

Reading and Writing Test

27 QUESTIONS | 32 MINUTES

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 researchers compiled data on side effects from 163 patients with major depressive disorder or bipolar disorder and 25 healthy controls who participated in one of five placebo-controlled clinical trials conducted at the NIH Clinical Center over 13 years. The study did not address the side effects associated with repeated infusions or long-term use.

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

- A) authorities
- B) restraints
- C) benchmarks
- D) commands

2

A large percentage of the organisms in the world are parasitic, meaning they derive nutrients from another species, but almost none of them are mammalian. One notable _____ is the vampire bat, which feeds on the blood of cows and other mammals.

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

- A) peculiarity
- B) exception
- C) distortion
- D) idiosyncrasy

3

Salt stress, too much salt in the soil for plants to thrive, is one of the major environmental constraints limiting agricultural productivity and influencing the _____ of bioactive compounds of vegetables. In this study, we assessed the effect of NaCl salt stress on flowering, fructification, and fruit nutritional quality of a local cultivar of chili pepper.

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

- A) attentiveness
- B) dedication
- C) concentration
- D) centralization

4

How HEPHL1 mechanistically regulates hair growth and development will require in-depth analysis, and the curly whiskers from *HEPHL1* knockout mice could help these investigations. Our preliminary results showed that HEPHL1 regulates the activity of an enzyme, lysyl oxidase, which needs copper for its enzymatic activity. This raises the intriguing possibility that, in addition to playing an iron-related role, HEPHL1 could relate to the copper absorption associated with Menkes disease and its associated hair abnormalities. In conclusion, our study identified HEPHL1 as a novel gene responsible for hair abnormalities and highlights the importance of exploring the role of HEPHL1—and its interconnections with other key regulators—in developing new therapeutic strategies to treat hair disorders and even more insidious genetic diseases.

What is the role of the second sentence in the overall structure of the text?

- A) It establishes a potential link between HEPHL1 and the lack of proper copper absorption found in patients with Menkes disease.
- B) It explains why patients with hair abnormalities may actually have a condition called Menkes disease.
- C) It points out that there is a connection between iron intake and copper intake and an imbalance could cause Menkes disease.
- D) It elaborates on the claim that mice are the best source of data about hair growth and development related to Menkes disease.

5

In general, deep ocean habitats may be negatively affected by tidal current energy systems due to the change of water flows, materials on the ocean floor, and movement of sediment. Potential other effects include mortality of fish passing through turbines (blade-strike) and the collision risk of marine mammals with tidal stream farms. A study showed that change in sediment patterns will most likely follow the installation of tidal arrays, impacting the local underwater habitat, and in turn, animal and plant species. However, in their review, Frid et al. conclude that “there is little scientific literature to suggest that operation of underwater tidal energy devices will cause elevated levels of mortality to organisms such as fish and marine mammals.” Also, Lewis et al. mention that, “while current technologies have moving parts that may harm marine life, there is no evidence to date of harm from tidal current devices to marine life.”

What is the main function of the quotes from Frid et al. and Lewis et al. in the overall structure of the text?

- A) They show reputable scientists that hold very different views from each other.
- B) They provide authoritative viewpoints that oppose that of the author.
- C) They undermine conclusions which emphasize safety of tidal energy systems.
- D) They introduce expert opinions that reinforce the authors’ primary claim.

6

Extraterrestrial life, that familiar science-fiction trope, that kitschy fantasy, that CGI nightmare, has become a matter of serious discussion, a “risk factor,” a “scenario.” How has ET gone from sci-fi fairytale to a serious scientific endeavor modeled by macroeconomists, funded by fiscal conservatives, and discussed by theologians? Because, following a string of remarkable discoveries over the past two decades, the idea of alien life is not as far-fetched as it used to seem. Discovery now seems inevitable and possibly imminent.

In the text, what is the primary function of the phrases “science-fiction trope,” “kitschy fantasy,” and “CGI nightmare”?

- A) To point out the ever-changing image of how extraterrestrial creatures appear
- B) To encourage readers to imagine the possible variety of extraterrestrial life
- C) To interject a lighthearted note into an otherwise serious passage
- D) To emphasize that there is credibility in something that once was believed impossible

7

Text 1

A 1979 paper by father-and-son team Luis and William Alvarez identified their discovery of unusual quantities of a rare element called iridium in a layer of sediment about 65 million years ago. They contended that the iridium was indicative of a massive meteor impact that sent clouds of dust into the atmosphere, cooling the Earth enough to trigger the mass extinction of the dinosaurs at the end of the Cretaceous period.

Text 2

Though dramatic, the idea of a meteor strike wiping out the dinosaurs is far-fetched, say modern paleontologists. They agree a strike occurred but claim that there was actually no simultaneous or instantaneous event that could be classified as a mass extinction. Instead, species slowly died out over millions of years, with the last major representatives living to approximately the end of the Cretaceous period.

Based on the texts, which choice would the authors of the text most likely agree about?

- A) A massive meteorite impact occurred, though it may not have caused a mass extinction.
- B) Though the earth cooled due to a meteor impact, it was not enough to kill the dinosaurs.
- C) There was actually no mass extinction of dinosaurs, though eventually they all died.
- D) Most dinosaur species died prior to the period after the Cretaceous period.

8

The following text is adapted from Mother Jones's 1912 speech to coal miners picketing in Charlestown, West Virginia.

I want to show you here that the average wages you fellows get in this country is \$500 a year. Before you get a thing to eat there is \$20 taken out a month, which leaves about \$24 a month. Then you go to the "pluck-me" stores (operated by the mine) and want to get something to eat for your wife, and the child comes back and says, "Papa, I can't get anything."

"Why," he says, "there is \$24 coming to me?"

The child says, "They said there was nothing coming to you." And the child goes back crying without a mouthful of anything to eat. The father goes to the "pluck-me" store and says to the manager, "there is \$24 coming to me," and the manager says, "Oh, no, we have kept \$26 for rent."

According to the passage, what is true about the wages of the mine workers?

- A) They are lower than the income of mine workers around the country.
- B) They are periodically being reduced without explanation.
- C) They are not consistent with the minimum wages of other jobs.
- D) They are insufficient because of the policies of the mine owners.

9

The *GRL* paper focuses on one region of the Southern Ocean extending from the tip of South America to the tip of the Antarctic Peninsula. “The Drake Passage is the windiest, roughest part of the Southern Ocean,” says Colm Sweeney, lead investigator on the Drake Passage study and co-author on the *GRL* paper, “The critical element to this study is that we were able to sustain measurements in this harsh environment as long as we have—both in the summer and the winter, in every year over the last 13 years. This data set of ocean carbon measurements is the densest ongoing time series in the Southern Ocean.” The team was able to take these long-term measurements by piggybacking instruments on the Antarctic Research Supply Vessel *Laurence M. Gould*, which makes nearly 20 crossings of the Drake Passage each year, transporting people and supplies to and from Antarctic research stations.

According to the text, why are the results of the Drake Passage study unique?

- A) They used more complete measurements than any other study of the region.
- B) They were derived using equipment that had not previously been used.
- C) They incorporated chemical measurements as well as other forms of data.
- D) It was the first study to focus only on the Southern Ocean.

10

Emily Dickenson’s poems were edited by her friends before publication to match the tastes of the times. Her personal style still shines through, as in the way she personifies books in her poem “In a Library”: _____

Which quote from “In a Library” most effectively illustrates the claim?

- A) “A precious, mouldering pleasure ’t is / To meet an antique book, / In just the dress his century wore;”
- B) “What interested scholars most, / What competitions ran / When Plato was a certainty.”
- C) “When Sappho was a living girl, / And Beatrice wore / The gown that Dante deified.”
- D) “Facts, centuries before, / He traverses familiar, / As one should come to town”

11

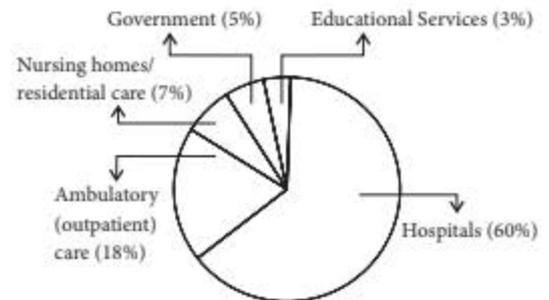
If we manage to separate out a clean signal from a planet outside our solar system and find some features in the light spectrum that might be indicative of life, we will need to work hard to think of any non-biological process that might account for them. "Life is the hypothesis of last resort," noted astronomer Carl Sagan. This requires some understanding of what processes might operate on worlds that we will know relatively little about; what we find on Earth can serve as a guide but also has potential to lead us astray.

Which hypothetical situation is Carl Sagan most likely warning to avoid in his quote?

- A) A rover that was sent to Mars discovers a bacteria-like organism when it drills deep into the core of the planet.
- B) An astronomer realizes that the atmosphere of a planet is too hot to sustain life even though it has oxygen.
- C) A scientist finds a planet with a large amount of oxygen in its atmosphere so claims that the oxygen is produced by living creatures.
- D) A new telescope finds a new planet orbiting a star that was previously believed to have no planets.

12

Percentage of Registered Nurses by Field



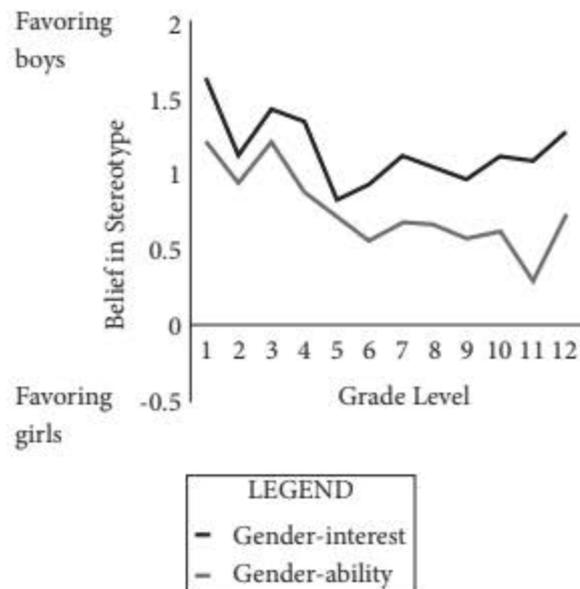
Data from US Bureau of Labor Statistics, June, 2021

Nursing is one of the fields in most demand, with an anticipated annual growth rate of 7 percent through 2029. Although some nurses work only in hospitals, there are actually many options, especially as the population ages and nurses are needed to tend to the daily needs of seniors. For example, _____

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

- A) educational services employed about 3 percent of the registered nurses in 2021.
- B) fewer registered nurses worked for the government than in ambulatory care.
- C) the percentage of registered nurses working in nursing homes increased by 7 percent in 2021.
- D) about 7 percent of registered nurses in 2021 worked in nursing or residential homes.

Engineering and Computer Science Stereotypes



“Scientists ran an experiment where they found that a diverse set of students believed gender-interest stereotypes favoring boys in computer science and engineering. Students developed these stereotypes at a very young age. They also found that: Gender-interest stereotypes were stronger than gender-ability stereotypes. Girls who believed the stereotypes were _____.”

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

- A) less skilled than interested in computer science and engineering.
- B) equally skilled and interested in computer science and engineering.
- C) less interested in participating in computer science and engineering.
- D) more interested in participating in computer science and engineering.

14

The following text is adapted from Jefferson Keel's 2011 statement, "The Indian Reorganization Act—75 Years Later: Renewing our Commitment to Restore Tribal Homelands and Promote Self-determination."

Two years ago, our shared vision and the Federal responsibility to Indian tribes were threatened by the Supreme Court's interpretation of the IRA in *Carcieri v. Salazar*. There are at least 14 pending cases where tribes and the Secretary of Interior are under challenge. There are many more tribes whose land-to-trust applications have simply been frozen while the Department of Interior works through painstaking legal and historical analysis. We are seeing harassment litigation against tribes who were on treaty reservations in 1934 with a BIA superintendent. Land acquisitions are delayed. Lending and credit are drying up. Jobs are lost or never created. We fear that this will continue to get worse until Congress acts. Even worse, this decision will create two classes of Indian tribes: those who will benefit from Federal trust responsibility and those who will not.

According to the text, why is the *Carcieri* decision especially problematic?

- A) It did not adhere to the exact wording of the original 1934 legislation.
- B) It asserted that the 1934 legislation only applies to specific Native Americans.
- C) It created new methods by which the Native Americans could regain lands.
- D) It set precedents that facilitated the establishment of tribal governments.

15

Behavioral activation is a type of talk therapy that helps a patient get unstuck from negative mood spirals by noticing a connection between what they do and how they feel, and gradually adding more small and enjoyable actions back into life. Behavioral activation has the goal of decreasing avoidance, bolstering peer connection, and improving engagement in rewarding activities. Through behavioral activation, a client works with a counselor to start looking at actions that could help boost the mood. For example, it might start with a goal to get out of one's pajamas and to shower every morning. Feeling a little bit better just by taking that step, the patient then could reach out to get extra support catching up in poor school subjects. In other words, rather than waiting to feel better, the patient does things that align with personal values and that will lead to feeling better.

Based on the text, why is behavioral activation successful in treating depression?

- A) It encourages the patient to do what feels most comfortable at the time.
- B) It uses incremental steps to form patterns of behavior that alter emotions.
- C) It focuses on solving the problems that triggered the depressed behavior.
- D) It emphasizes long-term goals that can be attempted when the patient is healthy.

16

In the Solomon Islands, cowry shells were sewn into long pieces of cloth as a form of currency, and although _____ use has declined, they have not been completely replaced by modern coinage.

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

- A) its
- B) their
- C) there
- D) they're

17

Volcanoes come in all sizes and shapes, but they all fall into three basic structural patterns known as cinder cone, _____ shield formations.

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

- A) composite (or stratovolcano), and
- B) composite, (or stratovolcano), and
- C) composite (or stratovolcano) and,
- D) composite, (or stratovolcano) and,

18

Numerous theorists have offered minimum wage as a mechanism for leveling economic inequality by enabling lower-paid workers to earn more money. However, Professor David Neumark, in conjunction with Dr. William Wascher of the Federal Reserve Board, _____ with this view. The results of their literature survey covering over 100 papers revealed that only 10 percent reported positive results and over two-thirds documented increased disparity.

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

- A) dissent
- B) dissents
- C) dissenting
- D) have dissented

19

People in developed nations often take water for _____ over 2 billion people in the world do not have access to safe drinking water; 670 million people have no handwashing facilities at all.

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

- A) granted but;
- B) granted; but
- C) granted, but
- D) granted but

20

Wheat and rice are the most common cereal crops in the world and are consumed as the staple part of diets in many countries, but there are many other cereal _____ that can be eaten directly or fed to meat animals.

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

- A) crops—such as rye and sorghum—
- B) crops, such as rye, and sorghum,
- C) crops—such as rye and sorghum,
- D) crops, such as rye and sorghum—

21

Inuit is the common name for a group of indigenous peoples who live in the arctic and subarctic regions. The term was originally used by the Alaskan Inupiat people, so is not always used in self-reference by all the _____ Labrador, Quebec, Nunavut, and the Northwest Territories.

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

- A) sub-groups in Greenland,
- B) sub-groups in: Greenland,
- C) sub-groups in: Greenland
- D) sub-groups; in Greenland,

22

According to _____ the variation among the sites would increase over time, as random chance caused different species to go extinct in some areas but not others.

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

- A) Clark the neutral model would predict that:
- B) Clark, the neutral model would predict that
- C) Clark, the neutral model would predict: that
- D) Clark the neutral model would predict, that

23

There are so many sub-fields in science that sometimes the distinctions are hard to determine, and many overlap. _____ paleontology is the study of ancient life, including creatures ranging from as small as microbes to as large as dinosaurs, but paleoichthyology focuses exclusively on the study of prehistoric fish.

Which choice completes the text with the most logical transition?

- A) Or else,
- B) Even so,
- C) For instance,
- D) On the whole,

24

Echolocation is a form of sonar in which an animal emits a sound and, using the resulting echo, can locate and identify various objects. Echolocation is highly developed in only a few species, such as bats, whales and dolphins. _____ it is also present in a limited form among shrews and two species of cave-dwelling birds.

Which choice completes the text with the most logical transition?

- A) However,
- B) Consequently,
- C) Accordingly,
- D) Clearly,

25

It turns out that 21.6 percent of the population in the United States are bilingual and speak a language other than English in their homes. _____ that may seem like a large percentage, it is far lower than the worldwide average of 43 percent of the population speaking at least two languages.

Which choice completes the text with the most logical transition?

- A) Although
- B) Because
- C) Despite
- D) Since

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

- Maya Angelou was a famous civil rights activist, poet, and author, though she held many other roles throughout her life.
- *I Know Why the Caged Bird Sings* (1969) is one of her most acclaimed books; it publicly reveals details about her private life up to the age of 17.
- She was asked to read the poem “On the Pulse of Morning” at President Bill Clinton’s inaugural ceremony in 1993.
- She directed her first movie, *Down the Delta*, in 1996, though she had previously participated in acting and production of other movies.
- Published in 2013 when she was 85 years old, *Mom & Me & Mom* recounts her complex relationship with her own mother.
- At her death in 2014, she was working on a new book about her experiences with different world leaders.

The student wants to emphasize an underlying theme in some of Maya Angelou’s books. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) Maya Angelou wrote a wide variety of works in her later years, including *Down the Delta* and *Mom & Me & Mom*.
- B) Many of Maya Angelou’s works, such as *I Know Why the Caged Bird Sings* and *Mom & Me & Mom*, are autobiographical.
- C) Maya Angelou had close contact with many world leaders, as shown by reading “On the Pulse of Morning” at President Bill Clinton’s 1993 inaugural ceremony and writing a book on the subject prior to her death.
- D) While some of her books received great critical acclaim, such as *I Know Why the Caged Bird Sings*, others were not popular, such as *Mom & Me & Mom*.

27

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

- In 1803, Luke Howard first defined the different categories of clouds.
- Cirro-form clouds are high and wispy, like curls of hair. They usually appear before a change in weather.
- Cumulo-form clouds are tall, reaching from low to high in the sky because they are formed by rising humid air. They have a flat base and distinct shapes, like fluffy cotton balls.
- Strato-form clouds are low, wide, and flat. They often cover the whole sky in a gray or white layer and do not have clear edges.
- Nimbo-form clouds are the type that bring rain or snow. They are actually a combination of the other three cloud forms, so can be similar in shape to any of the others.

The student wants to emphasize how nimbo-form clouds differentiate from the other three types. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) Unlike other types of clouds, nimbo-form clouds produce precipitation.
- B) Nimbo-form clouds are much larger than other types of clouds.
- C) Different from other cloud types, nimbo-forms do not have any shape.
- D) While other clouds are low in the sky, nimbo-form clouds are high.

No Test Material On This Page

Reading and Writing Test

27 QUESTIONS | 32 MINUTES

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 cane toad (*Rhinella marina*) was _____ to South America but was transported to Australia in 1935 in an attempt to control the beetle infestations on sugarcane plantation.

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

- A) innate
- B) congenital
- C) pandemic
- D) endemic

2

Be aware that some _____ business opportunity promoters have been known to name "insiders" who give glowing—but bogus—recommendations. Don't just talk to the few people they suggest. Choose whom to contact. What if what the seller is telling you is different from what's on the disclosure document or what you hear from another buyer? Step on the brake.

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

- A) arguable
- B) questionable
- C) improbable
- D) unresolved

3

The following text is adapted from Abraham Lincoln's last public address, given on April 11, 1965

If this course of rejection has any tendency to bring Louisiana into proper practical relations with the Union, I have, so far, been unable to perceive it. If, on the contrary, we recognize, and sustain the new government of Louisiana the converse of all this is made true.

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

- A) identify
- B) accept
- C) realize
- D) appreciate

4

The Business Opportunity Rule governing franchise sales says that a seller has to give you the disclosure document at least seven days before you sign a contract or pay them anything. Use that time to check out the information in the disclosure document, including contacting references. Be aware that some questionable business opportunity promoters have been known to name "insiders" who give glowing—but bogus—recommendations. Don't just talk to the few people they suggest. Choose whom to contact. What if what the seller is telling you is different from what's on the disclosure document or what you hear from another buyer? Step on the brake. An inconsistency could be a tell-tale sign of a business opportunity rip-off. However, it is important to remember that many business investments have a wide range of returns, so not all differences in profit are a deliberate attempt to scam a potential buyer.

What is the purpose of the information that the seller must disclose at least seven days before signing a contract?

- A) To point out that there is adequate time to make a decision
- B) To emphasize that the buyer is under a lot of pressure
- C) To indicate that honest references take time to find
- D) To offer the reason that sellers secure bogus recommendations

5

In order to learn more about the properties of fire in space, scientists aboard the International Space Station have conducted many experiments. Their goal is to gain valuable insight into the mechanisms of fire that will ultimately help prevent fires on spacecraft or offer solutions to quickly extinguish such fires. Flames act very differently in an environment devoid of gravity than they do on Earth. For example, spheres of light form, and the flames can ignite at extremely low temperatures. On Earth, a standard gas stove burns at about 3100 degrees Fahrenheit, but a sustained flame can burn at 900 degrees in the International Space Station.

What is the main purpose of the underlined portion in the overall structure of the text?

- A) It highlights the motivation for conducting the experiments.
- B) It outlines the methodology the scientists are using to conduct the experiments.
- C) It offers a point of comparison for the results of the experiments.
- D) It presents an example of the phenomenon viewed in the experiments.

6

This passage is adapted from Emma Lazarus's poem *Spring Star*.

Over the lamp-lit street,
Trodden by hurrying feet,
Where mostly pulse and beat
Life's throbbing veins,
See where the April star,
Blue-bright as sapphires are,
Hangs in deep heavens far,
Waxes and wanes.

What is the main structure of the text?

- A) It establishes a contrast between two images.
- B) It shows the futility of an action.
- C) It offers a solution to a problem.
- D) It elaborates on an extended metaphor.

7

The following text is adapted from F. Scott Fitzgerald's 1992 novel, *The Beautiful and the Damned*.

Young Anthony had one picture of his father and mother together—so often had it faced his eyes in childhood that it had acquired the impersonality of furniture, but everyone who came into his bedroom regarded it with interest. It showed a dandy of the nineties, spare and handsome, standing beside a tall dark lady with a muff and the suggestion of a bustle. Between them was a little boy with long brown curls, dressed in a velvet Lord Fauntleroy suit. This was Anthony at five, the year of his mother's death.

Which choice best summarizes the text?

- A) A young man reminisces about his family.
- B) A man's family's appearance is explained.
- C) An aristocrat's achievements are outlined.
- D) The cause of a tragic event is revealed.

8

The Panama Canal stands as one of the greatest feats of engineering in all time. The idea was not new—in 1534, Charles, King of Spain, ordered a survey of the region—but it took until 1904 for the self-educated engineer John Frank Stevens to solve the technical problems with an intricate lock system and numerous inventions of equipment for the specialized tasks. Equally important were the efforts of Sanitation Engineer William C. Gorgas, who tirelessly oversaw the efforts to keep the work crews healthy. Entire cities of workers and their families needed food, clean water, medical care, and other essential services.

Based on the passage, why is William Gorgas key in building the Panama Canal?

- A) He was able to invent equipment that performed different functions.
- B) He was a doctor who took care of the workers' medical needs.
- C) He was zealous about fulfilling duties regarding the health of workers.
- D) He surveyed the area to determine the best way to build cities for workers.

9

George Herman “Babe” Ruth, Jr. (1895–1948) played 22 seasons of Major League baseball. He started as a left-handed pitcher but made his fame as an outfielder and powerful batter, earning the title “Home Run King.” Despite the decades that have passed since he stepped off the field, Babe Ruth is still a household name and considered one of the greatest American sports heroes. He was fortunate in that respect, as fans celebrated his triumphs against the background of news from World War I and the 1918 influenza pandemic.

Based on the text, what is one reason why Babe Ruth became so famous?

- A) He was an excellent pitcher.
- B) He showed people success during a grim time.
- C) He fought in World War I.
- D) He suffered from the 1918 influenza pandemic.

10

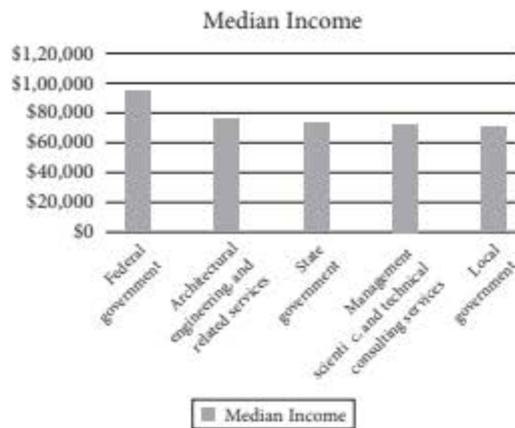
The extreme temperatures on the planet Mercury make it unlikely that there is any life on the planet in a form we would recognize. Mercury is closest to the Sun, and therefore the daytime temperatures are extremely hot, up to 800 degrees Fahrenheit (430 degrees Celsius). Since there is only a residual atmosphere, nights are much colder. In fact, despite its proximity to the Sun, Mercury_____

Which choice most logically completes the text?

- A) has an egg-shaped orbit which changes its distance from the Sun.
- B) rotates around the Sun faster than any other planet, in only 88 days.
- C) is approximately the same size as Earth’s moon and covered with craters.
- D) might even be cold enough to have permanent water ice near the poles.

11

Median annual wages for urban and regional planners in selected industries in the United States, May, 2019

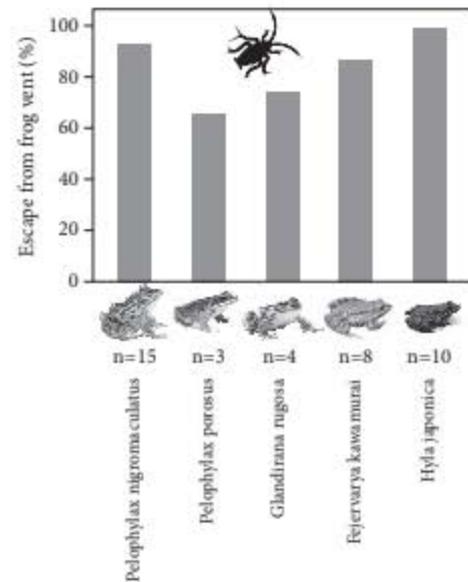


The median annual wage for urban and regional planners was \$73,050 in May 2018. The median wage is the wage at which half the workers in an occupation earned more than that amount and half earned less. The lowest 10 percent earned less than \$45,180, and the highest 10 percent earned more than \$114,170. The median rate varies depending on the field of the planning as well. For instance, the median income is _____.

Which choice most effectively completes the example using information from the graph?

- A) higher for state government employees than for local government employees
- B) greater for those in architectural, engineering, and related fields than for those in any government position
- C) lower for those working in the government than for those who work in private industries such as engineering or related services
- D) not as high for management, scientific, and technical consulting service employees as it is for local government employees.

12



“This study, authored solely by Sugiura Shinji, an ecologist from Kobe University in Japan, describes how the Japanese water scavenger beetle (*Regimbartia attenuate*) manages to extricate itself from inside several species of frog within 6 hours of being swallowed. Active escape of the aquatic beetle *Regimbartia attenuata* from the vents of five frog species via the digestive tract. Although adult beetles were easily eaten by frogs, _____.”

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

- A) a maximum of 65% of swallowed beetles were excreted were still alive.
- B) on average the swallowed beetles were excreted did not survive.
- C) it took less than 6 hours for the swallowed beetles to be extracted.
- D) an average of 90% of swallowed beetles were excreted were still alive.

13

The following text is adapted from Herman Melville's 1851 novel, *Moby Dick; or The Whale*.

I always go to sea as a sailor, because of the wholesome exercise and pure air of the fore-castle deck. For as in this world, head winds are far more prevalent than winds from astern (that is, if you never violate the Pythagorean maxim), so for the most part, the Commodore on the quarter-deck gets his atmosphere at second hand from the sailors on the fore-castle. He thinks he breathes it first; but not so. In much the same way do the commonalty lead their leaders in many other things, at the same time that the leaders little suspect it. But wherefore it was that after having repeatedly smelt the sea as a merchant sailor, I should now take it into my head to go on a whaling voyage; this the invisible police officer of the Fates.

With which idea about captains would the narrator most likely agree?

- A) They have worked hard to earn their position.
- B) They are greatly worthy of respect.
- C) They do not understand the needs of simple sailors.
- D) They are mistaken about the extent of their power.

14

The planet Venus is the second closest to the Sun in our solar system, but is generally hotter than the closest planet, Mercury—the average temperature is 462 degrees Celsius. That is because the atmosphere contains about 96 percent carbon dioxide, creating a greenhouse effect that is like having a giant blanket over the planet that retains the heat. The sulfuric acid in the atmosphere makes it very reflective, so Venus is the second brightest object in the night sky after the Moon.

According to the text, what is most likely true about the planet Mercury?

- A) It does not have any sulfuric acid in its atmosphere.
- B) Its temperature never exceeds 462 degrees Celsius.
- C) It has less than 96 percent carbon dioxide in its atmosphere.
- D) It is difficult to locate in the night sky because it is dark.

15

Coffee is the third most consumed beverage in the world, a welcome statistic for the people in Uganda, _____ is the leading cash crop.

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

- A) there, it
- B) where it
- C) which
- D) it

16

A classic image of colonial cooperation, _____ Martha kept detailed records of her experiences in the American frontier for over three decades.

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

- A) the diary of an 18th-century midwife named Martha Ballard documents several quilting bees
- B) an 18th-century midwife named Martha Ballard documented several quilting bees in her diary
- C) Martha Ballard, an 18th-century midwife, documented several quilting bees in her diary
- D) several quilting bees were documented in the diary of an 18th-century midwife named Martha Ballard

17

Marilyn Monroe, the iconic actress and fashion model from the 1950s and '60s, is attributed as _____ women rarely make history." In reality, the credit should go to Laurel Thatcher Ulrich, who was a student at the time but who later went on to become a professor at Harvard University.

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

- A) saying that, "Well-behaved
- B) having said that: "well-behaved
- C) she said, "Well-behaved
- D) saying that "well-behaved

18

Volunteers of America is a non-profit organization which helps homeless, disabled, senior, and other underserved individuals regain a balanced life. Over the past 125 years, the _____ have helped an average of 1.5 million people annually.

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

- A) volunteers efforts'
- B) volunteer's efforts
- C) volunteers' efforts
- D) volunteers's efforts'

19

Henry Wadsworth Longfellow's detailed poems greatly influenced the perception of various historical events, such as Paul Revere's nighttime ride during the American Revolutionary war, even though he sometimes sacrificed accuracy for eloquence to make the poems more engaging.

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

- A) sacrificed accuracy for eloquence
- B) sacrificed—accuracy for eloquence—
- C) sacrificed: accuracy for eloquence
- D) sacrificed (accuracy for eloquence)

20

Archaeologists determined that a pair of sandals made from sagebrush bark that were found in a cave in Oregon in 1939 are actually the oldest extant example of shoes in the _____ specimens have been dated to between 7,000 and 8,000 BCE.

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

- A) world; and the
- B) world. Because the
- C) world, the
- D) world. The

21

Inflation is when the prices of goods and services generally increase, resulting in a decrease in the purchasing power of money. Economists debate about the effects of low levels of _____ high levels of inflation are universally accepted as disruptive to an economy.

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

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

22

Edward Tingatinga's professional art career only lasted four years. _____ he is considered one of the most influential modern African painters and was the founder of an art style now archetypal in Tanzania.

Which choice completes the text with the most logical transition?

- A) Therefore,
- B) Even so,
- C) Specifically,
- D) Moreover,

23

Dogs trained for search and rescue have the same goal of finding humans, but there are actually two main methods that the dogs use to reach this goal. One is called air scent, in which a dog sniffs its surroundings and makes a straight line for the target once the scent is detected. _____ a dog sniffs the ground and follows the specific route that the person took, even if the path is very convoluted. This method is called tracking.

Which choice completes the text with the most logical transition?

- A) Furthermore,
- B) Precisely,
- C) However,
- D) Alternatively,

24

Tropical saltwater fish are beautiful to watch, but they take a lot of time and special equipment to maintain properly. That equipment is not cheap, either. A standard tank with fish can easily cost around \$2,000 to set up, and there are monthly expenses such as food, salt, and minerals, which can run over \$35 a month for a 50-gallon tank. _____ the upkeep alone is equivalent to over two coffee lattes from a specialty store every week.

Which choice completes the text with the most logical transition?

- A) On the other hand,
- B) Even so,
- C) In addition,
- D) In other words,

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

- Ada Lovelace (nee Byron) was born 1815 and was very interested in science and math from an early age, so her tutor introduced her to the mathematician Charles Babbage.
- Babbage is considered the “Father of the computer” because he invented an “Analytical Machine,” which he used to calculate numbers.
- It is possible that Lovelace wrote the first computer program in the world because she helped design programs for the Analytical Machine.
- In a 1842–1843 Italian translation explaining how the Analytical Machine worked, she wrote down a program in an appendix that was not in the original materials provided by Babbage.
- She realized that the Analytical Machine could be used for non-numerical purposes if other symbols such as letters or musical notes were substituted.

The student wants to emphasize that Ada Lovelace’s contributions to mathematics are just as important as Charles Babbage’s. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) Charles Babbage is famous for creating the Analytical Machine, but Ada Lovelace also was interested in explaining how it worked to others, even in different languages.
- B) Ada Lovelace wrote a program for the Analytical Machine in 1842–1843, without which Charles Babbage would not have been able to create a working computer.
- C) Charles Babbage, Ada Lovelace’s tutor, introduced her to the Analytical Machine, and she excelled beyond his abilities at using it.
- D) Although Babbage invented the Analytical Machine, Ada Lovelace was able to explain how it worked, create effective programs, and offer additional uses beyond mathematical calculations.

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

- Edward Tingatinga was born in 1932 in a small town called Namochelia in Tanzania.
- An art movement was named after his unique style of cartoon-like animals and landscapes.
- He tried his hand as a musician, and only started painting in 1968. His work was first done using recycled materials like old boards and bicycle paint.
- His work became popular among tourists so he was able to be an artist full time. He started a gallery and studio in 1970.
- In 1972 he was accidentally killed by a policeman who mistook him for someone else.
- His students continue to paint using his style and today his gallery is the largest in Africa.

The student wants to emphasize how influential Edward Tingatinga's painting is in Africa. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A) Edward Tingatinga painted using recycled materials, which started a trend towards using recycled art by a wide range of artists.
- B) Though his art career only lasted four years, Edward Tingatinga's art was appealing enough to build a following that carries on the art style today.
- C) Edward Tingatinga was the most popular artist of animals and landscapes for tourists to Africa, so his original paintings are highly sought-after today.
- D) Despite using recycled materials, Edward Tingatinga became so famous that other artists copied and sold pictures of his artwork.

27

Yellowstone National Park is a popular tourist site, but it is also an active supervolcano. Over the past 2.1 million years, it has erupted with such force that there are layers made of ash and pumice 400 meters thick in places. The most recent giant explosion, about 640,000 million years ago, emitted huge amounts of lava. _____ Now, the park's famous geysers and hot springs are heated by the remaining pools of magma, which are at most 15 percent of their former size.

Which choice most effectively anticipates and addresses a relevant counterargument to the assertion presented in the passage?

- A) About 70,000 years ago, there was another eruption, but it was not of the same magnitude and consisted mostly of lava.
- B) Geologists have determined that Yellowstone had three supereruptions as well as several lesser eruptions.
- C) One might expect a giant peak, but so much magma poured out each time that the underlying reservoirs collapsed and formed a giant caldera.
- D) The region to the southwest, the Snake River Plain, had eruptions prior to the supereruptions at Yellowstone.

STOP

No Test Material On This Page

Math

22 QUESTIONS | 35 MINUTES

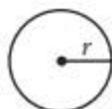
DIRECTIONS

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 is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

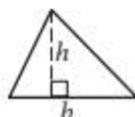


$$A = \pi r^2$$

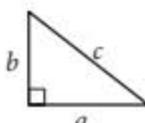
$$C = 2\pi r$$



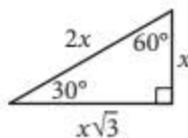
$$A = \ell w$$



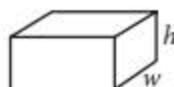
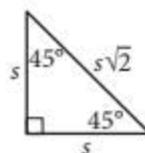
$$A = \frac{1}{2}bh$$



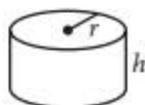
$$c^2 = a^2 + b^2$$



Special Right Triangles



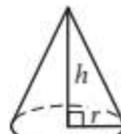
$$V = \ell wh$$



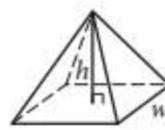
$$V = \pi r^2 h$$



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



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



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

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

The number of radians of arc in a circle is 2π .

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

Which of the following describes the transformation of a circle with the equation $(x - 3)^2 + (y + 6)^2 = 49$ to a circle with the equation $(x - 2)^2 + y^2 + 8y = 33$?

- A) The circle moves 1 to the right and 2 up
- B) The circle moves 1 to the right and 2 down
- C) The circle moves 1 to the left and 2 up
- D) The circle moves 1 to the left and 2 down

2

How many solutions are there to the equation below?

$$(x - 1)(x + 2) = x(x - 3)$$

- A) 0
- B) 1
- C) 2
- D) 4

3

If the system below has an infinite number of solutions, what would be the value of p ?

$$3(x - 6) - 2(x + 2) = px - 5x - 22$$

4

If the number of weeds on a farm is represented by the function $f(x) = 1,300(1.995)^x$, where x is in weeks, which of the following statements is true about the model?

- A) The number of weeds on the farm in the beginning was 1.995
- B) The number of weeds on the farm increases by 1.995 every x weeks
- C) The number of weeds on the farm increases by 99.5% every x weeks
- D) The number of weeds on the farm increases by 1300 every x weeks

5

Which of the following is equivalent to $(x - 2)^2(x + 2)^2$?

- A) $x^4 - 8x^2 + 16$
- B) $x^4 - 16$
- C) $x^4 + 8x + 16$
- D) $x^4 + 16$

6

A food scientist measures 27 different foods whose calorie content is shown below. What is the difference between the mean and the median of the calorie content of the 27 foods, rounded to the nearest tenth of a calorie?

Calorie content	Frequency
100	6
180	9
280	11
350	1

7

What is the x -intercept for the following equation

$$x = 3^{y-1} + \frac{5}{3} ?$$

- A) $\frac{5}{3}$
- B) 3
- C) 2
- D) $\frac{1}{3}$

8

30 Grade 11 students in a summer math class were asked what is the hardest subject for them. 80% of the students said that Statistics was the hardest while the rest chose Physics as the hardest subject. Which of the following statements can best be concluded from this information?

- A) 80% of the students in the summer math class think Statistics is the hardest subject.
- B) 20% of the Grade 11 students think Statistics is the hardest subject.
- C) 80% of the Grade 11 students in the math summer class think Physics is the hardest subject.
- D) 20% of the grade 11 students in the math summer class think Physics is the hardest subject.

9

If $-3(x + 3)^2 + 9 + x = ax^2 + bx + c$, what is the value of $a + b + c$?

10

If the maximum point for a quadratic equation $f(x)$ is $(3, 2)$, and it passes through the point $(2, 0)$, which of the following is a solution for x to the quadratic equation?

- A) -2
- B) 4
- C) -16
- D) 12

11

What is the value of the slope of a line that passes through the origin and point $(3, 5)$?

- A) $\frac{3}{5}$
- B) $-\frac{3}{5}$
- C) $\frac{5}{3}$
- D) $-\frac{5}{3}$

12

If (a, b) is a solution to the following system of inequalities, which of the following represents the minimum value of b ?

$$y \geq 2(x - 3)^2 + 5$$

$$y \leq x + 3$$

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

13

What is the volume of a sphere with a radius of 3?

14

If the system of equations below has no solution, which of the following would be a possible value of p ?

$$3x - 4y = 8$$

$$px + 8y + 6 = 0?$$

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

15

What is the center for the equation of the circle given below

$$x^2 + 6x + y^2 - 6y = 63 ?$$

- A) (3, -3)
- B) (6, -6)
- C) (-6, 6)
- D) (-3, 3)

16

If one of the solutions for the quadratic equation below is $\frac{3 + \sqrt{g}}{3}$, what is the value of g ?

$$3x^2 - 6x - 11$$

17

Which of the following is NOT a solution to the following inequality

$$-2x \geq -4 - x ?$$

- A) 4
- B) 5
- C) 3
- D) 2

18

What are the possible solutions to the equation below

$$\sqrt{2x+5} = x - 5 ?$$

- A) 2
- B) 10
- C) 2 and 10
- D) -2 and -10

19

If $\frac{5}{x} = \frac{2}{y}$ and $\frac{4}{x} - \frac{2}{y} = -\frac{1}{5}$, what is the value of xy ?

20

If $\frac{3x^2 + 7x + 9}{x - 2} = 3x + 13 + \frac{A}{x - 2}$. What is the value of A ?

- A) 19
- B) 7
- C) 35
- D) -23

21

A zookeeper conducted a study on the mass of penguins in the zoo. He found that the mean mass of the penguins in the zoo is 67.9 *kgs*. He estimated that the margin of error for the mean mass is 4.5 *kgs*. Which of the following statements can best be concluded from the study he conducted?

- A) The mass of the penguins in the zoo is between 72.4 *kgs* and 63.4 *kgs*.
- B) The mass of all penguins is 67.9 *kgs*.
- C) The median mass of penguins in the zoo lies between 72.4 *kgs* and 63.4 *kgs*.
- D) The mean mass of the penguins in the zoo lies between 72.4 *kgs* and 63.4 *kgs*.

22

How many solutions does the system below have ?

$$3(x - 3) + 2(x + y) = 5x + 2y - 9$$

- A) 0
- B) Infinitely many
- C) 1
- D) 2

No Test Material On This Page

Math

22 QUESTIONS | 35 MINUTES

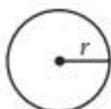
DIRECTIONS

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

NOTES

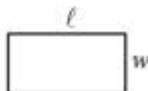
Unless otherwise indicated: • All variables and expressions represent real numbers. • Figures provided are drawn to scale. • All figures lie in a plane. • The domain of a given function is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

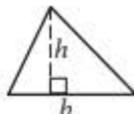


$$A = \pi r^2$$

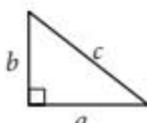
$$C = 2\pi r$$



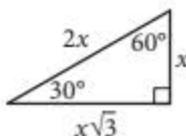
$$A = \ell w$$



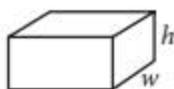
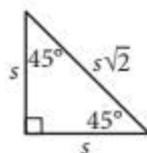
$$A = \frac{1}{2}bh$$



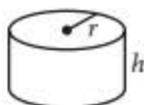
$$c^2 = a^2 + b^2$$



Special Right Triangles



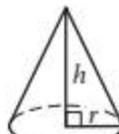
$$V = \ell wh$$



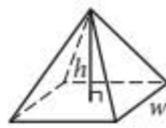
$$V = \pi r^2 h$$



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



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



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

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

The number of radians of arc in a circle is 2π .

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

Which of the following equations is equal to $3(x + 5)^2 - 2(x - 5)^2 + 2x$?

- A) $x^2 + x + 125$
 B) $3x^2 + 52x + 25$
 C) $x^2 - 2x - 25$
 D) $x^2 + 52x + 25$

2

Which of the following is equivalent to

$\frac{1}{x-2} + \frac{2x}{5-x}$, for all values of x , where $x \neq 2$ and $x \neq 5$?

- A) $\frac{2x^2 - 5x + 5}{-x^2 + 7x - 10}$
 B) $\frac{2x+1}{-3}$
 C) $\frac{2x+1}{3}$
 D) $\frac{2x+1}{(5-x)(x-2)}$

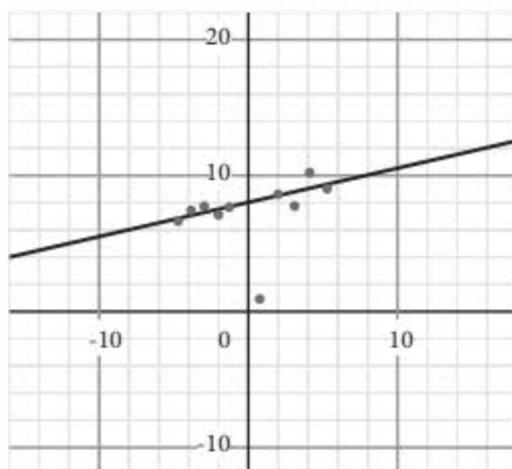
3

What is the value of y for the system below?

$$\begin{aligned} 3(x - 2) + 5y &= 2 \\ y &= -2(x - 5) \end{aligned}$$

4

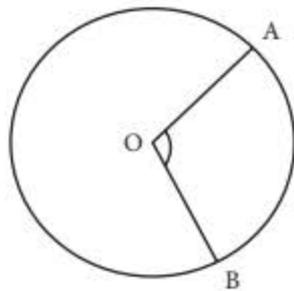
Which of the following best describes the line of best fit for the graph below?



- A) $y = \frac{1}{4}x + 8$
 B) $y = 4x + 8$
 C) $y = \frac{1}{4}x - 8$
 D) $y = -\frac{1}{4}x + 8$

5

If angle AOB is $\frac{7}{12}\pi$, what is the value of the arc length AB, given that the radius of the circle is 6 cm?



- A) 12π cm
- B) 36π cm
- C) $\frac{7}{2}\pi$ cm
- D) $\frac{21}{2}\pi$ cm

6

What is the sum of the roots for the equation given below

$$2x^2 + 6x + 18 = 0?$$

- A) 3
- B) -3
- C) 9
- D) -9

7

If the difference of the sum of the interior angles in a hexagon and that of a heptagon is $a\pi$, what is the value of a ?

8

Given that $f(3) = 2$ and $f(6) = -3$, which of the following functions best describes $f(x)$?

- A) $f(x) = -\frac{5}{3}x + 7$
- B) $f(x) = \frac{2}{3}x - 6$
- C) $f(x) = -\frac{3}{5}x$
- D) $f(x) = \frac{3}{5}x + 2$

9

Given that $2(x + 4) = 18$, what is the value of $x + 6$?

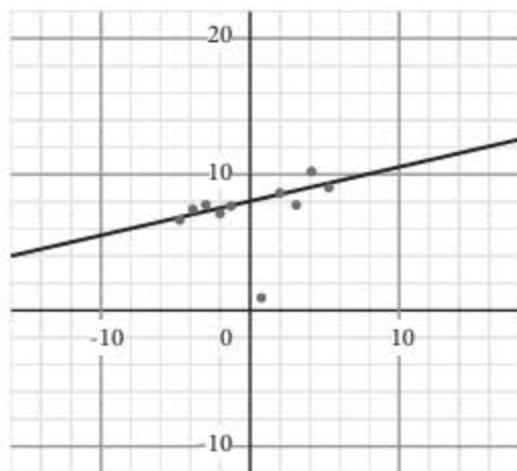
- A) 9
- B) 5
- C) -4
- D) 11

10

An educational fair is attended by students and parents in a state. If 2,000 students attended the fair, and the ratio of students to parents in the fair is 5:3.5, how many people attended the fair?

11

Find the percent decrease from the actual value y for when $x = 4$ and the predicted value y for when $x = 4$.



- A) 22.22%
- B) 33.33%
- C) 50%
- D) 18.18%

12

Which of the following coordinates represent a solution to the following system of inequalities

$$y > -3x + 5$$

$$y > 2x?$$

- A) (2, 4)
- B) (1, 4)
- C) (4, 3)
- D) (2, 1)

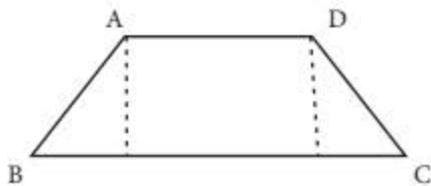
13

What is one possible positive solution to the equation below?

$$3|x - 4| = 6$$

14

If $AB = DC$ and segment AD is parallel to segment BC , and $AD = 12$, $DC = 10$, and $BC = 28$, find the area of the figure $ABCD$ below (not drawn to scale).



- A) 120
- B) 60
- C) 96
- D) 48

15

How many solutions does the equation below have

$$2|x + 3| - 3|x + 3| = -2?$$

- A) 0
- B) 1
- C) 2
- D) There isn't sufficient information to answer the question.

16

What is the value of the slope of a line perpendicular to the line $5x - 6y + 30 = 0$

17

Which of the following is equivalent to $\cos 72^\circ$?

- A) $\tan 18^\circ$
- B) $\sin 72^\circ$
- C) $\sin 18^\circ$
- D) $\cos 18^\circ$

18

The weather channel predicted that there will be a 0.26 chance that it will rain this week. What is the probability that it will not rain this week?

- A) 0.62
- B) 0.74
- C) 0.26
- D) 1

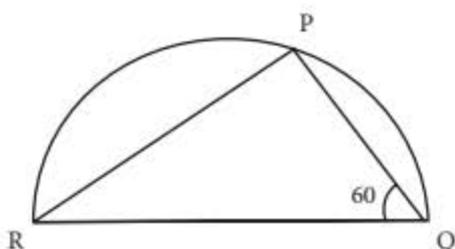
19

What is the maximum value of t for the given equation $v(t)$?

$$v(t) = -3t^2 + 9t + 12$$

20

If the semi-circle below has a radius of 7 and angle $PQR = 60^\circ$, what is the length of side PR ?



- A) 14
- B) 7
- C) $7\sqrt{2}$
- D) $7\sqrt{3}$

21

Which of the following is a solution to the inequality $|x + 3| > 4$?

- A) -5
- B) -9
- C) -2
- D) -7

22

If $3x + 4y = 31$ and $2x + 3y = 22$, what is the value of $x + y$?

- A) 9
- B) 5
- C) 4
- D) 11

STOP

No Test Material On This Page

Answer Key

Reading and Writing

Math

Module 1

Module 2

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

Module 1

Module 2

Questions	Correct	Mark your correct answers	Questions	Correct	Mark your correct answers
1.	C		1.	D	
2.	B		2.	A	
3.	6		3.	-2	
4.	C		4.	A	
5.	A		5.	C	
6.	29.3		6.	B	
7.	C		7.	1	
8.	D		8.	A	
9.	-38		9.	D	
10.	B		10.	2400	
11.	C		11.	D	
12.	D		12.	B	
13.	36π		13.	2 or 6	
14.	A		14.	A	
15.	D		15.	C	
16.	42		16.	-6/5	
17.	B		17.	C	
18.	B		18.	B	
19.	10		19.	3/2 or 1.5	
20.	C		20.	D	
21.	D		21.	B	
22.	B		22.	A	

1. **Level:** Hard | **Domain:** CRAFT AND STRUCTURE

Skill/Knowledge: Words in Context

Key Explanation: Choice C is the best answer because it refers to something that is used as a standard of comparison. It fits the context of saying that 25 healthy people were used as comparisons for the 163 patients with major depressive disorder or bipolar disorder.

Distractor Explanation: None of the other choices describe the 25 healthy patients. Choice A refers to “experts,” but the experts on the subject were conducting the experiment, not taking placebos as part of the test. Choice B refers to limitations rather than comparisons. Choice D refers to orders.

2. **Level:** Easy | **Domain:** CRAFT AND STRUCTURE

Skill/Knowledge: Words in Context

Key Explanation: Choice B is the best answer because the text is describing a trend among parasites: almost none are mammals. The blank portion is a noun that describes the vampire bat, which is a parasitic mammal. Choice B refers to something that does not follow the general rule, so perfectly describes a parasite that does not fit the usual pattern.

Distractor Explanations: Choice A is incorrect because it refers to a strange or unusual habit or characteristic that stands out, not to an object that does not fit a rule. Choice C is incorrect because it refers to something that is not the same shape or quality, such as sound or appearance. Choice D is incorrect because it refers to an individual preference that is unusual.

3. **Level:** Easy | **Domain:** CRAFT AND STRUCTURE

Skill/Knowledge: Words in Context

Key Explanation: Choice C is the best answer because C refers to the gradual amassing or acquisition of something. It fits the context of describing what aspect of bioactive compounds—in this case, nutrients—in vegetables is affected by salt stress. The sentence can be paraphrased by saying that salt changes the rate that bioactive compounds amass.

Distractor Explanation: None of the other choices fits the context of describing what aspect of biological compounds is affected by salt. Choice A refers to how well one focuses one’s thoughts, so it does not apply to inanimate things. Choice B also does not refer to inanimate things, as it describes the emotion of being committed to a purpose. Choice D is incorrect because it refers to bringing activities, not things, into one place under one form of control or leadership.

4. **Level:** Hard | **Domain:** CRAFT AND STRUCTURE

Skill/Knowledge: Text Structure and Purpose

Key Explanation: Choice A is the best answer because the sentence says that HEPHL1 regulates an enzyme that needs copper. Later, the passage points out that copper is related to Menkes disease. Therefore, the second sentence shows how HEPHL1 might be related: a change in copper changes how lysyl oxidase functions, and that would appear as the copper absorption issues in Menkes disease.

Distractor Explanation: Choice B is incorrect because the sentence does not refer to hair abnormalities or Menkes disease, only to

HEPHL1. **Choice C** is incorrect because the sentence refers to copper intake, but not iron intake. There is no discussion of whether an “imbalance” or “too much of one compared to the other” causes Menkes disease either. It is possible the syndrome can occur when they are in balance but at too low or high a dose. **Choice D** is incorrect because the second sentence does not relate to mice. It is possible that other creatures are better for study of Menkes disease.

5. **Level:** Medium | **Domain:** CRAFT AND STRUCTURE

Skill/Knowledge: Text Structure and Purpose

Key Explanation: **Choice B** is the best answer because the paragraph is outlining various potential problems to underwater habitats. The author indicates that there are many different potential problems, so “deep ocean habitats may be negatively affected.” The quotations come after this discussion and are preceded with “however,” which shows that they are a contradiction to the previous idea. Therefore, they are included to show the opposite side of the argument. They indicate that as yet, despite the author’s concerns, there has been no “elevated levels of mortality” or “evidence...of harm.”

Distractor Explanation: **Choice A** is incorrect because the claims made in the quote support the same idea: very little damage occurs to ocean creatures. Therefore, the views are not different from each other. **Choice C** is incorrect because “undermine” refers to weakening an argument. However, the quotes strengthen rather than weaken the idea that systems are safe. **Choice D** is incorrect because the conclusions oppose rather than strengthen the paragraph’s main claim that there are risks from tidal energy systems to aquatic habitats and creatures.

6. **Level:** Hard | **Domain:** CRAFT AND STRUCTURE

Skill/Knowledge: Text Structure and Purpose

Key Explanation: **Choice D** is the best answer because the author follows the phrases about extraterrestrial life with a question that asks how such life has changed from “sci-fi fairytale to a serious scientific endeavor.” The author is emphasizing the transition in how people perceive extraterrestrial life. In the past, it was viewed as something “impossible” or “not real,” and the phrases highlight that image. The phrases provide a strong contrast to the “credible” or “believable” nature of extraterrestrial life today, which the author summarizes in the concept that the search for life is “modeled by macroeconomists, funded by fiscal conservatives, and discussed by theologians.”

Distractor Explanation: **Choice A** is incorrect because the author never describes the appearance of extraterrestrial life. The phrases may evoke images, but they do not act as a contrast for the current beliefs about what life outside Earth might look like. **Choice B** is incorrect because the images evoked by the phrases are all theatrical forms of aliens. They do not necessarily reflect what scientists think actual extraterrestrial life might look like, and do not “encourage” or “suggest” that the reader think about anything other than the stereotypes. **Choice C** is incorrect because, while the phrases may be “lighthearted,” the purpose is not to make the reader laugh. The purpose is to emphasize the important point that the new view of extraterrestrial life is very serious compared to views of such life in the past.

7. **Level:** Medium | **Domain:** CRAFT AND STRUCTURE

Skill/Knowledge: Cross-Text Connections

Key Explanation: Choice D is the best answer that both authors would agree upon. The author of Text 1 says that there was a mass extinction at the end of the Cretaceous period, indicating that most species did not survive past that time: they died before the next period. The author of Text 2 says that there was no mass extinction, but that the “last major representatives liv[ed] to approximately the end of the Cretaceous period.” In other words, they died off slowly over time until the end of the period, and most did not live into the next period.

Distractor Explanations: Choice A is incorrect because the author of Text 1 says that a meteorite “triggered” or “caused” a mass extinction. Choice B is incorrect because the author of Text 2 does not say whether the Earth cooled or not; in addition, the author of Text 1 says that the change was enough to cause a mass extinction. Choice C is incorrect because Text 1 refers to a mass extinction.

8. **Level:** Medium | **Domain:** INFORMATION AND IDEAS

Skill/Knowledge: Central Ideas and Details

Key Explanation: Choice D is the best answer because Mother Jones says that the average wage is \$500 a year, but that “before you get a thing to eat there is \$20 is taken out a month,” presumably by the mine owners. Then the “pluck-me” stores, which are owned by the mine owners, take the remaining money for rent. Therefore, the wages are “insufficient” or “not high enough” because the mine owners have the policies of deducting wages and unfairly charging too much.

Distractor Explanation: Choice A is incorrect because the passage says that the “average wages

you fellows get in this country is \$500 a year,” which indicates that the wages of the miners Mother Jones is addressing is typical of the rest in the country. Choice B is incorrect because there is no indication that the wages are “periodically” or “sometimes” lowered or reduced; the problem is that the amount of money is not enough for expenses. Choice C is incorrect because there is no reference to the amount of money people earn in other jobs; it could be that miners earn more, but that their expenses are too high to survive.

9. **Level:** Medium | **Domain:** INFORMATION AND IDEAS

Skill/Knowledge: Central Ideas and Details

Key Explanation: Choice A is the best answer because, according to Sweeney, “The critical element” or “important point” of the study was that the researchers “were able to sustain measurements in this harsh environment as long as [they] have—both in the summer and the winter, in every year over the last 13 years.” In other words, the results of the study were “unique” or “one of a kind” because they relied on “measurements” or “data” that did not lack large blocks of time. No previous study had such complete data to work with: the Drake Passage data “is the densest ongoing time series in the Southern Ocean.”

Distractor Explanation: Choice B is incorrect because there is no discussion of what equipment or methods the scientists used to collect their data. They could have used very common tools. Choice C is incorrect because there is no evidence that previous studies did not “incorporate” or “use” chemical measurements. The only difference brought up is that the period of collection in the Drake Passage study was unbroken for 13 years. Choice D is incorrect because it is implied that

there have been other studies of the region. If the data set is “the densest,” then there is an implied comparison that there were other studies that had data that was not as dense.

10. **Level:** Hard | **Domain:** INFORMATION AND IDEAS

Skill/Knowledge: Command of Evidence
(Textual)

Key Explanation: **Choice A** is the best answer. The claim is that Dickenson “personifies books,” which means that she gives books the characteristics of living people. **Choice A** refers to “meeting” a book, like meeting a person, and that the book is “in the dress” or “wearing the clothes” of his time period, just like a person would.

Distractor Explanation: None of the other choices show books in a way that makes them seem like living creatures. **Choice B** only refers to what scholars are interested in, not the way books are. **Choice C** refers to time periods. **Choice D** is a weak choice because books are not mentioned; if “he” refers to a book, it could show that the book is familiar with facts from long ago. However, **Choice A** definitely refers to books having human qualities, so is a much better example of the claim.

11. **Level:** Medium | **Domain:** INFORMATION AND IDEAS

Skill/Knowledge: Command of Evidence
(Textual)

Key Explanation: **Choice C** is the best answer because Sagan’s quote is a warning that before assuming that there is life, “we will need to work hard to think of any non-biological process” that could explain “some features in the light spectrum that might be indicative of life.” **Choice C** is a case that Sagan would warn against because it

assumes that oxygen is caused by living creatures rather than considering and eliminating all other possible reasons that there may be oxygen present.

Distractor Explanation: **Choice A** is incorrect because it offers tangible proof of an organism rather than just guessing that there is life based on secondary signs. **Choice B** is incorrect because it shows that the scientist does not rashly assume that oxygen means there is life. Sagan would approve because the scientist indicates there are other options to explain the oxygen. **Choice D** is incorrect because it does not show that anyone is jumping to the conclusion that there is life before enough facts exist to prove that there is life.

12. **Level:** Medium | **Domain:** INFORMATION AND IDEAS

Skill/Knowledge: Command of Evidence
(Textual)

Key Explanation: **Choice D** is the best answer. The example should be one that shows that there are options for nurses other than working in hospitals; particularly, the example should relate to the aging population. **Choice D** focuses on a group of registered nurses who have such an occupation: they work in nursing homes or residential care facilities where seniors often live when their health declines.

Distractor Explanation: **Choice A** is incorrect because it refers to employment other than working in a hospital, but it does not address the question of an aging population. Nurses in education most likely work with younger people starting out in their careers. **Choice B** is incorrect because it is too vague. It lists two different careers, but does not say what percentage of nurses work in them or how they relate to an aging population. **Choice D** is incorrect because it does not convey the information from

the graph correctly. It refers to the percentage change in employment, but the graph refers to the percentage of the registered nurses employed at the time.

13. **Level:** Medium | **Domain:** INFORMATION AND IDEAS

Skill/Knowledge: Command of Evidence
(Quantitative)

Key Explanation: **Choice C** is the best answer because it uses data from the graph to accurately complete the text. The graph shows Gender-interest stereotypes were stronger than gender-ability stereotypes hence those who believed the stereotypes would be less interested in participating in any courses related to computer science or engineering.

Distractor Explanation: **Choice A** is incorrect because it doesn't accurately reflect the data from the graph. The graph indicates that girls who believed in the stereotypes would believe that they are less skilled but would also not be interested in participating in any courses related to computer science or engineering. The word "than" suggests that they more interested than skilled however the graph shows that gender-interest stereotypes were stronger than gender-ability stereotypes, meaning that they would be less interested than skilled and not less skilled than interested. **Choice B** is incorrect because it doesn't accurately reflect the data from the graph. The graph indicates that girls who believed in the stereotypes would believe that they are less skilled and not be interested in participating in any courses related to computer science or engineering. The word "equally" suggests that they interested and skilled at the same level however the graph shows that gender-interest stereotypes were stronger than gender-ability stereotypes, meaning that they would be less interested than skilled and not equally

interested and skilled. **Choice D** is incorrect because it doesn't accurately reflect the data from the graph. The graph indicates that gender-interest stereotypes were stronger than gender-ability stereotypes. Hence, girls who believed in the stereotypes would be less interested in participating in any courses related to computer science or engineering.

14. **Level:** Hard | **Domain:** INFORMATION AND IDEAS

Skill/Knowledge: Inferences

Key Explanation: **Choice B** is the best answer because Keel complains in the last sentence, "this decision will create two classes of Indian tribes: those who will benefit from Federal trust responsibility and those who will not." In other words, he feels that the decision has problems because some Native Americans qualify and some do not, so the "classes" or "groups" will be unequal in how they are treated.

Distractor Explanation: **Choice A** is incorrect because Keel does not explain how he felt about the original wording or how the policy varied from the original intent. **Choice C** is incorrect because the decision did not make any "new" methods or laws. It only restricted which groups of people the law applied to. **Choice D** is incorrect because "precedents" are legal cases that act as a guide for deciding future cases. The *Carcieri* decision, however, did not "facilitate" or "make easier" the process of "establishing" or "creating" tribal governments.

15. **Level:** Easy | **Domain:** INFORMATION AND IDEAS

Skill/Knowledge: Inferences

Key Explanation: **Choice B** is the best answer because the process of behavioral activation is described as beginning with simple activities to boost one's mood, such as taking a shower. As the patient improves, more advanced steps can be taken, such as improving in poor school subjects. "Incremental" refers to a series of additions, so accurately describes additional steps taken to alter behavior and feel better using new patterns or routines.

Distractor Explanation: **Choice A** is incorrect because patients are encouraged to do something positive even when they do not feel comfortable about doing it: "rather than waiting to feel better, the patient does things that align with personal values and that will lead to feeling better." **Choice C** is incorrect because the passage does not refer to solving the problems, only to doing positive steps to get out of a spiral of depression. **Choice D** is incorrect because behavioral activation focuses on a series of short-term goals, such as getting out of pajamas or taking a shower. The short-term goals may be aligned with a larger, long-term goal, but such a process is not discussed in the text.

16. **Level:** Easy | **Domain:** STANDARD ENGLISH CONVENTIONS

Skill/Knowledge: Form, Structure, and Sense

Key Explanation: **Choice B** is the best answer because it is a plural possessive form. It shows that the "use" is something of the "cowry shells."

Distractor Explanation: **Choice A** is incorrect because it is a singular possessive word, but "cowry shells" is plural. "Currency" is singular, but it is not the correct referent in the context because "cowry shells" are the subject of the sentence; "they" also give a clue to the proper pronoun.

Choice C is incorrect because it refers to a place rather than possession. **Choice D** is a contraction for "they are," which does not fit the grammatical structure preceding "use has declined."

17. **Level:** Easy | **Domain:** STANDARD ENGLISH CONVENTIONS

Skill/Knowledge: Form, Structure, and Sense

Key Explanation: **Choice A** is the best answer. "(or stratovolcano)" is another name for the composite formation of volcanoes, as shown by the "or." In other words, it is additional information describing the preceding item, "composite." Extra information in parentheses should be treated as part of the word it describes. In this case, there would be a comma after composite if there were no parentheses because it is part of a list joined by "and," so a comma should come after the parentheses.

Distractor Explanation: All of the other choices have incorrect punctuation for items in a list. For **Choice B**, items in parentheses are included as part of the word they describe, so they should not be divided into a separate item using a comma after "composite." **Choices C** and **D** are incorrect because items in a list should be followed by a comma, but "and" is not. **Choice C** is also missing a comma after "stratovolcano)" and **Choice D** erroneously places the first comma after "composite" rather than after "stratovolcano)".

18. **Level:** Easy | **Domain:** STANDARD ENGLISH CONVENTIONS

Skill/Knowledge: Form, Structure, and Sense

Key Explanation: **Choice B** is the best answer. The subject is the singular "Professor David Neumark," so a singular verb is needed for agreement.

Distractor Explanation: Choices A and D are incorrect because “in conjunction with Dr. William Wascher of the Federal Reserve Board” modifies “Professor David Neumark” rather than creates a verb with two people in it. Although it appears that a plural verb is needed, that is not the case. **Choice C** is incorrect because it is only a gerund rather than an active verb (such as “is dissenting,”) so the result is a fragment.

19. **Level:** Easy | **Domain:** STANDARD ENGLISH CONVENTIONS

Skill/Knowledge: Boundaries

Key Explanation: Choice C is the best answer. “People...granted” is the main idea, and “over...water” is another complete idea with a noun and verb. That idea is made secondary by the word “but.” A clause that is secondary needs to be separated from the main idea using a comma.

Distractor Explanation: It may appear that a semicolon is needed to separate ideas in a list, as there is a semicolon before “670 million.” However, **Choices A** and **B** are incorrect because a semicolon must be preceded and followed by complete ideas that can stand on their own. In **Choice A**, “but” is left hanging at the end of the preceding idea, and in **Choice B**, “but” creates a subordinate clause that can not stand alone. **Choice D** is incorrect because there should be a comma separating clauses from each other.

20. **Level:** Medium | **Domain:** STANDARD ENGLISH CONVENTIONS

Skill/Knowledge: Boundaries

Key Explanation: Choice A is the best answer. A pair of dashes can be used to add interesting but not essential information to a sentence. In

this case, the names of the crops are not required, but could help the reader know what other cereal crops there are.

Distractor Explanation: Choice B is incorrect because, while commas after “crops” and “sorghum” would also create an aside that describes “cereal crops,” there should be no comma after “rye.” That punctuation is because “rye and sorghum” forms a list of two items joined by “and,” and such a list should not have a comma before the “and.” **Choices C** and **D** are incorrect because “that” is the start of a relative clause that should not be divided from its noun with any punctuation. However, a single dash could otherwise be used after a main clause to add more information such as the names of the grains.

21. **Level:** Easy | **Domain:** STANDARD ENGLISH CONVENTIONS

Skill/Knowledge: Boundaries

Key Explanation: Choice A is the best answer. A series of nouns joined by “and” should have a comma following each noun. Since “Greenland” is one place on the list where Inuit people live, it should be followed by a comma. No other punctuation is needed.

Distractor Explanation: Choices B and C are incorrect because a colon should follow a complete clause, but the part preceding the colon cannot stand on its own as a sentence. “In” is left dangling. **Choice C** is also incorrect because there should be a comma after “Greenland.” **Choice D** is incorrect because the part before and after a semicolon should both be complete clauses, but the following portion has no subject or verb.

22. **Level:** Easy | **Domain:** STANDARD ENGLISH CONVENTIONS

Skill/Knowledge: Boundaries

Key Explanation: **Choice B** is the best answer because “According to Clark” is a modifier that refers to the main clause, “the neutral model... over time.” A modifier should be separated from the main clause with a comma. No other punctuation is needed in the underlined portion.

Distractor Explanation: **Choices A** and **C** are incorrect because a colon should follow a complete idea, but the portion preceding the colon cannot stand on its own as a sentence. **Choices A** and **D** are incorrect because “according to Clark” needs to be followed by a comma to separate it from the main clause. **Choice D** is also incorrect because there should not be a comma separating “predict” from its object, “that the variation would increase.”

23. **Level:** Easy | **Domain:** EXPRESSION OF IDEAS
Skill/Knowledge: Transitions

Key Explanation: **Choice C** is the best answer. The first sentence explains that some scientific fields overlap, and the following sentence gives a specific example of two fields that have points in common. **Choice C** is used to introduce an example or specific case of a general idea, so fits the context well.

Distractor Explanation: None of the other choices effectively shows that the following information is a particular case that is used to clarify the previous sentence. **Choice A** introduces an alternate possibility, not the same thing. **Choice B** shows that something happens despite something else, so provides an exception rather than a classic example. **Choice D** is used to introduce a summary or preference regarding the previous idea.

24. **Level:** Easy | **Domain:** EXPRESSION OF IDEAS
Skill/Knowledge: Transitions

Key Explanation: **Choice A** is the best answer.

The previous sentence explains that echolocation is highly developed in some species. The following sentence says that other species have echolocation, but it is in a “limited form” or “not developed much at all.” **Choice A** is used to qualify an earlier claim, so it fits the context of qualifying the idea that only a few animals have developed echolocation by saying that in reality, others also have it, albeit in a modified form.

Distractor Explanation: **Choices B** and **C** are used to show the logical result of an argument, so they do not effectively establish the relationship between ideas. A few species having limited echolocation is not necessarily a logical result of some species having echolocation. **Choice D** is used to introduce an idea that the reader might assume; in other words, the author feels it is obvious. However, it is probably not common knowledge that shrews and two bird species have modified echolocation.

25. **Level:** Easy | **Domain:** EXPRESSION OF IDEAS
Skill/Knowledge: Transitions

Key Explanation: **Choice A** is the best answer because it is used to establish a contrast between clauses in a sentence. In this case, it contrasts what “seems” or “appears” to be a large percentage with the much larger worldwide population. In other words, **Choice A** establishes that the percentage of bilingual speakers in the US is relatively small, as it is half that of the global average.

Distractor Explanation: None of the other choices effectively show the relationship between the first and second halves of the sentence.

Choices B and D are used to show a reason, but there is no reason given for why different populations are bilingual or not. Choice C is grammatically incorrect. Its meaning of “even though” fits the context, but “despite” should be followed by a noun or noun phrase rather than a clause starting with “that.”

26. **Level:** Medium | **Domain:** EXPRESSION OF IDEAS

Skill/Knowledge: Rhetorical Synthesis

Key Explanation: Choice B is the best answer. The question asks for an “underlying theme” in some of Maya Angelou’s books. In other words, it is asking for something that is similar to books that she wrote. The description of *I Know Why the Caged Bird Sings* says that it “reveals details about her private life up to the age of 17,” or “tells about her youth,” and the notes say that *Mom & Me & Mom* is about her relationship with her mother. In other words, both books tell about her personal life, which makes them “autobiographies.”

Distractor Explanation: Choice A is incorrect because, while it is true, it does not refer to a theme in books. Instead, it refers to a movie, *Down the Delta*. Choice C is incorrect because it also does not refer to a theme in books, only a theme in her life. There is no evidence that she actually wrote more than one unfinished book about world leaders. Choice D is incorrect because, while *I Know Why the Caged Bird Sings* was received well, there is no indication that her other books were received poorly or were not read by many people.

27. **Level:** Medium | **Domain:** EXPRESSION OF IDEAS

Skill/Knowledge: Rhetorical Synthesis

Key Explanation: Choice A is the best answer. The final bullet point refers to the fact that nimbo-form clouds “are the type that bring rain.” Therefore, they produce rain, but the others do not.

Distractor Explanation: Choice B is incorrect because there is no indication that nimbo-forms are larger than the other types. While they combine shapes, they could do so on a small scale. Choice C is incorrect because the notes state that nimbo-form combines the shapes of other clouds; therefore, they must have recognizable shapes that can be matched to other forms. Choice D is incorrect because the location of nimbo-form clouds is not given. In addition, cirro-forms are described as high.

1. **Level:** Medium | **Domain:** CRAFT AND STRUCTURE

Skill/Knowledge: Words in Context

Key Explanation: **Choice D** is the best answer because the blank shows the cane toad's relationship to South America. **Choice D** means "native to" a specific place, so fits the context of saying that the toad came from South America but was "transported" or "moved" to Australia.

Distractor Explanations: None of the other choices establishes the toad's relationship to South America. **Choices A** and **B** refer to an inborn or natural trait or characteristic, not a species. **Choice C** refers to an epidemic or wide-spread disease.

2. **Level:** Medium | **Domain:** CRAFT AND STRUCTURE

Skill/Knowledge: Words in Context

Key Explanation: **Choice B** is the best answer because the blank is used to describe the business opportunity promoters who get people to make "glowing—but bogus—recommendations." In other words, the sellers who find people to give fake good reviews. If the reviews are fake, they are dishonest. **Choice B** refers to something which is potentially dishonest or not completely legal, so accurately describes the sellers that do dishonest things.

Distractor Explanations: None of the other choices fits the context of describing a promoter who uses fraudulent methods to convince someone to buy a product. **Choice A** refers to something that does not have a clear answer. **Choice C** refers to something that is unlikely. **Choice D** refers to something that has not been decided or settled.

3. **Level:** Easy | **Domain:** CRAFT AND STRUCTURE

Skill/Knowledge: Words in Context

Key Explanation: **Choice B** is the best answer because "recognize" is what "we," the Union, could do to the new government of Louisiana that would make true the "converse" or "opposite" of the previous discussion of "discouraging and paralyzing" all the people. The previous discussion is about what happens if the Union does not support Louisiana. **Choice B** refers to welcoming or integrating something, in this case, Louisiana, so it fits the context of showing the opposite of rejecting Louisiana.

Distractor Explanations: None of the other choices show the opposite of rejection. **Choice A** refers to indicating what something is or naming it. **Choice C** refers to either fully understanding something or achieving a goal. **Choice D** refers to knowing the value of something.

4. **Level:** Medium | **Domain:** CRAFT AND STRUCTURE

Skill/Knowledge: Text Structure and Purpose

Key Explanation: **Choice A** is the best answer because the reference to the seven-day period is followed by, "Use that time to check out the information in the disclosure document, including contacting references." Therefore, the information about the length of time is given to show that buyers have a full week to research the purchase before agreeing to it.

Distractor Explanations: **Choice B** is incorrect because the author does not give any indication that the amount of time is too short. The time is mentioned to show that one even has leeway to contact references. **Choice C** is incorrect because

the author suggests using the time to check all the information, not just the references. There is no indication that finding honest references is more time-consuming than any of the other portions.

Choice D is incorrect because sellers “secure” or “get” bogus recommendations because they want their company to sound good. They do not do it only because of a seven-day period before signing.

5. **Level:** Easy | **Domain:** CRAFT AND STRUCTURE

Skill/Knowledge: Text Structure and Purpose

Key Explanation: **Choice C** is the best answer because the result of the experiment is that “flames can ignite at extremely low temperatures.” More specifically, the flames “can burn at 900 degrees in the International Space Station.” That piece of information is not very helpful to the average reader, so the author gives a reference that the reader most likely knows, the temperature of something in a house on Earth. The reader can then see that the flame can burn at a third the temperature as one on Earth.

Distractor Explanations: **Choice A** is incorrect because “motivation” is a “reason” or “goal.” The goal is not a fact about gas stoves on Earth; the goal is described in the second sentence, “to gain valuable insight into the mechanisms of fire.”

Choice B is incorrect because “methodology” is the series of steps taken to perform an experiment. However, there is no indication of how the scientists lit flames in space. **Choice D** is incorrect because the underlined portion shows what happens on Earth, not in the experiments on the International Space Station.

6. **Level:** Hard | **Domain:** CRAFT AND STRUCTURE

Skill/Knowledge: Text Structure and Purpose

Key Explanation: **Choice A** is the best answer because the text “contrasts” or “shows the difference” between two different things: the busy street below and the bright star above.

Distractor Explanations: **Choice B** is incorrect because the passage does not say that any actions are “futile” or “useless.” The busy street image is hectic, but there is no claim that it has no point. **Choice C** is incorrect because there is no “problem” or “concern to be solved,” and hence, there is also no solution or remedy in the text. **Choice D** is incorrect because while a star or street could be a metaphor, there is no hint about what they might represent in the text.

7. **Level:** Easy | **Domain:** INFORMATION AND IDEAS

Skill/Knowledge: Central Ideas and Details

Key Explanation: **Choice B** is the best answer because the text describes the photograph of Anthony’s family, explaining their “appearance” or “how they looked.”

Distractor Explanation: **Choice A** is incorrect because the passage is written from the point of view of a third-person narrator. Anthony does not “reminisce” or “nostalgically talk about” the people in the picture. **Choice C** is incorrect because, while the characters might be “aristocrats” or “upper class,” the passage does not focus on the “achievements” or “successes” of the characters. **Choice D** is incorrect because, while the mother’s death might be called “tragic” or “sad,” the cause of her death is not “revealed” or “shown.”

8. **Level:** Easy | **Domain:** INFORMATION AND IDEAS

Skill/Knowledge: Central Ideas and Details

Key Explanation: Choice C is the best answer. The next-to-the-last sentence explains that Gorgas “tirelessly” or “did not stop,” in other words, was zealous about his “duties” or “tasks,” which involved overseeing “the efforts to keep the work crews healthy.”

Distractor Explanation: Choice A is incorrect because Stevens, not Gorgas, invented new equipment. Choice B is incorrect because there is no indication that Gorgas was a doctor, only a sanitation engineer. Choice D is incorrect because the passage does not say the details of building cities for the workers; someone else might have done any necessary surveying.

9. **Level:** Medium | **Domain:** INFORMATION AND IDEAS

Skill/Knowledge: Central Ideas and Details

Key Explanation: Choice B is the best answer because the passage says he was “fortunate in that respect,” meaning that he was lucky in becoming “a household name” or “really famous” because “fans celebrated his triumphs against the background of news from World War I and the 1918 influenza pandemic.” In other words, fans liked his “triumphs” or “successes” as a contrast to the “grim” or “bad” times of a war and pandemic.

Distractor Explanations: Choice A is incorrect because the passage says that he started as a pitcher, but became famous when he was “an outfielder and powerful batter.” Therefore, his fame was not because of his pitching. Choices C and D are incorrect because the passage only refers to the se events as the “background” of Ruth’s “triumphs” or “successes.” There is no discussion whether he participated in them or not.

10. **Level:** Hard | **Domain:** INFORMATION AND IDEAS

Skill/Knowledge: Command of Evidence (Textual)

Key Explanation: Choice D is the best answer because the text is discussing the extreme temperatures on Mercury. The transition “in fact” is used to emphasize a point, and in this case, the blank portion needs to emphasize the previous idea of nights being cold. Choice D effectively does that by showing that despite the hot days, there may still be ice on the planet.

Distractor Explanations: All of the other choices can be eliminated because they offer a point that is off the topic of temperature and cold. Choice A refers to the orbit, Choice B to the speed, and Choice C to the size and appearance

11. **Level:** Easy | **Domain:** INFORMATION AND IDEAS

Skill/Knowledge: Command of Evidence (Textual)

Key Explanation: Choice A is the best answer because the graph shows that the median income for state government employees is slightly under the \$80,000 mark, at about \$75,000. The median income for local government employees is closer to \$70,000, which is halfway between the \$60,000 and \$80,000 lines. Therefore, the median income for state government employees is “higher” or “larger” than that for local government employees.

Distractor Explanation: All of the other choices can be eliminated because they are not supported by the data from the graph. Choices B and C are incorrect because “architectural, engineering, and related fields” at just under \$80,000 is lower, not

greater, than for “federal government employees” at just under \$100,000. **Choice D** is incorrect because “management, scientific, and technical consulting service” is slightly higher than for “local government,” though both are between \$60,000 and \$80,000.

12. **Level:** Medium | **Domain:** INFORMATION AND IDEAS

Skill/Knowledge: Command of Evidence (Quantitative)

Key Explanation: **Choice D** is the best answer because the total average of the bar chart values across the 5 species of frogs equates to approximately 90% ($15 \times 94 + 3 \times 64 + 4 \times 70 + 8 \times 88 + 10 \times 100$) / $(15 + 3 + 4 + 8 + 10)$. The total average can be estimated by looking at the graph without doing the math.

Distractor Explanation: **Choice A** is incorrect because More than 65% of the swallowed beetles survived. **Choice B** is incorrect because more than 50% of the swallowed beetles survived. **Choice C** is incorrect because the results of study was does not use time as variable.

13. **Level:** Medium | **Domain:** INFORMATION AND IDEAS

Skill/Knowledge: Inferences

Key Explanation: **Choice D** is the best answer because the narrator says that the simple sailors breathe the fresh air first, and that the captain “thinks he breathes it first; but not so.” The comparison is expanded to say that “In much the same way do the commonalty lead their leaders in many other things, at the same time that the leaders little suspect it.” In other words, he is implying that the captain feels he has power, but

really the sailors have influence and can lead or have control about many things in a quiet way.

Distractor Explanation: All of the other choices can be eliminated because they are not supported by any evidence from the passage. For **Choice A**, there is no reference to how captains get appointed. For **Choice B**, the comment that they breathe second-hand air implies that captains do not deserve as much respect as they think they do. For **Choice C**, there is no evidence that captains do not understand the needs of sailors. They order sailors about, but they still could take care of sailors well.

14. **Level:** Hard | **Domain:** INFORMATION AND IDEAS

Skill/Knowledge: Inferences

Key Explanation: **Choice C** is the best answer. The text points out that Venus is warm because it has a “giant blanket” of an atmosphere with so much carbon dioxide holding in the heat. If Mercury had such a blanket, then it would also hold in heat due to the greenhouse effect. Therefore, Mercury probably has less carbon dioxide, which is why it is less hot in general than Venus is, even though Mercury is closer to the Sun.

Distractor Explanations: **Choice A** is incorrect because Mercury could have some sulfuric acid in the atmosphere, though it presumably does not have as much as Venus, which is reflective and brighter because of the acid. **Choice B** is incorrect because “never” is too absolute. The passage only says that Venus is “generally hotter,” which means that it can sometimes be less hot than Mercury. Plus, the “average” or “middle” temperature is 462 degrees Celsius, so it is possible that Mercury is sometimes hotter than that. **Choice D** is not

discussed in the passage; it could be possible to locate Mercury easily. The passage only says that Venus is brighter.

15. **Level:** Medium | **Domain:** STANDARD
ENGLISH CONVENTIONS

Skill/Knowledge: Form, Structure, and Sense

Key Explanation: Choice B is the best answer.

“Where” is used to start a clause that describes a place, so it fits the context of adding detail about coffee being the leading cash crop in the place of Uganda.

Distractor Explanation: Choices A and D are incorrect because they create run-on sentences that join two independent clauses that can stand on their own as sentences. Choice C is incorrect because “which” starts a clause that refers to the preceding noun. However, the place of “Uganda” is not a leading cash crop. Instead, coffee is a cash crop in Uganda.

16. **Level:** Medium | **Domain:** STANDARD
ENGLISH CONVENTIONS

Skill/Knowledge: Form, Structure, and Sense

Key Explanation: Choice D is the best answer. “A classic image of colonial cooperation” is a modifier that needs to describe the noun that follows it.

Choice D accurately shows that the image of cooperation refers to quilting bees.

Distractor Explanation: All of the other choices can be eliminated because the modifier “A classic image of colonial cooperation” refers to something illogical. In Choice A, it refers to a diary, but a diary is a personal account rather than a classic example of cooperating with other people.

Choices B and C are incorrect because the subject

is Martha Ballard, who is an individual person rather than an image of cooperation.

17. **Level:** Medium | **Domain:** STANDARD
ENGLISH CONVENTIONS

Skill/Knowledge: Form, Structure, and Sense

Key Explanation: Choice D is the best answer.

When a quote is used as part of a sentence rather than a complete clause, it is only identified with quotation marks. While “said” is followed by a comma and the first word of the quotes is capitalized, in this case, “that” makes the quote part of the sentence itself.

Distractor Explanation: Choice A is incorrect because a comma and capitalization are used after a reporting verb such as “said,” not as part of a clause starting with “that.” Choice B is incorrect because a colon should come after a complete clause, but “that” is left dangling. Choice C is incorrect because “is attributed as” is followed by a noun or gerund (the -ing form of a verb) rather than a complete clause with subject or verb.

18. **Level:** Medium | **Domain:** STANDARD
ENGLISH CONVENTIONS

Skill/Knowledge: Form, Structure, and Sense

Key Explanation: Choice C is the best answer. An s followed by an apostrophe is the correct way to indicate a plural possessive. It correctly shows that the efforts were made by more than one volunteer.

Distractor Explanation: Choice A is incorrect because “volunteers” is a plural noun that does not show any possession. Choices A and D are incorrect because “efforts” does not possess anything in the sentence, so should not have an apostrophe. Choice B is incorrect because an apostrophe followed by an s is the way to show

possession of a singular thing, but the efforts span 125 years, so were done by more than one volunteer.

19. **Level:** Medium | **Domain:** STANDARD ENGLISH CONVENTIONS
Skill/Knowledge: Boundaries

Key Explanation: **Choice A** is the best answer. “Sacrificed XX for YY” is a standard idiom that refers to doing something at the expense of something else. No punctuation is needed.

Distractor Explanation: **Choices B** and **D** are incorrect because “accuracy” is the object of “sacrificed;” “for eloquence” is the reason that accuracy was given up. However, dashes and parentheses are used to indicate additional information that is not part of the main clause, so they erroneously divide the object from its verb. **Choice C** is incorrect because a colon should not divide essential parts of the sentence from the main clause. In this case, the portion after the colon is necessary for correct understanding of what Longfellow did.

20. **Level:** Easy | **Domain:** STANDARD ENGLISH CONVENTIONS
Skill/Knowledge: Boundaries

Key Explanation: **Choice D** is the best answer. The ideas in the preceding and following portions are complete clauses that can stand on their own as sentences, so should be divided by a period and a capital letter “t”.

Distractor Explanation: **Choice A** is incorrect because a semicolon should be preceded and followed by a complete clause that can stand on

its own, but “and” subordinates the following portion. The second part cannot stand on its own. **Choice B** is incorrect because “because” subordinates the following portion, which cannot stand on its own as a sentence. **Choice C** is incorrect because it is a comma splice between two clauses that can each stand on their own.

21. **Level:** Medium | **Domain:** STANDARD ENGLISH CONVENTIONS
Skill/Knowledge: Boundaries

Key Explanation: **Choice B** is the best answer. The portions before and after the punctuation are both independent clauses, meaning that they could both stand on their own as sentences. Therefore, they should be joined by a semicolon or a period, which is not a given choice.

Distractor Explanation: **Choice A** is incorrect because it creates a comma splice. **Choice C** is incorrect because a colon is used to add more information clarifying the clause before the colon. In this case, the preceding portion is about low levels of inflation, but the following portion introduces a different topic, high levels of inflation. **Choice D** is incorrect because it is a run-on.

22. **Level:** Easy | **Domain:** EXPRESSION OF IDEAS
Skill/Knowledge: Transitions

Key Explanation: **Choice B** is the best answer. The first sentence explains that Tingatinga’s career was very short. The second sentence offers a contrast: he was one of the most important painters in modern Africa. **Choice B** is used to show that despite one thing happening, another is true. It therefore fits the context of saying that despite the short career, Tingatinga made a great impact.

Distractor Explanation: None of the other choices establishes a contrast between the preceding and following ideas. **Choice A** is used to introduce a logical result of the previous claim, but it is more logical to expect little impact from a short career. **Choices C** and **D** are both used to add more detail to clarify the same topic rather than change tone to something unexpected.

23. **Level:** Easy | **Domain:** EXPRESSION OF IDEAS
Skill/Knowledge: Transitions

Key Explanation: **Choice D** is the best answer. The passage describes two types of search and rescue dog, and the blank is the point at which the topic changes from one type to the other, from air scent to tracking. **Choice D** is used to show that the following method is an “alternate” or “different” case, so it fits the context of introducing a second method.

Distractor Explanation: None of the other choices shows that the following information is the second of two possible methods. **Choice A** is used to add another point to continue an argument. **Choice B** is used to add specific detail clarifying a general statement. **Choice C** is used to add a qualification or restriction to a previous claim.

24. **Level:** Easy | **Domain:** EXPRESSION OF IDEAS
Skill/Knowledge: Transitions

Key Explanation: **Choice D** is the best answer. The previous sentence describes the price of “monthly expenses” as being over \$35. The following sentence describes the “upkeep” or “ongoing expenses,” which are the same thing, but uses a different way to express the money: it discusses what alternate things a person could buy, lattes. **Choice D** is used to rephrase or introduce

an idea in different words, so effectively shows that the following is a different way of looking at the figures in the previous sentence.

Distractor Explanation: **Choice A** is incorrect because it is used to show a contrasting or opposite idea, not rephrase the same point. **Choice B** is used to show that something happens in spite of something else, which does not fit the discussion of equivalent concepts. **Choice C** is used to add more to the same argument, so in the context, would be used to add a new type of expense in caring for tropical fish.

25. **Level:** Medium | **Domain:** EXPRESSION OF IDEAS
Skill/Knowledge: Rhetorical Synthesis

Key Explanation: **Choice D** is the best answer. It gives three valuable contributions that Lovelace made to the field of mathematics: she explained the computer, created programs, and devised uses for it. Therefore, she added to the field in specific and important ways. Creating programs and devising uses, in particular, show the need to manipulate math in order to accomplish certain goals.

Distractor Explanation: **Choice A** is incorrect because it only says that Lovelace “explained” or “talked about” the machine. Though that was one valuable addition to help spread information about what it was, on its own that does not show she made mathematical contributions. **Choice B** is incorrect because, while Lovelace wrote a program, the notes do not say that Babbage could not write them himself. It is possible that his computer would have worked without her help, but that she expanded on what it could do. **Choice C** is incorrect because Babbage was not Lovelace’s tutor, he was introduced by her tutor. Furthermore, the notes do not say that she

exceeded his abilities using it, only that she came up with different uses for it.

26. **Level:** Medium | **Domain:** EXPRESSION OF IDEAS

Skill/Knowledge: Rhetorical Synthesis

Key Explanation: **Choice B** is the best answer. The notes state that Tingatinga started painting in 1968 and died in 1972, a period of four years. However, his art was “appealing” or “attractive” enough that “an art movement was named after his unique style” and students “continue to paint using his style” even now.

Distractor Explanation: **Choice A** is incorrect because, while Tingatinga used recycled materials and started a movement, there is no indication that his followers also use recycled materials. His students paint in his style, but they do not represent a “wide range” of other artists, which would include artists in different media or styles. **Choice C** is incorrect because the notes say his artwork, which was of animals and landscapes, was popular among tourists, but not necessarily the “most” popular. The notes also say that his gallery sells works by the students, but not that “his original” or “his own” artworks are still being sold. **Choice D** is incorrect because the passage says that students made pictures “in his style,” but not that they “copied” or “made exact replicas” of the works that Tingatinga did.

27. **Level:** Hard | **Domain:** EXPRESSION OF IDEAS

Skill/Knowledge: Rhetorical Synthesis

Key Explanation: **Choice C** is the best answer. The assertion in the passage is that Yellowstone is a supervolcano. The reader might question that claim by saying that there is no peak, but the passage addresses that question by explaining why

none can be seen: the space where the magma had been collapsed, so the ground dropped down into a caldera or crater.

Distractor Explanation: None of the other choices addresses a counter argument about the park being a supervolcano. **Choices A** and **B** provide more detail about the eruptions, but does not show that the author recognizes that the reader might doubt the claim that there is a supervolcano. **Choice C** expands the discussion to a different area than the park rather than answer a question about the park.

This page is intentionally left blank

1. **Level:** Medium | **Domain:** GEOMETRY AND TRIGONOMETRY

Skill/Knowledge: Circles | **Testing point:**

Working with transformations and the equation of a circle

Key Explanation: Choice C is correct. The equation of a circle is given by $(x - h)^2 + (y - k)^2 = r^2$, where (h, k) is the center of the circle. In the initial equation, the center of the circle is $(3, -6)$ and in the transformed equation, the center of the circle is $(2, -4)$. To compare the equations, the equation of the second circle must be put into standard form by completing the square as shown below.

$$(x - 2)^2 + y^2 + 8y = 33$$

$$(x - 2)^2 + y^2 + 8y + 16 = 33 + 16$$

$$(x - 2)^2 + (y + 4)^2 = 33 + 16$$

$$(x - 2)^2 + (y + 4)^2 = 49,$$

This yields $(2, -4)$ as the center of the transformed circle.

Therefore, the transformation will be 1 to the left as the x coordinate moves from 3 to 2 and 2 up as the y coordinate moves from -6 to -4 .

Distractor Explanation: Choice A is incorrect because the x coordinate moves to the left rather than to the right. This answer may have been incorrectly selected if the student misinterpreted the standard form for the equation of a circle and thought that the x -coordinates of the centers of the circles are -3 and -2 . Choice B is incorrect. This answer may have been incorrectly selected if the student assumed that the centers were $(-3, 6)$ and $(-2, 4)$ through misinterpretation of the standard form of the equation of a circle and/or through completing the square incorrectly. Choice D is incorrect and may have been incorrectly selected by not completing the square correctly or incorrectly interpreting the center values in the standard equation for a circle

2. **Level:** Hard | **Domain:** ADVANCED MATH
Skill/Knowledge: Nonlinear equations in one variable and systems of equations in two variables

Testing point: How many solutions does an equation have

Key Explanation: Choice B is correct. To solve this equation, first, use the foiling method to expand the left side of the equation and use the distributive property to expand the right side of the equation. Then combine like terms and solve the resulting linear equation as follows:

$$(x - 1)(x + 2) = x(x - 3)$$

$$x^2 - x + 2x - 2 = x^2 - 3x$$

$$x - 2 = -3x$$

$$4x = 2$$

$$x = \frac{1}{2} \text{ or } 0.5$$

This shows that the equation has only one solution.

Distractor Explanation: Choices A and C are incorrect. These answers may be arrived at due to math miscalculations or conceptual errors. Choice D is incorrect. This answer may be arrived at if the student chooses to simply equate each parentheses to zero and finds $1, -2, 0,$ and 3 as the solutions.

3. **Level:** Easy | **Domain:** Algebra
Skill/Knowledge: Linear equations in one variable
Testing point: Solving equations of one variable

Key Explanation: For a system of equations to have an infinite number of solutions, it means that the equations are identical and have the same slope and y -intercept.

The first step is to use the distributive property to multiply out the terms on the left side of the equation, resulting in:

$$3x - 18 - 2x - 4 = px - 5x - 22a$$

Combining like terms yields:

$$x - 22 = px - 5x - 22$$

Adding $5x$ to both sides yields:

$$6x - 22 = px - 22p$$

Therefore p is equal to 6.

4. **Level:** Easy | **Domain:** ADVANCED MATH
Skill/Knowledge: Nonlinear functions | **Testing point:** Determining the meaning in context with exponential equations

Key Explanation: Choice C is correct. The format for an exponential growth equation is:

$$\text{Initial value} \times (1 + \text{growth rate as a decimal})^x$$

The growth factor of the weeds on the farm is defined by $1 +$ the growth rate r .

Therefore,

$$1 + r = 1.995 \\ r = 0.995 \text{ or } 99.5\%$$

which would then make choice C correct.

Distractor Explanation: Choice A is incorrect. The number of weeds on the farm, at the beginning, known as the initial value, was 1,300. Choice B is incorrect. This choice implies that the model is linear. However, the model is exponential. Choice D is incorrect because it implies that the model is linear and that 1,300 is the increase in weeds every x weeks, however, it is the initial number of weeds on the farm.

5. **Level:** Easy | **Domain:** ADVANCED MATH
Skill/Knowledge: Equivalent expressions | **Testing point:** Binomial expressions

Key Explanation: Choice A is correct. To solve this problem, first, use the exponent rules to combine both binomials in parentheses with one exponent. $((x - 2)(x + 2))^2$ using the identity $(a + b)(a - b) = a^2 - b^2$, $(x - 2)(x + 2)$ can be simplified to $(x^2 - 4)$ and that would simplify to

$$(x^2 - 4)^2.$$

Using the identity $(a - b)^2 = a^2 - 2ab + b^2$ the problem can be simplified to $(x^2 - 4)^2 = x^4 - 8x^2 + 16$, making Choice A the right option.

Distractor Explanation: Choice B is incorrect. This answer choice may be arrived at due to a common exponent conceptual error. Choice C is incorrect as this answer choice may be due to a miscalculation of $8x$ as positive. Choice D is incorrect due to both exponent conceptual and miscalculation errors.

6. **Level:** Easy | **Domain:** PROBLEM-SOLVING AND DATA ANALYSIS
Skill/Knowledge: One-variable data: distributions and measures of center and spread | **Testing point:** Finding mean and median of grouped data

Key Explanation: To calculate the median of the 27 foods, look for the middle number frequency wise of the data. If there are 27 items then the middle number is the 14th food which, based on the frequency table, has 180 calories. To find the mean number of calories, use the mean formula which can be found by taking the total number of calories divided by the number of food items. To find the total number of calories multiply each calorie content number in the table by its frequency, as follows:

$$(100 \times 6) + (180 \times 9) + (280 \times 11) + (350 \times 1) = 5,650 / 27 = 209.3.$$

Therefore the difference of the mean and median of the calorie content of the 27 foods would be $209.3 - 180 = 29.3$.

7. **Level:** Medium | **Domain:** ADVANCED MATH
Skill/Knowledge: Nonlinear functions | **Testing point:** Finding the x -intercept

Key Explanation: Choice C is correct. The x -intercept is found when $y = 0$, therefore:

$$x = 3^{0-1} + \frac{5}{3}$$

$$x = 3^{-1} + \frac{5}{3}$$

$$x = \frac{1}{3} + \frac{5}{3}, \text{ which makes } x = 2 \text{ making Choice C}$$

correct.

Distractor Explanation: Choice A is incorrect. The student might incorrectly think this equation is linear and therefore the $\frac{5}{3}$ represents the y -intercept. However, this is not the case. Also, the question has asked for the x -intercept. Choices B and D are incorrect and would be due to a conceptual or miscalculation error.

8. **Level:** Hard | **Domain:** PROBLEM-SOLVING AND DATA ANALYSIS
Skill/Knowledge: Inferences from sample statistics and margin of error |
Testing point: Generalization of data from surveys

Key Explanation: Choice D is correct. $100\% - 80\%$ (who think statistics is the hardest subject) $= 20\%$ (who chose Physics as the hardest subject). Since only 11th graders in the math summer class were surveyed the data can only be generalized to the 11th graders in the math summer class. This then makes option D, the best option.

Distractor Explanation: Choice A is incorrect. It generalizes the survey to all students in the summer math class. Choices B and C are incorrect. They contradict the given information.

9. **Level:** Easy | **Domain:** ADVANCED MATH
Skill/Knowledge: Equivalent expressions |
Testing point: Manipulating quadratic equations

Key Explanation: First, expand out $(x + 3)^2$ to $(x + 3) \times (x + 3)$. Using the foiling method, multiply out the two binomial terms to get the following:

$$-3(x^2 + 6x + 9) + 9 + x = ax^2 + bx + c$$

Use the distributive property to expand out the left side of the equation and then combine like terms to get the following: $-3x^2 - 17x - 18 = ax^2 + bx + c$
 Therefore $a = -3$, $b = -17$ and $c = -18$; $a + b + c = -3 + -17 + -18 = -38$

10. **Level:** Hard | **Domain:** ADVANCED MATH
Skill/Knowledge: Nonlinear functions | **Testing point:** Vertex form of a quadratic equation

Key Explanation: Choice B is correct. The maximum point of a quadratic equation is the vertex. Therefore, $(3, 2)$ is the vertex of the parabola. The vertex form of a parabola is given by $a(x - h)^2 + k$, where (h, k) is the vertex of the parabola. This equation can be used to find the equation for a parabola. Therefore, $y = a(x - 3)^2 + 2$. The quadratic equation passes through the point $(2, 0)$. Plugging this point into the vertex form equation for x and y yields

$$0 = a(2 - 3)^2 + 2$$

$$0 = a + 2$$

$$a = -2$$

$$y = -2(x - 3)^2 + 2$$

If x is a solution to the quadratic equation, y must equal zero. Plugging in the answer choices into the

vertex form equation is the fastest method. **Choice B** is the only answer that works. $0 = -2(4 - 3)2 + 2$ and thus $0 = 0$ results.

Distractor Explanation: Choice A is incorrect. This is the value of a in the vertex form of a parabola equation. However, this option can also be a miscalculation. **Choice C** is incorrect. This is the y -intercept of the equation. **Choice D** is incorrect. This can be the result of a conceptual or miscalculation error.

11. **Level:** Easy | **Domain:** ALGEBRA

Skill/Knowledge: Linear functions | **Testing**

point: Finding the slope of a line given two points

Key Explanation: Choice C is correct. To find the

slope of a line, the formula $\frac{y_2 - y_1}{x_2 - x_1}$ is used.

Plugging in the x and y coordinates of the two given points $(0, 0)$ and $(3, 5)$ into the slope

equation yields $\frac{5 - 0}{3 - 0} = \frac{5}{3}$

Distractor Explanation: Choice A is incorrect and was determined by finding the change in x over the change in y instead of the change in y over the change in x . **Choices B** and **D** are incorrect and were the result of either miscalculation or conceptual errors.

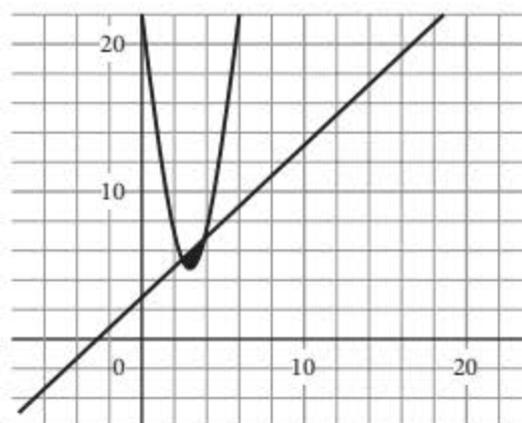
12. **Level:** Hard | **Domain:** ADVANCED MATH

Skill/Knowledge: Nonlinear equations in one

variable and systems of equations in two variables

Testing point: System of linear and quadratic inequalities

Key Explanation: Choice D is correct. To solve this problem, graph the system.



The solution for the system will be the region that is shaded. The minimum value of b can then be found by finding the vertex of the parabola $y = 2(x - 3)^2 + 5$. The vertex form of a parabola is given by $y = a(x - h)^2 + k$. Therefore, the vertex of the parabola is $(3, 5)$. The minimum y value of a concave up parabola can be found at the vertex. Therefore, the minimum value of b is 5.

Distractor Explanation: Choice A is incorrect.

It is the minimum value of the system of inequalities. **Choices B** and **C** are incorrect. These answers would be the value of a and b if the vertex was incorrectly found to be $(-3, -5)$.

13. **Level:** Easy | **Domain:** GEOMETRY AND TRIGONOMETRY

Skill/Knowledge: Area and volume | **Testing**

point: Volume of a sphere

Key Explanation: The volume of a sphere is found

using the formula $\frac{4}{3}\pi r^3 = \frac{4}{3}(3)^3\pi = 36\pi$

14. **Level:** Easy | **Domain:** ALGEBRA

Skill/Knowledge: Systems of two linear equations in two variables | **Testing point:** Systems of equations with no solution

Key Explanation: Choice A is correct. For a system of equations to have no solution, the system represents parallel lines with the same slope but different y -intercepts.

$$3x - 4y = 8$$

$$px + 8y = -6$$

To easily compare the slopes, the equations should be put into the slope-intercept form of a line $y = mx + b$ where m is the slope. By mathematical manipulation, doing this yields the equations:

$$y = \frac{3}{4}x - 2$$

$$y = \frac{p}{8}x - \frac{3}{4}$$

Since parallel lines have the same slope, the

equation $\frac{-p}{8} = \frac{3}{4}$ can be solved by p . Multiplying

both sides of the equation by -8 yields $p = -6$,

Choice A.

Distractor Explanation: Choices B, C, and D are incorrect. They would make the system of equations incorrectly have 1 solution. These answer choices are determined by mathematical miscalculations or conceptual errors.

15. **Level:** Easy | **Domain:** GEOMETRY AND TRIGONOMETRY

Skill/Knowledge: Circles | **Testing point:** Equation of a circle

Key Explanation: Choice D is correct. To find the center of the circle, we have to write the equation of the circle in its standard form $(x - h)^2 + (y - k)^2 = r^2$. This is done by completing the square for the

x 's and the y 's in the equation.

$$x^2 + 6x + 9 + y^2 - 6y + 9 = 63 + 9 + 9$$

$$(x + 3)^2 + (y - 3)^2 = 81$$

This then gives the center of the circle as $(-3, 3)$.

Distractor Explanation: Choice A is incorrect.

This is the negative of the center of the equation of the circle.

Choices B and C are incorrect. They can be determined by incorrectly picking the coefficients of x and y without writing the equation in standard form.

16. **Level:** Hard | **Domain:** ADVANCED MATH

Skill/Knowledge: Nonlinear equations in one variable and systems of equations in two variables
Testing point: Solving quadratic equations using the quadratic formula

Key Explanation: This quadratic equation can be solved using the quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}, \text{ where } a = 3 \text{ and } b = -6 \text{ and}$$

$$c = -11.$$

Therefore:

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(3)(-11)}}{2(3)}$$

$$x = \frac{6 \pm \sqrt{36 + 132}}{6}$$

$$x = \frac{6 \pm \sqrt{168}}{6}$$

$$x = \frac{6 \pm \sqrt{42\sqrt{4}}}{6}$$

$$x = \frac{6 \pm 2\sqrt{42}}{6}$$

$$x = \frac{3 \pm \sqrt{42}}{3}$$

Therefore $g = 42$.

17. **Level:** Easy | **Domain:** ALGEBRA

Skill/Knowledge: Linear inequalities in one or two variables | **Testing point:** Solving linear inequalities

Key Explanation: **Choice B** is correct. To solve the inequality, add x to both sides of the inequality.

$$-2x + x \geq -4 - x + x$$

$-x \geq -4$, Next, divide both sides of the equation by -1 which flips the inequality sign.

$x \leq 4$, Only 5 is not less than 4.

Distractor Explanation: **Choice A** is incorrect as it is a solution to the inequality. $-4 = -4$.

Choice C is incorrect as it is also a solution to the inequality $3 \leq 4$. **Choice D** is incorrect as $2 \leq 4$ and is therefore also a solution to the above inequality.

18. **Level:** Easy | **Domain:** ADVANCED MATH

Skill/Knowledge: Nonlinear equations in one variable and systems of equations in two variables
Testing point: Solving square root equations

Key Explanation: **Choice B** is correct. The problem can be solved in 2 ways. The easiest and quickest way is to just substitute the answer choices and test to see which answer makes the equation true.

Substitute **Choice A**.

$$\sqrt{2(2)+5} = 2-5$$

$$\sqrt{9} = -3,$$

This isn't true. Substitute **Choice B**.

$$\sqrt{2(10)+5} = 10-5$$

$$\sqrt{20+5} = 10-5$$

$$\sqrt{25} = 5$$

This makes **Choice B** the only right option.

Distractor Explanation: **Choice A** is incorrect mathematically as shown above. **Choice C** is incorrect as it incorrectly states that 2 is one of the solutions. **Choice D** is incorrect. It can be due to a miscalculation error.

19. **Level:** Hard | **Domain:** ALGEBRA

Skill/Knowledge: Systems of two linear equations in two variables | **Testing point:** Solving simultaneous equations

Key Explanation: Cross multiplying $\frac{5}{x} = \frac{2}{y}$ yields

$$5y = 2x$$

The next step is to get the two terms on the left side of the second equation of the same common denominator of xy as follows:

$$\frac{4}{x} \times \left(\frac{y}{y}\right) - \frac{2}{y} \times \left(\frac{x}{x}\right) = \frac{4y-2x}{xy} = -\frac{1}{5}$$

Cross multiplying the condensed second equation yields

$$5(4y-2x) = -xy = 20y-10x = xy$$

Using the first equation, $5y = 2x$, multiply each side by 4, resulting in $20y = 8x$

Substituting $8x$ for $20y$ in the second equation yields

$$8x - 10x = xy \text{ or } -2x = xy$$

Dividing both sides of the equation by x yields $y = -2$

Substituting this value for y in the first equation yields

$$5(-2) = 2x$$

$$-10 = 2x$$

$$x = -5$$

Therefore, $xy = (-2)(-5) = 10$

20. **Level:** Easy | **Domain:** ADVANCED MATH

Skill/Knowledge: Equivalent expressions |

Testing point: Remainder theorem

Key Explanation: Choice C is correct. A is the remainder when the function $3x^2 + 7x + 9$ is divided by $x - 2$. The remainder can be found when $f(2)$ is calculated. Because $x - 2 = 0$ yields $x = 2$ as a solution, it can be plugged into the given quadratic function as follows to find A:

$$3(2)^2 + 7(2) + 9 = 12 + 14 + 9 = 35.$$

Distractor Explanation: Choice A is incorrect. This is the answer incorrectly found by adding coefficients together ($3 + 7 + 9$) of the quadratic equation.

Choice B is incorrect. This is the answer incorrectly found by plugging in -2 instead of 2 into the quadratic equation

Choice D is incorrect. This is the answer incorrectly found through a conceptual or miscalculation error.

21. **Level:** Easy | **Domain:** PROBLEM-SOLVING AND DATA ANALYSIS

Skill/Knowledge: Inference from sample statistics and margin of error | **Testing point:** Margin of error

Key Explanation: Choice D is correct. Given that the sample mean mass is 67.9 kgs, the actual mean mass of the penguins in the zoo would lie between 67.9 kgs plus or minus 4.5 kgs, or 63.4 kgs and 72.4 kgs. This then makes Choice D correct.

Distractor Explanation: Choice A is incorrect as the mass of the penguins in the park cannot be found from the data available.

Choice B is incorrect as the mean mass does not state that the mass of all the penguins is 67.9 kgs.

Choice C is incorrect. Nothing can be concluded about the median mass of the penguins in the zoo.

22. **Level:** Hard | **Domain:** ALGEBRA

Skill/Knowledge: Linear equations in two variables | **Testing point:** Number of solutions in a linear system of two variables

Key Explanation: Choice B is correct. The first step is to use the distributive property to multiply out the terms on the left side of the equation as follows:

$$3x - 9 + 2x + 2y = 5x + 2y - 9$$

Combining like terms on the left side of the equation yields:

$$5x + 2y - 9 = 5x + 2y - 9$$

Since the equations on the left and the right are the same, they represent the same line and thus have infinitely many solutions.

Distractor Explanation: Choice A is incorrect. To have zero solutions the equations would need to be parallel lines and thus have the same slope and different y -intercepts. That would mean that the coefficients of x and y will be equal however the constants will not. This is not the case in this problem. Choice C is incorrect. That would mean there would be one (x, y) solution to the system above. That is not the case as they represent the same line. Choice D is incorrect. Linear equations with two variables do not have 2 solutions.

1. **Level:** Medium | **Domain:** ADVANCED MATH
Skill/Knowledge: Equivalent expressions | **Testing point:** Foiling out binomials and combining like terms

Key Explanation: Choice D is correct. To solve the question, first, distribute out the two binomial expressions. The next step is to combine like terms and put the final expression in standard form.

$$3(x^2 + 10x + 25) - 2(x^2 - 10x + 25) + 2x$$

$$3x^2 + 30x + 75 - 2x^2 + 20x - 50 + 2x$$

$$x^2 + 52x + 25$$

Distractor Explanation: Choices A and C are incorrect. These answers can be arrived at if the foiling expansion is done incorrectly. Choice B is incorrect. This answer can be arrived at if a math miscalculation is done after the foiling out expansion is completed.

2. **Level:** Medium | **Domain:** ADVANCED MATH
Skill/Knowledge: Equivalent expressions | **Testing point:** Finding the least common denominator with binomial terms and combining

Key Explanation: Choice A is correct. To solve this problem, the fractions need a common denominator to be added. The least common denominator is $(x - 2)(5 - x)$, which multiplies out to a denominator of $-x^2 + 7x - 10$. To get both terms of this expression over the same denominator, the numerator and denominator of the first term each must be multiplied by $(5 - x)$ and the numerator and denominator of the second term each must be multiplied by $(x - 2)$. Since the two terms are now over the same denominator, the numerators can be added as follows:

$$\frac{5 - x + 2x(x - 2)}{(x - 2)(5 - x)}$$

Using the foiling and distributive operations to multiply out and combine like terms, the final

$$\text{answer is: } \frac{2x^2 - 5x + 5}{-x^2 + 7x - 10}$$

Distractor Explanation: Choices B and C are incorrect. These answers can be arrived at wrongly by adding the two fractions directly, which is a common conceptual error. Choice D is incorrect. This answer may be arrived at by finding the common multiple for the denominator and then just adding the original numerators directly without multiplying them by the binomials needed to get the common multiple for the denominator.

3. **Level:** Easy | **Domain:** ALGEBRA
Skill/Knowledge: Systems of two linear equations in two variables | **Testing point:** Solving simultaneous equations

Key Explanation: Solve for y by using the distributing property and the substitution method as follows:

$$3x - 6 + 5(-2(x - 5)) = 2$$

$$3x - 6 - 10(x - 5) = 2$$

$$3x - 6 - 10x + 50 = 2$$

$$-7x + 44 = 2$$

$$-7x = -42$$

$$x = 6$$

Substitute $x = 6$ into the second equation to find y .

$$y = -2(6 - 5)$$

$$y = -2$$

4. **Level:** Easy | **Domain:** PROBLEM-SOLVING AND DATA ANALYSIS
Skill/Knowledge: Two-variable data: models and scatterplots | **Testing point:** Line of best fit

Key Explanation: Choice A is correct. This question can be solved in several ways. The

equation of the line of best fit can be determined by finding the slope and y -intercept from the graph directly and plugging those values into the slope-intercept equation of a line, $y = mx + b$. The elimination method can also be used. The slope and y -intercept of the line of best fit are both positive, which eliminates **Choices C** and **D**. The slope of the line of best fit is not steep so that eliminates **Choice B**.

Distractor Explanation: **Choice B** is incorrect because the slope of the line of best fit is $\frac{1}{4}$ and not 4. **Choice C** is incorrect because the y -intercept of the line of best fit is positive, not negative. **Choice D** is incorrect because the line of best fit has a positive slope and not a negative one.

5. **Level:** Medium | **Domain:** GEOMETRY AND TRIGONOMETRY

Skill/Knowledge: Circles | **Testing point:** Arc length of a circle

Key Explanation: **Choice C** is correct. The arc length of the circle can be found by using the equation arc length = $r\theta$, where r is the radius of the circle and theta is the degree in radians of the central angle that subtends the arc length desired.

Therefore the arc length would be

$$6\left(\frac{7}{12}\pi\right) = \frac{7}{2}\pi$$

The arc length can also be found

by converting radians to degrees using the

formula $\frac{\theta}{360} 2\pi r$. This would still give the answer

$$\text{as } \frac{7}{2}\pi \text{ cm.}$$

Distractor Explanation: **Choice A** is incorrect. This is the circumference of the whole circle. **Choice B** is incorrect. This is the area of the whole

circle. **Choice D** is incorrect. This is the area of the sector that can be found using the formula $\frac{1}{2}r^2\theta$, where θ is the measure of the central degree in radians.

6. **Level:** Easy | **Domain:** ADVANCED MATH
Skill/Knowledge: Nonlinear equations in one variable and systems of equations in two variables
Testing point: Finding the sum of the roots in a quadratic equation

Key Explanation: **Choice B** is correct. The first step is to simplify the equation by dividing out 2, the greatest common factor out of the equation, leaving $x^2 + 3x + 9 = 0$. The equation does not factor so the quadratic equation can be used in simplified form. The sum of the roots of a

quadratic equation is equal to $-\frac{b}{a}$, where $a = 1$,

$b = 3$ and $c = 9$.

Therefore, the sum of the roots of the quadratic equation above would be $-\frac{3}{1} = -3$.

Distractor Explanation: **Choice A** is incorrect.

This gives the value of $\frac{b}{a}$ or the negative of the sum of the roots. **Choice C** is incorrect. This is the product of the roots given by $\frac{c}{a}$.

Choice D is incorrect as this is the negative of the product of the roots and can be arrived at by using

$$\frac{-c}{a}.$$

7. **Level:** Medium | **Domain:** GEOMETRY AND TRIGONOMETRY

Skill/Knowledge: Lines, angles, and triangles

Testing point: Finding the sum of angles in a polygon and converting degrees to radians

Key Explanation: The sum of the interior angles in a polygon is $180 \times (n - 2)$, where n is the number of sides in the polygon. A heptagon has 7 sides, so the sum of its interior angles will be $180 \times (7 - 2) = 900^\circ$.

A hexagon has 6 sides, so the sum of its interior angles will be $180 \times (6 - 2) = 720^\circ$. The difference between the total number of degrees of the interior angles of the two shapes is 180° . This number in radians would be π and $a = 1$.

8. **Level:** Medium | **Domain:** ALGEBRA
Skill/Knowledge: Linear functions | **Testing point:** Finding equations of functions

Key Explanation: Choice A is correct. The problem gives two points and asks what the function $f(x)$ is that best describes the points. Using points $(3, 2)$ and $(6, -3)$, the slope of the function, which is the change in the y coordinates over the change in the x coordinates, $\frac{(y^2 - y^1)}{(x^2 - x^1)}$, can be found as follows:

$$\frac{2 - (-3)}{3 - 6} = \frac{5}{-3}$$

The answer choices are in slope-intercept form, $y = mx + b$ where m represents the slope. The only answer choice that has a slope of $-\frac{5}{3}$ is **Choice A**.

Distractor Explanation: Choice B is incorrect most likely due to a conceptual error. Choice C is incorrect and incorrectly states the slope formula as the change in x over the change in y . Choice D is incorrect as this is the equation of the line that is perpendicular to $f(x)$.

9. **Level:** Easy | **Domain:** ALGEBRA
Skill/Knowledge: Linear equations in one variable
Testing point: Solving for x

Key Explanation: Choice D is correct. To solve this problem, first divide both sides of the equation by 2 to get:

$$(x + 4) = \frac{18}{2}$$

$$(x + 4) = 9$$

$$x = 5$$

$$\text{Therefore } (x + 6) = 5 + 6 = 11$$

Distractor Explanation: Choice A is incorrect. This is the value of $(x + 4)$. Choice B is incorrect. This is the value of x only. Choice C is incorrect. It can be the result of a miscalculation.

10. **Level:** Medium | **Domain:** PROBLEM-SOLVING AND DATA ANALYSIS
Skill/Knowledge: Ratios, rates, proportional relationships, and units | **Testing point:** Ratios

Key Explanation: To solve this problem, let x equal the total number of people at the fair. Every group of 5 students and 3.5 parents has a total of 8.5 total people in it. Set up a proportion of ratio students to ratio total people and set it equal to the ratio of the total number of students to the total number of people as follows:

$$\frac{5}{8.5} = \frac{2,000}{x}$$

Cross multiplying gives the equation $5x = 2,000 \times 8.5$. Dividing both sides of the equation by 5 gives $x = 3,400$ students

11. **Level:** Medium | **Domain:** PROBLEM-SOLVING AND DATA ANALYSIS
Skill/Knowledge: Percentages | **Testing point:** Percent decrease

Key Explanation: Choice D is correct. The percent decrease can be found by using the formula:

((difference between actual and predicted values) / original value) $\times 100$.

Looking at the graph, the actual y values when $x = 4$ are 6 and 11. The predicted y value at $x = 4$ is 9. Since the question asked for the percent decrease from the actual value to the predicted value, the actual value needs to be higher and thus we would use the y value of 11 and not 6 at $x = 4$. Plugging in the y values of 11 and 9 into the equation yields $(11 - 9 / 11) \times 100 = 18.18\%$

Distractor Explanation: Choice A is incorrect as this answer is the percent increase from 9 to 11.

Choice B is incorrect as this answer is the percent decrease from 9 to 6.

Choice C is incorrect as this describes the percent increase from 6 to 9.

12. **Level:** Easy | **Domain:** ALGEBRA

Skill/Knowledge: Linear inequalities in one or two variables | **Testing point:** Systems of linear inequalities

Key Explanation: Choice B is correct. To solve the question, the fastest method would be to substitute the x and y coordinates of the answer choices into the system of inequalities and see which coordinate pair satisfies both inequalities. Plugging in the x and y values for **Choice B** makes both inequalities valid as follows:

$$\text{Inequality 1: } 4 > -3(1) + 5$$

$$4 > -3 + 5$$

$$4 > 2$$

$$\text{Inequality 2: } 4 > 2(1)$$

$$4 > 2$$

Distractor Explanation: Choice A is incorrect. Plugging in this coordinate pair into the second inequality yields $4 > 4$, which is false. Choice C is incorrect. Plugging this coordinate pair into the second inequality yields $4 > 2(3) = 4 > 6$, which is false. Choice D is incorrect. Plugging this

coordinate pair into the second inequality yields $1 > 2(2) = 1 > 4$, which is false.

13. **Level:** Medium | **Domain:** ADVANCED MATH
Skill/Knowledge: Nonlinear equations in one variable and systems of equations in two variables
Testing point: Finding solutions for an absolute value equation

Key Explanation: To solve this absolute value equation, first divide both sides of the equation by 3 to get: $|x - 4| = 2$. Then remove the absolute value and set up and solve the following 2 equations:

$$x - 4 = 2 \text{ and } x - 4 = -2$$

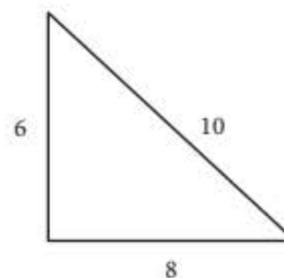
$$x = 6 \text{ and } x = 2$$

14. **Level:** Easy | **Domain:** GEOMETRY AND TRIGONOMETRY

Skill/Knowledge: Area and volume | **Testing point:** Area of a trapezoid

Key Explanation: Choice A is correct. Since segment AD is parallel to segment BC and $AB = DC$ the shape is an isosceles trapezoid. To find the area of a trapezoid the formula $\frac{h}{2}(a + b)$, is used where h is the height of the trapezoid and a and b are the lengths of the two bases of the trapezoid.

The height of the trapezoid can be found by using the Pythagorean theorem $a^2 + b^2 = c^2$, where a and b are the legs of the right triangle and c is its hypotenuse.



Using the pythagorean theorem $a^2 + 8^2 = 10^2$ or $a^2 = 36$, yielding $a = 6$. Thus the height of the trapezoid is 6. Plugging in the values for a , b , and h into the area of a trapezoid formula, yields

$$\frac{6}{2}(12 + 28) = 120$$

Therefore the area of the trapezoid would be 120.

Distractor Explanation: **Choice B** is incorrect. This answer is the perimeter of the trapezoid. **Choice C** is incorrect. This answer can be determined if the shape is divided into a rectangle and two triangles. This answer is the area of the rectangle plus one triangle. **Choice D** is incorrect. It is the value of the area of the two triangles alone.

15. **Level:** Easy | **Domain:** ADVANCED MATH
Skill/Knowledge: Nonlinear equations in one variable and systems of equations in two variables
Testing point: Absolute values

Key Explanation: **Choice C** is correct. The first step is to combine the two absolute value terms into $|x + 3| = -2$. The next step is to divide both sides by -1 to get: $|x + 3| = 2$. The absolute value is equal to a positive number and therefore it has 2 solutions.

Distractor Explanation: **Choice A** is incorrect. To have 0 solutions in an absolute value equation, the absolute equation value has to be equal to a negative number. **Choice B** is incorrect. For an absolute value equation to have 1 solution it has to be equal to 0. **Choice D** is incorrect. There is sufficient information to answer the question.

16. **Level:** Medium | **Domain:** ALGEBRA
Skill/Knowledge: Linear equations in two variables | **Testing point:** Perpendicular lines

Key Explanation: The slope is found by putting the equation of the line into slope-intercept form of $y = mx + b$ as follows:

$$5x - 6y + 30 = 0$$

$$-6y = -5x - 30$$

$$y = \frac{5}{6}x + 5. \text{ The slope is then } \frac{5}{6}, \text{ a line}$$

perpendicular to this will have the negative inverse of this slope which is $-\frac{6}{5}$.

17. **Level:** Easy | **Domain:** GEOMETRY AND TRIGONOMETRY

Skill/Knowledge: Right triangles and trigonometry

Testing point: Trigonometric identities

Key Explanation: **Choice C** is correct. $\sin x = \cos(90^\circ - x)$ and vice versa, therefore $\cos 72^\circ = \sin(90^\circ - 72^\circ)$ This equates to $\sin 18^\circ$.

Distractor Explanation: **Choice A** is incorrect. This choice may be selected due to a conceptual error. **Choice B** is incorrect as $\sin 72^\circ$ is equal to $\cos 18^\circ$. **Choice D** is incorrect. $\cos 18^\circ$ is equal to $\sin 72^\circ$.

18. **Level:** Easy | **Domain:** PROBLEM-SOLVING AND DATA ANALYSIS

Skill/Knowledge: Probability and conditional probability | **Testing point:** Probability Complement

Key Explanation: **Choice B** is correct. The sum of the probabilities of an event and its complement must add up to 1. Therefore, if the probability that it will rain is 0.26, the probability of no rain is $1 - 0.26 = 0.74$.

Distractor Explanation: **Choices A** and **C** are incorrect and can be due to a miscalculation or conceptual error. **Choice D** is incorrect as a probability of 1 means that it is certain that it will not rain.

19. **Level:** Easy | **Domain:** ADVANCED MATH
Skill/Knowledge: Nonlinear functions | **Testing point:** Vertex form of a quadratic and minimum/maximum point

Key Explanation: The maximum t value of a concave down parabola for the quadratic equation $ax^2 + bx + c$ can be found using the formula $t =$

$\frac{-b}{2a}$, which finds the x coordinate of the vertex of

the parabola. In the equation above, a is 3 and $b = 9$ yielding,

$$t = \left(\frac{-9}{2(-3)} \right) = \frac{-9}{-6} = \frac{3}{2}$$

20. **Level:** Hard | **Domain:** GEOMETRY AND TRIGONOMETRY
Skill/Knowledge: Right triangles and trigonometry | **Testing point:** Special triangles

Key Explanation: The triangle PQR is a special triangle. **Choice D** is correct. Triangle PQR is inscribed in a semicircle where the hypotenuse of triangle PQR is the diameter of the circle. This makes angle P a right angle. A triangle has 180 degrees and that would make angle R equal to 30 degrees. Therefore triangle PQR is a special triangle, more specifically a 30 – 60 – 90 special triangle. Since the radius of the circle is 7cm, this makes the diameter 14cm. The hypotenuse of triangle PQR is the diameter of the circle. In a 30 – 60 – 90 special triangle, the length of the side opposite the right angle, the hypotenuse, is two times the length of the side opposite the 30-degree angle. This makes side $PQ = 7\text{cm}$. The side opposite the 60-degree angle in this special triangle is the length of the side opposite the 30-degree angle times $\sqrt{3}$. Therefore the length of PR is equal to $7\sqrt{3}$.

Distractor Explanation: **Choice A** is incorrect. This is the diameter of the circle and the value of the length of RQ .

Choice B is incorrect as it is the length of PR .

Choice C is incorrect. This answer is due to a conceptual error confusing the ratios in sides of the 30 – 60 – 90 triangle with the 45 – 45 – 90 special triangle.

21. **Level:** Medium | **Domain:** ALGEBRA
Skill/Knowledge: Linear inequalities in one or two variables | **Testing point:** Absolute value linear inequalities

Key Explanation: **Choice B** is correct. For the above inequality either $x + 3 > 4$ or $x + 3 < -4$. Solving $x + 3 > 4$ yields $x > 1$. Solving $x + 3 < -4$ yields $x < -7$. **Choice B** is the correct choice as it has the only value in the domain of the range of solutions to the inequality.

Distractor Explanation: **Choices A, C, and D** are incorrect as they are not part of the range of solutions to the inequality.

22. **Level:** Easy | **Domain:** ALGEBRA
Skill/Knowledge: Systems of two linear equations in two variables | **Testing point:** Systems of equations

Key Explanation: **Choice A** is correct. To solve this problem, subtract the two equations.

$$3x + 4y = 31 - (2x + 3y = 22)$$

$$= x + y = 9, \text{ which is } \mathbf{Choice A}.$$

Distractor Explanation: **Choice B** is incorrect. This answer is the value of x . **Choice C** is incorrect. This answer is the value of y . **Choice D** is incorrect. It is due to conceptual or miscalculation errors.