the remains of mammals do would support the researchers' claim, since it would suggest that fish and aquatic reptiles are a more significant part of the jaguars' diet than mammals are.

*Choice B* is incorrect because finding that a particular aquatic reptile exists in high numbers in the area would not support the researchers' claim about the jaguars' diet. The mere presence of many aquatic reptiles nearby does not mean that the jaguars eat those reptiles, let alone survive on more aquatic reptiles and fish than mammals. *Choice C* is incorrect. Although finding that aquatic reptiles and fish can provide nutrients that land mammals typically do not provide could help explain why some animals eat those reptiles and fish, it would not indicate whether the jaguars in particular eat those reptiles and fish and thus would not support the researchers' claim. *Choice D* is incorrect because finding that when preying on mammals, jaguars prefer semiaquatic mammals, such as capybaras,

would be irrelevant to the researchers' claim that the jaguars can survive on a diet of more fish and aquatic reptiles than mammals. The type of mammals the jaguars tend to eat does not indicate anything about whether fish and aquatic reptiles are part of the jaguars' diet.

## QUESTION 14

**Choice B** is the best answer because it presents a finding that, if true, would most directly support Pirotta and her team's claim that East Australian humpback whales may not live only on stored energy during migration. The text explains that it has long been thought that East Australian humpback whales store extra energy during the feeding season and then use that energy to survive while traveling to their breeding grounds. If it were true that citizen scientists have often seen the whales feeding as they migrate to the breeding grounds, that would indicate that the whales sometimes feed and take in additional energy during the journey, meaning that they may not rely only on energy they stored before migrating.

*Choice A* is incorrect because finding that citizen scientists have observed many different types of marine animals feeding alongside the whales would have no bearing on the team's claim; the behavior of other animals is irrelevant, and without indicating the timing of the observed feeding, the finding wouldn't reveal whether the whales rely only on previously stored energy or ever take in additional energy during migration. *Choice C* is incorrect because finding that citizen scientists have more often observed whales on the way to their breeding grounds than returning to their feeding grounds would have no bearing on the team's claim. Since it would provide information about the timing of observations but not about the whales' observed activities, the finding wouldn't reveal whether the whales rely only on previously stored energy or ever take in additional energy during migration. *Choice D* is incorrect because finding that citizen scientists have recently started seeing the whales migrate to their breeding grounds earlier in the year would have no bearing on the team's claim. Since it would provide information about a change in the timing of migration but not about the whales' observed activities while migrating, the finding wouldn't reveal whether the whales rely only on previously stored energy or ever take in additional energy during migration.

## QUESTION 15

**Choice C** is the best answer because it presents a finding that, if true, would most directly support Vikash V. Gayah's claim that eliminating the option to turn left at busy intersections would improve traffic flow and reduce overall travel times. The text begins by describing a problem encountered by drivers in countries with right-hand traffic—namely that drivers wanting to make a left turn must wait for either gaps in oncoming traffic or for designated left-turn signals before proceeding. The resulting backup of vehicles causes increased traffic congestion at busy intersections that slows overall travel times. According to Gayah, eliminating left turns from busy intersections in urban areas would ease the congestion caused by vehicles waiting to turn left. If vehicles spend less time waiting at intersections for left turns, faster overall travel times would result even if some drivers would have to drive slightly longer distances to make the desired

left turn. Drivers for package-delivery companies, who presumably spend most of the day driving to destinations across the city in which they are based, would likely provide a good indication of overall traffic patterns across the city. A finding that after a city had eliminated left turns at busy intersections, package-delivery companies were able to complete more daily deliveries on average—which implies faster travel times between package destinations—would therefore support the claim that overall travel times would decrease if left turns were eliminated at busy intersections.

*Choice A* is incorrect because a finding that a majority of survey respondents agreed with the statement that implementing left-turn signals at all busy intersections made navigating streets in their communities easier wouldn't support the claim that eliminating the option to turn left altogether at some busy intersections—both with and without dedicated left-turn signals—would improve the flow of traffic and overall traffic times. In fact, the text emphasizes that designated left-turn signals contribute to increased congestion because they require drivers to wait to turn left, which results in a backup of vehicles. Installing such signals at all busy intersections would thus potentially compound the problem of congestion, not improve it. Moreover, although making streets easier for drivers to navigate might indicate that left-turn signals are beneficial to drivers, it doesn't indicate that overall travel times would necessarily be reduced. *Choice B* is incorrect because a study concluding that drivers wait longer to make left turns at intersections without dedicated left-turn signals than at intersections with such signals wouldn't support the claim that eliminating the option to turn left altogether would reduce overall travel times. In fact, the finding would merely support the idea that installing left-turn signals would likely reduce the time drivers spend waiting at busy intersections that didn't previously have left-turn signals, not that overall travel times would be reduced. *Choice D* is incorrect because the finding that after a restriction eliminating left turns at most intersections took effect, school buses took longer to complete their routes than they did before the restriction was implemented would contradict rather than support the researcher's claim that eliminating left turns would reduce overall travel times.

## QUESTION 16

**Choice B** is the best answer because it most logically follows from the text's point about zines today. The text describes zines as a form of expression that goes back to the 1920s and asserts that "this old form persists." The text then indicates that multiple zines exist in the US today and that they are popular enough to support annual festivals, a point that suggests that people continue to view zines as a meaningful form of expression.

*Choice A* is incorrect because the text's point about current interest in zines in the US doesn't logically suggest that zine creators can reach a larger audience by posting online. The text indicates that zines have long had an audience, and there's no indication that online posts have caused that audience to grow; there's no mention of zine creators' use of the internet at all. *Choice C* is incorrect because the idea that zine creators can explore new art forms—while objectively true—isn't logically connected to the text's discussion of zines as an existing

form of expression (one that often includes art) or the point that zines are still popular enough in the US to support annual festivals. *Choice D* is incorrect because the point that zines are popular enough in the US today to support annual festivals doesn't logically suggest that zines present mainstream culture (or are themselves mainstream); moreover, the text states that zine creators often "challenge mainstream culture."

## QUESTION 17

**Choice B** is the best answer. The text describes a study examining the relationship between a species of parasitic tapeworm, *A. brevis*, and its host insect, the *T. nylander* ant. According to the text, researchers were surprised to find that the tapeworm extends the life of its ant host, rather than reducing it. The text goes on to state that the infected ants end up doing less work to sustain the colony and that as a result, the uninfected ants take on the infected ants' share of labor in addition to caring for them in their infected state. The study's researchers also observed that the uninfected ants have shorter lifespans than expected. If the infected ants, who are doing less work in the colony, have longer lifespans, it can be inferred that the less an ant works, the longer it will live. The opposite of this statement can also be inferred: the more an ant works, the shorter its life. So, since the workload within the colony is being redistributed so that the infected ants work less while the uninfected ants work more (as they take on the neglected duties of the infected ants and also care for those ants), then it can be inferred that the lifespans of the uninfected ants are shortened because the need to compensate for reduced contributions within the colony while also caring for infected workers is burdensome to the uninfected workers.

*Choice A* is incorrect because the text does not indicate how *A. brevis* is transmitted to the ants or assert that uninfected ants are more likely to be directly exposed to *A. brevis* while caring for infected ants. *Choice C* is incorrect because the text makes no mention of the relative abilities of infected and uninfected ants to escape predators: in fact, predators are not mentioned in the text at all. *Choice D* is incorrect because the text does not supply any information about the average lifespans of the ants in colonies without parasitic activity; the text only indicates factors that lengthen and shorten the lifespans of ants in parasitized colonies.

## QUESTION 18

**Choice B** is the best answer because it most logically completes the text's discussion of artificial light at night (ALAN) and the common clownfish (*A. ocellaris*). The text indicates that researchers found that when *A. ocellaris* is exposed to low levels of ALAN, spawning frequency and egg fertilization aren't significantly affected but hatching is completely inhibited—that is, the eggs never hatch. Therefore, if *A. ocellaris* were to settle only in regions where the fish would be regularly exposed to low levels of ALAN, their eggs would stop hatching and their reproductive success would be at risk.

*Choice A* is incorrect because the text indicates that exposure to low levels of ALAN had no significant effect on egg fertilization for *A. ocellaris*, so there's no

reason to expect there would be any significant difference in rates of successful egg fertilization between areas with low levels of ALAN and areas without ALAN. *Choice C* is incorrect because the text doesn't discuss the particular effects of low levels of ALAN on any species of coral reef fish besides *A. ocellaris*. For this reason, there's no support in the text for the idea that the reproductive success of *A. ocellaris* is more greatly affected by the presence of low levels of ALAN than the reproductive success of other species of coral reef fish is. *Choice D* is incorrect. The text does indicate that *A. ocellaris* incubation was most strongly affected by low levels of ALAN, but it doesn't indicate that there was a greater effect on spawning frequency than on egg fertilization; in fact, the text states that there was no significant effect on either.

## QUESTION 19

**Choice A** is the best answer. The convention being tested is punctuation use between a preposition and its complement. No punctuation is needed between the preposition "of" and its complement "all the elements on the periodic table." The complement completes the meaning of the preposition in the phrase "the highest melting point of all the elements on the periodic table," and using punctuation to separate the complement from the preposition results in an ungrammatical sentence.

*Choice B* is incorrect because no punctuation is needed between the preposition and its complement. *Choice C* is incorrect because no punctuation is needed between the preposition and its complement. *Choice D* is incorrect because no punctuation is needed between the preposition and its complement.

## QUESTION 20

**Choice B** is the best answer. The convention being tested is the coordination of main clauses within a sentence. This choice correctly uses a comma and the coordinating conjunction "but" to join the first main clause ("Scientists...time") and the second main clause ("the Lund...otherwise").

*Choice A* is incorrect because when coordinating two longer main clauses such as these, it's conventional to use a comma before the coordinating conjunction. *Choice C* is incorrect because it results in a comma splice. Without a conjunction following it, a comma can't be used in this way to join two main clauses. *Choice D* is incorrect because it results in a run-on sentence. The two main clauses are fused without punctuation and/or a conjunction.

## QUESTION 21

**Choice A** is the best answer. The convention being tested is the use of verb forms within a sentence. A main clause requires a finite (tensed) verb to perform the action of the subject (in this case, "yellow"), and this choice supplies the present tense verb "is considered" to indicate that yellow is considered a complementary color to blue in modern color theory.

*Choice B* is incorrect because it results in an ungrammatical sentence. The nonfinite participle "having been considered" doesn't supply the main clause

with a finite verb. *Choice C* is incorrect because it results in an ungrammatical sentence. The nonfinite to-infinitive “to be considered” doesn’t supply the main clause with a finite verb. *Choice D* is incorrect because it results in an ungrammatical sentence. The nonfinite participle “being considered” doesn’t supply the main clause with a finite verb.

## QUESTION 22

**Choice B** is the best answer. The convention being tested is the use of verbs to express tense in a sentence. In this choice, the past tense verb “was,” used in conjunction with the prepositional phrase “from outside the United States,” correctly indicates that in the 1860s nearly 30% of the population in Los Angeles wasn’t from the US.

*Choice A* is incorrect because the present progressive tense verb “is being” doesn’t indicate that the claim about Los Angeles’s population refers to the population back in the 1860s. *Choice C* is incorrect because the present tense verb “is” doesn’t indicate that the claim about Los Angeles’s population refers to the population back in the 1860s. *Choice D* is incorrect because the future tense verb “will be” doesn’t indicate that the claim about Los Angeles’s population refers to the population back in the 1860s.

## QUESTION 23

**Choice D** is the best answer. The convention being tested is punctuation use between a preposition and its complement. No punctuation is needed between the preposition “by” and its complement “Native Hawaiians.” The complement completes the meaning of the preposition in the phrase “proudly embodied by Native Hawaiians,” and any punctuation within it results in an ungrammatical sentence.

*Choice A* is incorrect because no punctuation is needed between the preposition and its complement. *Choice B* is incorrect because no punctuation is needed between the preposition and its complement. *Choice C* is incorrect because no punctuation is needed between the preposition and its complement.

## QUESTION 24

**Choice C** is the best answer. The convention being tested is end-of-sentence punctuation. This choice correctly uses a period to punctuate a declarative sentence (“the reed of a wind instrument is the mouthpiece”) that ends with a prepositional phrase (“where sound is made”).

*Choice A* is incorrect. It’s unconventional to use a question mark to punctuate a declarative sentence. *Choice B* is incorrect. The structure requires that the sentence continue as a declarative clause, not end with an interrogative clause. *Choice D* is incorrect. The structure requires that the sentence continue as a declarative clause and end with a period, not end with an interrogative clause and a question mark.

## QUESTION 25

**Choice C** is the best answer. The convention being tested is the coordination of main clauses within a sentence. This choice correctly uses a comma before the coordinating conjunction “but” to join the first main clause (“This bat-and-ball game was derived from cricket”) and the second main clause (“kilikiti differs from cricket in a few key ways”).

*Choice A* is incorrect. When coordinating two main clauses such as these, it’s not conventional to use a colon in this way after the coordinating conjunction.

*Choice B* is incorrect. When coordinating two main clauses such as these, it’s not conventional to use a comma in this way after the coordinating conjunction.

*Choice D* is incorrect. When coordinating two main clauses such as these, it’s not conventional to use a comma in this way after the coordinating conjunction.

## QUESTION 26

**Choice A** is the best answer. The convention being tested is the use of verb forms within a sentence. The nonfinite present participle “ensuring” is correctly used to form a supplementary element that modifies the main clause “Okie-Tex takes place in an area with low light pollution,” describing the viewing conditions of the star party.

*Choice B* is incorrect because it results in a comma splice. The pronoun “this” and the finite future tense verb “will ensure” would add an additional main clause to this sentence, and the comma after “pollution” can’t be used in this way to join two main clauses. *Choice C* is incorrect because it results in an ungrammatical sentence. The finite present tense verb “ensures” can’t be used in this way to form a supplementary element to modify the main clause. *Choice D* is incorrect because it results in a comma splice. The pronoun “it” and the finite present tense verb “ensures” would add an additional main clause to this sentence, and the comma after “pollution” can’t be used in this way to join two main clauses.

## QUESTION 27

**Choice D** is the best answer. The convention being tested is the use of punctuation within and between sentences. In this choice, the colon correctly introduces the name of the instrument (the flute) that novel audio technologies allowed to be added to jazz and swing. In addition, the period is used to correctly mark the boundary between one sentence (“In...flute”) and another (“A relatively...greats”).

*Choice A* is incorrect because it results in a comma splice. A comma can’t be used in this way to join two main clauses (“In...quiet instrument” and “its...greats”).

*Choice B* is incorrect. In standard English, it’s unconventional to form a sentence in this way with two uncoordinated subjects (“the flute” and “its full range of sound”), and the lack of a clear main subject results in an awkwardly constructed and confusing sentence. *Choice C* is incorrect. In standard English, it’s unconventional to form an independent clause in this way with two uncoordinated subjects (“the flute” and “its full range of sound”), and the lack of a clear main subject results in an awkwardly constructed and confusing clause.



## QUESTION 28

**Choice D** is the best answer. “However” logically signals that the information in this sentence about butterfly species—that some have colorless, transparent wings—contrasts with the previous information about butterfly species with bold, colorful wings.

*Choice A* is incorrect because “similarly” illogically signals that the information in this sentence is similar to the previous information about butterfly species. Instead, it contrasts with the previous information. *Choice B* is incorrect because “previously” illogically signals that this sentence describes an event that occurred before another event. Instead, the sentence provides information about butterfly species that contrasts with the information in the first sentence. *Choice C* is incorrect because “in other words” illogically signals that the information in this sentence is a paraphrase or restatement of the previous information about butterfly species. Instead, it contrasts with the previous information.

## QUESTION 29

**Choice D** is the best answer. “Next” logically signals that the information in this sentence—which explains how Celado builds the pot’s walls—is the next step in Celado’s pot creation process. The sentences that follow further signal this information by completing the process.

*Choice A* is incorrect because “for example” illogically signals that the information about Celado building pot walls in this sentence exemplifies the information in the previous sentence about how Celado’s pot creation process begins. Instead, it is the next step in this process. *Choice B* is incorrect because “however” illogically signals that the information in this sentence contrasts with the information in the previous sentence about how Celado’s pot creation process begins. Instead, it is the next step in this process. *Choice C* is incorrect because “by contrast” illogically signals that the information in this sentence contrasts with the information in the previous sentence about how Celado’s pot creation process begins. Instead, it is the next step in this process.

## QUESTION 30

**Choice D** is the best answer. “Finally” logically signals that the information in this sentence—that scientists found evidence that chondrules were formed by shock waves in nearby nebulae—indicates a conclusion to the scientific debate mentioned in the previous sentences.

*Choice A* is incorrect because “for example” illogically signals that the information about the evidence for chondrule formation in this sentence exemplifies the information about the scientific debate regarding chondrule formation in the previous sentences. Instead, it indicates a conclusion to the debate. *Choice B* is incorrect because “therefore” illogically signals that the information in this sentence is a result of the previous information about the scientific debate regarding chondrule formation. Instead, it indicates a conclusion to the debate. *Choice C* is incorrect because “similarly” illogically signals that the information that follows is similar to the information about the scientific debate regarding chondrule formation in the previous sentences. Instead, it indicates a conclusion to the debate.

### QUESTION 31

**Choice D** is the best answer. The sentence describes Fung's location in Kang's photograph, noting that Fung is seated on the floor. Additionally, because the sentence is intended for an audience already familiar with the artists, it omits the artists' first names and other biographical information about them.

*Choice A* is incorrect. The sentence indicates that Fung appears in Kang's photograph; it doesn't describe Fung's location in Kang's photograph. *Choice B* is incorrect. The sentence identifies Kang and where she is based; it doesn't describe Fung's location in Kang's photograph. *Choice C* is incorrect. The sentence describes the background of Kang's photograph; it doesn't describe Fung's location in Kang's photograph.

### QUESTION 32

**Choice A** is the best answer. The sentence effectively introduces the Slow Food movement to a new audience, explaining that the movement, which was founded in 1989, promotes universal access to high-quality and healthy food that is produced sustainably by workers who are treated fairly.

*Choice B* is incorrect. While the sentence indicates when the international Slow Food movement and the Slow Food USA organization were founded, it doesn't effectively introduce the movement to a new audience. *Choice C* is incorrect. While the sentence notes that the Slow Food movement includes advocacy for food production workers, it doesn't effectively introduce the movement to a new audience. *Choice D* is incorrect. While the sentence describes some of the goals of the Slow Food movement, it doesn't effectively introduce the movement to a new audience.

### QUESTION 33

**Choice D** is the best answer. The sentence provides an example of an air mass: the cA, or continental arctic, air mass.

*Choice A* is incorrect. The sentence provides a general definition of air masses; it doesn't provide an example of a specific air mass. *Choice B* is incorrect. The sentence describes the system used to classify air masses; it doesn't provide an example of a specific air mass. *Choice C* is incorrect. The sentence explains how air masses are classified; it doesn't provide an example of a specific air mass.

# Math

## Module 1

(27 questions)

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### QUESTION 1

**Choice B** is correct. If a point  $(x, y)$  lies on both lines in the graph of a system of two linear equations, the ordered pair  $(x, y)$  is a solution to the system. The graph shown is the graph of a system of two linear equations, where the two lines in the graph intersect at the point  $(3, 4)$ . Therefore, the point  $(3, 4)$  lies on both lines, so the ordered pair  $(3, 4)$  is the solution to the system.

*Choice A* is incorrect. The point  $(2, 3)$  lies on one, not both, of the lines in the graph shown. *Choice C* is incorrect. The point  $(4, 5)$  lies on one, not both, of the lines in the graph shown. *Choice D* is incorrect. The point  $(5, 6)$  lies on one, not both, of the lines in the graph shown.

### QUESTION 2

**Choice C** is correct. It's given that  $x$  represents years after 2010. Therefore, 2010 is represented by  $x = 0$ . On the model shown, the point with an  $x$ -coordinate of 0 has a  $y$ -coordinate of 20,000. Thus, the model estimates that in 2010, the city had 20,000 residents.

*Choice A* is incorrect. This is the value of  $x$  that represents the year 2010.

*Choice B* is incorrect and may result from conceptual or calculation errors.

*Choice D* is incorrect. This is approximately the number of residents the model estimates the city had in 2014, not 2010.

### QUESTION 3

**Choice B** is correct. It's given that the bar graph shows the number of each type of monkey in a sanctuary. The bar representing the number of mandrills has a height of 5; therefore, there are 5 mandrills in the sanctuary. The bar representing vervets has a height of 11; therefore, there are 11 vervets in the sanctuary. Therefore, there are  $11 - 5$ , or 6, more vervets in this sanctuary than mandrills.

*Choice A* is incorrect. This is the number of vervets in the sanctuary. *Choice C* is incorrect. This is the number of mandrills in the sanctuary. *Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 4

**Choice A** is correct. Applying the distributive property on the left-hand side of the given equation yields  $3x + 5x + 20 = 76$ , or  $8x + 20 = 76$ . Subtracting 20 from each side of this equation yields  $8x = 56$ . Dividing each side of this equation by 8 yields  $x = 7$ .

*Choice B* is incorrect and may result from conceptual or calculation errors.

*Choice C* is incorrect and may result from conceptual or calculation errors.

*Choice D* is incorrect. This is the solution to the equation  $x + 4 = 76$ , not  $3x + 5(x + 4) = 76$ .

## QUESTION 5

**Choice A** is correct. It's given that  $f(x) = \frac{16}{x}$ . Substituting 17 for  $x$  in this function yields  $f(17) = \frac{16}{17}$ . Therefore, when  $x = 17$ , the value of  $f(x)$  is  $\frac{16}{17}$ .

*Choice B* is incorrect. This is the value of the reciprocal of  $f(x)$  when  $x = 17$ .

*Choice C* is incorrect. This is the value of  $f(x)$  when  $x = 1$ . *Choice D* is incorrect. This is the value of  $x$  when  $x = 17$ .

## QUESTION 6

The correct answer is 3. It's given that the  $y$ -intercept of the graph shown is  $(0, y)$ . The graph passes through the point  $(0, 3)$ . Therefore, the value of  $y$  is 3.

## QUESTION 7

The correct answer is 5. Let  $p$  represent the number of packages of dinner rolls that should be bought for the party. It's given that dinner rolls are sold in packages of 12. Therefore,  $12p$  represents the number of dinner rolls that should be bought for the party. It's also given that 50 dinner rolls are needed; therefore,  $12p \geq 50$ .

Dividing both sides of this inequality by 12 yields  $p \geq \frac{50}{12}$ , or approximately  $p \geq 4.17$ . Since the number of packages of dinner rolls must be a whole number, the minimum number of packages that should be bought for the party is 5.

## QUESTION 8

**Choice D** is correct. Let  $x$  represent the number that 21 is 21% of. It follows that

$\frac{21}{x} = \frac{21}{100}$ . Multiplying each side of this equation by  $x$  yields  $21 = \frac{21x}{100}$ . Multiplying each side of this equation by 100 yields  $2,100 = 21x$ . Dividing each side of this equation by 21 yields  $100 = x$ . Therefore, 21 is 21% of 100.

*Choice A* is incorrect. 21% of 0 is 0, not 21. *Choice B* is incorrect. 21% of 1 is 0.21, not 21. *Choice C* is incorrect. 21% of 42 is 8.82, not 21.

## QUESTION 9

**Choice C** is correct. It's given that the technician charges \$60 per hour for labor. Therefore, if the job takes  $x$  hours, the technician will charge  $\left(\frac{\$60}{1 \text{ hour}}\right)(x \text{ hours})$ , or  $\$60x$ , for labor. It's also given that the technician charges \$120 for parts. Therefore,  $f(x) = 60x + 120$  represents the total amount, in dollars, the technician will charge for this job if it takes  $x$  hours.

*Choice A* is incorrect and may result from conceptual or calculation errors.

*Choice B* is incorrect. This function represents the total amount, in dollars, the technician charges for labor only, not the total amount charged for labor and parts. *Choice D* is incorrect. This function represents the total amount, in dollars, the technician would charge if the charge for parts were subtracted from, rather than added to, the charge for labor.

## QUESTION 10

**Choice B** is correct. It's given that function  $f$  is defined by  $f(x) = 80 - 6x$ . The value of  $f(7)$  can be found by substituting 7 for  $x$  in the given function, which yields  $f(7) = 80 - 6(7)$ , or  $f(7) = 80 - 42$ , which is equivalent to  $f(7) = 38$ . Therefore, the value of  $f(7)$  is 38.

*Choice A* is incorrect. This is the value of  $80 - 67$ , not  $80 - 6(7)$ . *Choice C* is incorrect. This is the value of  $80 - 6(1)$ , not  $80 - 6(7)$ . *Choice D* is incorrect. This is the value of  $80 - 6 + 7$ , not  $80 - 6(7)$ .

## QUESTION 11

**Choice A** is correct. Let  $x$  represent the number of rabbit snails that Naomi bought. It's given that each rabbit snail costs \$8. Therefore, the total cost, in dollars, of the rabbit snails that Naomi bought can be represented by the expression  $8x$ . It's also given that each nerite snail costs \$6, and that Naomi bought 2 nerite snails. Therefore, the total cost, in dollars, of the nerite snails that Naomi bought is  $6(2)$ , or 12. Since Naomi bought both the rabbit snails and the nerite snails for a total of \$52, the equation  $8x + 12 = 52$  can be used to represent the situation. Subtracting 12 from both sides of this equation yields  $8x = 40$ . Dividing both sides of this equation by 8 yields  $x = 5$ . Therefore, Naomi bought 5 rabbit snails.

*Choice B* is incorrect. This is the total cost, in dollars, of the nerite snails that Naomi bought, not the number of rabbit snails. *Choice C* is incorrect. This is the cost, in dollars, of one rabbit snail and one nerite snail, not the number of rabbit snails that Naomi bought. *Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 12

**Choice A** is correct. The  $x$ -intercept of a graph is the point where the graph intersects the  $x$ -axis. The graph of function  $f$ , where  $y = f(x)$ , intersects the  $x$ -axis at  $(-12, 0)$ . Therefore, the  $x$ -intercept of the graph of  $f$  is  $(-12, 0)$ .

*Choice B* is incorrect and may result from conceptual or calculation errors.

*Choice C* is incorrect and may result from conceptual or calculation errors.

*Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 13

The correct answer is 1,800. The area,  $A$ , of a triangle can be found using the formula  $A = \frac{1}{2}bh$ , where  $b$  is the base length of the triangle and  $h$  is the height of the triangle. It's given that the triangle has a base length of 40 centimeters and a height of 90 centimeters. Substituting 40 for  $b$  and 90 for  $h$  in the formula  $A = \frac{1}{2}bh$  yields  $A = \frac{1}{2}(40)(90)$ , or  $A = 1,800$ . Therefore, the area, in square centimeters, of the triangle is 1,800.

## QUESTION 14

The correct answer is 14.1. It's given that a participant completes the bicycle race with an average speed of 24,816 yards per hour and  $1 \text{ mile} = 1,760 \text{ yards}$ . It follows that this average speed is equivalent to  $\left(\frac{24,816 \text{ yards}}{1 \text{ hour}}\right)\left(\frac{1 \text{ mile}}{1,760 \text{ yards}}\right)$ , which yields  $\frac{14.1 \text{ miles}}{1 \text{ hour}}$ , or 14.1 miles per hour.

## QUESTION 15

**Choice C** is correct. For the graph shown, the x-axis represents temperature, in kelvins, and the y-axis represents volume, in liters. Therefore, the estimated volume, in liters, of the hydrogen when its temperature is 500 kelvins is represented by the y-coordinate of the point on the graph that has an x-coordinate of 500. The point on the graph with an x-coordinate of 500 has a y-coordinate of 7. Therefore, the estimated volume, in liters, of the hydrogen when its temperature is 500 kelvins is 7.

*Choice A* is incorrect and may result from conceptual errors. *Choice B* is incorrect and may result from conceptual errors. *Choice D* is incorrect and may result from conceptual errors.

## QUESTION 16

**Choice B** is correct. Subtracting 34 from each side of the given equation yields  $p = q + r - 34$ . Thus, the equation  $p = q + r - 34$  correctly expresses  $p$  in terms of  $q$  and  $r$ .

*Choice A* is incorrect. This equation can be rewritten as  $p - 34 = q + r$ . *Choice C* is incorrect. This equation can be rewritten as  $p - 34 = -q - r$ . *Choice D* is incorrect. This equation can be rewritten as  $p + 34 = -q - r$ .

## QUESTION 17

**Choice C** is correct. The Pythagorean theorem states that for a right triangle,  $a^2 + b^2 = c^2$ , where  $a$  and  $b$  represent the lengths of the legs of the triangle and  $c$  represents the length of its hypotenuse. In the triangle shown, the legs have lengths of 3 and 7. Substituting 3 for  $a$  and 7 for  $b$  in the equation  $a^2 + b^2 = c^2$

yields  $3^2 + 7^2 = c^2$ , which is equivalent to  $9 + 49 = c^2$ , or  $58 = c^2$ . Taking the positive square root of both sides of this equation yields  $\sqrt{58} = c$ . Thus, the value of  $c$  is approximately 7.6. Therefore, of the given choices, 7.6 is the closest to the length of the triangle's hypotenuse.

*Choice A* is incorrect and may result from conceptual or calculation errors.

*Choice B* is incorrect and may result from conceptual or calculation errors.

*Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 18

**Choice D** is correct. It's given that the number of coins in the collection increased from 9 to 90. It follows that the number of coins in the collection increased by  $90 - 9$ , or 81. Let  $x\%$  represent the percentage that 81 is of 9. The value of  $x$  can be found using the proportion  $\frac{81}{9} = \frac{x}{100}$ , or  $9 = \frac{x}{100}$ . Multiplying both sides of this equation by 100 yields  $900 = x$ . Thus, when the number of coins in the collection increased from 9 to 90, the percent increase was 900%.

*Choice A* is incorrect and may result from conceptual or calculation errors.

*Choice B* is incorrect and may result from conceptual or calculation errors.

*Choice C* is incorrect and may result from conceptual or calculation errors.

## QUESTION 19

**Choice C** is correct. It's given that in triangle  $QRS$ , sides  $QR$  and  $RS$  each have a length of  $x$  centimeters. Therefore, the expression  $2x$  represents the sum of the lengths, in centimeters, of sides  $QR$  and  $RS$ . It's also given that side  $SQ$  has a length of  $y$  centimeters. Therefore, the expression  $2x + y$  represents the sum of the lengths, in centimeters, of sides  $QR$ ,  $RS$ , and  $SQ$ . Since  $2x + y$  is the sum of the lengths, in centimeters, of the three sides of the triangle and  $2x + y = 37$ , it follows that 37 is the sum of the lengths, in centimeters, of the three sides of the triangle.

*Choice A* is incorrect. The difference, in centimeters, between the lengths of sides  $QR$  and  $SQ$  is  $x - y$ , not 37. *Choice B* is incorrect. The difference, in centimeters, between the lengths of sides  $QR$  and  $RS$  is  $x - x$ , or 0, not 37. *Choice D* is incorrect. The length, in centimeters, of one of the two sides of equal length is  $x$ , not 37.

## QUESTION 20

The correct answer is  $\frac{5}{13}$ . The graph of a line in the  $xy$ -plane can be represented by the equation  $y = mx + b$ , where  $m$  is the slope of the line and  $b$  is the  $y$ -coordinate of the  $y$ -intercept. The given equation can be written as  $y = \left(\frac{5}{13}\right)x - 23$ . Therefore, the slope of the graph of this equation in the  $xy$ -plane is  $\frac{5}{13}$ . Note that  $5/13$ , .3846, 0.385, and 0.384 are examples of ways to enter a correct answer.

## QUESTION 21

The correct answer is 6.21. It's given that the samples of pumice were cut in the shape of a cube. It's also given that the length of the edge of one of these cubes is 3.000 centimeters. Therefore, the volume of this cube is  $(3.000 \text{ centimeters})^3$ , or 27 cubic centimeters. Since the density of this cube is 0.230 grams per cubic centimeter, it follows that the mass of this cube is  $\left(\frac{0.230 \text{ grams}}{1 \text{ cubic centimeter}}\right)(27 \text{ cubic centimeters})$ , or 6.21 grams.

## QUESTION 22

**Choice C** is correct. A line in the  $xy$ -plane that passes through points  $(x_1, y_1)$  and  $(x_2, y_2)$  has a slope of  $\frac{y_2 - y_1}{x_2 - x_1}$ . The line of best fit shown passes approximately through the points  $(0, 0.2)$  and  $(5, 9.3)$ . It follows that the slope of this line is approximately  $\frac{9.3 - 0.2}{5 - 0}$ , which is equivalent to  $\frac{9.1}{5}$ , or 1.82. Therefore, of the given choices, 1.8 is closest to the slope of the line of best fit shown.

**Choice A** is incorrect. This value is closest to the  $y$ -coordinate of the  $y$ -intercept of the line of best fit shown. **Choice B** is incorrect and may result from conceptual or calculation errors. **Choice D** is incorrect and may result from conceptual or calculation errors.

## QUESTION 23

**Choice A** is correct. The perimeter of a rectangle is equal to the sum of 2 times its length and 2 times its width. It's given that the rectangle's length is 50 inches and the width is  $x$  inches. Therefore, the perimeter, in inches, is  $2(50) + 2x$ , or  $100 + 2x$ , which is equivalent to  $2x + 100$ . It's given that the perimeter is at most 210 inches; therefore,  $2x + 100 \leq 210$  represents this situation.

**Choice B** is incorrect. This inequality represents a situation where the perimeter is at least, rather than at most, 210 inches. **Choice C** is incorrect. This inequality represents a situation where 2 times the length, rather than the length, is 50 inches. **Choice D** is incorrect. This inequality represents a situation where 2 times the length, rather than the length, is 50 inches, and the perimeter is at least, rather than at most, 210 inches.

## QUESTION 24

**Choice D** is correct. Since  $8x$  is a common factor of each term in the given expression, the expression can be rewritten as  $8x(x^9 - x^8 + 11)$ .

**Choice A** is incorrect. This expression is equivalent to  $7x^{11} - 7x^{10} + 87x^2$ . **Choice B** is incorrect. This expression is equivalent to  $8^{10}x - 8^9x + 88x$ . **Choice C** is incorrect. This expression is equivalent to  $8x^{11} - 8x^{10} + 88x^2$ .

## QUESTION 25

**Choice D** is correct. Each of the tables gives the same three values of  $x$ : 1, 2, and 4. Substituting 1 for  $x$  in the given equation yields  $\left(\frac{3}{5}\right)(1) + \frac{3}{4}y = 7$ , or  $\frac{3}{5} + \frac{3}{4}y = \frac{35}{5}$ .



Subtracting  $\frac{3}{5}$  from both sides of this equation yields  $\frac{3}{4}y = \frac{32}{5}$ . Multiplying both sides of this equation by  $\frac{4}{3}$  yields  $y = \frac{128}{15}$ . Therefore, when  $x = 1$ , the corresponding value of  $y$  for the given equation is  $\frac{128}{15}$ . Substituting 2 for  $x$  in the given equation yields  $(\frac{3}{5})(2) + \frac{3}{4}y = 7$ , or  $\frac{6}{5} + \frac{3}{4}y = \frac{35}{5}$ . Subtracting  $\frac{6}{5}$  from both sides of this equation yields  $\frac{3}{4}y = \frac{29}{5}$ . Multiplying both sides of this equation by  $\frac{4}{3}$  yields  $y = \frac{116}{15}$ . Therefore, when  $x = 2$ , the corresponding value of  $y$  for the given equation is  $\frac{116}{15}$ . Substituting 4 for  $x$  in the given equation yields  $(\frac{3}{5})(4) + \frac{3}{4}y = 7$ , or  $\frac{12}{5} + \frac{3}{4}y = \frac{35}{5}$ . Subtracting  $\frac{12}{5}$  from both sides of this equation yields  $\frac{3}{4}y = \frac{23}{5}$ . Multiplying both sides of this equation by  $\frac{4}{3}$  yields  $y = \frac{92}{15}$ . Therefore, when  $x = 4$ , the corresponding value of  $y$  for the given equation is  $\frac{92}{15}$ . The table in choice D gives  $x$ -values of 1, 2, and 4 and corresponding  $y$ -values of  $\frac{128}{15}$ ,  $\frac{116}{15}$ , and  $\frac{92}{15}$ , respectively. Therefore, the table in choice D gives three values of  $x$  and their corresponding values of  $y$  for the given equation.

*Choice A* is incorrect. This table gives three values of  $x$  and their corresponding values of  $y$  for the equation  $\frac{3}{5}x + \frac{3}{4}y = 7$ . *Choice B* is incorrect. This table gives three values of  $x$  and their corresponding values of  $y$  for the equation  $\frac{3}{5}x + y = 10$ . *Choice C* is incorrect. This table gives three values of  $x$  and their corresponding values of  $y$  for the equation  $\frac{3}{5}x + \frac{3}{4}y = 8$ .

## QUESTION 26

**Choice B** is correct. The length of a segment in the  $xy$ -plane can be found using the distance formula,  $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ , where  $(x_1, y_1)$  and  $(x_2, y_2)$  are the endpoints of the segment. The segment shown has endpoints at  $(-6, 4)$  and  $(3, 10)$ . Substituting  $(-6, 4)$  and  $(3, 10)$  for  $(x_1, y_1)$  and  $(x_2, y_2)$ , respectively, in the distance formula yields  $\sqrt{(3 - (-6))^2 + (10 - 4)^2}$ , or  $\sqrt{9^2 + 6^2}$ , which is equivalent to  $\sqrt{81 + 36}$ , or  $\sqrt{117}$ . Let  $x$  represent the length, in units, of the other leg of this triangle. The area,  $A$ , of a right triangle can be calculated using the formula

$A = \frac{1}{2}bh$ , where  $b$  and  $h$  are the lengths of the legs of the triangle. It's given that the area of the triangle is  $36\sqrt{13}$  square units. Substituting  $36\sqrt{13}$  for  $A$ ,  $\sqrt{117}$  for  $b$ , and  $x$  for  $h$  in the formula  $A = \frac{1}{2}bh$  yields  $36\sqrt{13} = \frac{1}{2}(\sqrt{117})(x)$ . Multiplying both sides of this equation by 2 yields  $72\sqrt{13} = x\sqrt{117}$ . Dividing both sides of this equation by  $\sqrt{117}$  yields  $\frac{72\sqrt{13}}{\sqrt{117}} = x$ . Multiplying the numerator and denominator on the left-hand side of this equation by  $\sqrt{117}$  yields  $\frac{72\sqrt{1,521}}{117} = x$ , or  $\frac{72(39)}{117} = x$ , which is equivalent to  $\frac{2,808}{117} = x$ , or  $24 = x$ . Therefore, the length, in units, of the other leg of this triangle is 24.

*Choice A* is incorrect and may result from conceptual or calculation errors. *Choice C* is incorrect.  $3\sqrt{13}$  is equivalent to  $\sqrt{117}$ , which is the length, in units, of the line segment shown in the  $xy$ -plane, not the length, in units, of the other leg of the triangle. *Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 27

The correct answer is 31. Subtracting 7 from both sides of the equation

$x^2 + 6x + 7 = 0$  yields  $x^2 + 6x = -7$ . To complete the square, adding  $\left(\frac{6}{2}\right)^2$ , or  $3^2$ , to

both sides of this equation yields  $x^2 + 6x + 3^2 = -7 + 3^2$ , or  $(x + 3)^2 = 2$ . Taking

the square root of both sides of this equation yields  $x + 3 = \pm\sqrt{2}$ . Subtracting 3

from both sides of this equation yields  $x = -3 \pm \sqrt{2}$ . Therefore, the solutions  $r$

and  $s$  to the equation  $x^2 + 6x + 7 = 0$  are  $-3 - \sqrt{2}$  and  $-3 + \sqrt{2}$ . Since  $r < s$ , it

follows that  $r = -3 - \sqrt{2}$  and  $s = -3 + \sqrt{2}$ . Subtracting 8 from both sides of

the equation  $x^2 + 8x + 8 = 0$  yields  $x^2 + 8x = -8$ . To complete the square, adding

$\left(\frac{8}{2}\right)^2$ , or  $4^2$ , to both sides of this equation yields  $x^2 + 8x + 4^2 = -8 + 4^2$ , or

$(x + 4)^2 = 8$ . Taking the square root of both sides of this equation yields

$x + 4 = \pm\sqrt{8}$ , or  $x + 4 = \pm 2\sqrt{2}$ . Subtracting 4 from both sides of this equation

yields  $x = -4 \pm 2\sqrt{2}$ . Therefore, the solutions  $t$  and  $u$  to the equation

$x^2 + 8x + 8 = 0$  are  $-4 - 2\sqrt{2}$  and  $-4 + 2\sqrt{2}$ . Since  $t < u$ , it follows that

$t = -4 - 2\sqrt{2}$  and  $u = -4 + 2\sqrt{2}$ . It's given that the solutions to  $x^2 + 14x + c = 0$ ,

where  $c$  is a constant, are  $r + t$  and  $s + u$ . It follows that this equation can

be written as  $(x - (r + t))(x - (s + u)) = 0$ , which is equivalent to

$x^2 - (r + t + s + u)x + (r + t)(s + u) = 0$ . Therefore, the value of  $c$  is  $(r + t)(s + u)$ .

Substituting  $-3 - \sqrt{2}$  for  $r$ ,  $-4 - 2\sqrt{2}$  for  $t$ ,  $-3 + \sqrt{2}$  for  $s$ , and  $-4 + 2\sqrt{2}$  for  $u$

in this equation yields  $((-3 - \sqrt{2}) + (-4 - 2\sqrt{2}))((-3 + \sqrt{2}) + (-4 + 2\sqrt{2}))$ ,

which is equivalent to  $(-7 - 3\sqrt{2})(-7 + 3\sqrt{2})$ , or  $(-7)(-7) - (3\sqrt{2})(3\sqrt{2})$ , which

is equivalent to  $49 - 18$ , or 31. Therefore, the value of  $c$  is 31.

# Math

## Module 2

(27 questions)

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### QUESTION 1

**Choice C** is correct. For each point on the scatterplot shown, the  $x$ -value represents the weight, in pounds, of a female gray wolf and the  $y$ -value represents the number of offspring that wolf produced. The point on the graph with an  $x$ -value of 50 has a  $y$ -value of 6. Therefore, the 50-pound gray wolf produced 6 offspring.

*Choice A* is incorrect. One of the wolves produced 8 offspring, but its weight was greater than 50 pounds. *Choice B* is incorrect. Three of the wolves produced 7 offspring each, but their weights were each greater than 50 pounds. *Choice D* is incorrect. Two of the wolves produced 5 offspring each, but their weights were each less than 50 pounds.

### QUESTION 2

**Choice A** is correct. According to the first equation in the given system,  $y = 4$ . Substituting 4 for  $y$  in the second equation in the given system yields  $x = 4 + 6$ , or  $x = 10$ .

*Choice B* is incorrect and may result from conceptual or calculation errors.

*Choice C* is incorrect. This is the value of  $y$ , not  $x$ . *Choice D* is incorrect and may result from conceptual or calculation errors.

### QUESTION 3

**Choice D** is correct. The height of each bar in the graph shown represents the number of volunteers who chose the gift labeled with the letter specified at the bottom of the bar. The bar for gift C has a height of 18. Therefore, 18 volunteers chose gift C.

*Choice A* is incorrect. This is the number of volunteers who chose gift D, not gift C. *Choice B* is incorrect. This is the number of volunteers who chose gift B, not gift C. *Choice C* is incorrect. This is the number of volunteers who chose gift A, not gift C.

## QUESTION 4

**Choice B** is correct. If a number from the data set is selected at random, the probability of selecting a negative number is the count of negative numbers in the data set divided by the total count of numbers in the data set. It's given that a data set of three numbers is shown. It follows that the total count of numbers in the data set is 3. In the data set shown,  $-13$  is the only negative number. It follows that the count of negative numbers in the data set is 1. Therefore, if a number from the data set is selected at random, the probability of selecting a negative number is  $\frac{1}{3}$ .

**Choice A** is incorrect. This is the probability of selecting a negative number from a data set that doesn't contain any negative numbers. **Choice C** is incorrect. This is the probability of selecting a positive number, not a negative number, from the data set. **Choice D** is incorrect. This is the probability of selecting a negative number from a data set that contains only negative numbers.

## QUESTION 5

**Choice B** is correct. A line in the  $xy$ -plane with a slope of  $m$  and a  $y$ -intercept of  $(0, b)$  can be represented by the equation  $y = mx + b$ . It's given that the line has a slope of  $-\frac{1}{2}$ . Therefore,  $m = -\frac{1}{2}$ . It's also given that the line passes through the point  $(0, 3)$ . Therefore,  $b = 3$ . Substituting  $-\frac{1}{2}$  for  $m$  and 3 for  $b$  in the equation  $y = mx + b$  yields  $y = -\frac{1}{2}x + 3$ . Therefore, the equation  $y = -\frac{1}{2}x + 3$  represents this line.

**Choice A** is incorrect. This equation represents a line in the  $xy$ -plane that passes through the point  $(0, -3)$ , not  $(0, 3)$ . **Choice C** is incorrect. This equation represents a line in the  $xy$ -plane that has a slope of  $\frac{1}{2}$ , not  $-\frac{1}{2}$ , and passes through the point  $(0, -3)$ , not  $(0, 3)$ . **Choice D** is incorrect. This equation represents a line in the  $xy$ -plane that has a slope of  $\frac{1}{2}$ , not  $-\frac{1}{2}$ .

## QUESTION 6

The correct answer is 66. It's given that a product costs 11.00 dollars per pound. Therefore, the cost for 6 pounds of the product is  $\left(\frac{11.00 \text{ dollars}}{1 \text{ pound}}\right)(6 \text{ pounds})$ , which is equivalent to 66.00, or 66, dollars.

## QUESTION 7

The correct answer is 15. It's given that the equation  $46 = 2x + 2y$  gives the perimeter of a rectangular rug that has length  $x$ , in feet, and width  $y$ , in feet. It's also given that the width of the rug is 8 feet. Substituting 8 for  $y$  in the equation  $46 = 2x + 2y$  yields  $46 = 2x + 2(8)$ , or  $46 = 2x + 16$ . Subtracting 16 from both sides of this equation yields  $30 = 2x$ . Dividing both sides of this equation by 2 yields  $15 = x$ . Since  $x$  represents the length, in feet, of the rug, it follows that the length of the rug is 15 feet.

## QUESTION 8

**Choice C** is correct. On the line of best fit, an  $x$ -value of 1,200 corresponds to a  $y$ -value between 10 and 12. Therefore, of the given choices, 11 is closest to the  $y$ -value predicted by the line of best fit at  $x = 1,200$ .

**Choice A** is incorrect. This is the integer value closest to the  $y$ -value predicted by the line of best fit at  $x = 1,800$ . **Choice B** is incorrect. This is the integer value closest to the  $y$ -value predicted by the line of best fit at  $x = 1,500$ . **Choice D** is incorrect. This is the integer value closest to the  $y$ -value predicted by the line of best fit at  $x = 600$ .

## QUESTION 9

**Choice A** is correct. The given expression can be rewritten as  $(8 \cdot 7)(y \cdot y)(z \cdot z)$ , which is equivalent to  $(56)(y^2)(z^2)$ , or  $56y^2z^2$ .

**Choice B** is incorrect. This expression is equivalent to  $(8yz)(y)(7)$ . **Choice C** is incorrect. This expression is equivalent to  $(8z)(y)(7)$ . **Choice D** is incorrect and may result from conceptual or calculation errors.

## QUESTION 10

**Choice D** is correct. It's given that the food truck buys forks for \$0.04 each. Therefore, the cost, in dollars, of  $x$  forks can be represented by the expression  $0.04x$ . It's also given that the food truck buys plates for \$0.48 each. Therefore, the cost, in dollars, of  $y$  plates can be represented by the expression  $0.48y$ . Since the total cost of  $x$  forks and  $y$  plates is \$661.76, the equation  $0.04x + 0.48y = 661.76$  represents this situation.

**Choice A** is incorrect and may result from conceptual or calculation errors.

**Choice B** is incorrect and may result from conceptual or calculation errors.

**Choice C** is incorrect. This equation represents a situation in which the food truck buys forks for \$0.48 each and plates for \$0.04 each.

## QUESTION 11

**Choice B** is correct. The triangle shown is a right triangle, where the interior angle shown with a right angle symbol has a measure of  $90^\circ$ . It's shown that the other two interior angles measure  $13^\circ$  and  $a^\circ$ . The sum of the measures of the interior angles of a triangle is  $180^\circ$ ; therefore,  $90 + 13 + a = 180$ . Combining like terms on the left-hand side of this equation yields  $103 + a = 180$ . Subtracting 103 from both sides of this equation yields  $a = 77$ .

**Choice A** is incorrect. This is the measure, in degrees, of the other acute interior angle of the right triangle, not the value of  $a$ . **Choice C** is incorrect. This is the measure, in degrees, of the right angle of the right triangle, not the value of  $a$ . **Choice D** is incorrect. This is the sum of the measures, in degrees, of the other two interior angles of the right triangle, not the value of  $a$ .

## QUESTION 12

**Choice D** is correct. It's given that at the beginning of the 1st week of the year there was \$600 in a savings account and Gabriella deposits \$35 in that savings account at the end of each week. Therefore, the amount of money, in dollars, in the savings account at the end of the 4th week of that year is  $600 + 4(35)$ , or 740.

**Choice A** is incorrect. This is the amount of money, in dollars, that will be in the account at the end of the 4th week if Gabriella withdraws, rather than deposits, \$35 at the end of each week. **Choice B** is incorrect. This is the amount of money, in dollars, that will be in the account at the end of the 1st week, not the 4th week. **Choice C** is incorrect and may result from conceptual or calculation errors.

## QUESTION 13

The correct answer is 22. The given equation,  $x^2 = (22)(22)$ , is equivalent to  $x^2 = (22)^2$ . Taking the square root of each side of this equation yields  $x = \pm 22$ . Thus, the positive solution to the given equation is 22.

## QUESTION 14

The correct answer is 980. It's given that the ratio 140 to  $m$  is equivalent to the ratio 4 to 28. Therefore, the value of  $m$  can be found by solving the equation  $\frac{140}{m} = \frac{4}{28}$ . Multiplying each side of this equation by  $m$  yields  $140 = \frac{4m}{28}$ . Multiplying each side of this equation by 28 yields  $3,920 = 4m$ . Dividing each side of this equation by 4 yields  $980 = m$ . Therefore, the value of  $m$  is 980.

## QUESTION 15

**Choice B** is correct. Dividing each side of the given equation by 3 yields  $x - 9 = 8$ . Therefore, the value of  $x - 9$  is 8.

**Choice A** is incorrect and may result from conceptual or calculation errors.

**Choice C** is incorrect. This is the value of  $3x - 27$ , not  $x - 9$ . **Choice D** is incorrect and may result from conceptual or calculation errors.

## QUESTION 16

**Choice C** is correct. An equation defining the linear function  $f$  can be written in the form  $f(x) = mx + b$ , where  $m$  is the slope and  $(0, b)$  is the  $y$ -intercept of the graph of  $y = f(x)$  in the  $xy$ -plane. The slope of the graph of  $y = f(x)$  can be found using the formula  $m = \frac{y_2 - y_1}{x_2 - x_1}$ , where  $(x_1, y_1)$  and  $(x_2, y_2)$  are any two points that the graph passes through. If  $f(0) = 17$ , it follows that the graph of  $y = f(x)$  passes through the point  $(0, 17)$ . If  $f(1) = 17$ , it follows that the graph of  $y = f(x)$  passes through the point  $(1, 17)$ . Substituting  $(0, 17)$  and  $(1, 17)$  for  $(x_1, y_1)$  and  $(x_2, y_2)$ , respectively, in the formula  $m = \frac{y_2 - y_1}{x_2 - x_1}$  yields  $m = \frac{17 - 17}{1 - 0}$ , which is equivalent to  $m = \frac{0}{1}$ , or  $m = 0$ . Since the graph of  $y = f(x)$  passes through  $(0, 17)$ , it follows that  $b = 17$ . Substituting 0 for  $m$  and 17 for  $b$  in the equation  $f(x) = mx + b$  yields  $f(x) = 0x + 17$ , or  $f(x) = 17$ . Thus, the equation that defines  $f$  is  $f(x) = 17$ .

*Choice A* is incorrect and may result from conceptual or calculation errors.

*Choice B* is incorrect and may result from conceptual or calculation errors.

*Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 17

**Choice B** is correct. It's given that the function  $f(x) = 55.20 - 0.16x$  gives the estimated surface water temperature, in degrees Celsius, of a body of water on the  $x$ th day of the year. Substituting 326 for  $x$  in the given function yields  $f(326) = 55.20 - 0.16(326)$ , which is equivalent to  $f(326) = 55.20 - 52.16$ , or  $f(326) = 3.04$ . Therefore, the estimated surface water temperature, in degrees Celsius, of this body of water on the 326th day of the year is 3.04.

*Choice A* is incorrect and may result from conceptual or calculation errors.

*Choice C* is incorrect. This is the rate of change, in degrees Celsius per day, of the estimated surface water temperature. *Choice D* is incorrect. This is the change, in degrees Celsius, in the estimated surface water temperature over 326 days.

## QUESTION 18

**Choice B** is correct. It's given by the first equation in the system that  $y = -\frac{1}{5}x$ .

Substituting  $-\frac{1}{5}x$  for  $y$  in the second equation in the system,  $y = \frac{1}{7}x$ , yields  $-\frac{1}{5}x = \frac{1}{7}x$ . Adding  $-\frac{1}{5}x$  to both sides of this equation yields  $0 = \frac{1}{7}x + \frac{1}{5}x$ , which is equivalent to  $0 = \frac{5}{35}x + \frac{7}{35}x$ , or  $0 = \frac{12}{35}x$ . Multiplying both sides of this equation by  $\frac{35}{12}$  yields  $0 = x$ . Therefore, the value of  $x$  is 0.

*Choice A* is incorrect and may result from conceptual or calculation errors.

*Choice C* is incorrect and may result from conceptual or calculation errors.

*Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 19

**Choice A** is correct. In the given function,  $s(t)$  represents the approximate mass, in grams, of the sample that remains  $t$  years after the sample starts to decay. It follows that the best interpretation of  $s(87) = 23$  is that approximately 23 grams of the sample remains 87 years after the sample starts to decay.

*Choice B* is incorrect. The mass of the sample has decreased by approximately  $184 - 23$ , or 161, grams, not 23 grams, 87 years after the sample starts to decay.

*Choice C* is incorrect. The mass of the sample has decreased by approximately 78 grams, not 87 grams, 23 years after the sample starts to decay. *Choice D* is incorrect. This would be the best interpretation of  $s(23) = 87$ , not  $s(87) = 23$ .

## QUESTION 20

The correct answer is 2,432. It's given that 4 cups = 1 quart. It follows that

76 quarts is equivalent to  $(76 \text{ quarts})\left(\frac{4 \text{ cups}}{1 \text{ quart}}\right)$ , or 304 cups. It's also given that

8 fluid ounces = 1 cup. It follows that 304 cups is equivalent to

$(304 \text{ cups})\left(\frac{8 \text{ fluid ounces}}{1 \text{ cup}}\right)$ , or 2,432 fluid ounces.

## QUESTION 21

The correct answer is 25. It's given that a piece of wire has a length of 32 inches and is cut into two parts. It's also given that one part has a length of  $x$  inches and the other part has a length of  $y$  inches. It follows that the equation  $x + y = 32$  represents this situation. It's also given that the value of  $x$  is 4 more than 3 times the value of  $y$ , or  $x = 3y + 4$ . Substituting  $3y + 4$  for  $x$  in the equation  $x + y = 32$  yields  $3y + 4 + y = 32$ . Combining like terms on the left-hand side of this equation yields  $4y + 4 = 32$ . Subtracting 4 from both sides of this equation yields  $4y = 28$ . Dividing both sides of this equation by 4 yields  $y = 7$ . Substituting 7 for  $y$  in the equation  $x = 3y + 4$  yields  $x = 3(7) + 4$ , or  $x = 25$ . Therefore, the value of  $x$  is 25.

## QUESTION 22

**Choice D** is correct. It's given that triangle  $XYZ$  is similar to triangle  $TUV$ . Therefore, each side of triangle  $XYZ$  is  $k$  times its corresponding side of triangle  $TUV$ , where  $k$  is a constant. It follows that the perimeter of triangle  $XYZ$  is  $k$  times the perimeter of triangle  $TUV$ . It's also given that  $\overline{TU}$  corresponds to  $\overline{XY}$  and the length of  $\overline{TU}$  is 18. Let  $x$  represent the length of  $\overline{XY}$ . It follows that  $x = 18k$ . The table shows that the perimeters of triangles  $TUV$  and  $XYZ$  are 37 and 333, respectively. It follows that  $333 = 37k$ , or  $9 = k$ . Substituting 9 for  $k$  in the equation  $x = 18k$  yields  $x = (18)(9)$ , or  $x = 162$ . Therefore, the length of  $\overline{XY}$  is 162.

*Choice A* is incorrect and may result from conceptual or calculation errors.

*Choice B* is incorrect. This is the length of  $\overline{TU}$ , not the length of  $\overline{XY}$ . *Choice C* is incorrect and may result from conceptual or calculation errors.

## QUESTION 23

**Choice D** is correct. The volume,  $V$ , of a sphere can be found using the formula

$V = \frac{4}{3}\pi r^3$ , where  $r$  is the radius of the sphere. It's given that the sphere has a radius of  $\frac{17}{5}$  feet. Substituting  $\frac{17}{5}$  for  $r$  in the formula  $V = \frac{4}{3}\pi r^3$  yields  $V = \frac{4}{3}\pi\left(\frac{17}{5}\right)^3$ , which is equivalent to  $V = \frac{4}{3}\pi\left(\frac{4,913}{125}\right)$ , or  $V = \frac{19,652\pi}{375}$ . Therefore, the volume, in cubic feet, of the sphere is  $\frac{19,652\pi}{375}$ .

*Choice A* is incorrect and may result from conceptual or calculation errors.

*Choice B* is incorrect. This is the volume, in cubic feet, of a sphere with a radius of  $\sqrt[3]{\frac{17}{5}}$  feet. *Choice C* is incorrect and may result from conceptual or calculation errors.

## QUESTION 24

**Choice C** is correct. It's given that the dot plot represents a data set of the number of bursts for 13 eruptions of a steam vent. The median of a data set with an odd number of elements is the middle element when the elements are in numerical order. For 13 elements in numerical order, this is the 7th element. For this data set, the first 4 elements have a value of 1, and the next 5 elements have a value of 2. Thus, the 7th element in the ordered data set is 2 and the median



number of bursts for the original data set is 2. If an additional eruption with 11 bursts is added to this data set to create a new data set of 14 eruptions, the median of the new data set will be between the 7th and 8th elements in the ordered set, which will also be 2. Therefore, the median number of bursts for the new data set will be the same as the median number of bursts for the original data set. The mean number of bursts for the original data set is found by adding the values of all 13 elements and dividing that sum by the number of elements, 13. Since the data is shown in a dot plot, the sum of the values of the elements can be found by multiplying each element's value by its frequency:

$1(4) + 2(5) + 3(2) + 4(1) + 5(1)$ , or 29. Therefore, the mean number of bursts for the original data set is  $\frac{29}{13}$ . If an additional eruption with 11 bursts is added to this data set to create a new data set of 14 bursts, the mean number of bursts for the new data set is  $\frac{29+11}{14}$ , or  $\frac{40}{14}$ . Since  $\frac{40}{14} > \frac{29}{13}$ , the mean number of bursts for the new data set is greater than the mean number of bursts for the original data set. Therefore, of the median number of bursts and the mean number of bursts, only the mean number of bursts is greater for the new data set than for the original data set.

*Choice A* is incorrect and may result from conceptual or calculation errors.

*Choice B* is incorrect and may result from conceptual or calculation errors.

*Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 25

**Choice D** is correct. It's given that during a certain day at a factory, the number of 7-inch concrete screws the factory makes is  $n$  and the number of 4-inch concrete screws the factory makes is 22. It's also given that during this day the number of 9-inch concrete screws the factory makes is 5 times the number of 7-inch concrete screws, or  $5n$ . Therefore, the total number of 7-inch, 9-inch, and 4-inch concrete screws is  $n + 5n + 22$ , or  $6n + 22$ . It's given that during this day, the factory makes 100 concrete screws total. Thus, the equation  $6n + 22 = 100$  represents this situation.

*Choice A* is incorrect. This equation represents a situation where the total length, in inches, of all the concrete screws, rather than the total number of concrete screws, is 100. *Choice B* is incorrect and may result from conceptual or calculation errors. *Choice C* is incorrect. This equation represents a situation where the total number of 9-inch concrete screws and 4-inch concrete screws, not including the 7-inch concrete screws, is 100.

## QUESTION 26

**Choice B** is correct. It's given that the number  $b$  is 80% less than 24. It follows that  $b$  is equal to 24 minus 80% of 24, which can be written as  $b = 24 - \left(\frac{80}{100}\right)24$ . This is equivalent to  $b = 24 - 0.8(24)$ , or  $b = 4.8$ . It's also given that the number  $a$  is 190% greater than the number  $b$ . It follows that  $a$  is equal to  $b$  plus 190% of  $b$ . Since  $b = 4.8$ , this can be written as  $a = 4.8 + \left(\frac{190}{100}\right)4.8$ . This is equivalent to  $a = 4.8 + 1.9(4.8)$ , or  $a = 13.92$ .

*Choice A* is incorrect. This would be the value of  $a$  if  $a$  were 190% of  $b$ , not 190% greater than  $b$ . *Choice C* is incorrect. This is  $(190 - 80)\%$  of 24. *Choice D* is incorrect. This would be the value of  $a$  if  $b$  were 80% of 24, not 80% less than 24, and  $a$  were 190% of  $b$ , not 190% greater than  $b$ .

## QUESTION 27

The correct answer is 12. The volume,  $V$ , of a right square prism can be calculated using the formula  $V = s^2h$ , where  $s$  represents the length of an edge of the base and  $h$  represents the height of the prism. It's given that the volume of the prism is 2,016 cubic units and the height is 14 units. Substituting 2,016 for  $V$  and 14 for  $h$  in the formula  $V = s^2h$  yields  $2,016 = (s^2)(14)$ . Dividing both sides of this equation by 14 yields  $144 = s^2$ . Taking the square root of both sides of this equation yields two solutions:  $-12 = s$  and  $12 = s$ . The length can't be negative, so  $12 = s$ . Therefore, the length, in units, of an edge of the base is 12.