

# PSAT 8/9 Practice Test #1

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Answer Key Materials  
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# PSAT<sup>™</sup> 8/9

# Practice Test #1

**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

Bioluminescent beetles called fireflies may seem to create flashes of light randomly, but each species of firefly actually has its own special series of repeated flashes and pauses. These unique \_\_\_\_\_ allow fireflies of the same species to find each other.

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

- A) quantities
- B) decorations
- C) patterns
- D) agreements

2

As an architect in Los Angeles in the 1950s, Helen Liu Fong became known for avoiding \_\_\_\_\_ designs in her buildings. Instead of using standard shapes and colors, she typically explored innovative forms and daring hues.

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

- A) creative
- B) bold
- C) traditional
- D) understandable

3

The printing of Virginia Woolf's novels featured a creative \_\_\_\_\_ between Woolf and her sister Vanessa Bell: a talented painter, Bell worked closely with Woolf to create original cover art for most of the novels.

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

- A) rebellion
- B) partnership
- C) discovery
- D) disagreement

4

A brief book review cannot fully convey the \_\_\_\_\_ of Olga Tokarczuk's novel *The Books of Jacob*, with its enormous cast of characters, its complicated, wandering plot, and its page numbers that count backward (beginning at 965 and ending at 1).

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

- A) accuracy
- B) inactivity
- C) complexity
- D) restraint

5

Sumerian civilization (which lasted from around 3300 to 2000 BCE) \_\_\_\_\_ many concepts that persist into present-day civilizations: for example, the first description of the seven-day week appears in the Sumerian *Epic of Gilgamesh*.

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

- A) transformed
- B) introduced
- C) inherited
- D) overlooked

6

The following text is adapted from Louisa May Alcott's 1869 novel *An Old-Fashioned Girl*. Polly, a teenager, is visiting her friend Fanny.

Fanny's friends did not interest Polly much; she was rather afraid of them [because] they seemed so much older and wiser than herself, even those younger in years. They talked about things of which she knew nothing and when Fanny tried to explain, she didn't find them interesting; indeed, some of them rather shocked and puzzled her.

Which choice best states the main purpose of the text?

- A) To portray Polly's reaction to Fanny's friends
- B) To identify the topics Polly talks about with Fanny's friends
- C) To explain how Fanny met some of her friends
- D) To illustrate how Fanny's friends feel about Polly

7

In 1801, a Blackfoot chief named Ac Ko Mok Ki drew a finely detailed map of the Upper Missouri region. This work demonstrates a vast amount of topographic knowledge, as the map features specific names of mountains and rivers, as well as the first-known sketch of the drainage network of the Missouri River. The map is especially notable because Ac Ko Mok Ki also included details about the numerous tribes that lived in the area.

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

- A) It emphasizes Ac Ko Mok Ki's desire to represent other tribes on the map.
- B) It explains how Ac Ko Mok Ki developed an interest in mapmaking.
- C) It identifies some reasons why the map is impressive.
- D) It details how the map was used for hunting and trading purposes.

8

Yawn contagion occurs when one individual yawns in response to another's yawn. Studies of this behavior in primates have focused on populations in captivity, but biologist Elisabetta Palagi and her colleagues have shown that it can occur in wild primate populations as well. In their study, which focused on a wild population of gelada monkeys (*Theropithecus gelada*) in Ethiopia, the researchers further reported that yawn contagion most commonly occurred in males and across different social groups instead of within a single social group.

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

- A) It defines a phenomenon that is discussed in the text.
- B) It introduces a problem that is examined in the text.
- C) It makes a claim that is challenged in the text.
- D) It presents a hypothesis that is evaluated in the text.

9

The following text is adapted from Paul Laurence Dunbar's 1902 novel *The Sport of the Gods*. Joe and some of his family members have recently moved to New York City.

[Joe] was wild with enthusiasm and with a desire to be a part of all that the metropolis meant. In the evening he saw the young fellows passing by dressed in their spruce clothes, and he wondered with a sort of envy where they could be going. Back home there had been no place much worth going to, except church and one or two people's houses.

Which choice best states the main purpose of the text?

- A) It illustrates a character's reaction to a new environment.
- B) It explains why a character has traveled to a city.
- C) It compares a character's thoughts about an event at two different times of day.
- D) It presents a character feeling regret over leaving home.

10

The painter María Izquierdo played an important role in the development of twentieth-century Mexican art, but her work has never been well-known in the United States except among art historians. One reason for Izquierdo's relative obscurity is the enormous popularity of some of her peers. In particular, the painters Frida Kahlo and Diego Rivera have so captivated the interest of US audiences that Izquierdo and other Mexican artists from the period often get overlooked, despite the high quality of their work.

Which choice best states the main idea of the text?

- A) Izquierdo's work is not as well-known in the United States as it should be because Kahlo and Rivera draw so much of the public's attention.
- B) During Izquierdo's lifetime, her paintings were displayed in galleries in the United States much more frequently than paintings by Kahlo and Rivera were.
- C) Izquierdo painted some of the same subjects that Kahlo and Rivera painted but used different techniques than they used.
- D) Few of Izquierdo's works are in galleries today because she produced only a small number of paintings.

11

Moons of Dwarf Planets

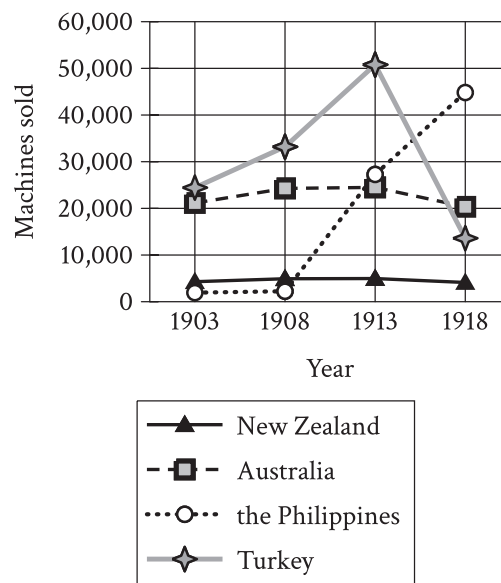
Dwarf planet name	Number of moons	Name of moons
Haumea	2	Hi'iaka, Namaka
Ceres	0	N/A
Makemake	1	MK 2
Eris	1	Dysnomia
Pluto	5	Charon, Nix, Kerberos, Styx, Hydra

Like Earth, some dwarf planets in the solar system have exactly one moon. Two examples of such dwarf planets are \_\_\_\_\_

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

- A) Eris and Makemake.
- B) Haumea and Eris.
- C) Pluto and Haumea.
- D) Makemake and Ceres.

12

Singer Sewing Machine Sales  
in Four Countries, 1903–1918

By the early 1900s, the Singer Corporation, a US sewing machine manufacturer founded in 1851, began to see rapidly increasing sales abroad, particularly in Russia, Germany, and the United Kingdom. These markets were responsible for the bulk of Singer's overseas sales, but demand for the company's machines in other countries also grew significantly in the early twentieth century. For instance, sales of their sewing machines in \_\_\_\_\_

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

- A) the Philippines increased dramatically from 1908 to 1918.
- B) New Zealand were largely consistent from 1903 to 1918.
- C) Australia increased steadily from 1903 to 1918.
- D) Turkey declined substantially from 1913 to 1918.

13

Results of Footprint Analysis for Two Sets of  
Theropod Tracks

Tracks	Estimated footprint length (centimeters)	Average stride length (meters)	Estimated mean speed (meters per second)
La Torre 6A	32.8	5.23	6.5–10.3
La Torre 6B	28.9	5.57	8.8–12.4

The table shows data from paleontologist Angélica Torices and colleagues' 2021 study of two sets of dinosaur tracks preserved in a fossilized lake bed in Spain. The tracks, referred to as La Torre 6A and La Torre 6B, were left by two individual theropods (dinosaurs that walked on two legs). The team's findings suggest that of the two theropods, the one that left the La Torre 6B tracks had a higher maximum mean speed, \_\_\_\_\_

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

- A) a longer footprint, and a longer average stride.
- B) a longer footprint, and a shorter average stride.
- C) a shorter footprint, and a longer average stride.
- D) a shorter footprint, and a shorter average stride.

14

In 1967 the US Congress created the Corporation for Public Broadcasting, which in turn created National Public Radio (NPR). NPR began producing and distributing high-quality news and cultural programming to affiliate stations across the United States in 1971. In a research paper, a student claims that the Corporation for Public Broadcasting and NPR were inspired by the British Broadcasting System (BBC), which had been established in the 1920s.

Which quotation from a work by a historian would be the most effective evidence for the student to include in support of this claim?

- A) "Although the BBC had begun as a private corporation, politicians successfully argued to make it a public company because they believed a public broadcaster could help build national unity in the aftermath of World War I."
- B) "For many decades, the BBC had no competition since it held Britain's only broadcasting license, whereas in the United States, the Corporation for Public Broadcasting launched NPR in a broadcasting market already filled with competitors."
- C) "Congress's embrace of publicly funded broadcasting reflected a common belief among US politicians that the role of government was not only to ensure people's safety and liberty but also to enrich people's lives in other ways."
- D) "The goal of the BBC was to support British democracy by promoting an informed citizenry, and US legislators believed that ensuring access to high-quality programming could do the same for democracy in the United States."



15

“Odalie” is an 1899 short story by Alice Dunbar-Nelson. In the story, a young woman named Odalie attends the annual Mardi Gras carnival in New Orleans, where she lives with her guardian Tante Louise. Dunbar-Nelson portrays Odalie as eager to escape the monotony of her everyday life: \_\_\_\_\_

Which quotation from “Odalie” most effectively illustrates the claim?

- A) “Mardi Gras was a tiresome day, after all, she sighed, and Tante Louise agreed with her for once.”
- B) “In the old French house on Royal Street, with its quaint windows and Spanish courtyard green and cool, and made musical by the plashing of the fountain and the trill of caged birds, lived Odalie in convent-like seclusion.”
- C) “When one is shut up in a great French house with a grim sleepy tante and no companions of one’s own age, life becomes a dull thing, and one is ready for any new sensation.”
- D) “It was Mardi Gras day at last, and early through her window Odalie could hear the jingle of folly bells on the [participants’] costumes, the tinkle of music, and the echoing strains of songs.”

16

Five of the Responses to Survey about Actions to Conserve Energy

Action	Action category	Percentage of respondents selecting action (%)
Use efficient cars/hybrids	efficiency	2.8
Change thermostat setting	curtailment	6.3
Use bike or public transportation instead of car	curtailment	12.9
Use efficient light bulbs	efficiency	3.6
Turn off lights	curtailment	19.6

In a survey of public perceptions of energy use, researcher Shahzeen Attari and her team asked respondents to name the most effective action ordinary people can take to conserve energy. The team categorized each action as either an efficiency or a curtailment and found that respondents tended to name curtailments more often than they did efficiencies. For example, 19.6% of respondents stated that the most effective way to conserve energy is to turn off the lights, while only \_\_\_\_\_

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

- A) 6.3% of respondents said it was most effective to use efficient cars or hybrids.
- B) 2.8% of respondents said it was most effective to change the thermostat setting.
- C) 12.9% of respondents said it was most effective to use a bike or public transportation.
- D) 3.6% of respondents said it was most effective to use efficient light bulbs.

17

An archaeological team led by Piotr Bieliński and Sultan al-Bakri found remnants of a 4,000-year-old Bronze Age board game at a site in Oman. Little is left of the game except a stone board, which is carved with a grid and has places to hold game pieces. Some scholars claim that the game was largely played by traders.

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

- A) Other examples of the game dating to the same period have been found in the remains of several homes in the region, including in one home that may have belonged to a trader.
- B) Similar games have been found in other sites dating to the same period that were connected to the site in Oman via trade routes.
- C) The other known examples of the game dating to the same period have been found along routes that seem to have been used primarily by traders at the time.
- D) Remnants of other goods have been found at the site in Oman that probably also reached the location through trade.

18

#### Swahili Speakers in Three African Countries

Country	Approximate number of speakers (in millions)	Estimated % of population
Democratic Republic of the Congo	22	25
Kenya	55	100
Tanzania	61	100

Swahili is estimated to be the first language of up to 15 million people worldwide. It's also an officially recognized language in Tanzania, Kenya, and the Democratic Republic of the Congo, which means these countries use Swahili in government documents and proceedings. But even in countries where almost everyone speaks Swahili, for many it isn't their first language but is instead their second, third, or even fourth language.

Which choice most effectively uses data from the table to support the underlined claim?

- A) Tanzania has approximately 61 million Swahili speakers, which is much more than the estimated total number of people worldwide for whom Swahili is their first language.
- B) Tanzania is estimated to have at most 15 million Swahili speakers, while the country's total population is approximately 61 million people.
- C) Approximately 100 percent of the people who speak Swahili as their first language live in Kenya, which has a total population of approximately 55 million people.
- D) Approximately 100 percent of Kenya's population speaks Swahili, while only about 25 percent of the Democratic Republic of the Congo's population speaks Swahili.

19

Obsidian is a kind of volcanic glass formed when lava cools so quickly that the atoms inside it cannot arrange themselves in a crystalline structure. You \_\_\_\_\_ more about obsidian's structure, which is classified as amorphous, in a later chapter.

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

- A) had learned
- B) had been learning
- C) will learn
- D) have learned

20

With its towering, six-spired exterior of granitelike quartz monzonite, the Salt Lake Temple is one of the most instantly recognizable structures in the state of Utah. However, many people do not know that \_\_\_\_\_ built over the course of forty years, with construction beginning in 1853 and ending in 1893.

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

- A) it was
- B) one was
- C) they were
- D) both were

21

Human-made (synthetic) fibers used in clothes and many other consumer products are more durable than most natural plant \_\_\_\_\_ the manufacture of synthetic fibers requires toxic chemical solvents that can pollute air and water.

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

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

22

The fine, powdery substance that covers the Moon's surface is called regolith. Because regolith is both readily available and high in oxygen \_\_\_\_\_ scientists have wondered whether it could be used as a potential source of oxygen for future lunar settlements.

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

- A) content and
- B) content,
- C) content
- D) content, and

23

Each year in the fall, when the weather starts to cool in the northern hemisphere, millions of North American monarch butterflies journey south. Searching for food and warmer habitats, they \_\_\_\_\_ thousands of miles—from as far north as Canada all the way down to Mexico—on this annual migration.

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

- A) flew
- B) were flying
- C) had flown
- D) fly

24

Objects ranging from the Kikkoman soy sauce bottle to the Yamaha VMAX motorcycle to the Komachi bullet train \_\_\_\_\_ designed by twentieth-century industrial designer Kenji Ekuan.

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

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

25

“Praise Song for the Day,” Elizabeth Alexander’s 2009 inaugural poem, asserts that “We cross dirt roads and highways...to see what’s on the other side.” Alexander’s use of “we” \_\_\_\_\_ Americans’ collective efforts and shared desire to seek new opportunity.

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

- A) evokes
- B) are evoking
- C) have evoked
- D) evoke

26

Author Madeline L’Engle, \_\_\_\_\_ to create a suspenseful tone that draws the reader in, begins her novel *A Wrinkle in Time* with descriptions of “wraithlike shadows” and “the frenzied lashing of the wind.”

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

- A) looked
- B) looks
- C) is looking
- D) looking

27

In 1955, Indian Bengali filmmaker Satyajit Ray released his first movie, *Pather* \_\_\_\_\_ quiet black-and-white drama about a family in rural India, Ray’s film was quite different from the loud, colorful action-romance movies that were popular at the time.

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

- A) *Panchali* a
- B) *Panchali*, which was a
- C) *Panchali*, a
- D) *Panchali*. A

28

A recent study tracked the number of bee species present in twenty-seven New York apple orchards over a ten-year period. \_\_\_\_\_ found that when wild growth near an orchard was cleared, the number of different bee species visiting the orchard decreased.

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

- A) Entomologist Heather Grab:
- B) Entomologist, Heather Grab,
- C) Entomologist Heather Grab
- D) Entomologist Heather Grab,

29

Tyrian purple was a highly prized dye among the Phoenicians (an ancient civilization located in present-day Lebanon). The Phoenicians were famous for using this natural dye to color their clothes a distinctive purple. \_\_\_\_\_ the name “Phoenicia” itself, some historians claim, may have originally meant “land of purple.”

Which choice completes the text with the most logical transition?

- A) In fact,
- B) Regardless,
- C) Lastly,
- D) On the contrary,

30

In Gothic architecture, flying buttresses are large arches that help support a building’s exterior walls. Before the Gothic era, cathedrals’ heavy ceilings had to be supported by thick, short walls, but the invention of flying buttresses eliminated this need. \_\_\_\_\_ Gothic cathedrals could be built with thinner, higher walls.

Which choice completes the text with the most logical transition?

- A) Similarly,
- B) For instance,
- C) Nevertheless,
- D) As a result,

31

In 1873, Spanish scientist Santiago Ramón y Cajal observed that brain fibers have distinct boundaries with clear end points, a finding that went against earlier assumptions about the brain. \_\_\_\_\_ scientists had assumed that the brain was a continuous web of fused fibers, not a vast network of distinct, individual cells.

Which choice completes the text with the most logical transition?

- A) However,
- B) Previously,
- C) As a result,
- D) Likewise,

32

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

- The Sasanian Empire lasted about 400 years (AD 224 to AD 651).
- The Sasanians controlled an area spanning 1.4 million square miles.
- This area included present-day Iran and Iraq.
- The empire's capital was the ancient city of Ctesiphon.
- Ctesiphon was located near present-day Baghdad, Iraq.

The student wants to specify the location of Ctesiphon. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) The Sasanian Empire began in AD 224 and ended in AD 651.
- B) The capital of the Sasanian Empire, which spanned 1.4 million square miles, was Ctesiphon.
- C) The Sasanians controlled an area of 1.4 million square miles, including present-day Iran and Iraq.
- D) Ctesiphon, the capital of the Sasanian Empire, was located near present-day Baghdad, Iraq.

33

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

- In the art world, the term biennial traditionally refers to an art exhibition that takes place every two years in a single location.
- Such biennials are held in New York, Berlin, and Venice.
- In 2006, artists Ed Gomez and Luis Hernandez founded the unconventional MexiCali Biennial.
- The MexiCali Biennial hosts exhibitions in different venues on both sides of the US-Mexico border.
- The MexiCali Biennial has taken place on an uneven schedule, with exhibitions in 2006, 2009–10, 2013, and 2018–20.

The student wants to emphasize a difference between the MexiCali Biennial and traditional biennials. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) In 2006, artists Ed Gomez and Luis Hernandez founded the MexiCali Biennial, which has taken place in 2006, 2009–10, 2013, and 2018–20.
- B) Unlike traditional biennials, the MexiCali Biennial hosts exhibitions in different venues on an uneven schedule.
- C) The term biennial traditionally refers to an art exhibition that takes place every two years in a single location, not to exhibitions hosted at a variety of times and venues.
- D) Biennial exhibitions have been held in New York, Berlin, and Venice but also on both sides of the US-Mexico border.

**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

The following text is from Nella Larsen's 1928 novel *Quicksand*.

The trees in their spring beauty sent through her restive mind a sharp thrill of pleasure. Seductive, charming, and beckoning as cities were, they had not this easy unhuman loveliness.

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

- A) Demanding
- B) Signaling
- C) Inviting
- D) Shifting

2

Physicist Joseph Weber performed \_\_\_\_\_ work in gravitational wave research in the 1960s and 1970s, conducting key experiments that scientists later used as the basis for their own investigations that led to the first verified detection of a gravitational wave in 2015.

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

- A) foundational
- B) supplementary
- C) repetitive
- D) ineffective

3

*Sueño de Familia* is an exhibition of drawings, paintings, and ceramics that explores the artistic heritage of US-based artist Yolanda González. The exhibition \_\_\_\_\_ five generations, featuring works by González’s great-grandfather, grandmother, mother, and niece as well as González herself.

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

- A) borrows
- B) spans
- C) judges
- D) neglects

4

The following text is from Claude McKay’s 1922 poem “Morning Joy.” The speaker is looking out a window and observing a wold, or large area of land.

At night the wide and level stretch of wold,  
Which at high noon had basked in quiet gold,  
Far as the eye could see was ghostly white;  
Dark was the night save for the snow’s weird  
light.

I drew the shades far down, crept into bed;  
Hearing the cold wind moaning overhead  
Through the sad pines, my soul, catching its  
pain,  
Went sorrowing with it across the plain.

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

- A) Pulled
- B) Drained
- C) Inspired
- D) Sketched

5

Some people have speculated that two helmets with attached horns discovered in Denmark in 1942 belonged to Vikings, but scholars have long been skeptical. Archaeologist Helle Vandkilde and colleagues recently provided radiocarbon dates for the helmets, and their findings \_\_\_\_\_ scholars’ skepticism: the helmets date to the Nordic Bronze Age, centuries before the Vikings existed.

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

- A) anticipate
- B) inspect
- C) reveal
- D) justify

6

Streams and rivers carry soil and rocks from one location to another. But there is another way for these geological materials to move. Scientists call this process “aeolian transport.” In aeolian transport, winds move small particles of soil or rock over potentially great distances. Geologist Melisa Diaz and her team studied dust in Antarctica to find out if it was moved by aeolian transport. They discovered that the dust matched geological material in Australia. Aeolian transport had carried it from one continent to another, across thousands of miles of open ocean.

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

- A) It presents Melisa Diaz’s remarks about difficulties that her team encountered.
- B) It introduces a scientific term that is used in the discussion that follows.
- C) It emphasizes the surprising nature of the findings that are presented.
- D) It explains the difference between two kinds of geological material.



7

San Francisco is known for the colorful murals painted on many of its buildings. The densest collection of murals is found on Balmy Alley in the Mission District neighborhood. In the 1970s, Latina artists painted vivid scenes of community life on walls along this block. As the original murals have faded, later generations of artists have painted new ones over them. As a result, Balmy Alley has become a living showcase of San Francisco's artistic spirit, with its murals reflecting changes in the cultural life of the city.

Which choice best states the main purpose of the text?

- A) To compare the Balmy Alley murals to other murals in San Francisco
- B) To offer an overview of the history and importance of the Balmy Alley murals
- C) To urge people to protect the murals of San Francisco from decay
- D) To describe the rise of mural painting in San Francisco beginning in the 1970s

8

Industrial activity is often assumed to be a threat to wildlife, but that isn't always so. Consider the silver-studded blue butterfly (*Plebejus argus*): as forest growth has reduced grasslands in northern Germany, many of these butterflies have left meadow habitats and are now thriving in active limestone quarries. In a survey of multiple active quarries and patches of maintained grassland, an ecologist found silver-studded blue butterflies in 100% of the quarries but only 57% of the grassland patches. Moreover, butterfly populations in the quarries were four times larger than those in the meadows.

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

- A) It challenges a common assumption about the species under investigation in the research referred to in the text.
- B) It introduces discussion of a specific example that supports the general claim made in the previous sentence.
- C) It suggests that a certain species should be included in additional studies like the one mentioned later in the text.
- D) It provides a definition for an unfamiliar term that is central to the main argument in the text.

9

**Text 1**

Dominique Potvin and colleagues captured five Australian magpies (*Gymnorhina tibicen*) to test a new design for attaching tracking devices to birds. As the researchers fitted each magpie with a tracker attached by a small harness, they noticed some magpies without trackers pecking at another magpie's tracker until it broke off. The researchers suggest that this behavior could be evidence of magpies attempting to help another magpie without benefiting themselves.

**Text 2**

It can be tempting to think that animals are deliberately providing help when we see them removing trackers and other equipment from one another, especially when a species is known to exhibit other cooperative behaviors. At the same time, it can be difficult to exclude the possibility that individuals are simply interested in the equipment because of its novelty, curiously pawing or pecking at it until it detaches.

Based on the texts, how would the author of Text 2 most likely respond to the researchers' perspective in Text 1 on the behavior of the magpies without trackers?

- A) That behavior might have been due to the novelty of the magpies' captive setting rather than to the novelty of the tracker.
- B) That behavior likely indicates that the magpies were deliberately attempting to benefit themselves by obtaining the tracker.
- C) That behavior may not be evidence of selflessness in *Gymnorhina tibicen* because not all the captured magpies demonstrated it.
- D) That behavior might be adequately explained without suggesting that the magpies were attempting to assist the other magpie.

10

Philadelphia's Black Pearl Chamber Orchestra, founded by Jeri Lynne Johnson, performs classical music, from well-known compositions by Beethoven to contemporary works by Jessie Montgomery. For the orchestra's iConduct! program, Johnson invites community members to learn some basic elements of conducting and then experience conducting the Black Pearl orchestra themselves.

Which choice best states the main idea of the text?

- A) The Black Pearl orchestra performs music from all over the world but mostly performs music composed by Philadelphians.
- B) Johnson founded the Black Pearl orchestra to perform classical music by contemporary artist Jessie Montgomery.
- C) The Black Pearl orchestra gives community members the chance to both listen to and participate in classical music performance.
- D) Johnson has community members conduct an orchestra to demonstrate how difficult the task is.

11

The recovery of a 1,000-year-old Chinese shipwreck in the Java Sea near present-day Indonesia has yielded a treasure trove of artifacts, including thousands of small ceramic bowls. Using a portable X-ray fluorescence analyzer tool, Lisa Niziolek and her team were able to detect the chemical composition of these bowls without damaging them. By comparing the chemical signatures of the bowls with those of the materials still at old Chinese kiln sites, Niziolek and her team can pinpoint which Chinese kilns likely produced the ceramic bowls.

Which choice best states the main idea of the text?

- A) Because of a new technology, researchers can locate and recover more shipwrecks than they could in the past.
- B) Researchers have been able to identify the location of a number of Chinese kilns in operation 1,000 years ago.
- C) With the help of a special tool, researchers have determined the likely origin of bowls recovered from a shipwreck.
- D) Before the invention of portable X-ray fluorescence, researchers needed to take a small piece out of an artifact to analyze its components.

12

The following text is adapted from Guy de Maupassant's nineteenth-century short story "The Trip of Le Horla" (translated by Albert M. C. McMaster, A. E. Henderson, Mme. Quesada, et al.). The narrator is part of a group traveling in a hot-air balloon at night.

The earth no longer seems to exist, it is buried in milky vapors that resemble a sea. We are now alone in space with the moon, which looks like another balloon travelling opposite us; and our balloon, which shines in the air, appears like another, larger moon, a world wandering in the sky amid the stars, through infinity. We no longer speak, think nor live; we float along through space in delicious inertia. The air which is bearing us up has made of us all beings which resemble itself, silent, joyous, irresponsible beings, peculiarly alert, although motionless.

Which choice best states the main idea of the text?

- A) The narrator feels a growing sense of isolation even though his companions are nearby during the balloon ride.
- B) The narrator and his companions are completely absorbed in the change in perspective they gain while riding in the balloon.
- C) The narrator and his companions are troubled by the disorienting effects of the altitude while riding in the balloon.
- D) The narrator is pleasantly surprised by his companions' unrestrained enthusiasm about the sensation of riding in the balloon.

13

Icebergs generally appear to be mostly white or blue, depending on how the ice reflects sunlight. Ice with air bubbles trapped in it looks white because much of the light reflects off the bubbles. Ice without air bubbles usually looks blue because the light travels deep into the ice and only a little of it is reflected. However, some icebergs in the sea around Antarctica appear to be green. One team of scientists hypothesized that this phenomenon is the result of yellow-tinted dissolved organic carbon in Antarctic waters mixing with blue ice to produce the color green.

Which finding, if true, would most directly weaken the team's hypothesis?

- A) White ice doesn't change color when mixed with dissolved organic carbon due to the air bubbles in the ice.
- B) Dissolved organic carbon has a stronger yellow color in Antarctic waters than it does in other places.
- C) Blue icebergs and green icebergs are rarely found near each other.
- D) Blue icebergs and green icebergs contain similarly small traces of dissolved organic carbon.

14

To create the poems in her 2017 collection *One Last Word*, poet Nikki Grimes used a writing method called the golden shovel. This method often involves choosing a line from an existing poem and then using each word from that line as the last word of each line in a new poem. Grimes wanted the poems in *One Last Word* to honor important Black poets of the past, so she chose lines by poets such as Langston Hughes and Georgia Douglas Johnson. Writing in this way can be challenging and might seem as though it would produce awkward poems. However, reviewers praised *One Last Word* as a beautiful and powerful tribute to the poets who inspired it. This reaction suggests that \_\_\_\_\_

Which choice most logically completes the text?

- A) most reviewers didn't understand Grimes's goal for *One Last Word*.
- B) Grimes successfully used the golden shovel method to achieve her goal for *One Last Word*.
- C) Langston Hughes and Georgia Douglas Johnson are two of Grimes's favorite poets.
- D) Grimes inspired many other writers to create poems using the golden shovel method.

15

The Indus River valley civilization flourished in South Asia from 3300 BCE to 1300 BCE. Many examples of the civilization's writing system exist, but researchers haven't yet deciphered it or identified which ancient language it represents. Nevertheless, archaeologists have found historical artifacts, such as clay figures and jewelry, that provide information about the civilization's customs and how its communities were organized. The archaeologists' findings therefore suggest that \_\_\_\_\_

Which choice most logically completes the text?

- A) investigating an ancient civilization is easier without knowledge of the civilization's language.
- B) knowing an ancient civilization's language isn't necessary in order to learn details about the civilization.
- C) archaeological research should focus on finding additional artifacts rather than deciphering ancient languages.
- D) examining the civilization's historical artifacts has resolved the debate about this civilization's language.

16

Ana Castillo's 1986 novel *The Mixquiahuala Letters* is a story told entirely through expressive letters from the narrator to her friend—letters that Castillo suggests could be read in several different orders. As they began reading it in class, some students remarked that they found the novel's letter format daunting and its treatment of gender relations old-fashioned. The professor, however, pointed out that the novel is written in modern-sounding language and addresses issues that still matter today, suggesting that *The Mixquiahuala Letters* \_\_\_\_\_

Which choice most logically completes the text?

- A) has more to say about gender relations than other novels from the same period.
- B) is more relevant to contemporary audiences than it may seem at first.
- C) is easier to read than many contemporary novels that focus on friendship.
- D) is best understood after multiple readings in different orders.

17

By running computer simulations of the development of our solar system, André Izidoro, Rajdeep Dasgupta, and colleagues concluded that the Sun may have been surrounded by three giant dust rings before the planets started to form. The researchers suggest that the materials in the innermost ring became the four planets closest to the Sun, the materials in the middle ring produced the rest of the planets, and the materials in the outermost ring created the asteroids and other small bodies in the region beyond Neptune. In one simulation, the researchers delayed the initial formation of the middle ring, causing oversized super-Earths to begin developing from the innermost ring. The researchers therefore hypothesize that \_\_\_\_\_

Which choice most logically completes the text?

- A) the middle ring formed earlier in the solar system's development than the initial simulations suggested.
- B) the timing of the initial formation of the middle ring played an important role in determining the eventual size of Earth.
- C) if the formation of the outermost ring had occurred earlier in a simulation, all the planets would have become super-Earths.
- D) the innermost ring actually formed into all the planets in our solar system, not just the four closest to the Sun.

18

Archaeologists and historians used to believe that the Maya civilization during its Classic period (roughly 250–900) lacked agricultural marketplaces. One reason for this belief was that these scholars misunderstood the ecology of the regions the Maya inhabited. Marketplaces typically emerge because different individuals or groups want to trade resources they control for resources they don't control. Scholars seriously underestimated the ecological diversity of the Maya landscape and thus assumed that \_\_\_\_\_

Which choice most logically completes the text?

- A) marketplaces likely would not have attracted many traders from outside the regions controlled by the Maya.
- B) farming practices would have been largely the same throughout Maya lands even if the crops people produced varied significantly.
- C) marketplaces would not have enabled Maya people to acquire many products different from those they already produced.
- D) farmers would trade agricultural products only if they had already produced enough to meet their own needs.

19

In 1976, the Inuit rock group Sikumiut recorded the album *People of the Ice*. Though only their first record, it shows a band already skilled at the difficult task of making music that sounds easy and fun. On songs like "Utirumavunga," Lucassie Koperqualuk's guitar riffs effortlessly \_\_\_\_\_ Charlie Adams's delightfully catchy vocal melodies.

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

- A) blend, with
- B) blend. With
- C) blend; with
- D) blend with

20

If you try on one of artist Nick Cave's signature Soundsuits, you can expect to swish, rustle, or clang every time you move. Cave makes his suits out of found objects, everything from ceramic birds to broken record players. He carefully considers the sound an object makes before using \_\_\_\_\_ in a suit.

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

- A) this
- B) that
- C) these
- D) it

21

The alga species *Chlorella vulgaris* is very efficient at making oxygen. For this reason, scientists are currently exploring ways to use this species in space. *C. vulgaris* might be used, for example, to build future biological air exchange systems that \_\_\_\_\_ oxygen for astronauts.

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

- A) are producing
- B) produced
- C) produce
- D) have produced

22

Farouk El-Baz, a geologist and space scientist, \_\_\_\_\_ part of the team that selected the lunar landing sites for the Apollo program during the 1960s and 1970s.

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

- A) are
- B) was
- C) have been
- D) were

23

A pioneer in the field of taphonomy (the study of how organic remains become fossils), \_\_\_\_\_ may be just as prevalent in the fossil record as those of thick-shelled organisms.

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

- A) fossils of thin-shelled organisms, Anna Behrensmeyer demonstrated in a 2005 analysis,
- B) Anna Behrensmeyer demonstrated in a 2005 analysis that fossils of thin-shelled organisms
- C) it was demonstrated in a 2005 analysis by Anna Behrensmeyer that fossils of thin-shelled organisms
- D) a 2005 analysis—by Anna Behrensmeyer—demonstrated that fossils of thin-shelled organisms

24

In 2018, the innovative works of Congolese sculptor and architect Bodys Isek \_\_\_\_\_ were featured in *City Dreams*, a solo exhibition at New York’s Museum of Modern Art.

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

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

25

The poem *Beowulf* begins with the word “hwæt,” which is an Old English \_\_\_\_\_ as “hark!” or “listen!” in some versions, the word was playfully rendered as “bro!” by Maria Dahvana Headley in her 2020 translation of the poem.

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

- A) exclamation, translated
- B) exclamation and translated
- C) exclamation translated
- D) exclamation. Translated

26

In June, female loggerhead sea turtles will swim back to the sandy beaches where they were born to lay eggs of their own. First, the turtle will dig her nest in the sand. \_\_\_\_\_ she will lay up to 100 eggs in the nest. Finally, she will cover it all with sand, before returning to the ocean.

Which choice completes the text with the most logical transition?

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

27

As biologist Terrie Williams has documented, deep dives present a challenge for seals and other marine mammals. A seal must exert enough energy to propel itself hundreds of meters downward, while keeping its heart rate low enough that it doesn’t run out of oxygen while underwater. \_\_\_\_\_ a seal moves its flippers as little as possible on a deep dive, gliding to conserve energy.

Which choice completes the text with the most logical transition?

- A) In the first place,
- B) On the other hand,
- C) For this reason,
- D) In comparison,



28

As a young historian in the 1950s, Alixa Naff began interviewing fellow Arab American immigrants about their experiences straddling two cultures. Over the next few decades, Naff conducted more than 450 such interviews, also known as oral histories.

\_\_\_\_\_ she collected photographs and other artifacts that represented her subjects' experiences.

Which choice completes the text with the most logical transition?

- A) In other words,
- B) On the contrary,
- C) In addition,
- D) Today,

29

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

- The tundra is a type of environment characterized by especially harsh winter conditions.
- Winter temperatures in the tundra average a frigid –30 degrees Fahrenheit.
- Animals that have adapted to these conditions can survive tundra winters.
- During the tundra's short growing season, average temperatures can reach a relatively mild 54 degrees Fahrenheit.
- Around 1,700 different kinds of plants are able to grow in the tundra.

The student wants to emphasize how harsh the conditions can be in the tundra. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) Winters in the tundra are especially harsh, with temperatures averaging a frigid –30 degrees Fahrenheit.
- B) Animals that have adapted to harsh winter conditions can survive tundra winters.
- C) There are around 1,700 different kinds of plants that can live in the tundra, where average temperatures can reach a mild 54 degrees Fahrenheit.
- D) Along with animals that have adapted to the tundra's conditions, around 1,700 different kinds of plants can live in the tundra.

30

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

- Minnesota defines a lake as an inland body of water of at least 10 acres.
- Wisconsin's definition of a lake doesn't take size into account.
- By its own definition, Wisconsin has over 15,000 lakes, many smaller than 10 acres.
- By Minnesota's definition, Wisconsin has only about 6,000 lakes.

The student wants to contrast Minnesota's definition of a lake with Wisconsin's. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) Wisconsin, which doesn't take size into account in defining a lake, claims that it has over 15,000 lakes.
- B) Because its definition of a lake is different from Minnesota's, it is unclear how many lakes Wisconsin really has.
- C) According to Minnesota's definition of a lake—an inland body of water of at least 10 acres—Wisconsin has about 6,000 lakes.
- D) Minnesota's definition of a lake—an inland body of water of at least 10 acres—is more restrictive than Wisconsin's, which doesn't take size into account.

31

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

- Just like states have state flags, some cities have city flags.
- Over one hundred US cities have redesigned their flags since 2015.
- The city of Pocatello, Idaho, redesigned its flag after it was named the most poorly designed flag in North America.
- Pocatello's new flag better represents the city's mountainous geography and civic priorities.
- Residents consider the new flag to be a meaningful symbol of civic pride.

The student wants to make and support a generalization about the effect of redesigning a city flag. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) Over one hundred US cities have redesigned their flags, including Pocatello, whose flag had been named the most poorly designed flag in North America.
- B) Pocatello is just one of over one hundred US cities that have redesigned their flags.
- C) After it was named the most poorly designed flag in North America, the flag of Pocatello was redesigned to better represent the city's geography and civic priorities.
- D) Redesigning a poorly designed city flag can create a meaningful symbol of civic pride, as was the case when Pocatello redesigned its original flag to better represent its geography and civic priorities.

32

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

- Allan Houser was a Chiricahua Warm Springs Apache sculptor, illustrator, and painter.
- Many of his sculptures featured Native American figures.
- He depicted this subject matter using abstract, modernist forms, developing a distinctive style that influenced many other artists.
- His well-known sculpture *Sacred Rain Arrow* was pictured on the State of Oklahoma license plate.

The student wants to describe the distinctive style of Houser's sculptures. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) A sculptor, illustrator, and painter, Houser developed a distinctive style for portraying Native American figures.
- B) Houser's sculptures employ abstract, modernist forms to depict Native American figures.
- C) Many other artists have been influenced by the style of Houser's sculptures.
- D) The sculpture *Sacred Rain Arrow* is a well-known example of Houser's style.

33

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

- Architect Julian Abele studied Gregorian and neo-Gothic architecture in Europe.
- Abele worked for an architecture firm that was hired in 1924 to design buildings for Duke University's new campus.
- Most of the buildings on Duke's campus were designed in the Gregorian or neo-Gothic architectural styles.
- At the time, Abele was not formally credited with designing the buildings.
- Based on the buildings' architectural styles, historians believe Abele designed most of the campus buildings.

The student wants to specify why historians believe Abele designed most of Duke's campus buildings. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) Given that most of the buildings on Duke's campus feature architectural styles that Abele had studied in Europe, historians believe Abele is the one who designed them.
- B) Though Abele wasn't formally credited at the time, historians believe he designed most of the buildings on Duke's campus.
- C) Most of Duke's campus buildings, which were designed by a firm Abele worked for, were designed in the Gregorian and neo-Gothic architectural styles.
- D) Abele, an architect who studied Gregorian and neo-Gothic architecture in Europe, is believed to have designed most of the buildings on Duke's campus.

**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

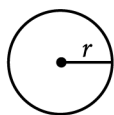
The questions in this section address a number of important math skills.  
Use of a calculator is permitted for all questions.

### NOTES

Unless otherwise indicated:

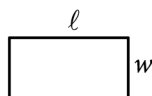
- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

### REFERENCE

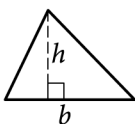


$$A = \pi r^2$$

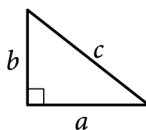
$$C = 2\pi r$$



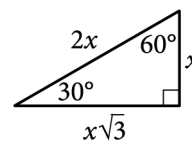
$$A = \ell w$$



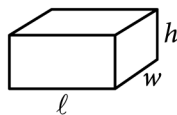
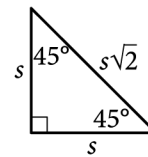
$$A = \frac{1}{2}bh$$



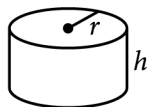
$$c^2 = a^2 + b^2$$



Special Right Triangles



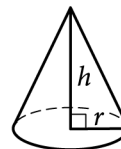
$$V = \ell wh$$



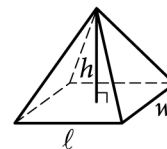
$$V = \pi r^2 h$$



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



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



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

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

How many yards are equivalent to 612 inches?  
(1 yard = 36 inches)

- A) 0.059
- B) 17
- C) 576
- D) 22,032

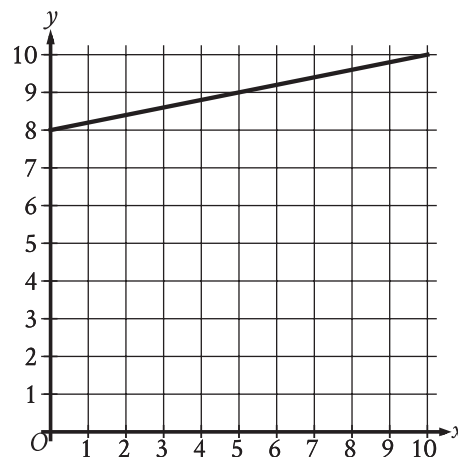
2

Response	Frequency
Once a week or more	3
Two or three times a month	16
About once a month	26
A few times a year	73
Almost never	53
Never	29
Total	200

The table gives the results of a survey of 200 people who were asked how often they see a movie in a theater. How many people responded either “never” or “almost never”?

- A) 24
- B) 53
- C) 82
- D) 118

3



What is the  $y$ -intercept of the line graphed?

- A)  $(0, -8)$
- B)  $\left(0, -\frac{1}{8}\right)$
- C)  $(0, 0)$
- D)  $(0, 8)$

4

What value of  $p$  satisfies the equation  
 $5p + 180 = 250$  ?

- A) 14
- B) 65
- C) 86
- D) 250

5

What is the area, in square centimeters, of a rectangle with a length of 36 centimeters and a width of 34 centimeters?

- A) 70
- B) 140
- C) 1,156
- D) 1,224

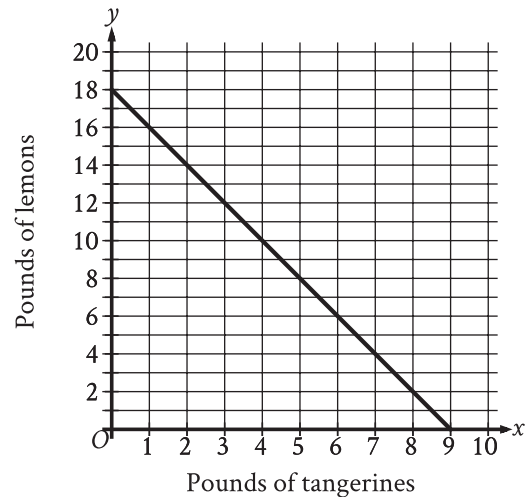
6

There are 170 blocks in a container. Of these blocks, 10% are green. How many blocks in the container are green?

7

The equation  $46 = 2a + 2b$  gives the relationship between the side lengths  $a$  and  $b$  of a certain parallelogram. If  $a = 9$ , what is the value of  $b$ ?

8



The graph shows the possible combinations of the number of pounds of tangerines and lemons that could be purchased for \$18 at a certain store. If Melvin purchased lemons and 4 pounds of tangerines for a total of \$18, how many pounds of lemons did he purchase?

- A) 7
- B) 10
- C) 14
- D) 16

9

The area of a square is 64 square inches. What is the side length, in inches, of this square?

- A) 8
- B) 16
- C) 64
- D) 128

10

Connor has  $c$  dollars and Maria has  $m$  dollars. Connor has 4 times as many dollars as Maria, and together they have a total of \$25.00. Which system of equations represents this situation?

- A)  $c = 4m$   
 $c + m = 25$
- B)  $m = 4c$   
 $c + m = 25$
- C)  $c = 25m$   
 $c + m = 4$
- D)  $m = 25c$   
 $c + m = 4$

11

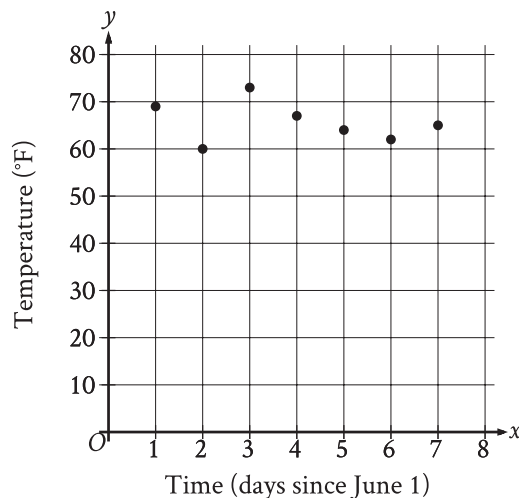
$$d = 16t$$

The given equation represents the distance  $d$ , in inches, where  $t$  represents the number of seconds since an object started moving. Which of the following is the best interpretation of 16 in this context?

- A) The object moved a total of 16 inches.
- B) The object moved a total of  $16t$  inches.
- C) The object is moving at a rate of 16 inches per second.
- D) The object is moving at a rate of  $\frac{1}{16}$  inches per second.

12

The scatterplot shows the temperature  $y$ , in  $^{\circ}\text{F}$ , recorded by a meteorologist at various times  $x$ , in days since June 1.



During which of the following time periods did the greatest increase in recorded temperature take place?

- A) From  $x = 6$  to  $x = 7$
- B) From  $x = 5$  to  $x = 6$
- C) From  $x = 2$  to  $x = 3$
- D) From  $x = 1$  to  $x = 2$

13

A distance of 112 furlongs is equivalent to how many feet? (1 furlong = 220 yards and 1 yard = 3 feet)



14

$$j(x) = mx + 144$$

For the linear function  $j$ ,  $m$  is a constant and  $j(12) = 18$ . What is the value of  $j(10)$ ?

15

$$y = 4x - 9$$

$$y = 19$$

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

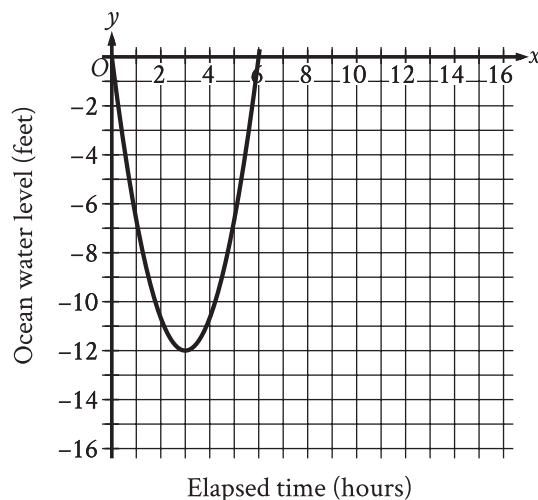
- A) (4, 19)
- B) (7, 19)
- C) (19, 4)
- D) (19, 7)

16

Which expression is equivalent to  $256w^2 - 676$ ?

- A)  $(16w - 26)(16w - 26)$
- B)  $(8w - 13)(8w + 13)$
- C)  $(8w - 13)(8w - 13)$
- D)  $(16w - 26)(16w + 26)$

17



Scientists recorded data about the ocean water levels at a certain location over a period of 6 hours. The graph shown models the data, where  $y = 0$  represents sea level. Which table gives values of  $x$  and their corresponding values of  $y$  based on the model?

A)

$x$	$y$
0	-12
0	3
3	6

B)

$x$	$y$
0	0
3	12
0	-6

C)

$x$	$y$
0	0
3	-12
6	0

D)

$x$	$y$
0	0
12	3
-6	0

18

Line  $k$  is defined by  $y = 3x + 15$ . Line  $j$  is perpendicular to line  $k$  in the  $xy$ -plane. What is the slope of line  $j$ ?

- A)  $-\frac{1}{3}$
- B)  $-\frac{1}{12}$
- C)  $-\frac{1}{18}$
- D)  $-\frac{1}{45}$

19

A store sells two different-sized containers of a certain Greek yogurt. The store's sales of this Greek yogurt totaled 1,277.94 dollars last month. The equation  $5.48x + 7.30y = 1,277.94$  represents this situation, where  $x$  is the number of smaller containers sold and  $y$  is the number of larger containers sold. According to the equation, which of the following represents the price, in dollars, of each smaller container?

- A) 5.48
- B)  $7.30y$
- C) 7.30
- D)  $5.48x$

20

A right rectangular prism has a length of 28 centimeters (cm), a width of 15 cm, and a height of 16 cm. What is the surface area, in  $\text{cm}^2$ , of the right rectangular prism?

21

If  $3x^2 - 18x - 15 = 0$ , what is the value of  $x^2 - 6x$ ?

22

Which expression is equivalent to  $(d - 6)(8d^2 - 3)$ ?

- A)  $8d^3 - 14d^2 - 3d + 18$
- B)  $8d^3 - 17d^2 + 48$
- C)  $8d^3 - 48d^2 - 3d + 18$
- D)  $8d^3 - 51d^2 + 48$

23

A right triangle has legs with lengths of 28 centimeters and 20 centimeters. What is the length of this triangle's hypotenuse, in centimeters?

- A)  $8\sqrt{6}$
- B)  $4\sqrt{74}$
- C) 48
- D) 1,184

24

Each of the following frequency tables represents a data set. Which data set has the greatest mean?

A)

Value	Frequency
70	4
80	5
90	6
100	7

B)

Value	Frequency
70	6
80	6
90	6
100	6

C)

Value	Frequency
70	7
80	6
90	6
100	7

D)

Value	Frequency
70	8
80	5
90	5
100	8

25

$$\begin{aligned}8x + 7y &= 9 \\ 24x + 21y &= 27\end{aligned}$$

For each real number  $r$ , which of the following points lies on the graph of each equation in the  $xy$ -plane for the given system?

- A)  $\left(r, -\frac{8r}{7} + \frac{9}{7}\right)$
- B)  $\left(-\frac{8r}{7} + \frac{9}{7}, r\right)$
- C)  $\left(-\frac{8r}{7} + 9, \frac{8r}{7} + 27\right)$
- D)  $\left(\frac{r}{3} + 9, -\frac{r}{3} + 27\right)$

26

A salesperson's total earnings consist of a base salary of  $x$  dollars per year, plus commission earnings of 11% of the total sales the salesperson makes during the year. This year, the salesperson has a goal for the total earnings to be at least 3 times and at most 4 times the base salary. Which of the following inequalities represents all possible values of total sales  $s$ , in dollars, the salesperson can make this year in order to meet that goal?

- A)  $2x \leq s \leq 3x$
- B)  $\frac{2}{0.11}x \leq s \leq \frac{3}{0.11}x$
- C)  $3x \leq s \leq 4x$
- D)  $\frac{3}{0.11}x \leq s \leq \frac{4}{0.11}x$

27

The number  $a$  is 70% less than the positive number  $b$ . The number  $c$  is 60% greater than  $a$ . The number  $c$  is how many times  $b$ ?

**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

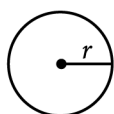
The questions in this section address a number of important math skills.  
Use of a calculator is permitted for all questions.

### NOTES

Unless otherwise indicated:

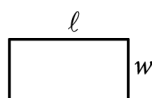
- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

### REFERENCE

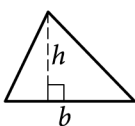


$$A = \pi r^2$$

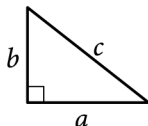
$$C = 2\pi r$$



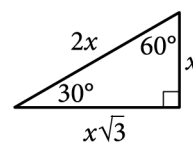
$$A = \ell w$$



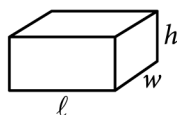
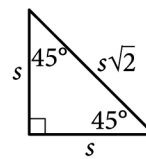
$$A = \frac{1}{2}bh$$



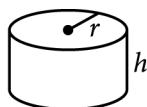
$$c^2 = a^2 + b^2$$



Special Right Triangles



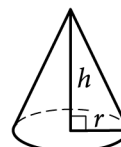
$$V = \ell wh$$



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



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



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



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

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

There are 20 buttons in a bag: 8 white buttons, 2 orange buttons, and 10 brown buttons. If one of these buttons is selected at random, what is the probability of selecting a white button?

- A)  $\frac{2}{20}$
- B)  $\frac{8}{20}$
- C)  $\frac{10}{20}$
- D)  $\frac{12}{20}$

2

An employee at a restaurant prepares sandwiches and salads. It takes the employee 1.5 minutes to prepare a sandwich and 1.9 minutes to prepare a salad. The employee spends a total of 46.1 minutes preparing  $x$  sandwiches and  $y$  salads. Which equation represents this situation?

- A)  $1.9x + 1.5y = 46.1$
- B)  $1.5x + 1.9y = 46.1$
- C)  $x + y = 46.1$
- D)  $30.7x + 24.3y = 46.1$

3

In a box of pens, the ratio of black pens to red pens is 8 to 1. There are 40 black pens in the box. How many red pens are in the box?

- A) 5
- B) 8
- C) 40
- D) 320

4

The function  $f$  is defined by the equation  $f(x) = 100x + 2$ . What is the value of  $f(x)$  when  $x = 9$ ?

- A) 111
- B) 118
- C) 900
- D) 902

5

The length,  $y$ , of a white whale was 162 centimeters (cm) when it was born and increased an average of 4.8 cm per month for the first 12 months after it was born. Which equation best represents this situation, where  $x$  is the number of months after the whale was born and  $y$  is the length, in cm, of the whale?

- A)  $y = 162x$
- B)  $y = 162x + 162$
- C)  $y = 4.8x + 4.8$
- D)  $y = 4.8x + 162$

6

The perimeter of an isosceles triangle is 83 inches. Each of the two congruent sides of the triangle has a length of 24 inches. What is the length, in inches, of the third side?

7

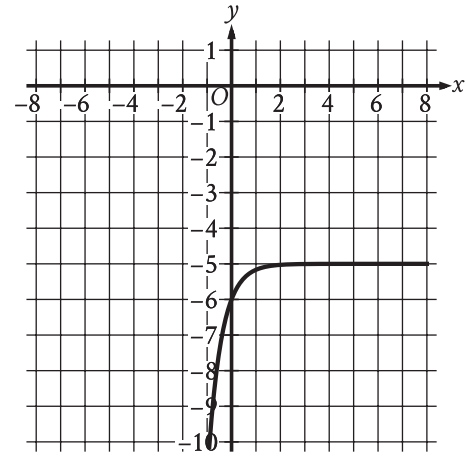
If  $2 + x = 60$ , what is the value of  $16 + 8x$  ?

8

The population density of Worthington is 290 people per square mile. Worthington has a population of 92,800 people. What is the area, in square miles, of Worthington?

- A) 102,400
- B) 93,090
- C) 320
- D) 32

9



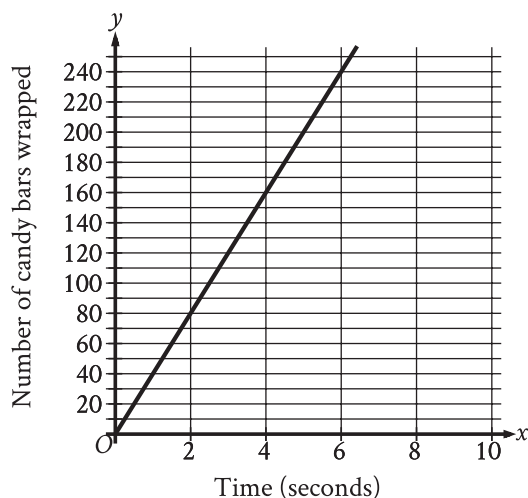
What is the  $y$ -intercept of the graph shown?

- A)  $(0, -6)$
- B)  $(-6, 0)$
- C)  $(0, 0)$
- D)  $(-5, -5)$



10

The graph shown models the number of candy bars a certain machine wraps with a label in  $x$  seconds.



According to the graph, what is the estimated number of candy bars the machine wraps with a label per second?

- A) 2
- B) 40
- C) 78
- D) 80

11

In a right triangle, the measure of one of the acute angles is  $51^\circ$ . What is the measure, in degrees, of the other acute angle?

- A) 6
- B) 39
- C) 49
- D) 51

12

2, 9, 14, 23, 32

What is the mean of the data shown?

- A) 14
- B) 16
- C) 17
- D) 32

13

The function  $f$  is defined by  $f(x) = 6 + \sqrt{x}$ . What is the value of  $f(36)$ ?

14

$$x + 3y = 29$$

$$3y = 11$$

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

15

On a car trip, Rhett and Jessica each drove for part of the trip, and the total distance they drove was under 220 miles. Rhett drove at an average speed of 35 miles per hour (mph), and Jessica drove at an average speed of 40 mph. Which of the following inequalities represents this situation, where  $r$  is the number of hours Rhett drove and  $j$  is the number of hours Jessica drove?

- A)  $35r + 40j > 220$
- B)  $35r + 40j < 220$
- C)  $40r + 35j > 220$
- D)  $40r + 35j < 220$

16

$$b = 42cf$$

The given equation relates the positive numbers  $b$ ,  $c$ , and  $f$ . Which equation correctly expresses  $c$  in terms of  $b$  and  $f$ ?

- A)  $c = \frac{b}{42f}$
- B)  $c = \frac{b - 42}{f}$
- C)  $c = 42bf$
- D)  $c = 42 - b - f$

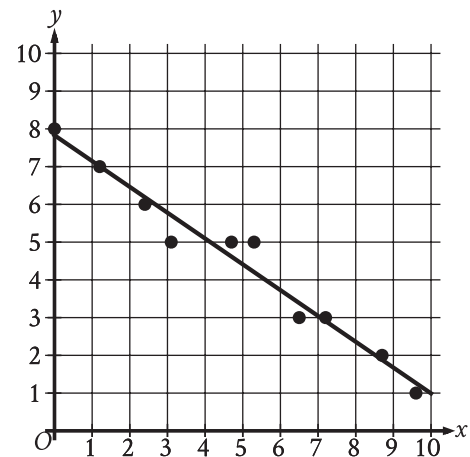
17

Davio bought some potatoes and celery. The potatoes cost \$0.69 per pound, and the celery cost \$0.99 per pound. If Davio spent \$5.34 in total and bought twice as many pounds of celery as pounds of potatoes, how many pounds of celery did Davio buy?

- A) 2
- B) 2.5
- C) 2.67
- D) 4

18

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



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

- A) 7
- B) 0.7
- C) -0.7
- D) -7

19

Scientists collected fallen acorns that each housed a colony of the ant species *P. ohioensis* and analyzed each colony's structure. For any of these colonies, if the colony has  $x$  worker ants, the equation  $y = 0.67x + 2.6$ , where  $20 \leq x \leq 110$ , gives the predicted number of larvae,  $y$ , in the colony. If one of these colonies has 58 worker ants, which of the following is closest to the predicted number of larvae in the colony?

- A) 41
- B) 61
- C) 83
- D) 190

20

What number is 40% greater than 115?

21

For the values  $j$  and  $k$ , the ratio of  $j$  to  $k$  is 11 to 12. If  $j$  is multiplied by 17, what is  $k$  multiplied by in order to maintain the same ratio?

22

Immanuel purchased a certain rare coin on January 1. The function  $f(x) = 65(1.03)^x$ , where  $0 \leq x \leq 10$ , gives the predicted value, in dollars, of the rare coin  $x$  years after Immanuel purchased it. What is the best interpretation of the statement " $f(8)$  is approximately equal to 82" in this context?

- A) When the rare coin's predicted value is approximately 82 dollars, it is 8% greater than the predicted value, in dollars, on January 1 of the previous year.
- B) When the rare coin's predicted value is approximately 82 dollars, it is 8 times the predicted value, in dollars, on January 1 of the previous year.
- C) From the day Immanuel purchased the rare coin to 8 years after Immanuel purchased the coin, its predicted value increased by a total of approximately 82 dollars.
- D) 8 years after Immanuel purchased the rare coin, its predicted value is approximately 82 dollars.

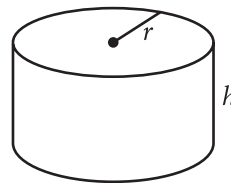
23

$x$	$y$
-6	$n + 184$
-3	$n + 92$
0	$n$

The table shows three values of  $x$  and their corresponding values of  $y$ , where  $n$  is a constant, for the linear relationship between  $x$  and  $y$ . What is the slope of the line that represents this relationship in the  $xy$ -plane?

- A)  $-\frac{92}{3}$
- B)  $-\frac{3}{92}$
- C)  $\frac{n + 92}{-3}$
- D)  $\frac{2n - 92}{3}$

24



The figure shown is a right circular cylinder with a radius of  $r$  and height of  $h$ . A second right circular cylinder (not shown) has a volume that is 392 times as large as the volume of the cylinder shown. Which of the following could represent the radius  $R$ , in terms of  $r$ , and the height  $H$ , in terms of  $h$ , of the second cylinder?

- A)  $R = 8r$  and  $H = 7h$
- B)  $R = 8r$  and  $H = 49h$
- C)  $R = 7r$  and  $H = 8h$
- D)  $R = 49r$  and  $H = 8h$

25

Each side of a 30-sided polygon has one of three lengths. The number of sides with length 8 centimeters (cm) is 5 times the number of sides  $n$  with length 3 cm. There are 6 sides with length 4 cm. Which equation must be true for the value of  $n$ ?

- A)  $5n + 6 = 30$
- B)  $6n + 6 = 30$
- C)  $8n + 3n + 4n = 30$
- D)  $8(5n) + 3n + 4(6) = 30$

26

Data set F consists of 55 integers between 170 and 290. Data set G consists of all the integers in data set F as well as the integer 10. Which of the following must be less for data set F than for data set G?

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

27

A right circular cone has a height of 22 centimeters (cm) and a base with a diameter of 6 cm. The volume of this cone is  $n\pi \text{ cm}^3$ . What is the value of  $n$ ?

**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 #1



## 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 C** is the best answer because it most logically completes the text's discussion of the flashes created by fireflies. In this context, "patterns" means distinct and predictable sequences. The text indicates that although the flashes that fireflies produce appear to occur randomly—that is, without any particular sequence or rhythm—each species actually produces its own special series of flashes and pauses. Indeed, these series of flashes are so unique that fireflies can use them to find other members of their species. Therefore, this context supports the idea that fireflies produce flashes in distinct and recognizable patterns.

*Choice A* is incorrect because "quantities" means certain amounts or numbers of something. Although the text discusses how different firefly species produce flashes and pauses in unique sequences that help other members of their species to find them, it doesn't mention the number of flashes that are used in these sequences. *Choice B* is incorrect because in this context, "decorations" would mean things that make an object more beautiful. Although it may be reasonable to say that firefly flashes are beautiful, the text focuses on the fact that fireflies use these unique sequences of flashes to find other members of their own species, not that the flashes make fireflies more beautiful. *Choice D* is incorrect because in this context, "agreements" would refer to deals that individuals have discussed and come to a consensus about. Since fireflies aren't capable of making such agreements, it wouldn't make sense to use this word to refer to the signals they send each other with their flashes.

## QUESTION 2

**Choice C** is the best answer because it most logically completes the text's discussion of Helen Liu Fong's architectural designs. In this context, "traditional" means conventional. The text states that rather than use "standard shapes and colors," Fong pursued "innovative" and "daring" design choices in her work. Fong's style is depicted as inventive, so it therefore makes sense in this context that she avoided mainstream, traditional designs in her buildings.

*Choice A* is incorrect because the text indicates that Fong's work is innovative and experimental. Thus, Fong's design choices could reasonably be considered creative, or original. She likely would have pursued creative designs, not avoided them. *Choice B* is incorrect because the text indicates that Fong used "daring" hues in her designs. Thus, Fong likely would have pursued bold, or brave and vivid design choices; she wouldn't have avoided them. *Choice D* is incorrect because the text doesn't address whether Fong's designs are understandable, or reasonable or expected. The text focuses on certain characteristics of Fong's designs, not on how people received or understood them.

## QUESTION 3

**Choice B** is the best answer because it most logically completes the text's discussion of the cover art of Virginia Woolf's novels. In this context, "partnership" means collaboration or joint effort. The text states that Woolf's sister Vanessa Bell was a talented painter and that Bell worked with Woolf to provide the cover art for most of Woolf's novels. Thus, this context suggests that Woolf and Bell pursued a creative partnership in order to produce several of Woolf's novels.

*Choice A* is incorrect because there is no indication that Woolf or Bell were undergoing a "rebellion," or revolt, against anything in particular. Instead, the text focuses on how they worked together in some aspects of the production of Woolf's novels. *Choice C* is incorrect because there is nothing in the text to indicate that Woolf or Bell made a "discovery," or encountered anything new for the first time as they worked together. The text suggests that Woolf had already written her novels and that Bell then assisted Woolf with the cover art for many of them. *Choice D* is incorrect because the text implies that Woolf and Bell had a positive relationship. According to the text, the sisters "worked closely" together to produce the cover art for many of Woolf's novels; the text doesn't mention whether while working together, Woolf and Bell had a "disagreement," or conflict.



## QUESTION 4

**Choice C** is the best answer because it most logically completes the text's discussion of Olga Tokarczuk's novel *The Books of Jacob*. As used in this context, "complexity" means having many complicated parts that when taken as a whole are difficult to follow or explain. The text indicates that *The Books of Jacob* has a large cast of characters, a complicated and wandering plot (that is, a plot that is difficult to follow), and reverse page numbering. Together, these features make up a novel that's challenging to read and summarize. This context supports the idea that a brief book review can't do justice to the novel's complexity.

**Choice A** is incorrect. Although the word "accuracy," or being free from error or falsehood, can sometimes be used to describe a novel, the text doesn't discuss whether Tokarczuk's novel has this quality. Instead, the text describes the novel as having a large cast of characters, a difficult-to-follow plot, and reverse page numbering. These features suggest complexity, not accuracy. **Choice B** is incorrect because "inactivity" means being in a state of idleness or doing nothing, neither of which would make sense in this context. The text describes Tokarczuk's novel, and although it's possible the novel could portray its characters as inactive, it wouldn't make sense to describe the novel itself as such. **Choice D** is incorrect because in this context "restraint" would mean holding back or showing self-control, and the text doesn't indicate that Tokarczuk's novel has either of these qualities. In fact, the features of the novel that the text describes, such as a large cast of characters, a complicated and wandering plot, and reverse page numbering, suggest excess and complexity, not restraint.

## QUESTION 5

**Choice B** is the best answer because it most logically completes the text's discussion of the contributions of the Sumerian civilization. In this context, "introduced" means brought into practice or use. The text states that the first reference to a seven-day week appears in the Sumerian *Epic of Gilgamesh*. The text presents this information about the seven-day week as an example of a concept introduced by the Sumerian civilization that persists into present-day civilizations.

**Choice A** is incorrect because nothing in the text suggests that the Sumerian civilization "transformed," or changed the nature of, concepts that persist into present-day civilizations. Instead, the text's presentation of a Sumerian literary work that contains the first description of the seven-day week is an example of the phenomenon described in the first half of the sentence, suggesting that the Sumerians invented many concepts that still persist. **Choice C** is incorrect because the information that a Sumerian literary work includes the first description of the seven-day week suggests that Sumerian civilization may have originated the seven-day week and other concepts that persist into present-day civilizations, not that it "inherited" the concepts, or received them from an ancestral figure or culture. **Choice D** is incorrect because the information that Sumerian civilization produced the first description of the seven-day week is presented as an example of the phenomenon described in the first half of the sentence, suggesting that Sumerian civilization originated this and other concepts that still persist, not that the Sumerians "overlooked," or failed to notice or consider, such concepts.

## QUESTION 6

**Choice A** is the best answer because it most accurately describes the main purpose of the text, which is to show how Polly reacted to some of Fanny's other friends. The text describes Polly as being frightened of Fanny's friends because they seemed "much older and wiser" to her and elaborates that they "talked about things of which" Polly was unfamiliar, uninterested, and shocked. Thus, the main purpose of the text is to describe Polly's impressions of Fanny's other friends.

*Choice B* is incorrect because the text does not provide any of the topics Polly discussed with Fanny's friends, stating only that Polly found the topics unfamiliar, uninteresting, and shocking. *Choice C* is incorrect because the text says nothing about how Fanny and her other friends first met. *Choice D* is incorrect because the focus of the text is on Polly's feelings about Fanny's other friends, not on the other friends' feelings about Polly.

## QUESTION 7

**Choice C** is the best answer because it best describes how the underlined sentence functions in the text as a whole. The text presents information about a map drawn by Blackfoot chief Ac Ko Mok Ki in 1801. The underlined sentence states that the map "demonstrates a vast amount of topographic knowledge" and mentions that it features the "specific names of mountains and rivers" and includes the first-known sketch of the Missouri River's drainage network. These are all characteristics that indicate that the map was executed with remarkable skill. Thus, the underlined sentence identifies some reasons why the map is impressive.

*Choice A* is incorrect. Though the sentence after the underlined sentence in the text mentions that Ac Ko Mok Ki included information about other tribes on his map, the underlined sentence itself does not address this topic. *Choice B* is incorrect because nothing in the underlined sentence indicates how Ac Ko Mok Ki became interested in mapmaking, only that his mapmaking skills are impressive. *Choice D* is incorrect because though the underlined sentence describes several features of the map, it does not specifically describe how the map was used.

## QUESTION 8

**Choice A** is the best answer because it most accurately describes how the first sentence functions in the text as a whole. The first sentence introduces what yawn contagion is, explaining that it occurs when an individual yawns in response to the yawn of another individual. The text goes on to describe Elisabetta Palagi and her colleagues' study of this phenomenon in a wild population of gelada monkeys. According to the text, the study showed that wild primate populations experience yawn contagion and that the behavior occurs most commonly in male monkeys and across social groups. Thus, the function of the first sentence is to define the phenomenon of yawn contagion that is discussed in the text.

**Choice B** is incorrect. Although the first sentence introduces the text's discussion of yawn contagion, it doesn't present this behavior, or anything else, as a problem. **Choice C** is incorrect because the first sentence doesn't present a claim but instead explains what yawn contagion is. Moreover, the text doesn't challenge anything; it's an informative text that describes the findings of a research study about yawning in wild primate populations. **Choice D** is incorrect. Although the text describes a scientific study, and most scientific studies are guided by a hypothesis, the text doesn't say what Palagi and her colleagues' hypothesis was; the text discusses their findings instead.

## QUESTION 9

**Choice A** is the best answer because it most accurately describes the main purpose of the text. The narrator describes how Joe responds to being in "the metropolis": he's excited and "wild with enthusiasm." He also envies the young fellows who walk by because, dressed as they are, they look as if they have somewhere special to go. The text contrasts this new place with the place Joe comes from, where apparently there wasn't as much to do. Thus, the main purpose of the text is to illustrate Joe's reaction to a new environment.

**Choice B** is incorrect because the text makes no reference to why Joe has moved. The narrator indicates that Joe is enthusiastic about being in a city, but there's no explanation provided for the move. **Choice C** is incorrect because the text makes no reference to how Joe thinks about an event. The narrator describes young men passing by in the evening and then recalls places worth going to at home—church and a few people's houses—but there's no explicit comparison made nor is a time of day mentioned for these events back home. **Choice D** is incorrect because the text doesn't support the idea that Joe feels regret over leaving home. Instead, Joe is described as "wild with enthusiasm" at being in the city. Joe's home is mentioned, but only to compare it unfavorably with the city.

## QUESTION 10

**Choice A** is the best answer because it most accurately states the main idea of the text. The text begins by stating that María Izquierdo was an important figure in the history of twentieth-century Mexican art, but despite her importance, her work hasn't received widespread recognition in the United States. According to the text, one reason for this is that Frida Kahlo and Diego Rivera are so famous in the US that they overshadow other important Mexican artists, including Izquierdo. Thus, the main idea of the text is that Izquierdo's work is less well known in the US than it should be because Kahlo and Rivera draw most of the public's attention.

**Choice B** is incorrect because the text doesn't discuss the appearance of Izquierdo's paintings in galleries in the US during her lifetime, nor does it suggest that her paintings were displayed more frequently than paintings by Kahlo or Rivera were. Instead, the text focuses on the fact that Izquierdo has been overlooked in the US because of Kahlo's and Rivera's greater popularity. **Choice C** is incorrect because the text doesn't discuss either the subject matter of Izquierdo's paintings or the techniques she used, nor does it compare these aspects of her paintings with those of Kahlo's and Rivera's paintings. **Choice D** is incorrect because the text doesn't mention how many of Izquierdo's paintings appear in galleries today, nor does it state that she produced only a small number of paintings.

## QUESTION 11

**Choice A** is the best answer because it most effectively uses data from the table to complete the statement about dwarf planets that have exactly one moon. The table lists several dwarf planets in one column and the number of moons that each of those dwarf planets has in another column. The text states that some dwarf planets have exactly one moon and indicates that there are two examples. Only two dwarf planets in the table have exactly one moon: Eris and Makemake.

**Choice B** is incorrect. According to the table, Eris has exactly one moon, but Haumea has two moons. **Choice C** is incorrect. According to the table, Haumea has two moons, and Pluto has five moons. Thus, they are not examples of dwarf planets with exactly one moon. **Choice D** is incorrect because while the table indicates that Makemake has exactly one moon, the table shows that Ceres has no moons at all.

## QUESTION 12

**Choice A** is the best answer because it most effectively uses data from the graph to complete the example. According to the graph, fewer than 10,000 sewing machines were sold in the Philippines in both 1903 and 1908, but nearly 30,000 were sold in 1913 and around 45,000 were sold in 1918. This increase illustrates the statement in the text that demand for Singer sewing machines grew significantly in the early twentieth century in overseas countries other than Russia, Germany, and the United Kingdom.

*Choice B* is incorrect because consistent sales of Singer sewing machines in New Zealand from 1903 to 1918 do not indicate that demand for the product increased but rather that demand remained relatively the same. *Choice C* is incorrect because it does not accurately describe the data in the graph. Although sales in Australia did increase somewhat between 1903 and 1908, there was very little change between 1908 and 1913, and then sales declined between 1913 and 1918. The data for Australia, then, do not show a steady increase from 1903 to 1918. *Choice D* is incorrect because declining sales of Singer sewing machines in Turkey from 1913 to 1918 do not point to an increase in demand for the product but rather to a decline in demand.

## QUESTION 13

**Choice C** is the best answer because it most effectively uses data from the table to complete the claim about the tracks left by two theropods. The table indicates that the set of tracks labeled La Torre 6A has an estimated footprint length of 32.8 centimeters, an average stride length of 5.23 meters, and an estimated mean speed of 6.5–10.3 meters per second. For the set of tracks labeled La Torre 6B, on the other hand, the estimated footprint length is 28.9 centimeters, the average stride length is 5.57 meters, and the estimated mean speed is 8.8–12.4 meters per second. Therefore, the theropod that left the La Torre 6B tracks had a shorter footprint and a longer average stride than the one that left the La Torre 6A tracks.

*Choice A* is incorrect. While it is true that of the two theropods, the one that left the La Torre 6B tracks had a longer average stride, it didn't have a longer footprint: the table shows that its estimated footprint length is 28.9 centimeters, while La Torre 6A's estimated footprint length is 32.8 centimeters. *Choice B* is incorrect because the table shows that of the two theropods, the one that left the La Torre 6B tracks had a footprint length estimated at 28.9 centimeters, which is shorter than the 32.8 centimeters estimated for the other set of tracks. Moreover, the theropod that left the La Torre 6B tracks had a longer average stride, not shorter: 5.57 meters, compared with 5.23 meters for the other set of tracks. *Choice D* is incorrect. While it is true that of the two theropods, the one that left the La Torre 6B tracks had a shorter footprint, it didn't have a shorter average stride: the table shows that its average stride length is 5.57 meters, while La Torre 6A's average stride length is 5.23 meters.

## QUESTION 14

**Choice D** is the best answer because this quotation would be the most effective evidence to include in support of the claim that the Corporation for Public Broadcasting and NPR were inspired by the British Broadcasting System (BBC). The quotation states that the goal of the BBC was to support British democracy and that US legislators believed high-quality programming could accomplish the same goal for democracy in the United States. In other words, US legislators looked to the BBC as a model, taking direct inspiration from it when they created the Corporation for Public Broadcasting, which in turn created NPR.

*Choice A* is incorrect because this quotation provides historical information about the BBC, not information about the inspiration for the creation of the Corporation for Public Broadcasting and NPR. This quotation, therefore, is irrelevant to the student's claim that the BBC inspired the creation of the Corporation for Public Broadcasting, which in turn created NPR. *Choice B* is incorrect because this quotation contrasts the lack of competition faced by the BBC with the substantial competition faced by NPR, which has no bearing on the student's claim that the Corporation for Public Broadcasting and NPR were inspired by the BBC. *Choice C* is incorrect because this quotation focuses on a common belief among US politicians that inspired Congress's embrace of publicly funded broadcasting. The quotation doesn't say anything about the BBC and therefore doesn't support the claim that the BBC inspired Congress to create the Corporation for Public Broadcasting, which in turn created NPR.

## QUESTION 15

**Choice C** is the best answer because it most effectively uses a quotation from "Odalie" to illustrate the claim that Odalie is eager to escape the monotony, or tedious lack of variety, of her everyday life. In the quotation, Odalie describes feeling "shut up" and complains that she has "no companions" except for her "sleepy tante." Odalie goes on to say that, as a result, her life is "dull" and she is "ready for any new sensation," meaning she wants a change. This suggests that Odalie wishes to get away from her monotonous everyday life.

*Choice A* is incorrect. Although this quotation includes the word "tiresome," which means dull, it does so to suggest Odalie's negative feelings about Mardi Gras, which is a once-a-year celebration, not her feelings about her everyday life. This quotation therefore doesn't express that Odalie's everyday life is monotonous or that she wishes to escape. *Choice B* is incorrect. Although this quotation ends by saying that Odalie lives in seclusion, or isolation, it doesn't express that Odalie's everyday life is monotonous or that she wishes to escape. Instead, it describes the pleasant qualities of the house Odalie lives in, saying that it has "quaint windows" and a "green and cool" courtyard that is "made musical" by the sounds of a fountain and pet birds. *Choice D* is incorrect because this quotation describes the lively sounds of a Mardi Gras celebration that Odalie hears through her window, not the monotony of Odalie's everyday life or her wish to escape.

## QUESTION 16

**Choice D** is the best answer because it most effectively uses data from the table to complete the text's discussion of Attari and her team's survey results. The text states that the team asked respondents to identify the most effective action people can take to save energy, with the team classifying each action as either an efficiency or a curtailment. According to the text, respondents named curtailments more often than they did efficiencies. The text then offers an example that begins by citing a curtailment, turning off the lights, that was selected by a relatively high percentage of respondents (19.6%). Given that the example is presented in support of the idea that more respondents selected curtailments than efficiencies, the most effective way to complete the example is by citing an efficiency, using efficient light bulbs, that was selected by a relatively low percentage of respondents (only 3.6%).

**Choice A** is incorrect because it inaccurately describes data in the table. The data indicate that 6.3% of respondents said the most effective action was to change the thermostat setting, not to use efficient cars or hybrids. **Choice B** is incorrect because it inaccurately describes data in the table. The data indicate that 2.8% of respondents said the most effective action was to use efficient cars/hybrids, not to change the thermostat setting. **Choice C** is incorrect because it mentions a curtailment (using a bike or public transportation) and not an efficiency. The text states that a research team asked respondents to identify the most effective action people can take to save energy, with the team classifying each action as either an efficiency or a curtailment. According to the text, respondents named curtailments more often than they did efficiencies. The text then offers an example that begins by citing a curtailment, turning off the lights, that was selected by a relatively high percentage of respondents (19.6%). Given that the example is presented in support of the idea that more people selected curtailments than efficiencies, the most effective way to complete the example is not by referring to another curtailment but rather by referring to an efficiency that was selected by a relatively low percentage of respondents.

## QUESTION 17

**Choice C** is the best answer because it presents a finding that, if true, would most directly support the scholars' claim about the board game. The text explains that the remains of a 4,000-year-old board game were found in Oman. The text then states that scholars claim this board game was played mostly by traders. If the other known examples of this board game from the same time period were discovered along routes that seem to have been used primarily by traders, this finding would directly support the scholars' claim because it suggests that the game was largely played by traders who brought it with them for entertainment as they traveled.

**Choice A** is incorrect because this finding would suggest only that a single trader may have possessed examples of the board game, perhaps for the purpose of trading or selling the game to residents of Oman. For this reason, the finding wouldn't directly support the scholars' claim that the majority of the game's players were traders. **Choice B** is incorrect because this finding doesn't mention the board

game at all, referring only to similar games found at other sites, and would therefore provide no direct support for the scholars' claim about the board game. *Choice D* is incorrect because this finding doesn't mention the board game at all, referring only to the remains of other goods found at the site in Oman, and would therefore provide no direct support for the scholars' claim about the board game.

## QUESTION 18

**Choice A** is the best answer because it most effectively uses data from the table to support the underlined claim. The text indicates that Swahili is the first language of up to 15 million people worldwide. The text goes on to claim, in the underlined portion, that even in countries where nearly everyone speaks Swahili, many of the language's speakers don't have Swahili as their first language. The table indicates that 61 million people in Tanzania, which amounts to 100 percent of the population, speak Swahili. If 61 million people in Tanzania speak Swahili, but only 15 million people worldwide have Swahili as their first language, that means there are many people in Tanzania who speak Swahili as a language other than their first language. This information about Swahili speakers in Tanzania therefore supports the claim that many Swahili speakers in countries where nearly everyone speaks Swahili speak it as a language other than their first language (such as their second, third, or fourth language).

*Choice B* is incorrect because it doesn't accurately describe information in the table. According to the table, Tanzania has 61 million Swahili speakers, not at most 15 million Swahili speakers. Additionally, the table indicates that 100 percent of Tanzania's population speak Swahili, which means that the number of Swahili speakers in the country and the country's total population should be the same, not that they should differ by such a large amount. *Choice C* is incorrect because there's no information in the table or the text that indicates where people who speak Swahili as their first language live. Although Kenya's total population can be inferred from the table—if Kenya has 55 million Swahili speakers and 100% of Kenya's population speak Swahili, then Kenya must have a population of 55 million people—nothing suggests that all the people who speak Swahili as their first language live in a single country, let alone that they all live in Kenya. *Choice D* is incorrect. Although the table does indicate that 100 percent of Kenya's population and 25 percent of the Democratic Republic of the Congo's population speak Swahili, this comparison is irrelevant to the claim that Swahili isn't the first language of many of its speakers even in countries where almost everyone speaks Swahili. On its own, a difference in the proportions of the population who speak Swahili cannot reveal whether those Swahili speakers have Swahili as their first language or a subsequent language.



## QUESTION 19

**Choice C** is the best answer. The convention being tested is the use of verbs to express tense in a sentence. In this choice, the future tense verb “will learn,” used in conjunction with the phrase “in a later chapter,” correctly indicates that “you” (the reader) are going to learn about obsidian’s structure at some point in the future.

*Choice A* is incorrect because the past perfect verb “had learned” doesn’t indicate that the subject is going to learn about obsidian’s structure in the future.

*Choice B* is incorrect because the past perfect progressive verb “had been learning” doesn’t indicate that the subject is going to learn about obsidian’s structure in the future. *Choice D* is incorrect because the present perfect verb “have learned” doesn’t indicate that the subject is going to learn about obsidian’s structure in the future.

## QUESTION 20

**Choice A** is the best answer. The convention being tested is pronoun-antecedent agreement. The singular pronoun “it” agrees in number with the singular antecedent “the Salt Lake Temple.”

*Choice B* is incorrect because the singular pronoun “one” is ambiguous in this context; the resulting sentence leaves unclear whether there is only one Salt Lake temple or multiple. *Choice C* is incorrect because the plural pronoun “they” doesn’t agree in number with the singular antecedent “the Salt Lake Temple.”

*Choice D* is incorrect because the plural pronoun “both” doesn’t agree in number with the singular antecedent “the Salt Lake Temple.”

## QUESTION 21

**Choice D** 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 (“Human-made... fibers”) and the second main clause (“the manufacture...water”).

*Choice A* 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 B* 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 run-on sentence. The two main clauses are fused without punctuation and/or a conjunction.

## QUESTION 22

**Choice B** is the best answer. The convention being tested is punctuation between a subordinate clause and a main clause. This choice correctly uses a comma to mark the boundary between the subordinate clause ("Because...content") and the main clause ("scientists...settlements").

*Choice A* is incorrect. Joining the subordinate clause ("Because...content") and the clause that follows ("scientists...settlements") with the conjunction "and" results in an ungrammatical sentence that lacks a main clause. *Choice C* is incorrect because it fails to mark the boundary between the subordinate clause and the main clause with appropriate punctuation. *Choice D* is incorrect. Joining the subordinate clause ("Because...content") and the clause that follows ("scientists...settlements") with a comma and the conjunction "and" results in an ungrammatical sentence that lacks a main clause.

## QUESTION 23

**Choice D** is the best answer. The convention being tested is the use of verbs to express tense. In this choice, the present tense verb "fly" is consistent with the other present tense verb ("journey") used to describe the butterflies' yearly migration. Together, these simple present tense verbs correctly indicate that the migration is a current, yearly occurrence.

*Choice A* is incorrect. The simple past tense verb "flew" isn't consistent with the other present tense verb used to describe the butterflies' yearly migration. *Choice B* is incorrect. The past progressive tense verb "were flying" isn't consistent with the other present tense verb used to describe the butterflies' yearly migration. *Choice C* is incorrect. The past perfect tense verb "had flown" isn't consistent with the other present tense verb used to describe the butterflies' yearly migration.

## 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 "objects."

*Choice A* is incorrect because the singular verb "was" doesn't agree in number with the plural subject "objects." *Choice B* is incorrect because the singular verb "is" doesn't agree in number with the plural subject "objects." *Choice C* is incorrect because the singular verb "has been" doesn't agree in number with the plural subject "objects."

## QUESTION 25

**Choice A** is the best answer. The convention being tested is subject-verb agreement. The singular verb “evokes” agrees in number with the singular subject “Alexander’s use.”

*Choice B* is incorrect because the plural verb “are evoking” doesn’t agree in number with the singular subject “Alexander’s use.” *Choice C* is incorrect because the plural verb “have evoked” doesn’t agree in number with the singular subject “Alexander’s use.” *Choice D* is incorrect because the plural verb “evoke” doesn’t agree in number with the singular subject “Alexander’s use.”

## QUESTION 26

**Choice D** is the best answer. The convention being tested is the use of verb forms within a sentence. The nonfinite present participle verb “looking” is correctly used to form a subordinate clause that describes the intent behind how L’Engle begins her novel.

*Choice A* is incorrect because the finite past tense verb “looked” can’t be used in this way to form a subordinate clause. *Choice B* is incorrect because the finite present tense verb “looks” can’t be used in this way to form a subordinate clause. *Choice C* is incorrect because the finite present progressive tense verb “is looking” can’t be used in this way to form a subordinate clause.

## QUESTION 27

**Choice D** 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 (“In...*Panchal*”) and another (“A quiet...time”). The phrase beginning with “a quiet” modifies the subject of the next sentence, “Ray’s film.”

*Choice A* is incorrect because it results in a run-on sentence. The sentences are fused without punctuation and/or a conjunction. *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 C* is incorrect because it results in a comma splice. A comma can’t be used in this way to mark the boundary between sentences.

## QUESTION 28

**Choice C** is the best answer. The convention being tested is punctuation use between a name and title and between a subject and a verb. No punctuation is needed between the proper noun “Heather Grab” and “entomologist,” the title that describes Grab. Additionally, no punctuation is needed between the sentence’s subject (“Entomologist Heather Grab”) and the main verb (“found”) that indicates what Grab did.

*Choice A* is incorrect because no punctuation is needed between the subject and the verb. *Choice B* is incorrect because no punctuation is needed. Setting the entomologist’s name off with commas suggests that it could be removed without affecting the coherence of the sentence, which isn’t the case. *Choice D* is incorrect because no punctuation is needed between the subject and the verb.

## QUESTION 29

**Choice A** is the best answer. “In fact” logically signals that the claim in this sentence—Phoenicia being named after the color purple—emphasizes and supports the previous claim that Phoenicians were famous for using purple dye.

*Choice B* is incorrect because “regardless” illogically signals that the claim about Phoenicia’s name contrasts with the previous claim that Phoenicians were famous for using purple dye. Instead, the naming emphasizes and supports this claim.

*Choice C* is incorrect because “lastly” illogically signals that the claim about Phoenicia’s name is the final step in a process or sequence. Instead, the naming emphasizes and supports the previous claim that Phoenicians were famous for using purple dye. *Choice D* is incorrect because “on the contrary” illogically signals that the claim about Phoenicia’s name directly opposes the previous claim that Phoenicians were famous for using purple dye. Instead, the naming emphasizes and supports this claim.

## QUESTION 30

**Choice D** is the best answer. “As a result” logically signals that the thinner, higher walls in this sentence were a result of the invention of flying buttresses in the previous sentence.

*Choice A* is incorrect because “similarly” illogically signals that the thinner, higher walls in this sentence are similar to the invention of flying buttresses in the previous sentence. Instead, the walls were a result of that invention. *Choice B* is incorrect because “for instance” illogically signals that the thinner, higher walls in this sentence are an example supporting the statement about the invention of flying buttresses in the previous sentence. Instead, the walls were a result of that invention. *Choice C* is incorrect because “nevertheless” illogically signals that the thinner, higher walls in this sentence occurred despite the invention of flying buttresses in the previous sentence. Instead, the walls were a result of that invention.

## QUESTION 31

**Choice B** is the best answer. “Previously” logically signals that the fused fiber theory came before Ramón y Cajal’s discovery.

*Choice A* is incorrect. “However” illogically signals that the fused fiber theory in this sentence contrasts with the information in the previous sentence. While this theory does contrast with Ramón y Cajal’s discovery, the previous sentence concludes by stating that his discovery went against prior assumptions about the brain. The fact that the fused fiber theory was one of those earlier assumptions makes “however” an illogical choice. *Choice C* is incorrect because “as a result” illogically signals that the fused fiber theory in this sentence was a result of the discovery in the previous sentence. Instead, the fused fiber theory came before Ramón y Cajal’s discovery. *Choice D* is incorrect because “likewise” illogically signals that the fused fiber theory in this sentence was similar to the discovery in the previous sentence. Instead, the fused fiber theory, which came before Ramón y Cajal’s discovery, was very different from it.

## QUESTION 32

**Choice D** is the best answer. The sentence specifies the location of Ctesiphon, noting that it was located near present-day Baghdad, Iraq.

*Choice A* is incorrect because the sentence explains when the Sasanian Empire began and ended; it doesn’t specify the location of Ctesiphon. *Choice B* is incorrect because the sentence emphasizes that Ctesiphon was the capital of the Sasanian Empire; it doesn’t specify Ctesiphon’s location. *Choice C* is incorrect because it emphasizes the size of the Sasanian Empire; it doesn’t specify the location of Ctesiphon.

## QUESTION 33

**Choice B** is the best answer. The sentence effectively emphasizes a difference between the MexiCali Biennial and traditional biennials, stating that the MexiCali Biennial is unlike traditional biennials because it hosts exhibitions in different venues on an uneven schedule.

*Choice A* is incorrect. The sentence indicates who founded the MexiCali Biennial and the years this biennial has taken place; it doesn’t emphasize a difference between the MexiCali Biennial and traditional biennials. *Choice C* is incorrect. While the sentence clarifies the traditional meaning of biennial with language that could apply to the MexiCali Biennial, it doesn’t mention the MexiCali Biennial by name. Therefore, the sentence doesn’t effectively emphasize a difference between the MexiCali Biennial and traditional biennials. *Choice D* is incorrect. The sentence notes locations where various biennial exhibitions have been held; it doesn’t emphasize a difference between the MexiCali Biennial and traditional biennials.

# Reading and Writing

## Module 2

(33 questions)

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### QUESTION 1

**Choice C** is the best answer because as used in the text, “beckoning” most nearly means “inviting,” or attractive. The text portrays a woman who is looking at “trees in their spring beauty.” She compares them to cities, which have their own pleasures even if they do not have the “easy unhuman loveliness” of trees: she thinks of cities as “seductive” and “charming,” both adjectives that signify something that is enticing, or attractive. Therefore, cities that are seductive and charming would also be described as inviting people closer to them.

*Choice A* is incorrect because there is no indication in this context that cities are “demanding,” or requiring effort. *Choice B* is incorrect. Though “signaling,” or communicating something, might be considered a key feature of the act of “beckoning,” in the context here, “beckoning” suggests that cities have attractive qualities that naturally draw people to them. Such attractive qualities are not described by the word “signaling” alone. Therefore, “signaling” is an incorrect answer because it is insufficiently precise. *Choice D* is incorrect because there is no reason to think in this context that the cities are “shifting,” or changing shape.

## QUESTION 2

**Choice A** is the best answer because it most logically completes the text's discussion of physicist Joseph Webster's research on gravitational waves. In this context "foundational" means the basis on which something else develops. The text indicates that Webster's experiments in the 1960s and 1970s were earlier than, and "key" to, the work of later scientists in the field; thus, Webster's work was foundational to the later scientists' experiments and the eventual detection of a gravitational wave in 2015.

**Choice B** is incorrect because the text does not suggest that Webster's work was supplementary, or an additional element of an existing, larger project, but rather it was "the basis for" later experiments. **Choice C** is incorrect because the text does not assert that Webster's work was repetitive, or involved doing something the same way many times. Rather, the text indicates that Webster's work formed the basis for later investigations in the field of gravitational wave research. **Choice D** is incorrect because the text does not state that Webster's work was ineffective, or failed to produce the desired outcome. Rather, the text strongly implies that Webster's work was productive and extremely important to later work in the field of gravitational wave research.

## QUESTION 3

**Choice B** is the best answer because it most logically completes the text's discussion of the *Sueño de Familia* art exhibition. In this context, "spans" means extends across or covers. The text states that the exhibition explores González's artistic heritage and features artwork by her great-grandfather, grandmother, mother, and niece. This context conveys the idea that the exhibition spans, or extends across, five generations of González's family.

**Choice A** is incorrect because it wouldn't make sense to say that the exhibition "borrows," or acquires, five generations of González's family. The text indicates that the exhibition features artwork by family members from five generations, not that the five generations themselves have been acquired for inclusion in the exhibition. **Choice C** is incorrect because the text indicates that the purpose of the exhibition is to highlight artwork, not to "judge," or give an opinion on, five generations of the artist's family. **Choice D** is incorrect because the text doesn't suggest that the exhibition "neglects," or gives little attention to, five generations of González's family. On the contrary, the text indicates that the exhibition is dedicated to exploring González's artistic heritage and therefore designed to bring attention to her family members and their artwork.

## QUESTION 4

**Choice A** is the best answer because as used in the text, “drew” most nearly means pulled. In the text, the speaker stands at a window, looking out on a landscape at night. The speaker then “drew the shades far down, crept into bed.” That is, the speaker pulled down, or lowered, the shades until they were completely shut before going to sleep.

**Choice B** is incorrect. Although in some contexts, “drew” can refer to draining or removing liquid, especially water, as when someone draws water from a well, in this context it refers to the speaker pulling down window shades for the night. **Choice C** is incorrect. In some contexts, “drew” can be used to describe how a person or thing inspires, or elicits, a response from someone, as when a performer draws applause from an audience. But in this context it refers to the speaker pulling down window shades for the night. **Choice D** is incorrect. Although “drew” has several meanings, including sketched, or illustrated with a pen or pencil, in this context it refers to the speaker pulling down window shades for the night.

## QUESTION 5

**Choice D** is the best answer because it most logically completes the text’s discussion of the helmets found in Denmark. In this context, “justify” means confirm or give reasons for. The text indicates that scholars have long been skeptical about the supposed Viking origin of two helmets found in Denmark. The radiocarbon dating of the helmets conducted by Vandkilde and colleagues demonstrates that the helmets date from the Nordic Bronze Age, making the helmets too old to have belonged to Vikings. This context supports the idea that the scholars’ skepticism is justified.

**Choice A** is incorrect because “anticipate” means expect or come before, neither of which would make sense in context. The text indicates that scholars have long been skeptical of the idea that the helmets belonged to Vikings. Because the skepticism has existed for a long time, Vandkilde and colleagues’ research couldn’t be said to anticipate it. Instead, the radiocarbon dating results justify or confirm the scholar’s skepticism. **Choice B** is incorrect because “inspect” means examine or review, which wouldn’t make sense in this context. Research findings are inanimate and therefore unable to inspect scholars’ skepticism. The text focuses on the origin of two helmets, which some people believe belonged to Vikings. Vandkilde and colleagues found that the helmets are from the Nordic Bronze Age and therefore much older than the Vikings. This context suggests that the researchers’ findings justify, not inspect, the scholars’ skepticism. **Choice C** is incorrect because “reveal” means uncover or report, which wouldn’t make sense in context. The text focuses on the origin of two helmets, which some people believe belonged to Vikings. Vandkilde and colleagues tested the helmets and found that they date to the Nordic Bronze Age and therefore are much older than the Vikings. This context suggests that the researchers’ findings confirm or justify the scholars’ skepticism, which was already known so didn’t need to be revealed.



## QUESTION 6

**Choice B** is the best answer because it most accurately describes the function of the underlined portion in the text as a whole. The first two sentences introduce the idea that soil and rocks can be moved from one location to another by something other than rivers and streams. The underlined sentence then states that the term used by scientists to refer to this process is “aeolian transport.” The discussion that follows explains what aeolian transport is (the movement of small geological materials over potentially great distances by the wind) and describes an example of a study that found that dust particles had been moved by aeolian transport from Australia to Antarctica. Thus, the underlined portion introduces a scientific term that is used in the discussion that follows.

**Choice A** is incorrect because the underlined portion of the text doesn't present any remarks from Melisa Diaz, nor does it suggest that Diaz and her team encountered difficulties in their study. Instead, the phrase in quotation marks in the underlined portion simply presents a term that is used by scientists to refer to a specific process discussed in the text. **Choice C** is incorrect because nothing in either the underlined portion or the text as a whole suggests that the findings of the study presented in the text were surprising or unexpected. In fact, the text suggests that Diaz and her team wanted to see if aeolian transport could explain the appearance of certain geological materials in Antarctica, and their findings did indeed confirm the involvement of aeolian transport. **Choice D** is incorrect. Although the first sentence of the text mentions soil and rocks, which are two different kinds of geological material, the underlined portion doesn't refer to these materials, nor does it explain the difference between them. Rather, the underlined portion introduces the scientific term “aeolian transport,” which is used in the discussion that follows.

## QUESTION 7

**Choice B** is the best answer because it best states the main purpose of the text. The text begins by briefly stating that San Francisco is known for its murals, then transitions to a discussion of a single collection of murals, which is found on Balmy Alley in the city's Mission District. The text explains that the murals in this area were originally created in the 1970s, then observes that they have changed over time: as some have faded through the decades, others have been painted in their place. The text ends by emphasizing that these murals are significant because they reflect San Francisco's artistic spirit and cultural life. Therefore, the text provides an overview of the history and importance of the Balmy Alley murals.

**Choice A** is incorrect. Although it can be inferred from the text that there are murals in other areas of San Francisco besides Balmy Alley, the text doesn't specifically discuss murals in other areas or compare the murals of Balmy Alley to those in other areas. **Choice C** is incorrect. By observing that some of the murals of Balmy Alley have been replaced due to fading, the text implies that murals can decay, but it never urges readers to protect this specific collection of murals—or any murals elsewhere in San Francisco, for that matter. Indeed, by describing the ever-changing murals of Balmy Alley as “a living showcase of San Francisco's artistic spirit,” the text emphasizes the positive aspects of the

fact that the original Balmy Alley murals have faded and been replaced with new murals. *Choice D* is incorrect because the text doesn't describe the rise of mural painting in San Francisco generally or note when this occurred. The only historical development of the 1970s mentioned in the text is the origin of the murals in a specific area of the city: Balmy Alley in the Mission District.

## QUESTION 8

**Choice B** is the best answer because it most accurately describes how the underlined portion functions in the text as a whole. The first sentence presents the general claim that industrial activity is not always a threat to wildlife. The underlined portion of the sentence that follows suggests that the silver-studded blue butterfly is an example of wildlife thriving in areas of industrial activity: active limestone quarries. Thus, the function of the underlined portion is to introduce a specific example in support of the general claim in the previous sentence.

*Choice A* is incorrect. Although the first sentence indicates that "industrial activity is often assumed" to harm wildlife, in the case of the silver-studded blue butterfly the text mentions neither an assumption about this species nor any challenge to such an assumption. *Choice C* is incorrect because the text mentions only one study: the "survey." Additional studies are not mentioned in the text. *Choice D* is incorrect because neither the underlined portion nor any other portion of the text provides a definition for any of the terms used in the text's argument.

## QUESTION 9

**Choice D** is the best answer because it reflects how the author of Text 2 would most likely respond to the researchers' perspective in Text 1 on the behavior of the magpies without trackers. According to Text 1, Dominique Potvin and colleagues observed magpies without trackers pecking at a tracker on another magpie until the device fell off. The researchers suggested that the birds might have been attempting to help the other bird, with no benefit to themselves. Text 2 generally discusses scenarios in which animals have been observed removing trackers from each other. The text cautions that it shouldn't be assumed that these animals are helping one another deliberately, since they might simply be pecking at trackers out of curiosity, causing them to fall off eventually. Therefore, the author of Text 2 would most likely respond to Potvin and colleagues' perspective in Text 1 by saying that the behavior of the magpies without trackers could be adequately explained without suggesting that they were attempting to assist the other magpie.

*Choice A* is incorrect because Text 2 never discusses the novelty, or the newness and unusual quality, of the captive settings in which animals have been observed to remove trackers from other animals, nor does it suggest that such novelty might account for this behavior. Instead, the text suggests that it's the novelty of the tracking equipment itself that might cause the behavior: interested in the trackers because they're unusual, animals might paw or peck at them until they fall off. *Choice B* is incorrect because Text 2 never suggests that when animals remove trackers from other animals, they do so because they wish to obtain the trackers for themselves. Instead, Text 2 argues that animals paw or peck

at trackers because they are merely curious about them. *Choice C* is incorrect because Text 2 doesn't argue that when captured animals are observed removing trackers from each other, their behavior should be regarded as selfless only if all of them participate in it. Instead, the text argues that the behavior may not be selfless at all and may instead be attributed to animals' curiosity about the new and unusual trackers.

## QUESTION 10

**Choice C** is the best answer because it most accurately states the main idea of the text. The text begins by stating that the Black Pearl orchestra performs classical music, and then goes on to explain that the orchestra offers an iConduct! program. According to the text, this program offers community members the opportunity to learn some basics about conducting and then apply what they learn by conducting the orchestra themselves. Thus, the main idea of the text is that community members can both listen to and participate in a classical music performance.

*Choice A* is incorrect. Although the text states that the Black Pearl orchestra is based in Philadelphia, it doesn't indicate that most of the music it plays was composed by Philadelphians. *Choice B* is incorrect. Although the text does state that Johnson founded the Black Pearl orchestra, this is just a detail and not the main focus of the text. Moreover, while the text does say that the orchestra sometimes plays music by Montgomery, it doesn't assert that the orchestra was founded solely for the purpose of performing Montgomery's work. *Choice D* is incorrect. Although the text explains that community members are invited to conduct the Black Pearl orchestra after participating in the iConduct! program, the text doesn't indicate that Johnson allows community members to do this for the specific purpose of showing how difficult the task is.

## QUESTION 11

**Choice C** is the best answer because it most accurately states the main idea of the text. According to the text, thousands of ceramic bowls were found in a recovered Chinese shipwreck. The text goes on to say that Niziolek and her team used a special tool, a portable X-ray fluorescence analyzer, to determine the bowls' chemical signatures. Comparing these chemical signatures with the chemical signatures of materials they had collected from old Chinese kiln sites, the text says, allowed the researchers to identify which kilns had produced the bowls. In other words, the researchers determined the bowls' origin.

*Choice A* is incorrect. Although the text indicates that the researchers used technology in the form of a portable X-ray fluorescence analyzer, it doesn't specifically state that this technology is new. In addition, the text says that Niziolek and her team used the tool to determine the chemical composition of bowls that were found in a Chinese shipwreck, not to locate and recover the shipwreck itself. There's no indication in the text that a new technology can help researchers locate and recover shipwrecks. *Choice B* is incorrect because the text indicates that the researchers collected materials from old kiln sites for chemical comparison with the ceramic bowls, which means that the researchers

must have already known the location of those kiln sites. Rather than identifying the location of the kilns, the researchers determined which kilns in operation 1,000 years ago had likely produced the bowls that were found in the shipwreck. *Choice D* is incorrect. Although the text says that using a portable X-ray fluorescence analyzer tool enabled Niziolek and her team to analyze artifacts in the form of ceramic bowls without damaging them, the text doesn't discuss how researchers analyzed artifacts before this tool was invented. Moreover, the point that the bowls were left undamaged isn't the text's main idea. Rather, it's a detail that's provided to develop the main idea, which is that the researchers used a special tool to determine where the bowls had been produced.

## QUESTION 12

**Choice B** is the best answer because it most accurately states the main idea of the text. The narrator describes the view he and his companions have from the balloon: the earth lies beneath "milky vapors," and the balloon itself looks like another moon. The narrator goes on to explain how the people riding in the balloon are affected by the ride, explaining that they are immersed in the experience: floating along in "delicious inertia," or inactivity, like "silent, joyous, irresponsible beings." Thus, the main idea is that the narrator and his companions are completely absorbed in the change in perspective they gain while riding in the balloon.

*Choice A* is incorrect because the narrator never describes himself as feeling isolated from his companions; instead, he characterizes riding in the balloon as an experience he is sharing with them. And although he does imply a sense of isolation, it is isolation from those on the ground, as when he says of himself and his companions, "We are now alone." *Choice C* is incorrect because the narrator doesn't suggest that he or his companions are troubled by the effects of the balloon ride. Instead, he describes himself and his companions as "joyous" and the experience of floating in the balloon as "delicious." *Choice D* is incorrect because nothing in the text suggests that the narrator is surprised by his companions' response to the balloon ride. In fact, the text indicates that the narrator and his companions are having the same experience: they're described as "silent" and "motionless," rather than as having unrestrained enthusiasm.

## QUESTION 13

**Choice D** is the best answer because it presents a finding that, if true, would weaken the scientists' hypothesis about icebergs that appear to be green. The text indicates that most icebergs are either mostly white or blue in color but that some icebergs in Antarctica appear to be green. The text goes on to say that the scientists hypothesized that this green color occurs when yellow-tinted dissolved organic carbon in ocean waters mixes with blue ice. A finding that both blue icebergs and green icebergs contain similarly small traces of dissolved organic carbon would suggest that something other than yellow-tinted organic carbon causes some icebergs' green color, since the blue icebergs that contain yellow-tinted organic carbon remained blue instead of turning green.

*Choice A* is incorrect because, according to the text, the scientists' hypothesis was that blue icebergs, not white ones, change color when their ice mixes with yellow-tinted dissolved organic carbon. A finding that white ice, because of its air bubbles, doesn't change color when it's mixed with dissolved organic carbon would therefore have no bearing on the scientists' hypothesis. *Choice B* is incorrect because the text focuses only on Antarctic icebergs that appear to be green. It doesn't indicate that icebergs in locations other than Antarctica have been found to have a green hue. A finding that dissolved organic carbon has a stronger yellow color in Antarctic waters than in other places would therefore have no bearing on the scientists' hypothesis that green color in icebergs in Antarctica is caused by yellow-tinted dissolved organic carbon mixing with blue ice. *Choice C* is incorrect because, according to the text, the scientists' hypothesis was that blue icebergs turn green when their ice mixes with yellow-tinted dissolved organic carbon in the sea around them. If that's correct, one would expect blue icebergs and green icebergs to be located at a distance from each other since all blue icebergs in an area where the waters contain yellow-tinted dissolved organic carbon would take on a green hue. A finding that blue icebergs and green icebergs are rarely found near each other would therefore strengthen, not weaken, the researchers' hypothesis.

## QUESTION 14

**Choice B** is the best answer because it most logically completes the text's discussion of Nikki Grimes's poetry collection *One Last Word*. The text explains that Grimes used a writing method called the golden shovel to create the poems in her book. According to the text, the method involves basing a new poem on a line from an existing poem. The text then mentions Langston Hughes and Georgia Douglas Johnson as examples of important Black poets whose lines of poetry form the basis of Grimes's poems. The text goes on to say that this writing method is difficult and that the resulting poems can be awkward, but reviewers have positively reviewed Grimes's book. If the reviewers of *One Last Word* specifically note that the work is a "beautiful and powerful tribute to the poets who inspired it," then they must have appreciated how Grimes used the golden shovel method to pay tribute to other poets. This suggests that Grimes was successful in using the golden shovel method to achieve her goal of honoring Black poets in her book.

*Choice A* is incorrect because the reaction suggests that most reviewers did understand Grimes's goal for her book. According to the text, the reviewers noted that the poems in her book were a "beautiful and powerful tribute to the poets who inspired it." Earlier, the text claims that Grimes intended the poems "to honor important Black poets of the past," so in their praise of her book, the reviewers clearly indicated that they understood Grimes's goal. *Choice C* is incorrect. Although it's likely that Grimes sought to honor Hughes and Johnson in her book of poetry because they're among her favorite poets, this fact isn't suggested by the reviewers' positive reaction to her book. Instead, the reaction suggests that Grimes was successful in her use of the golden shovel method. *Choice D* is incorrect because the text doesn't discuss whether other writers were inspired by Grimes to use the golden shovel method in their poetry. The text mentions the poets Hughes and Johnson as examples of poets honored in Grimes's book and describes reviewers' positive reception of her book, but it doesn't detail Grimes's impact on other writers.

## QUESTION 15

**Choice B** is the best answer because it most logically completes the text's discussion of the Indus River valley civilization. The text establishes that archaeologists haven't been able to interpret the Indus River valley civilization's writing system but have nevertheless acquired information about the civilization through historical artifacts. The fact that archaeologists have been able to learn about the Indus River valley civilization's customs and community organization from historical artifacts suggests that it isn't necessary to understand an ancient civilization's language to learn about the civilization.

**Choice A** is incorrect because the text doesn't discuss how easy it is to investigate ancient civilizations with or without knowledge of the civilization's language; rather, it states that even though researchers have not yet deciphered the language of the Indus River valley civilization, they are still able to learn about it through historical artifacts. **Choice C** is incorrect because the text doesn't make any claims as to what the focus of archaeological research should be. Rather, the text discusses how archaeologists have been able to learn about an ancient civilization through historical artifacts despite not understanding the civilization's language. **Choice D** is incorrect because the text states that the civilization's language has not yet been interpreted; it makes no mention of a debate about the language. Instead, the text suggests that examination of the historical artifacts has allowed archaeologists to learn about the civilization but has not aided thus far in deciphering its language.

## QUESTION 16

**Choice B** is the best answer because it most logically completes the text's discussion of Ana Castillo's 1986 novel *The Mixquiahuala Letters*. The text states that the novel consists entirely of letters from the narrator to her friend—a format that some students reading the novel in a class found intimidating. According to the text, those students also found the novel's treatment of gender to be old-fashioned. In response to the students' concerns, their professor emphasized the novel's relevance: it's written in modern-sounding language and addresses issues that still matter. This, in turn, suggests that *The Mixquiahuala Letters* is more relevant to contemporary audiences than it may initially seem.

**Choice A** is incorrect because the professor's response to the students only mentions *The Mixquiahuala Letters*; it doesn't compare the novel to others from the same period. **Choice C** is incorrect because nothing in the professor's response to the students compares *The Mixquiahuala Letters* to contemporary novels about friendship. **Choice D** is incorrect because the professor's response to the students doesn't address the idea of reading the novel's letters multiple times and in different orders.

## QUESTION 17

**Choice B** is the best answer because it most logically follows from the text's discussion of André Izidoro, Rajdeep Dasgupta, and colleagues' computer simulations of our solar system's development. The text begins by stating that the simulations led the researchers to conclude that the solar system likely formed from three giant dust rings that encircled the Sun. The text explains that the four inner planets, including Earth, formed from the innermost ring and that the remaining planets formed from the middle ring. It then explains that in one simulation, the researchers delayed the formation of the middle ring—that is, they tested to see what would happen if the middle ring had formed later than it actually did. They found that doing so affected the size of the innermost planets, resulting in oversized super-Earths, planets that are much larger than Earth. Since the delayed timing had the effect of changing the size of Earth in the simulation relative to Earth's real size, it's reasonable to conclude that the timing of the middle ring's formation was important in determining Earth's eventual size.

*Choice A* is incorrect. Although the text explains that when the researchers delayed the formation of the middle ring in one simulation, the size of the innermost planets was affected (which suggests that the middle ring likely formed earlier than it did in this simulation), the text doesn't indicate that this was an initial simulation—that is, a simulation that was conducted before other simulations. Moreover, the text makes no reference to the specific results of any other simulations; therefore, there is no basis for comparing any conclusions based on the simulation in which the middle ring's formation was delayed with conclusions based on other simulations. *Choice C* is incorrect because the text discusses how altering the timing of the formation of the middle ring, not the outermost ring, affected the four innermost planets' eventual size in the researchers' simulation; therefore, the simulation offers no basis for a conclusion about how the outermost ring's formation affected the size of the planets. *Choice D* is incorrect because there is nothing in the text to suggest that the innermost ring produced all the solar system's planets. Rather, the text states that the simulations showed that the innermost planets formed from the innermost ring and that the remaining planets formed from the middle ring.



## QUESTION 18

**Choice C** is the best answer because it presents the conclusion that most logically follows from the text's discussion of scholars' understanding of Maya ecology and agricultural marketplaces. The text indicates that scholars used to believe that during the Classic period, the Maya civilization didn't have agricultural marketplaces. According to the text, scholars held this view because they misunderstood the ecology of areas where the Maya lived. The text points out that people tend to create marketplaces in order to acquire resources they don't otherwise control. Agricultural marketplaces would have allowed farmers who produced one type of crop to trade that crop for other types of crops that they didn't produce. The text goes on to say, however, that scholars underestimated the ecological diversity of the Maya areas, meaning that scholars thought that the Maya landscape produced a smaller range of resources than it actually produced. Taken together, then, this information suggests that scholars assumed that marketplaces wouldn't have allowed Maya people to acquire products different from the products they already produced: that is, if everyone produced the same array of crops, as scholars mistakenly believed, then there wouldn't have been any need for marketplaces where people could trade those crops.

*Choice A* is incorrect because the text doesn't say anything about trade between the Maya and people from outside the regions controlled by the Maya. Although scholars' mistaken belief that the Maya lands weren't very ecologically diverse would give those scholars a reason to think that the Maya didn't have marketplaces, it wouldn't lead scholars to assume that traders from outside Maya lands were uninterested in acquiring resources produced by the Maya. Even if the Maya actually did produce only a small array of resources throughout their lands, there is no reason to believe from the text that people outside Maya lands also produced these same resources and thus would have no need to trade with the Maya people. *Choice B* is incorrect because the text indicates that scholars underestimated the ecological diversity of the Maya lands, which suggests that they mistakenly believed that the Maya produced a relatively small array of resources throughout their territory, not that the crops the Maya produced varied significantly throughout the Maya lands. Although the scholars might have assumed that a lack of ecological diversity suggests that Maya farming practices were largely the same everywhere, the text does not support that they also assumed there was a lot of variation in the crops that Maya people produced. In fact, the text states that marketplaces emerge when people want to obtain resources they don't already control. If it were the case that scholars assumed that the crops Maya people produced varied significantly, this would have led them to conclude that Maya people likely established marketplaces so they could trade for resources they didn't already possess, not that the Maya civilization lacked marketplaces. *Choice D* is incorrect because nothing in the text suggests that scholars assumed that farmers wouldn't trade their agricultural products unless they had already met their own needs with those products. Instead, the text says that scholars thought that the Maya lands produced a smaller array of resources than they actually did, which the text suggests led scholars to assume that the Maya didn't have any need for marketplaces. The scholars' mistaken belief has no bearing on the issue of whether farmers met their own needs before trading their products.



## QUESTION 19

**Choice D** is the best answer. The convention being tested is punctuation between a verb and a prepositional phrase. No punctuation is needed between the verb “blend” and the prepositional phrase “with Charlie Adams’s delightfully catchy vocal melodies.” The prepositional phrase completes the idea of the sentence, explaining with what Koperqualuk’s guitar riffs blend.

*Choice A* is incorrect because no punctuation is needed between the verb and the prepositional phrase. *Choice B* is incorrect because no punctuation is needed between the verb and the prepositional phrase. *Choice C* is incorrect because no punctuation is needed between the verb and the prepositional phrase.

## QUESTION 20

**Choice D** is the best answer. The convention being tested here is pronoun-antecedent agreement. The singular pronoun “it” agrees in number with the singular antecedent “object.”

*Choice A* is incorrect. The singular pronoun “this” is used to refer to a specific thing, but here there is no specific object being referred to. Instead, the sentence is referring back to a hypothetical object that Cave might use in a Soundsuit.

*Choice B* is incorrect. The singular pronoun “that” is used to refer to a specific thing, but here there is no specific object being referred to. Instead, the sentence is referring back to a hypothetical object that Cave might use in a Soundsuit.

*Choice C* is incorrect because the plural pronoun “these” doesn’t agree in number with the singular antecedent “object.”

## QUESTION 21

**Choice C** is the best answer. The convention being tested is the use of verbs to express tense. Simple present tense verbs can be used to describe actions that tend to occur, including in a hypothetical or future scenario. In this case, the simple present tense verb “produce” indicates what the air exchange systems might be able to do in the future (produce oxygen for astronauts).

*Choice A* is incorrect. The present progressive tense verb “are producing” suggests that the oxygen is currently being produced, not that it might be produced in the future. *Choice B* is incorrect because the past tense verb “produced” suggests that the oxygen was produced in the past, not that it might be produced in the future. *Choice D* is incorrect because the present perfect tense verb “have produced” suggests that the oxygen has been produced from a point in the past up to the present, not that it might be produced in the future.

## QUESTION 22

**Choice B** is the best answer. The convention being tested is subject-verb agreement. The singular verb “was” agrees in number with the singular subject “Farouk El-Baz.”

*Choice A* is incorrect because the plural verb “are” doesn’t agree in number with the singular subject “Farouk El-Baz.” *Choice C* is incorrect because the plural verb “have been” doesn’t agree in number with the singular subject “Farouk El-Baz.” *Choice D* is incorrect because the plural verb “were” doesn’t agree in number with the singular subject “Farouk El-Baz.”

## QUESTION 23

**Choice B** is the best answer. The convention being tested is subject-modifier placement. This choice makes the noun phrase “Anna Behrensmeyer” the subject of the sentence and places it immediately after the modifying phrase “a pioneer... fossils.” In doing so, this choice clearly establishes that Anna Behrensmeyer—and not another noun in the sentence—is a pioneer in the field of taphonomy.

*Choice A* is incorrect because it results in a dangling modifier. The placement of the noun phrase “fossils of thin-shelled organisms” immediately after the modifying phrase illogically suggests that the “fossils” are a pioneer in the field of taphonomy. *Choice C* is incorrect because it results in a dangling modifier. The placement of the pronoun “it” immediately after the modifying phrase illogically suggests that “it” is a pioneer in the field of taphonomy. *Choice D* is incorrect because it results in a dangling modifier. The placement of the noun phrase “a 2005 analysis” immediately after the modifying phrase illogically suggests that “a 2005 analysis” is a pioneer in the field of taphonomy.

## QUESTION 24

**Choice C** is the best answer. The convention being tested is punctuation between a subject and a verb. No punctuation is needed when the subject of a sentence is immediately followed by a main verb. In this case, the sentence’s subject (“the innovative works of Congolese sculptor and architect Bodys Isek Kingelez”) is followed by the main verb “were featured,” and no punctuation should come between them.

*Choice A* is incorrect because no punctuation is needed between the subject and the verb. *Choice B* is incorrect because no punctuation is needed between the subject and the verb. *Choice D* is incorrect because no punctuation is needed between the subject and the verb.

## QUESTION 25

**Choice D** 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 poem...exclamation") and another sentence that begins with a supplementary element ("Translated...poem"). The supplementary element "translated as 'hark!' or 'listen!' in some versions" modifies the subject of the second sentence, "the word" (referring to *hwæt*).

*Choice A* is incorrect because it results in a comma splice after "exclamation."

A comma can't be used in this way to mark the boundary between sentences.

*Choice B* is incorrect. Without a comma preceding it, the conjunction "and" can't be used in this way to join sentences. *Choice C* is incorrect because it results in a comma splice after "versions." A comma can't be used in this way to mark the boundary between sentences.

## QUESTION 26

**Choice C** is the best answer. "Next" logically signals that the egg laying in this sentence is the next step in the sequence of events described in the other sentences.

*Choice A* is incorrect because "by contrast" illogically signals that the egg laying in this sentence contrasts with the nest digging in the previous sentence. Instead, the egg laying follows the nest digging as the next step in the sequence of events.

*Choice B* is incorrect because "similarly" illogically signals that the egg laying in this sentence is similar to the nest digging in the previous sentence. Though the two actions are related, they are not similar. Instead, the egg laying follows the nest digging as the next step in the sequence of events. *Choice D* is incorrect because "for example" illogically signals that the egg laying in this sentence is an example of the nest digging in the previous sentence. Instead, the egg laying follows the nest digging as the next step in the sequence of events.

## QUESTION 27

**Choice C** is the best answer. "For this reason" logically signals that the behavior described in this sentence is a consequence of the information about seals in the previous sentence. That is, a seal moves its flippers as little as possible during a deep dive because it needs to keep its heart rate low enough that it does not run out of oxygen.

*Choice A* is incorrect because "in the first place" illogically signals that this sentence is the first point in a discussion. Instead, the sentence describes a behavior that is a consequence of the previous information about seals. *Choice B* is incorrect because "on the other hand" illogically signals that the behavior described in this sentence contrasts with the previous information about seals. Instead, it is a consequence of that information. *Choice D* is incorrect because "in comparison" illogically signals that the behavior described in this sentence is being compared to the previous information about seals. Instead, it is a consequence of that information.

## QUESTION 28

**Choice C** is the best answer. “In addition” logically signals that Naff’s artifact collecting was separate from, and in addition to, her interviewing.

*Choice A* is incorrect because “in other words” illogically signals that the information about Naff’s artifact collecting restates the previous information about her interviewing. Instead, Naff collected artifacts in addition to conducting interviews.

*Choice B* is incorrect because “on the contrary” illogically signals that Naff’s artifact collecting was contrary to her interviewing. Instead, Naff collected artifacts in addition to conducting interviews. *Choice D* is incorrect because “today” illogically signals that Naff’s artifact collecting is occurring in the present day. Instead, this activity occurred in the past, as indicated by the past tense verb “collected.”

## QUESTION 29

**Choice A** is the best answer. The sentence emphasizes how harsh the conditions in the tundra can be, noting that the winters are especially harsh and describing the average temperatures as “frigid.”

*Choice B* is incorrect because the sentence explains that some animals can survive harsh tundra winters; it doesn’t emphasize how harsh the conditions can be. *Choice C* is incorrect because the sentence specifies how many different kinds of plants can live in the tundra; it doesn’t emphasize how harsh the conditions in the tundra can be. *Choice D* is incorrect because the sentence explains that both plants and animals can survive in the tundra; it doesn’t emphasize how harsh the conditions in the tundra can be.

## QUESTION 30

**Choice D** is the best answer. The sentence contrasts Minnesota’s definition of a lake with Wisconsin’s, explaining that Minnesota’s definition (which takes size into account) is more restrictive than Wisconsin’s definition (which doesn’t).

*Choice A* is incorrect. While the sentence notes that Wisconsin’s definition of a lake doesn’t take size into account, it doesn’t contrast Minnesota’s definition with Wisconsin’s. *Choice B* is incorrect. The sentence states that Wisconsin’s definition of a lake is different from Minnesota’s, but it doesn’t clarify how they differ. In other words, it doesn’t contrast Minnesota’s definition with Wisconsin’s. *Choice C* is incorrect. The sentence indicates how many lakes Wisconsin has according to Minnesota’s definition of a lake, but it doesn’t clarify how the states’ definitions differ. In other words, it doesn’t contrast Minnesota’s definition with Wisconsin’s.

## QUESTION 31

**Choice D** is the best answer. The sentence makes and supports a generalization about the effect of redesigning a city flag, noting that redesigning a city flag can create a meaningful symbol of civic pride, as was the case when the city of Pocatello redesigned its flag.

*Choice A* is incorrect because the sentence explains that many US cities have redesigned their flags and provides an example; it doesn't make and support a generalization about the effect of redesigning a city flag. *Choice B* is incorrect because the sentence provides an example of a city that redesigned its flag; it doesn't make and support a generalization about the effect of redesigning a city flag. *Choice C* is incorrect because the sentence emphasizes why the flag of Pocatello was redesigned; it doesn't make and support a generalization about the effect of redesigning a city flag.

## QUESTION 32

**Choice B** is the best answer. The sentence describes the distinctive style of Houser's sculptures, explaining that the sculptures use abstract, modernist forms to depict Native American figures.

*Choice A* is incorrect. While the sentence indicates that Houser developed a distinctive style for portraying Native American figures, it doesn't describe this style. *Choice C* is incorrect. While the sentence states that other artists have been influenced by the style of Houser's sculptures, it doesn't describe this style. *Choice D* is incorrect. While the sentence mentions the name of a sculpture that's a well-known example of Houser's style, it doesn't describe the sculpture's style.

## QUESTION 33

**Choice A** is the best answer. The sentence specifies why historians believe Abele designed most of Duke's campus buildings, noting that most of the buildings feature architectural styles that Abele had studied.

*Choice B* is incorrect. While the sentence explains that historians believe Abele designed most of Duke's campus buildings, it doesn't specify why historians hold that belief. *Choice C* is incorrect because the sentence emphasizes the architectural styles of Duke's campus buildings; it doesn't specify why historians believe Abele designed the buildings. *Choice D* is incorrect. While the sentence explains that Abele is believed to have designed most of the buildings on Duke's campus, it doesn't specify why historians believe that he designed the buildings.

# Math

## Module 1

(27 questions)

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### QUESTION 1

**Choice B** is correct. It's given that 1 yard = 36 inches. Therefore, 612 inches is equivalent to 612 inches  $\left(\frac{1 \text{ yard}}{36 \text{ inches}}\right)$ , which can be rewritten as  $\frac{612 \text{ yards}}{36}$ , or 17 yards.

*Choice A* is incorrect. This is the number of yards that are equivalent to 2.124 inches. *Choice C* is incorrect. This is the number of yards that are equivalent to 20,736 inches. *Choice D* is incorrect. This is the number of yards that are equivalent to 793,152 inches.

### QUESTION 2

**Choice C** is correct. The table gives the results of 200 people who were asked how often they see a movie in a theater. The table shows that 29 people responded "never" and 53 people responded "almost never." Therefore,  $29 + 53$ , or 82, people responded either "never" or "almost never."

*Choice A* is incorrect. This is the difference between the number of people who responded "almost never" and the number of people who responded "never."

*Choice B* is incorrect. This is the number of people who responded "almost never" but doesn't include those who responded "never." *Choice D* is incorrect. This is the number of people who responded something other than "never" or "almost never," rather than the number of people who responded either "never" or "almost never."

### QUESTION 3

**Choice D** is correct. The  $y$ -intercept of a line graphed in the  $xy$ -plane is the point where the line intersects the  $y$ -axis. The line graphed intersects the  $y$ -axis at the point  $(0, 8)$ . Therefore, the  $y$ -intercept of the line graphed is  $(0, 8)$ .

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

## QUESTION 4

**Choice A** is correct. Subtracting 180 from both sides of the given equation yields  $5p = 70$ . Dividing both sides of this equation by 5 yields  $p = 14$ . Therefore, the value of  $p$  that satisfies the equation  $5p + 180 = 250$  is 14.

**Choice B** is incorrect. This value of  $p$  satisfies the equation  $5p + 180 = 505$ .

**Choice C** is incorrect. This value of  $p$  satisfies the equation  $5p + 180 = 610$ .

**Choice D** is incorrect. This value of  $p$  satisfies the equation  $5p + 180 = 1,430$ .

## QUESTION 5

**Choice D** is correct. The area  $A$ , in square centimeters, of a rectangle can be found using the formula  $A = \ell w$ , where  $\ell$  is the length, in centimeters, of the rectangle and  $w$  is its width, in centimeters. It's given that the rectangle has a length of 36 centimeters and a width of 34 centimeters. Substituting 36 for  $\ell$  and 34 for  $w$  in the formula  $A = \ell w$  yields  $A = 36(34)$ , or  $A = 1,224$ . Therefore, the area, in square centimeters, of this rectangle is 1,224.

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

**Choice B** is incorrect. This is the perimeter, in centimeters, not the area, in square centimeters, of the rectangle. **Choice C** is incorrect and may result from conceptual or calculation errors.

## QUESTION 6

The correct answer is 17. It's given that there are 170 blocks in a container, and of these blocks, 10% are green. Since 10% can be rewritten as  $\frac{10}{100}$ , or 0.1, the number of green blocks in the container is  $0.1(170)$ , or 17.

## QUESTION 7

The correct answer is 14. It's given that the equation  $46 = 2a + 2b$  gives the relationship between the side lengths  $a$  and  $b$  of a certain parallelogram.

Substituting 9 for  $a$  in the given equation yields  $46 = 2(9) + 2b$ , or  $46 = 18 + 2b$ .

Subtracting 18 from both sides of this equation yields  $28 = 2b$ . Dividing both sides of this equation by 2 yields  $14 = b$ . Therefore, if  $a = 9$ , the value of  $b$  is 14.

## QUESTION 8

**Choice B** is correct. It's given that the graph shows the possible combinations of the number of pounds of tangerines,  $x$ , and the number of pounds of lemons,  $y$ , that could be purchased for \$18 at a certain store. If Melvin purchased lemons and 4 pounds of tangerines for a total of \$18, the number of pounds of lemons he purchased is represented by the  $y$ -coordinate of the point on the graph where  $x = 4$ . For the graph shown, when  $x = 4$ ,  $y = 10$ . Therefore, if Melvin purchased lemons and 4 pounds of tangerines for a total of \$18, then he purchased 10 pounds of lemons.

**Choice A** is incorrect. This is the number of pounds of tangerines Melvin purchased if he purchased tangerines and 4 pounds of lemons for a total of \$18.

**Choice C** is incorrect. This is the number of pounds of lemons Melvin purchased if

he purchased lemons and 2 pounds of tangerines for a total of \$18. *Choice D* is incorrect. This is the number of pounds of lemons Melvin purchased if he purchased lemons and 1 pound of tangerines for a total of \$18.

## QUESTION 9

**Choice A** is correct. It's given that the area of a square is 64 square inches. The area  $A$ , in square inches, of a square is given by the formula  $A = s^2$ , where  $s$  is the side length, in inches, of the square. Substituting 64 for  $A$  in this formula yields  $64 = s^2$ . Taking the positive square root of both sides of this equation yields  $8 = s$ . Thus, the side length, in inches, of this square is 8.

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

*Choice C* is incorrect. This is the area, in square inches, of the square, not the side length, in inches, of the square. *Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 10

**Choice A** is correct. It's given that Connor has  $c$  dollars, Maria has  $m$  dollars, and Connor has 4 times as many dollars as Maria. This can be represented by the equation  $c = 4m$ . It's also given that together, Connor and Maria have a total of \$25.00, which can be represented by the equation  $c + m = 25$ . Therefore, the system consisting of the equations  $c = 4m$  and  $c + m = 25$  represents this situation.

*Choice B* is incorrect. The equation  $m = 4c$  represents a situation where Maria has 4 times as many dollars as Connor, rather than the situation where Connor has 4 times as many dollars as Maria. *Choice C* is incorrect. The equation  $c = 25m$  represents a situation where Connor has 25 times, rather than 4 times, as many dollars as Maria. The equation  $c + m = 4$  represents a situation where Connor and Maria together have a total of \$4.00, rather than \$25.00. *Choice D* is incorrect. The equation  $m = 25c$  represents a situation where Maria has 25 times as many dollars as Connor, rather than the situation where Connor has 4 times as many dollars as Maria. The equation  $c + m = 4$  represents a situation where Connor and Maria together have a total of \$4.00, rather than \$25.00.

## QUESTION 11

**Choice C** is correct. It's given that in the equation  $d = 16t$ ,  $d$  represents the distance, in inches, and  $t$  represents the number of seconds since an object started moving. In this equation,  $t$  is being multiplied by 16. This means that the object's distance increases by 16 inches each second. Therefore, the best interpretation of 16 in this context is that the object is moving at a rate of 16 inches per second.

*Choice A* is incorrect and may result from conceptual errors. *Choice B* is incorrect. This is the best interpretation of  $16t$ , rather than 16, in this context. *Choice D* is incorrect and may result from conceptual errors.



## QUESTION 12

**Choice C** is correct. The scatterplot shows that there was an increase in recorded temperature from  $x = 2$  to  $x = 3$  and from  $x = 6$  to  $x = 7$ . When  $x = 2$ , the recorded temperature was approximately  $60^{\circ}\text{F}$  and when  $x = 3$ , the recorded temperature was greater than  $70^{\circ}\text{F}$ . This means that the increase in recorded temperature from  $x = 2$  to  $x = 3$  was greater than  $(70 - 60)^{\circ}\text{F}$ , or  $10^{\circ}\text{F}$ . When  $x = 6$ , the recorded temperature was greater than  $60^{\circ}\text{F}$  and when  $x = 7$ , the recorded temperature was less than  $70^{\circ}\text{F}$ . This means that the increase in recorded temperature from  $x = 6$  to  $x = 7$  was less than  $(70 - 60)^{\circ}\text{F}$ , or  $10^{\circ}\text{F}$ . It follows that the greatest increase in recorded temperature took place from  $x = 2$  to  $x = 3$ .

**Choice A** is incorrect. The increase in recorded temperature from  $x = 6$  to  $x = 7$  was less than the increase in recorded temperature from  $x = 2$  to  $x = 3$ . **Choice B** is incorrect. From  $x = 5$  to  $x = 6$ , a decrease, not an increase, in recorded temperature took place. **Choice D** is incorrect. From  $x = 1$  to  $x = 2$ , a decrease, not an increase, in recorded temperature took place.

## QUESTION 13

The correct answer is 73,920. It's given that 1 furlong = 220 yards and 1 yard = 3 feet. It follows that a distance of 112 furlongs is equivalent to

$(112 \text{ furlongs})\left(\frac{220 \text{ yards}}{1 \text{ furlong}}\right)\left(\frac{3 \text{ feet}}{1 \text{ yard}}\right)$ , or 73,920 feet.

## QUESTION 14

The correct answer is 39. It's given that for the linear function  $j$ ,  $m$  is a constant and  $j(12) = 18$ . Substituting 12 for  $x$  and 18 for  $j(x)$  in the given equation yields  $18 = m(12) + 144$ . Subtracting 144 from both sides of this equation yields  $-126 = m(12)$ . Dividing both sides of this equation by 12 yields  $-10.5 = m$ .

Substituting  $-10.5$  for  $m$  in the given equation,  $j(x) = mx + 144$ , yields

$j(x) = -10.5x + 144$ . Substituting 10 for  $x$  in this equation yields

$j(10) = (-10.5)(10) + 144$ , or  $j(10) = 39$ . Therefore, the value of  $j(10)$  is 39.

## QUESTION 15

**Choice B** is correct. It's given by the second equation in the system that  $y = 19$ . Substituting 19 for  $y$  in the first equation yields  $19 = 4x - 9$ . Adding 9 to both sides of this equation yields  $28 = 4x$ . Dividing both sides of this equation by 4 yields  $7 = x$ . Therefore, since  $x = 7$  and  $y = 19$ , the solution  $(x, y)$  to the given system of equations is  $(7, 19)$ .

**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 16

**Choice D** is correct. The given expression follows the difference of two squares pattern,  $x^2 - y^2$ , which factors as  $(x - y)(x + y)$ . Therefore, the expression  $256w^2 - 676$  can be written as  $(16w)^2 - 26^2$ , or  $(16w)(16w) - (26)(26)$ , which factors as  $(16w - 26)(16w + 26)$ .

**Choice A** is incorrect. This expression is equivalent to  $256w^2 - 832w + 676$ .

**Choice B** is incorrect. This expression is equivalent to  $64w^2 - 169$ . **Choice C** is incorrect. This expression is equivalent to  $64w^2 - 208w + 169$ .

## QUESTION 17

**Choice C** is correct. Each point  $(x, y)$  on the graph represents an elapsed time  $x$ , in hours, and the corresponding ocean water level  $y$ , in feet, at a certain location based on the model. The graph shown passes through the points  $(0, 0)$ ,  $(3, -12)$ , and  $(6, 0)$ . Thus, the table in choice C gives the values of  $x$  and their corresponding values of  $y$  based on the model.

**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 A** is correct. It's given that line  $j$  is perpendicular to line  $k$  in the  $xy$ -plane. It follows that the slope of line  $j$  is the opposite reciprocal of the slope of line  $k$ . The equation for line  $k$  is written in slope-intercept form  $y = mx + b$ , where  $m$  is the slope of the line and  $b$  is the  $y$ -coordinate of the  $y$ -intercept of the line. It follows that the slope of line  $k$  is 3. The opposite reciprocal of a number is  $-1$  divided by the number. Thus, the opposite reciprocal of 3 is  $-\frac{1}{3}$ . Therefore, the slope of line  $j$  is  $-\frac{1}{3}$ .

**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 19

**Choice A** is correct. It's given that the store's sales of a certain Greek yogurt totaled 1,277.94 dollars last month. It's also given that the equation  $5.48x + 7.30y = 1,277.94$  represents this situation, where  $x$  is the number of smaller containers sold and  $y$  is the number of larger containers sold. Since  $x$  represents the number of smaller containers of yogurt sold, the expression  $5.48x$  represents the total sales, in dollars, from smaller containers of yogurt. This means that  $x$  smaller containers of yogurt were sold at a price of 5.48 dollars each. Therefore, according to the equation, 5.48 represents the price, in dollars, of each smaller container.

**Choice B** is incorrect. This expression represents the total sales, in dollars, from selling  $y$  larger containers of yogurt. **Choice C** is incorrect. This value represents

the price, in dollars, of each larger container of yogurt. *Choice D* is incorrect. This expression represents the total sales, in dollars, from selling  $x$  smaller containers of yogurt.

## QUESTION 20

The correct answer is 2,216. The surface area of a prism is the sum of the areas of all its faces. A right rectangular prism consists of six rectangular faces, where opposite faces are congruent. It's given that this prism has a length of 28 cm, a width of 15 cm, and a height of 16 cm. Thus, for this prism, there are two faces with area  $(28)(15)$  cm<sup>2</sup>, two faces with area  $(28)(16)$  cm<sup>2</sup>, and two faces with area  $(15)(16)$  cm<sup>2</sup>. Therefore, the surface area, in cm<sup>2</sup>, of the right rectangular prism is  $2(28)(15) + 2(28)(16) + 2(15)(16)$ , or 2,216.

## QUESTION 21

The correct answer is 5. Dividing each side of the given equation by 3 yields  $x^2 - 6x - 5 = 0$ . Adding 5 to each side of this equation yields  $x^2 - 6x = 5$ . Therefore, if  $3x^2 - 18x - 15 = 0$ , the value of  $x^2 - 6x$  is 5.

## QUESTION 22

**Choice C** is correct. Applying the distributive property to the given expression yields  $d(8d^2 - 3) - 6(8d^2 - 3)$ . Applying the distributive property once again to this expression yields  $(d)(8d^2) + (d)(-3) + (-6)(8d^2) + (-6)(-3)$ , or  $8d^3 + (-3d) + (-48d^2) + 18$ . This expression can be rewritten as  $8d^3 - 48d^2 - 3d + 18$ . Thus,  $(d - 6)(8d^2 - 3)$  is equivalent to  $8d^3 - 48d^2 - 3d + 18$ .

*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 23

**Choice B** is correct. The Pythagorean theorem states that in a right triangle, the sum of the squares of the lengths of the two legs is equal to the square of the length of the hypotenuse. It's given that the right triangle has legs with lengths of 28 centimeters and 20 centimeters. Let  $c$  represent the length of this triangle's hypotenuse, in centimeters. Therefore, by the Pythagorean theorem,  $28^2 + 20^2 = c^2$ , or  $1,184 = c^2$ . Taking the positive square root of both sides of this equation yields  $\sqrt{1,184} = c$ , or  $4\sqrt{74} = c$ . Therefore, the length of this triangle's hypotenuse, in centimeters, is  $4\sqrt{74}$ .

*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. This is the square of the length of the triangle's hypotenuse.

## QUESTION 24

**Choice A** is correct. The tables in choices B, C, and D each represent a data set where the values 80 and 90 have the same frequency and the values 70 and 100 have the same frequency. It follows that each of these data sets is symmetric around the value halfway between 80 and 90, or 85. When a data set is symmetric around a value, that value is the mean of the data set. Therefore, the data sets represented by the tables in choices B, C, and D each have a mean of 85. The table in choice A represents a data set where the value 90 has a greater frequency than the value 80 and the value 100 has a greater frequency than the value 70. It follows that this data set has a mean greater than 85. Therefore, of the given choices, choice A represents the data set with the greatest mean.

*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 25

**Choice A** is correct. Dividing both sides of the second equation in the given system by 3 yields  $8x + 7y = 9$ , which is the first equation in the given system. Therefore, the first and second equations represent the same line in the  $xy$ -plane. If the  $x$ - and  $y$ -coordinates of a point satisfy an equation, the point lies on the graph of the equation in the  $xy$ -plane. Choice A is a point with  $x$ -coordinate  $r$  and  $y$ -coordinate  $-\frac{8r}{7} + \frac{9}{7}$ . Substituting  $r$  for  $x$  and  $-\frac{8r}{7} + \frac{9}{7}$  for  $y$  in the equation  $8x + 7y = 9$  yields  $8r + 7\left(-\frac{8r}{7} + \frac{9}{7}\right) = 9$ . Applying the distributive property to the left-hand side of this equation yields  $8r - 8r + 9 = 9$ . Combining like terms on the left-hand side of this equation yields  $9 = 9$ , so the coordinates of the point  $\left(r, -\frac{8r}{7} + \frac{9}{7}\right)$  satisfy both equations in the given system. Therefore, for each real number  $r$ , the point  $\left(r, -\frac{8r}{7} + \frac{9}{7}\right)$  lies on the graph of each equation in the  $xy$ -plane for the given system.

*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 26

**Choice B** is correct. It's given that a salesperson's total earnings consist of a base salary of  $x$  dollars per year plus commission earnings of 11% of the total sales the salesperson makes during the year. If the salesperson makes  $s$  dollars in total sales this year, the salesperson's total earnings can be represented by the expression  $x + 0.11s$ . It's also given that the salesperson has a goal for the total earnings to be at least 3 times and at most 4 times the base salary, which can be represented by the expressions  $3x$  and  $4x$ , respectively. Therefore, this situation can be represented by the inequality  $3x \leq x + 0.11s \leq 4x$ . Subtracting  $x$  from each part of this inequality yields  $2x \leq 0.11s \leq 3x$ . Dividing each part

of this inequality by 0.11 yields  $\frac{2}{0.11}x \leq s \leq \frac{3}{0.11}x$ . Therefore, the inequality  $\frac{2}{0.11}x \leq s \leq \frac{3}{0.11}x$  represents all possible values of total sales  $s$ , in dollars, the salesperson can make this year in order to meet their goal.

*Choice A* is incorrect. This inequality represents a situation in which the total sales, rather than the total earnings, are at least 2 times and at most 3 times, rather than at least 3 times and at most 4 times, the base salary. *Choice C* is incorrect. This inequality represents a situation in which the total sales, rather than the total earnings, are at least 3 times and at most 4 times the base salary. *Choice D* is incorrect. This inequality represents a situation in which the total earnings are at least 4 times and at most 5 times, rather than at least 3 times and at most 4 times, the base salary.

## QUESTION 27

The correct answer is .48. It's given that the number  $a$  is 70% less than the positive number  $b$ . Therefore,  $a = \left(1 - \frac{70}{100}\right)b$ , which is equivalent to  $a = (1 - 0.70)b$ , or  $a = 0.30b$ . It's also given that the number  $c$  is 60% greater than  $a$ . Therefore,  $c = \left(1 + \frac{60}{100}\right)a$ , which is equivalent to  $c = (1 + 0.60)a$ , or  $c = 1.60a$ . Since  $a = 0.30b$ , substituting  $0.30b$  for  $a$  in the equation  $c = 1.60a$  yields  $c = 1.60(0.30b)$ , or  $c = 0.48b$ . Thus,  $c$  is 0.48 times  $b$ . Note that .48 and  $\frac{12}{25}$  are examples of ways to enter a correct answer.

# Math

## Module 2

(27 questions)

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### QUESTION 1

**Choice B** is correct. It's given that there are 20 buttons in a bag and 8 of the buttons are white. If one button from the bag is selected at random, the probability of selecting a white button is the number of white buttons in the bag divided by the total number of buttons in the bag. Therefore, if one button from the bag is selected at random, the probability of selecting a white button is  $\frac{8}{20}$ .

**Choice A** is incorrect. This is the probability of selecting an orange button from the bag. **Choice C** is incorrect. This is the probability of selecting a brown button from the bag. **Choice D** is incorrect. This is the probability of selecting a button that isn't white from the bag.

### QUESTION 2

**Choice B** is correct. It's given that the employee takes 1.5 minutes to prepare a sandwich. Multiplying 1.5 by the number of sandwiches,  $x$ , yields  $1.5x$ , the amount of time the employee spends preparing  $x$  sandwiches. It's also given that the employee takes 1.9 minutes to prepare a salad. Multiplying 1.9 by the number of salads,  $y$ , yields  $1.9y$ , the amount of time the employee spends preparing  $y$  salads. It follows that the total amount of time, in minutes, the employee spends preparing  $x$  sandwiches and  $y$  salads is  $1.5x + 1.9y$ . It's given that the employee spends a total of 46.1 minutes preparing  $x$  sandwiches and  $y$  salads. Thus, the equation  $1.5x + 1.9y = 46.1$  represents this situation.

**Choice A** is incorrect. This equation represents a situation where it takes the employee 1.9 minutes, rather than 1.5 minutes, to prepare a sandwich and 1.5 minutes, rather than 1.9 minutes, to prepare a salad. **Choice C** is incorrect. This equation represents a situation where it takes the employee 1 minute, rather than 1.5 minutes, to prepare a sandwich and 1 minute, rather than 1.9 minutes, to prepare a salad. **Choice D** is incorrect. This equation represents a situation where it takes the employee 30.7 minutes, rather than 1.5 minutes, to prepare a sandwich and 24.3 minutes, rather than 1.9 minutes, to prepare a salad.

### QUESTION 3

**Choice A** is correct. It's given that the ratio of black pens to red pens is 8 to 1.

Therefore, there are  $\frac{1}{8}$  as many red pens as black pens in the box. It's also given that there are 40 black pens in the box. Therefore, the number of red pens is  $\frac{1}{8}$  of the 40 black pens. Thus, the number of red pens is  $40\left(\frac{1}{8}\right)$ , or 5.

*Choice B* is incorrect. This is the number of black pens in the box for every red pen. *Choice C* is incorrect. This is the number of black pens in the box. *Choice D* is incorrect. This is the number of red pens in the box if the ratio of black pens to red pens is 1 to 8.

### QUESTION 4

**Choice D** is correct. Substituting 9 for  $x$  in the given equation yields  $f(9) = 100(9) + 2$ , or  $f(9) = 902$ . Therefore, the value of  $f(x)$  when  $x = 9$  is 902.

*Choice A* is incorrect. This is the value of  $f(x)$  when  $x = 1.09$ . *Choice B* is incorrect. This is the value of  $f(x)$  when  $x = 1.16$ . *Choice C* is incorrect. This is the value of  $f(x)$  when  $x = 8.98$ .

### QUESTION 5

**Choice D** is correct. It's given that the length of the whale was 162 cm when it was born and that its length increased an average of 4.8 cm per month for the first 12 months after it was born. Since  $x$  represents the number of months after the whale was born, the total increase in the whale's length, in cm, is 4.8 times  $x$ , or  $4.8x$ . The length of the whale  $y$ , in cm, can be found by adding the whale's length at birth, 162 cm, to the total increase in length,  $4.8x$  cm. Therefore, the equation that best represents this situation is  $y = 4.8x + 162$ .

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

### QUESTION 6

The correct answer is 35. It's given that the perimeter of an isosceles triangle is 83 inches and that each of the two congruent sides has a length of 24 inches. The perimeter of a triangle is the sum of the lengths of its three sides. The equation  $24 + 24 + x = 83$  can be used to represent this situation, where  $x$  is the length, in inches, of the third side. Combining like terms on the left-hand side of this equation yields  $48 + x = 83$ . Subtracting 48 from both sides of this equation yields  $x = 35$ . Therefore, the length, in inches, of the third side is 35.

### QUESTION 7

The correct answer is 480. Multiplying both sides of the given equation by 8 yields  $8(2 + x) = 8(60)$ , or  $16 + 8x = 480$ . Therefore, if  $2 + x = 60$ , the value of  $16 + 8x$  is 480.

## QUESTION 8

**Choice C** is correct. It's given that the population density of Worthington is 290 people per square mile and Worthington has a population of 92,800 people.

Therefore, the area of Worthington is 92,800 people  $\left(\frac{1 \text{ square mile}}{290 \text{ people}}\right)$ , which is equivalent to  $\frac{92,800 \text{ square miles}}{290}$ , or 320 square miles.

*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 9

**Choice A** is correct. The  $y$ -intercept of a graph in the  $xy$ -plane is the point  $(x, y)$  on the graph where  $x = 0$ . For the graph shown, at  $x = 0$ , the corresponding value of  $y$  is  $-6$ . Therefore, the  $y$ -intercept of the graph shown is  $(0, -6)$ .

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

## QUESTION 10

**Choice B** is correct. For the graph shown, the  $x$ -axis represents time, in seconds, and the  $y$ -axis represents the number of candy bars wrapped. The slope of a line in the  $xy$ -plane is the change in  $y$  for each 1-unit increase in  $x$ . It follows that the slope of the graph shown represents the estimated number of candy bars the machine wraps with a label per second. The slope,  $m$ , of a line in the  $xy$ -plane can be found using any two points,  $(x_1, y_1)$  and  $(x_2, y_2)$ , on the line and the slope

formula  $m = \frac{y_2 - y_1}{x_2 - x_1}$ . The graph shown passes through the points  $(0, 0)$  and  $(2, 80)$ .

Substituting these points for  $(x_1, y_1)$  and  $(x_2, y_2)$ , respectively, in the slope formula yields  $m = \frac{80 - 0}{2 - 0}$ , which is equivalent to  $m = \frac{80}{2}$ , or  $m = 40$ . Therefore, the estimated number of candy bars the machine wraps with a label per second is 40.

*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 11

**Choice B** is correct. The sum of the measures of the interior angles of a triangle is 180 degrees. Since the triangle is a right triangle, it has one angle that measures 90 degrees. Therefore, the sum of the measures, in degrees, of the remaining two angles is  $180 - 90$ , or 90. It's given that the measure of one of the acute angles in the triangle is 51 degrees. Therefore, the measure, in degrees, of the other acute angle is  $90 - 51$ , or 39.

*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. This is the measure, in degrees, of the acute angle whose measure is given.



## QUESTION 12

**Choice B** is correct. The mean of a set of data values is the sum of all the data values divided by the number of data values in the set. The sum of the data values shown is  $2 + 9 + 14 + 23 + 32$ , or 80. Since there are 5 data values in the set, the mean of the data shown is  $\frac{80}{5}$ , or 16.

*Choice A* is incorrect. This is the median, not the mean, of the data shown.

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

*Choice D* is incorrect. This is the maximum, not the mean, of the data shown.

## QUESTION 13

The correct answer is 12. The value of  $f(36)$  is the value of  $f(x)$  when  $x = 36$ . Substituting 36 for  $x$  in the given equation yields  $f(36) = 6 + \sqrt{36}$ , which is equivalent to  $f(36) = 6 + 6$ , or  $f(36) = 12$ . Thus, the value of  $f(36)$  is 12.

## QUESTION 14

The correct answer is 18. It's given by the second equation in the system that  $3y = 11$ . Substituting 11 for  $3y$  in the first equation in the system,  $x + 3y = 29$ , yields  $x + 11 = 29$ . Subtracting 11 from both sides of this equation yields  $x = 18$ .

## QUESTION 15

**Choice B** is correct. It's given that Rhett drove at an average speed of 35 miles per hour and that he drove for  $r$  hours. Multiplying 35 miles per hour by  $r$  hours yields  $35r$  miles, or the distance that Rhett drove. It's also given that Jessica drove at an average speed of 40 miles per hour and that she drove for  $j$  hours. Multiplying 40 miles per hour by  $j$  hours yields  $40j$  miles, or the distance that Jessica drove. The total distance, in miles, that Rhett and Jessica drove can be represented by the expression  $35r + 40j$ . It's given that the total distance they drove was under 220 miles. Therefore, the inequality  $35r + 40j < 220$  represents this situation.

*Choice A* is incorrect. This inequality represents a situation in which the total distance Rhett and Jessica drove was over, rather than under, 220 miles.

*Choice C* is incorrect. This inequality represents a situation in which Rhett drove at an average speed of 40, rather than 35, miles per hour, Jessica drove at an average speed of 35, rather than 40, miles per hour, and the total distance they drove was over, rather than under, 220 miles. *Choice D* is incorrect. This inequality represents a situation in which Rhett drove at an average speed of 40, rather than 35, miles per hour, and Jessica drove at an average speed of 35, rather than 40, miles per hour.

## QUESTION 16

**Choice A** is correct. It's given that the equation  $b = 42cf$  relates the positive numbers  $b$ ,  $c$ , and  $f$ . Dividing each side of the given equation by  $42f$  yields  $\frac{b}{42f} = c$ , or  $c = \frac{b}{42f}$ . Thus, the equation  $c = \frac{b}{42f}$  correctly expresses  $c$  in terms of  $b$  and  $f$ .

**Choice B** is incorrect. This equation can be rewritten as  $b = cf + 42$ . **Choice C** is incorrect. This equation can be rewritten as  $b = \frac{c}{42f}$ . **Choice D** is incorrect. This equation can be rewritten as  $b = 42 - c - f$ .

## QUESTION 17

**Choice D** is correct. Let  $p$  represent the number of pounds of potatoes and let  $c$  represent the number of pounds of celery that Davio bought. It's given that potatoes cost \$0.69 per pound and celery costs \$0.99 per pound. If Davio spent \$5.34 in total, then the equation  $0.69p + 0.99c = 5.34$  represents this situation. It's also given that Davio bought twice as many pounds of celery as pounds of potatoes; therefore,  $c = 2p$ . Substituting  $2p$  for  $c$  in the equation  $0.69p + 0.99c = 5.34$  yields  $0.69p + 0.99(2p) = 5.34$ , which is equivalent to  $0.69p + 1.98p = 5.34$ , or  $2.67p = 5.34$ . Dividing both sides of this equation by 2.67 yields  $p = 2$ . Substituting 2 for  $p$  in the equation  $c = 2p$  yields  $c = 2(2)$ , or  $c = 4$ . Therefore, Davio bought 4 pounds of celery.

**Choice A** is incorrect. This is the number of pounds of potatoes, not the number of pounds of celery, Davio bought. **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 18

**Choice C** is correct. A line of best fit is shown in the scatterplot such that as the value of  $x$  increases, the value of  $y$  decreases. It follows that the slope of the line of best fit shown is negative. The slope of a line in the  $xy$ -plane that passes through the points  $(x_1, y_1)$  and  $(x_2, y_2)$  can be calculated as  $\frac{y_2 - y_1}{x_2 - x_1}$ . The line of best fit shown passes approximately through the points  $(0, 8)$  and  $(10, 1)$ . Substituting  $(0, 8)$  for  $(x_1, y_1)$  and  $(10, 1)$  for  $(x_2, y_2)$  in  $\frac{y_2 - y_1}{x_2 - x_1}$  yields the slope of the line being approximately  $\frac{1-8}{10-0}$ , which is equivalent to  $\frac{-7}{10}$ , or  $-0.7$ . Therefore, of the given choices,  $-0.7$  is the closest to the slope of this line of best fit.

**Choice A** is incorrect. The line of best fit shown has a negative slope, not a positive slope. **Choice B** is incorrect. The line of best fit shown has a negative slope, not a positive slope. **Choice D** is incorrect and may result from conceptual or calculation errors.

## QUESTION 19

**Choice A** is correct. It's given that the equation  $y = 0.67x + 2.6$ , where  $20 \leq x \leq 110$ , gives the predicted number of larvae,  $y$ , in a colony of ants if the colony has  $x$  worker ants. If one of these colonies has 58 worker ants, the predicted number of larvae in that colony can be found by substituting 58 for  $x$  in the given equation. Substituting 58 for  $x$  in the given equation yields  $y = 0.67(58) + 2.6$ , or  $y = 41.46$ . Of the given choices, 41 is closest to the predicted number of larvae in the colony.

**Choice B** is incorrect. This is closest to the predicted number of larvae in a colony with 87 worker ants. **Choice C** is incorrect. This is closest to the number of worker ants for which the predicted number of larvae in a colony is 58. **Choice D** is incorrect. This is closest to the predicted number of larvae in a colony with 280 worker ants.

## QUESTION 20

The correct answer is 161. For a number to be 40% greater than 115, it follows that the number is  $(100\% \text{ of } 115) + (40\% \text{ of } 115)$ , which can be written as

$\frac{100}{100}(115) + \frac{40}{100}(115)$ . This expression is equivalent to  $1(115) + 0.4(115)$ , or  $1.4(115)$ , which is equal to 161. Therefore, 161 is 40% greater than 115.

## QUESTION 21

The correct answer is 17. If one value is multiplied by a number, then the other value must be multiplied by the same number in order to maintain the same ratio. It's given that  $j$  is multiplied by 17. Therefore, in order to maintain the same ratio,  $k$  must also be multiplied by 17.

## QUESTION 22

**Choice D** is correct. It's given that the function  $f(x) = 65(1.03)^x$  gives the predicted value, in dollars, of a certain rare coin  $x$  years after Immanuel purchased it. It follows that  $f(x)$  represents the predicted value, in dollars, of the coin  $x$  years after Immanuel purchased it. Since the value of  $f(8)$  is the value of  $f(x)$  when  $x = 8$ , it follows that " $f(8)$  is approximately equal to 82" means that  $f(x)$  is approximately equal to 82 when  $x = 8$ . Therefore, the best interpretation of the statement " $f(8)$  is approximately equal to 82" in this context is 8 years after Immanuel purchased the rare coin, its predicted value is approximately 82 dollars.

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

## QUESTION 23

**Choice A** is correct. The slope,  $m$ , of a line in the  $xy$ -plane can be found using two points on the line,  $(x_1, y_1)$  and  $(x_2, y_2)$ , and the slope formula  $m = \frac{y_2 - y_1}{x_2 - x_1}$ . Based on the given table, the line representing the relationship between  $x$  and  $y$  in the  $xy$ -plane passes through the points  $(-6, n + 184)$ ,  $(-3, n + 92)$ , and  $(0, n)$ , where  $n$  is a constant. Substituting two of these points,  $(-3, n + 92)$  and  $(0, n)$ , for  $(x_1, y_1)$  and  $(x_2, y_2)$ , respectively, in the slope formula yields  $m = \frac{n - (n + 92)}{0 - (-3)}$ , which is equivalent to  $m = \frac{n - n - 92}{0 + 3}$ , or  $m = -\frac{92}{3}$ . Therefore, the slope of the line that represents this relationship in the  $xy$ -plane is  $-\frac{92}{3}$ .

**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 24

**Choice C** is correct. The volume of a right circular cylinder is equal to  $\pi a^2 b$ , where  $a$  is the radius of a base of the cylinder and  $b$  is the height of the cylinder. It's given that the cylinder shown has a radius of  $r$  and a height of  $h$ . It follows that the volume of the cylinder shown is equal to  $\pi r^2 h$ . It's given that the second right circular cylinder has a radius of  $R$  and a height of  $H$ . It follows that the volume of the second cylinder is equal to  $\pi R^2 H$ . Choice C gives  $R = 7r$  and  $H = 8h$ . Substituting  $7r$  for  $R$  and  $8h$  for  $H$  in the expression that represents the volume of the second cylinder yields  $\pi(7r)^2(8h)$ , or  $\pi(49r^2)(8h)$ , which is equivalent to  $\pi(392r^2h)$ , or  $392(\pi r^2 h)$ . This expression is equal to 392 times the volume of the cylinder shown,  $\pi r^2 h$ . Therefore,  $R = 7r$  and  $H = 8h$  could represent the radius  $R$ , in terms of  $r$ , and the height  $H$ , in terms of  $h$ , of the second cylinder.

**Choice A** is incorrect. Substituting  $8r$  for  $R$  and  $7h$  for  $H$  in the expression that represents the volume of the second cylinder yields  $\pi(8r)^2(7h)$ , or  $\pi(64r^2)(7h)$ , which is equivalent to  $\pi(448r^2h)$ , or  $448(\pi r^2 h)$ . This expression is equal to 448, not 392, times the volume of the cylinder shown. **Choice B** is incorrect.

Substituting  $8r$  for  $R$  and  $49h$  for  $H$  in the expression that represents the volume of the second cylinder yields  $\pi(8r)^2(49h)$ , or  $\pi(64r^2)(49h)$ , which is equivalent to  $\pi(3,136r^2h)$ , or  $3,136(\pi r^2 h)$ . This expression is equal to 3,136, not 392, times the volume of the cylinder shown. **Choice D** is incorrect. Substituting  $49r$  for  $R$  and  $8h$  for  $H$  in the expression that represents the volume of the second cylinder yields  $\pi(49r)^2(8h)$ , or  $\pi(2,401r^2)(8h)$ , which is equivalent to  $\pi(19,208r^2h)$ , or  $19,208(\pi r^2 h)$ . This expression is equal to 19,208, not 392, times the volume of the cylinder shown.

## QUESTION 25

**Choice B** is correct. It's given that each side of a 30-sided polygon has one of three lengths. It's also given that the number of sides with length 8 centimeters (cm) is 5 times the number of sides  $n$  with length 3 cm. Therefore, there are  $5 \times n$ , or  $5n$ , sides with length 8 cm. It's also given that there are 6 sides with length 4 cm. Therefore, the number of 3 cm, 4 cm, and 8 cm sides are  $n$ , 6, and  $5n$ , respectively. Since there are a total of 30 sides, the equation  $n + 6 + 5n = 30$  represents this situation. Combining like terms on the left-hand side of this equation yields  $6n + 6 = 30$ . Therefore, the equation that must be true for the value of  $n$  is  $6n + 6 = 30$ .

*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 26

**Choice D** is correct. It's given that data set F consists of 55 integers between 170 and 290 and data set G consists of all the integers in data set F as well as the integer 10. Since the integer 10 is less than all the integers in data set F, the mean of data set G must be less than the mean of data set F. Thus, the mean of data set F isn't less than the mean of data set G. When a data set is in ascending order, the median is between the two middle values when there is an even number of values and the median is the middle value when there is an odd number of values. It follows that the median of data set F is either greater than or equal to the median of data set G. Therefore, the median of data set F isn't less than the median of data set G. Thus, neither the mean nor the median must be less for data set F than for data set G.

*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 27

The correct answer is 66. It's given that the right circular cone has a height of 22 centimeters (cm) and a base with a diameter of 6 cm. Since the diameter of the base of the cone is 6 cm, the radius of the base is 3 cm. The volume  $V$ , in  $\text{cm}^3$ , of a right circular cone can be found using the formula  $V = \frac{1}{3}\pi r^2 h$ , where  $h$  is the height, in cm, and  $r$  is the radius, in cm, of the base of the cone. Substituting 22 for  $h$  and 3 for  $r$  in this formula yields  $V = \frac{1}{3}\pi(3)^2(22)$ , or  $V = 66\pi$ . Therefore, the volume of the cone is  $66\pi \text{ cm}^3$ . It's given that the volume of the cone is  $n\pi \text{ cm}^3$ . Therefore, the value of  $n$  is 66.