



SAT Practice Test 2

Four modules, 98 questions, 2 hours 14 minutes plus a 10-minute break

Section	Questions	Time
Reading and Writing, Module 1	27 questions	32 minutes
Reading and Writing, Module 2	27 questions	32 minutes
Math, Module 1	22 questions	35 minutes
Math, Module 2	22 questions	35 minutes

1. Time each module on its own, and take the 10-minute break after Reading and Writing Module 2.
2. Mark answers on the answer sheet near the back. Work in the margins of the questions as much as you like.
3. Check your answers with the answer key, then read the explanations for every question you missed or guessed.
4. To take this test on screen or mark it up with a pen on a tablet, go to **marginsat.com**.

The questions in this section address a range 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 committee's final report was notably _____: it recommended no specific policy, instead listing the arguments for and against each proposal without indicating which it found more persuasive.

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

- (A) noncommittal
- (B) incendiary
- (C) redundant
- (D) conciliatory

- 2** Although the sculptor's early critics found her use of industrial scrap _____, later scholars have argued that the choice was carefully considered: each piece of metal, they note, came from a factory where one of her relatives had worked.

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

- (A) deliberate
- (B) arbitrary
- (C) ornamental
- (D) derivative

- 3** The following text is from a novel. Rafael is helping his uncle close the family bookshop.

They worked through the afternoon without speaking much, boxing the histories, then the atlases, then the slim volumes of poetry his uncle had never managed to sell. For days the two of them had argued about whether to leave the old sign in the window. Now, standing in the doorway of the bare room, his uncle settled the matter quietly: he turned the sign so that it faced the street.

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

- (A) Calmed
- (B) Occupied
- (C) Resolved
- (D) Lowered

- 4** Botanist Lucía Ferrán cautions that the apparent hardiness of desert succulents can be _____: although the plants survive months without rain, many die within weeks when transplanted into rich garden soil, which holds moisture around their roots until the roots rot.

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

- (A) inherent
- (B) deceptive
- (C) commendable
- (D) incremental

5 Many migratory songbirds cross the Gulf of Mexico in a single nonstop flight lasting up to 24 hours. Ornithologists have long wondered how birds so small can carry enough fuel for the journey. Before departure, some species nearly double their body mass, storing fat that can make up more than half of their weight at takeoff. Remarkably, some also shrink certain digestive organs during the flight, drawing on the organs' proteins as an additional energy source.

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

- (A) It challenges an assumption that ornithologists have long held about migratory birds.
- (B) It describes an exception to a pattern discussed in the previous sentence.
- (C) It provides an answer to the question raised in the previous sentence.
- (D) It explains why some species of songbird avoid crossing the Gulf of Mexico.

6 The following text is from a short story. Noor has recently started working the night shift at a small radio station.

On her first night alone at the station, Noor read the weather report for a town she had never seen, to listeners she would never meet. Rain by morning, she told them, clearing by noon. Then she sat back, listened to the hum of the transmitter, and imagined, somewhere out in the dark, a farmer moving his tractor into the barn on her word.

Which choice best states the main purpose of the text?

- (A) To convey Noor's sense of connection with an audience she cannot see
- (B) To show Noor's anxiety about making an error during a broadcast
- (C) To describe the technical demands of operating a radio station alone
- (D) To contrast Noor's own upbringing with the rural lives of her listeners

7 Economist Tunde Bakare studies why farmers in some regions are slow to adopt new seed varieties, even varieties that produce higher average yields. His fieldwork suggests that the farmers are not simply cautious; rather, they are responding sensibly to a risk that outsiders tend to overlook: a variety that outperforms in a good year may fail badly in a drought, and for a farmer without savings, one failed harvest can mean losing the farm.

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

- (A) It provides evidence that new seed varieties produce higher yields than older ones in most years.
- (B) It describes a specific drought that affected the regions where Bakare conducted his fieldwork.
- (C) It identifies the overlooked risk that makes the farmers' behavior a sensible response.
- (D) It presents a recommendation that Bakare makes to the governments of the regions he studied.

8 Text 1

Since the 1990s, many museums have returned human remains and sacred objects to the communities from which they were taken. Critics of this practice argue that it deprives researchers of irreplaceable evidence about the past.

Text 2

Anthropologist Teresa Molina points out that returning objects has, in several cases, expanded research rather than ended it. When objects go back to their communities, she notes, community members often share knowledge about the objects' uses and histories that appears in no museum catalog, and some communities have invited researchers to collaborate on new studies.

Based on the texts, how would Molina (Text 2) most likely respond to the critics in Text 1?

- (A) She would agree that returning objects ends research but argue that ethical considerations outweigh scientific ones.
- (B) She would contend that museum catalogs already contain most of what researchers need to know about the objects.
- (C) She would suggest that museums should return only objects that have already been thoroughly studied.
- (D) She would argue that their concern overlooks ways in which returning objects can create new opportunities for research.

9 The following text is from a novel. Imre is a watchmaker.

Imre had repaired so many watches that he no longer heard their ticking; it had become, like his own breathing, a sound beneath notice. Only on the morning the power failed, when every electric clock in the shop stopped at once and the wound watches in the cases ran down one by one, did he notice what he had stopped hearing. He stood among the stilled faces feeling as though the room itself had stopped breathing with him.

Which choice best states the main idea of the text?

- (A) Imre has come to resent work that has become routine.
- (B) Imre becomes aware of something familiar only when it is absent.
- (C) Imre fears that the power failure will damage the watches in his shop.
- (D) Imre realizes that he prefers silence to the constant sound of ticking.

10 Researchers have documented that the mimic octopus can impersonate several dangerous animals, including venomous lionfish and sea snakes. Biologist Hana Okoye wanted to know whether the octopus chooses its impersonation based on the threat it faces. In field observations, she found that when the octopus was approached by damselfish, which are preyed upon by sea snakes, it most often adopted a sea-snake posture, hiding six arms in a burrow and waving the other two in opposite directions.

According to the text, what did Okoye find?

- (A) The octopus most often imitated a sea snake when approached by damselfish.
- (B) Damselfish are more likely than other fish to attack the mimic octopus.
- (C) The octopus imitates lionfish more often than it imitates any other animal.
- (D) Sea snakes avoid the mimic octopus when it adopts a lionfish posture.

- 11** In a poem about returning to her childhood home as an adult, the speaker conveys a sense that the house seems smaller than she remembers.

Which quotation from the poem most effectively illustrates this claim?

- (A) “The doorframe I once reached up to touch now grazes my hair as I walk through,”
- (B) “my mother’s garden, wild now, has crept up to the porch,”
- (C) “the town has paved a road where the orchard used to be,”
- (D) “and I hear my brother’s laughter in the empty hall.”

- 12** Linguist Ama Owusu hypothesizes that speakers of languages with distinct words for different kinds of relatives, such as separate terms for a mother’s brother and a father’s brother, are faster at recalling family relationships described in stories than speakers of languages without such terms are.

Which finding, if true, would most directly support Owusu’s hypothesis?

- (A) Participants whose languages had distinct terms for maternal and paternal uncles used more kinship terms in everyday conversation than other participants did.
- (B) All participants took longer to answer questions about family relationships in a story than questions about the story’s setting.
- (C) Participants whose languages had distinct terms for maternal and paternal uncles answered questions about family relationships in a story faster than other participants did, though both groups answered questions about other story details equally quickly.
- (D) Participants whose languages lacked distinct terms for maternal and paternal uncles made more errors when recalling where a story took place.

- 13** Germination After Five Years of Storage (%)

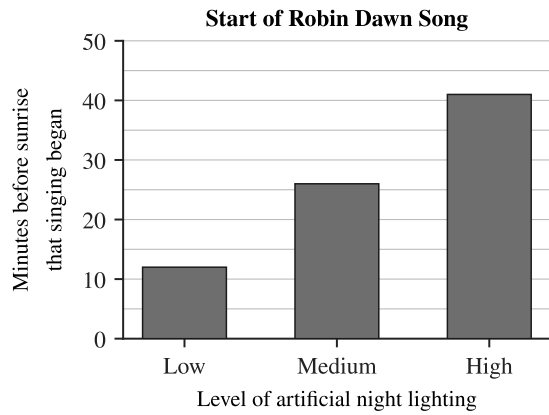
Species	Stored at 15°C	Stored at -20°C
Oak	4	0
Pine	61	88
Cacao	0	0
Mahogany	52	79

To study how well seeds survive long-term storage, researchers stored seeds of four tree species for five years at two temperatures and then measured the percentage that germinated. A student claims that the results show that seeds of some species tolerate freezing while seeds of other species do not.

Which choice most effectively uses data from the table to support the student’s claim?

- (A) Cacao seeds did not germinate after storage at either temperature.
- (B) Pine seeds stored at -20°C had a germination rate of 88%, whereas oak seeds stored at the same temperature did not germinate at all.
- (C) Mahogany seeds had a higher germination rate after storage at -20°C than after storage at 15°C.
- (D) Oak seeds had the lowest germination rate of the four species after storage at 15°C.

14



Ecologist Jonas Varga recorded when male robins began their dawn songs in neighborhoods with different levels of artificial night lighting. He concluded that robins in more brightly lit neighborhoods begin singing earlier in the morning than robins in darker neighborhoods do.

Which choice best describes data from the graph that support Varga's conclusion?

- (A) Robins in neighborhoods with high artificial light began singing about 41 minutes after sunrise.
- (B) As the level of artificial light increased, robins began singing progressively closer to sunrise.
- (C) Robins in neighborhoods with medium artificial light began singing earlier than robins in neighborhoods with high artificial light.
- (D) Robins in neighborhoods with high artificial light began singing about 29 minutes earlier than robins in neighborhoods with low artificial light.

15

Glaciers in the European Alps began retreating rapidly in the mid-1800s, before industrial warming had substantially raised global temperatures. Some researchers have attributed this early retreat to soot from coal burning, which darkens ice and causes it to absorb more sunlight. However, analysis of Alpine ice cores shows that soot levels did not rise substantially until about 1870, roughly fifteen years after the retreat began. This timing suggests that _____

Which choice most logically completes the text?

- (A) soot alone cannot account for the start of the glaciers' retreat, though it may have contributed later.
- (B) industrial warming was the main cause of the glaciers' retreat in the 1850s.
- (C) coal burning had no effect on Alpine glaciers at any point in the nineteenth century.
- (D) ice cores do not provide reliable information about past soot levels.

- 16** A city began letting residents borrow tools such as drills and ladders from some of its public libraries. In the program's first year, libraries that lent tools issued 14% more library cards than in the previous year, while the city's other libraries issued 2% more. A city official concluded that the tool program attracted new library users. However, the libraries chosen for the program were all in neighborhoods where several large apartment buildings opened that same year. As a result, _____

Which choice most logically completes the text?

- (A) the tool program likely reduced the number of books borrowed at the participating libraries.
- (B) residents of new apartment buildings are less likely than other residents to use public libraries.
- (C) the libraries that did not lend tools should have been chosen for the program instead.
- (D) the official's conclusion may be premature, since population growth near the participating libraries could also explain the increase.

- 17** Most volcanic eruptions are preceded by swarms of small earthquakes as magma pushes toward the _____ some eruptions occur with almost no warning, which makes them especially dangerous.

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

- (A) surface; however,
- (B) surface, however,
- (C) surface however,
- (D) surface, however

- 18** The Svalbard Global Seed Vault, _____ deep inside a mountain on a remote Norwegian island, stores duplicate samples of more than one million seed varieties from around the world.

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

- (A) was built
- (B) built
- (C) is built
- (D) it was built

- 19** The number of bird species recorded at the reservoir, which had been declining for a decade, _____ sharply after volunteers planted native shrubs along its banks.

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

- (A) have risen
- (B) were rising
- (C) rose
- (D) are rising

- 20** Marine _____ discovered in 2021 that some reef-building corals can survive brief exposure to water far more acidic than the surrounding ocean.

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

- (A) biologist, Leila Nasser,
- (B) biologist, Leila Nasser
- (C) biologist Leila Nasser,
- (D) biologist Leila Nasser

- 21** In 1928, bacteriologist Alexander Fleming returned from vacation and noticed that a mold contaminating one of his culture plates _____ the bacteria growing around it.

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

- (A) has killed
- (B) kills
- (C) will kill
- (D) had killed

- 22** The wingspan of the Andean condor, which can exceed three meters, is larger than _____

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

- (A) nearly every other land bird.
- (B) those of nearly every other land bird.
- (C) that of nearly every other land bird.
- (D) nearly every other land bird's wing.

- 23** For decades, astronomers assumed that planets could not form around pairs of closely orbiting stars, since the gravity of each star would disrupt the disk of material from which planets grow. Observations by the Kepler space telescope proved otherwise. _____ although such disks are indeed disturbed, Kepler identified about a dozen planets that orbit both stars of a pair.

Which choice completes the text with the most logical transition?

- (A) Nonetheless,
- (B) In fact,
- (C) By contrast,
- (D) Even so,

- 24** The tomato was brought to Europe from the Americas in the sixteenth century. Many Europeans initially regarded it with suspicion, in part because it belongs to the nightshade family, which includes several poisonous plants. _____ for decades the tomato was grown in much of Europe mainly as an ornamental curiosity rather than as food.

Which choice completes the text with the most logical transition?

- (A) Consequently,
- (B) Nevertheless,
- (C) Similarly,
- (D) Meanwhile,

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

- Venus and Earth are similar in size and mass.
- Venus's surface temperature is about 465°C, hot enough to melt lead.
- Earth's average surface temperature is about 15°C.
- Both planets have volcanoes.
- Venus rotates so slowly that one Venusian day is longer than one Venusian year.

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

- (A) Venus's surface temperature of about 465°C is far higher than Earth's average of about 15°C.
- (B) Unlike Earth, Venus rotates so slowly that a Venusian day is longer than a Venusian year.
- (C) Both Venus and Earth orbit the Sun, but Venus's surface is hot enough to melt lead.
- (D) Venus and Earth are similar in size and mass, and both planets have volcanoes.

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

- Psychologist Ines Albrecht studied whether doodling affects memory.
- Participants listened to a long, monotonous recorded weather report that named many cities.
- Half the participants shaded in printed shapes while listening; the other half did not.
- Afterward, participants who had shaded shapes recalled 23% more of the cities than participants who had not.
- Albrecht suggests that simple doodling may keep the mind from wandering.

The student wants to present the study's main finding. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- (A) Albrecht suggests that simple doodling may keep the mind from wandering.
- (B) In Albrecht's study, participants listened to a monotonous weather report while either shading printed shapes or doing nothing.
- (C) Participants who shaded printed shapes while listening to a weather report later recalled 23% more of the cities it named than participants who did not.
- (D) Albrecht studied whether doodling affects memory.

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

- Many desert plants open the pores on their leaves only at night, when it is cooler and less water evaporates.
- This adaptation is part of a process called CAM photosynthesis.
- CAM plants store carbon dioxide at night and use it for photosynthesis during the day.
- Pineapples use CAM photosynthesis.
- So do many cacti and agaves.

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

- (A) Pineapples, like many cacti and agaves, use CAM photosynthesis.
- (B) Plants that use CAM photosynthesis, including many desert species, reduce water loss by opening their leaf pores only at night and storing carbon dioxide to use during the day.
- (C) Cacti open the pores on their leaves at night, when it is cooler.
- (D) CAM photosynthesis is used by pineapples.

STOP. This is the end of Reading and Writing, Module 1.

The questions in this section address a range 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** Critics who characterize the composer's late works as _____ overlook how heavily those works draw on the folk songs she heard as a child; far from being radical breaks with tradition, the pieces are in many ways a return to it.

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

- (A) iconoclastic
- (B) derivative
- (C) sentimental
- (D) perfunctory

- 2** The diplomat's memoir is remarkably _____ about his own failures: he devotes an entire chapter to a negotiation he mishandled, quoting at length from colleagues who criticized his judgment at the time.

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

- (A) self-serving
- (B) laconic
- (C) equivocal
- (D) unsparing

- 3** The following text is from a novel. The narrator describes her grandmother, a seamstress.

My grandmother had no patience for talk of talent. A seam was straight or it was not, and if it was not, you unpicked it and sewed it again. She allowed that some hands were quicker than others, but she held that any hand could be taught to be careful, and carefulness, she said, was the whole of the craft.

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

- (A) Permitted
- (B) Conceded
- (C) Intended
- (D) Supplied

- 4** Although the mayor's opponents described the funding for the new transit line as _____, the money had in fact been secured years in advance through a bond measure that voters approved by a wide margin.

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

- (A) lavish
- (B) provincial
- (C) precarious
- (D) unobjectionable

5 Historian Ana Kovač examines how nineteenth-century travel guides shaped tourists' expectations of Venice. She argues that the guides did not merely describe the city but taught visitors what to feel there. One widely sold guide instructed readers to view the Grand Canal for the first time at dusk, from a gondola, and warned that arriving on foot in daylight would “spoil the effect.” Kovač suggests that many visitors' famous raptures over Venice were thus, in part, performances of a script they had read in advance.

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

- (A) It offers an example of the guides' practice of prescribing how visitors should experience the city.
- (B) It describes a common complaint that nineteenth-century visitors made about Venice.
- (C) It identifies a claim in one guide that Kovač considers historically inaccurate.
- (D) It explains why gondolas became the most popular way to travel through Venice.

6 Most models of how the Moon formed hold that a Mars-sized body collided with the early Earth and that the Moon coalesced from the resulting debris. Such models predict that the Moon should consist mostly of material from the impacting body. Yet lunar rocks returned by the Apollo missions are nearly identical to Earth's rocks in their oxygen isotopes, a chemical signature that differs from one body in the solar system to another. Planetary scientist Sabine Roth proposes that the collision was energetic enough to vaporize and thoroughly mix both bodies, which would account for the shared signature.

Which choice best states the main purpose of the text?

- (A) To argue that the collision model of the Moon's formation should be abandoned
- (B) To explain how oxygen isotopes are used to determine the age of lunar rocks
- (C) To present a puzzle raised by a widely accepted account of the Moon's formation and describe a proposed resolution
- (D) To describe the Apollo missions' findings and their influence on later exploration of the Moon

7

Some species of army ants build living bridges by linking their bodies across gaps along a foraging trail. At first glance the behavior seems costly, since every ant in a bridge is an ant that is not carrying food. But researchers who modeled colony traffic found that bridges shorten routes so much that the colony's overall rate of food delivery rises, even after accounting for the workers locked in place. The ants appear to weigh cost against benefit: a bridge stops growing once adding another ant would save less time than that ant could contribute by foraging.

Which choice best describes the overall structure of the text?

- (A) It presents two competing explanations for a behavior and explains why researchers have rejected both of them.
- (B) It describes a behavior, explains how the behavior evolved, and predicts how it will change in the future.
- (C) It identifies a problem facing ant colonies and evaluates several solutions that different species have developed.
- (D) It describes a behavior, identifies an apparent disadvantage of that behavior, and explains research suggesting that the behavior is beneficial overall.

8

Text 1

Many historians credit the printing press, invented in Europe in the fifteenth century, with sparking the Protestant Reformation. Printed pamphlets, they argue, allowed reformers' ideas to spread far faster than handwritten copies ever could.

Text 2

Economic historian Paulo Mendes has found that European cities that adopted printing presses early were indeed more likely to adopt Protestantism. But he cautions that early-adopting cities also tended to be large trading hubs with relatively literate populations and weak ties to church authorities, characteristics that could independently have made them receptive to reform.

Based on the texts, how would Mendes (Text 2) most likely respond to the historians in Text 1?

- (A) He would argue that the printing press had no connection to the spread of Protestantism.
- (B) He would contend that handwritten copies spread ideas almost as quickly as printed pamphlets did.
- (C) He would claim that literacy rates in European cities declined after the printing press was invented.
- (D) He would agree that printing and the Reformation are linked but caution that the link may partly reflect other features of the cities involved.

9

Text 1

Paleoecologist Ruth Akande argues that the extinction of North America's large mammals about 13,000 years ago was caused primarily by human hunting. Her evidence: the extinctions coincided with the arrival of humans, and in regions that people settled later, the extinctions also came later.

Text 2

Critics of the hunting hypothesis note that the extinctions also coincided with abrupt climate change at the end of the last ice age. A recent study, however, examined an island off the coast of Alaska that people did not reach until thousands of years after they reached the mainland. The island's woolly mammoths survived the climate shifts at the end of the ice age; they died out only thousands of years later, after the island's freshwater lakes dried up, and still long before any people arrived.

Based on the texts, how would Akande (Text 1) most likely respond to the study described in Text 2?

- (A) She would note that the study shows mammoths surviving the end-of-ice-age climate shifts where people were absent, which is consistent with her view.
- (B) She would argue that the study supports the critics' view that climate change at the end of the last ice age caused the extinctions.
- (C) She would claim that the study shows people must have reached the island earlier than researchers believe.
- (D) She would concede that the study undermines her view, since the island's mammoths died out without any human involvement.

10

Political scientist Mireille Dubois studies why citizens of some democracies trust their governments more than citizens of others do. A common view holds that trust tracks performance: when governments deliver economic growth and reliable services, trust rises. Dubois compared twenty countries over three decades and found that performance mattered, but less than procedural fairness. Where citizens believed that officials followed consistent rules and treated people impartially, trust stayed high even through recessions; where officials were seen as playing favorites, trust collapsed soon after economic downturns.

Which choice best states the main idea of the text?

- (A) Dubois found that economic performance has no effect on how much citizens trust their governments.
- (B) Recessions cause trust in government to collapse in most of the world's democracies.
- (C) Citizens trust governments that deliver reliable services more than governments that deliver economic growth.
- (D) Dubois's research suggests that perceived fairness in how a government operates may shape citizens' trust more than its economic results do.

11

In a novel, the narrator suggests that her father's reserve concealed deep feeling.

Which quotation from the novel most effectively illustrates this claim?

- (A) "My father rarely spoke at dinner, and when he did, it was usually about the weather or the price of feed."
- (B) "He never said that he missed my mother, but every evening for twenty years he set out two cups before remembering, and quietly put one away."
- (C) "Neighbors described him as fair in his dealings, if somewhat stern."
- (D) "He had a habit of whistling while he worked, the same three notes over and over."

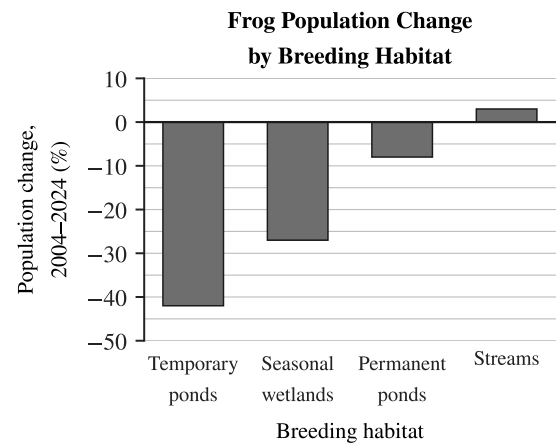
12

Archaeologist Kofi Mensah hypothesizes that pottery excavated at a site in present-day Ghana was made at the site rather than imported, because the pottery's clay contains a combination of minerals found in a riverbed near the site.

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

- (A) The pottery's decorative patterns resemble those on pottery from other sites in the region.
- (B) Remains of kilns used for firing pottery were found at the site.
- (C) The same combination of minerals is common in riverbeds throughout the region, including near several known centers of pottery trade.
- (D) The site was continuously occupied for several centuries.

13



A team of herpetologists compiled population data for frog species in a large nature reserve, grouping the species by the type of water in which they breed. The team concluded that species breeding in less permanent bodies of water have fared worse over the past two decades than species breeding in more permanent water.

Which choice best describes data from the graph that support the team's conclusion?

- (A) Species breeding in streams showed the largest population decline of the four groups.
- (B) Species breeding in temporary ponds increased by about 42% between 2004 and 2024.
- (C) Populations of species breeding in temporary ponds and seasonal wetlands fell by about 42% and 27%, respectively, while those breeding in permanent ponds fell by about 8% and stream breeders rose slightly.
- (D) Species breeding in seasonal wetlands declined less than species breeding in permanent ponds did.

14

Average Weekly Hours and Hourly Wages

Industry	Hours (2014)	Wage (2014)	Hours (2024)	Wage (2024)
Retail	32	\$14	30	\$17
Manufacturing	41	\$22	40	\$24
Health care	36	\$25	37	\$27

Economist Rhys Morgan argues that a rise in hourly wages does not always translate into an equivalent rise in weekly earnings, because the number of hours people work can change as well. The table shows average weekly hours and average hourly wages for workers in three industries. For example, _____

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

- (A) retail workers' average hourly wage rose by about 21% between 2014 and 2024, but because their average hours fell from 32 to 30, their weekly earnings rose by only about 14%.
- (B) health care workers' average weekly hours and average hourly wage both increased between 2014 and 2024.
- (C) manufacturing workers worked more hours per week, on average, than workers in either of the other two industries in both years.
- (D) retail workers' average weekly earnings fell between 2014 and 2024 even though their average hourly wage rose.

15

In many songbird species, females prefer males with more complex songs. Ecologist Iris Lund studied a sparrow population in which young males learn their songs from older males nearby during their first months of life and do not change them afterward. She found that males raised in dense forest learned simpler songs than males raised in open grassland, probably because complex songs degrade more over distance in thick vegetation. Lund also found that females in both habitats preferred complex songs. Lund's findings suggest that a male that hatches in forest and later moves to grassland will likely _____

Which choice most logically completes the text?

- (A) learn a more complex song after arriving in the grassland.
- (B) attract fewer mates there than males raised in grassland, since his song will be simpler than theirs.
- (C) be preferred by grassland females over males raised locally.
- (D) cause grassland females to develop a preference for simpler songs.

16 Archaeologists have long debated when people first reached the Americas. Stone tools found at sites in Chile and Texas have been dated to about 15,000 years ago, earlier than the oldest well-dated sites in Canada and Alaska, through which the first migrants presumably passed. One explanation is that early migrants traveled south along the Pacific coast by boat, settling at sites that are now underwater because sea levels have risen since the last ice age. If this explanation is correct, then _____

Which choice most logically completes the text?

- (A) the absence of older sites in Canada and Alaska may reflect where evidence has survived rather than when people arrived.
- (B) the first migrants must have reached Chile before they reached Alaska.
- (C) the stone tools found in Chile and Texas were most likely dated incorrectly.
- (D) people living along the coast during the last ice age did not use boats.

17 _____ a previously unknown mineral in a meteorite that fell in Somalia in 2020, researchers named the substance elaliite, after the region where the meteorite landed.

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

- (A) They identified
- (B) Having identified
- (C) Researchers identified
- (D) Identified

18 Researchers who analyzed sediment cores drilled from the bed of Lake Malawi, a lake whose deepest layers have accumulated undisturbed for more than a million years, _____ that the region's climate had swung between extreme drought and abundant rainfall many times.

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

- (A) concluding
- (B) concluded
- (C) having concluded
- (D) to conclude

19 Neither the novelist nor her editors _____ aware, when the book went to press in 1962, that an entire chapter had been accidentally left out of the printer's copy.

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

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

20 Many fungi form partnerships with plant roots that benefit both _____. The fungi supply the plants with phosphorus and other nutrients, and the plants supply the fungi with sugars.

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

- (A) partners,
- (B) partners
- (C) partners:
- (D) partners; for

- 21 Many everyday _____ smartphone screens and electric-car batteries, depend on elements that are mined in only a handful of countries.

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

- (A) technologies such as
- (B) technologies, such as
- (C) technologies; such as
- (D) technologies: such as

- 22 The two _____ independent measurements of the comet's speed differed by less than one percent, a level of agreement that surprised even the researchers involved.

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

- (A) observatory's
- (B) observatories'
- (C) observatories
- (D) observatorys'

- 23 Critics argue that the economist's proposal to tax land rather than buildings would place an unfair burden on farmers, whose wealth consists mostly of land. She anticipated this objection when designing the plan. _____ while acknowledging that farmland would be taxed, the plan exempts the first several hundred acres of any working farm, a provision that would leave most family farms paying less than they do now.

Which choice completes the text with the most logical transition?

- (A) Indeed,
- (B) Nonetheless,
- (C) Conversely,
- (D) Even so,

- 24 In most mammals, the body stops producing lactase, the enzyme that digests the sugar in milk, soon after weaning. In some human populations, however, a genetic variant keeps lactase production going into adulthood. This variant is most common in populations with long histories of dairy farming. _____ it is rare in populations whose ancestors did not keep milk-producing animals.

Which choice completes the text with the most logical transition?

- (A) Conversely,
- (B) Thus,
- (C) For instance,
- (D) Similarly,

25

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

- Pendulum clocks and quartz clocks both keep time by counting regular oscillations.
- A pendulum clock counts the swings of a weighted rod, typically about one swing per second.
- A quartz clock counts the vibrations of a small quartz crystal, typically 32,768 vibrations per second.
- Both kinds of clocks can be affected by changes in temperature.
- Quartz clocks are typically far more accurate than pendulum clocks.

The student wants to emphasize a difference in the oscillations that the two kinds of clocks count. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- (A) Unlike many other timekeeping devices, pendulum clocks and quartz clocks both keep time by counting regular oscillations.
- (B) Quartz clocks, in contrast to pendulum clocks, are typically far more accurate.
- (C) Whereas a pendulum clock typically counts about one swing per second, a quartz clock counts about 32,768 vibrations per second.
- (D) In contrast to what some people assume, pendulum clocks and quartz clocks can both be affected by changes in temperature.

26

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

- Hydrothermal vents on the deep seafloor release hot, mineral-rich water.
- Scientists long believed that virtually all life depended ultimately on energy from sunlight.
- In 1977, researchers aboard the submersible *Alvin* found dense communities of tube worms, clams, and crabs around vents near the Galápagos Islands.
- These animals depend on bacteria that obtain energy from chemicals in the vent water rather than from sunlight.
- The discovery opened a new field of research on life powered by chemical energy.

The student wants to explain why the 1977 discovery surprised scientists. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- (A) In 1977, researchers aboard *Alvin* found tube worms, clams, and crabs living around hydrothermal vents near the Galápagos Islands.
- (B) Hydrothermal vents on the deep seafloor release hot, mineral-rich water.
- (C) Because scientists had long believed that virtually all life depended on sunlight, the 1977 discovery of vent communities fed by chemical-powered bacteria came as a surprise.
- (D) The 1977 discovery opened a new field of research on life powered by chemical energy.

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

- The Danube River flows through ten countries, more than any other river in the world.
- It is about 2,850 kilometers long.
- The Volga River is about 3,530 kilometers long and flows entirely within Russia.
- The Volga is the longest river in Europe.
- The Danube is the second-longest river in Europe.

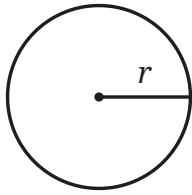
The student wants to introduce the Danube to an audience unfamiliar with it, emphasizing what makes the river unusual. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- (A) The Danube flows through ten countries.
- (B) The Danube is the second-longest river in Europe, after the Volga.
- (C) While the Volga flows entirely within Russia, the Danube is about 2,850 kilometers long.
- (D) The Danube, a European river about 2,850 kilometers long, flows through ten countries, more than any other river in the world.

STOP. This is the end of Reading and Writing, Module 2.

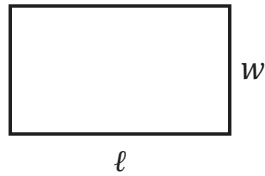
Math Reference Sheet

Use it during both Math modules

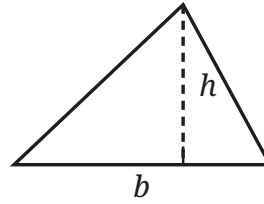


$$A = \pi r^2$$

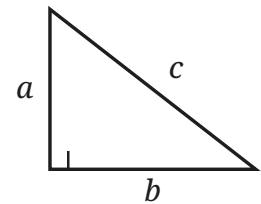
$$C = 2\pi r$$



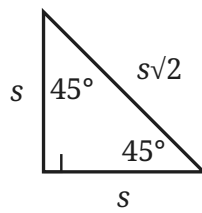
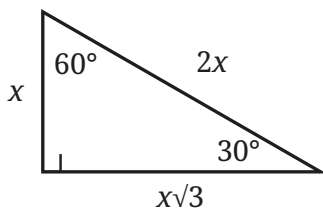
$$A = \ell w$$



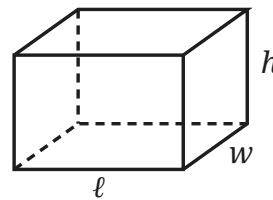
$$A = \frac{1}{2}bh$$



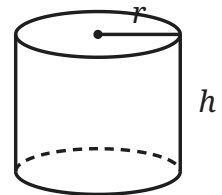
$$c^2 = a^2 + b^2$$



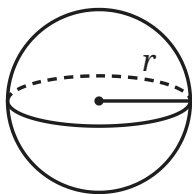
Special Right Triangles



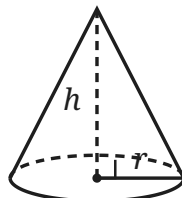
$$V = \ell wh$$



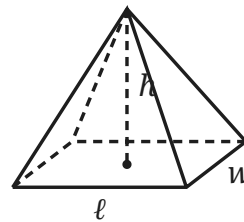
$$V = \pi r^2 h$$



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



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



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

- 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.

The questions in this section address a number of important math skills.

Use of a calculator is permitted for all questions. A reference sheet, calculator, and these directions can be accessed throughout the test.

Unless otherwise indicated:

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- Figures provided are drawn to scale.
- All figures lie in a plane.
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For **multiple-choice questions**, solve each problem and choose the correct answer from the choices provided. Each multiple-choice question has a single correct answer.

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- If you find more than one correct answer, enter only one of them.
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- If a fraction doesn't fit, enter its decimal equivalent instead.
- If a decimal doesn't fit, truncate or round it at the fourth digit.
- Enter a mixed number such as $3\frac{1}{2}$ as an improper fraction ($7/2$) or as a decimal (3.5).
- Leave out symbols such as a percent sign, comma, or dollar sign.

Examples

Answer	Acceptable ways to enter answer	Unacceptable: will NOT receive credit
3.5	3.5 3.50 7/2	31/2 3 1/2
$\frac{2}{3}$	2/3 .6666 .6667 0.666 0.667	0.66 .66 0.67 .67
$-\frac{1}{3}$	-1/3 -.3333 -0.333	-.33 -0.33

- 1** If $4x - 7 = 2x + 13$, what is the value of $x + 5$?

- (A) 5
(B) 10
(C) 15
(D) 20

- 2** A recipe uses 3 cups of flour for every 2 cups of sugar. If a baker uses 7.5 cups of flour, how many cups of sugar should the baker use to keep the same ratio?

- (A) 5
(B) 6.5
(C) 9.5
(D) 11.25

- 3 A company's profit P , in dollars, from selling n items is given by $P = 12n - 3,600$. Which of the following is the best interpretation of $-3,600$ in this context?

(A) The company's profit if it sells no items
(B) The company's profit on each item sold
(C) The number of items the company must sell to break even
(D) The company's maximum possible profit

- 4 Two angles are supplementary. The measure of one angle is 18° more than twice the measure of the other. What is the measure, in degrees, of the smaller angle?

Your answer

- 5 The function $f(t) = 250(2)^{t/6}$ gives the number of bacteria in a culture t hours after an experiment begins. According to the model, how many hours does it take for the number of bacteria to double?

(A) $\frac{1}{6}$
(B) 2
(C) 3
(D) 6

6

$$3x - 2y = 16$$

$$x + y = 7$$

If (x, y) is the solution to the system of equations above, what is the value of $x - y$?

Your answer

- 7 A data set consists of the values 12, 15, 15, 18, 21, 24, and 26. If the value 80 is added to the data set, which of the following statements is true?

(A) The mean increases by more than the median does.
(B) The median increases by more than the mean does.
(C) The mean and the median increase by the same amount.
(D) Neither the mean nor the median changes.

- 8 What is the positive difference between the two solutions to the equation $x^2 - 10x + 21 = 0$?

Your answer

- 9 A phone plan costs \$35 per month, plus \$0.10 for each text message beyond the first 200 sent that month. If a customer's bill for a month was at most \$50, what is the greatest number of text messages the customer could have sent that month?

(A) 150
(B) 350
(C) 500
(D) 850

- 10 What is the distance between the points $(-3, 4)$ and $(5, -2)$ in the xy -plane?

(A) 8
(B) 10
(C) 14
(D) 100

- 11 A garden hose delivers water at a rate of 9 gallons per minute. A swimming pool holds 2,700 cubic feet of water. If 1 cubic foot is equivalent to 7.5 gallons, how many hours will it take the hose to fill the empty pool?

Your answer

- 12 The functions f and g are defined by $f(x) = 3x^2 - 2$ and $g(x) = x + 4$. What is the value of $f(g(-2))$?
- (A) 2
(B) 10
(C) 14
(D) 46
- 13 Line k has equation $3x + 4y = 12$. Line j is parallel to line k and passes through the point $(8, -1)$. What is the y -intercept of line j ?
- (A) -5
(B) -1
(C) 3
(D) 5
- 14 Which of the following is equivalent to $(2x - 3)^2 - (x + 1)(4x - 5)$?
- (A) $-11x + 14$
(B) $-13x + 4$
(C) $-11x + 4$
(D) $8x^2 - 11x + 14$
- 15 A bag contains 60 marbles that are red, blue, and green in the ratio $3 : 5 : 4$. If 6 more red marbles are added to the bag, what is the probability that a marble chosen at random from the bag is red?
- (A) $\frac{1}{11}$
(B) $\frac{1}{4}$
(C) $\frac{7}{22}$
(D) $\frac{7}{20}$
- 16 For $x > 0$, the expression $\frac{\sqrt{x} \cdot x^{3/2}}{x^{-1}}$ is equivalent to x^k . What is the value of k ?
- (A) $\frac{1}{2}$
(B) 1
(C) 2
(D) 3
- 17 In right triangle ABC , angle C is a right angle, $\cos A = 0.6$, and $AB = 20$. What is the length of BC ?
- (A) 12
(B) 16
(C) 20
(D) 25
- 18 A store's weekly revenue R , in dollars, from selling a product at a price of p dollars is modeled by $R(p) = -20p^2 + 800p$. What is the maximum weekly revenue, in dollars, predicted by the model?
- (A) 20
(B) 400
(C) $8,000$
(D) $16,000$
- 19 A student bought 12 items: some pens at \$1.50 each and some notebooks at \$3.50 each. The student spent \$32.00 in all. How many notebooks did the student buy?
- (A) 5
(B) 6
(C) 7
(D) 8

- 20** A circle is inscribed in a square, so that the circle touches all four sides of the square. The area of the circle is 36π square units. What is the area of the square, in square units?

(A) 12
(B) 36
(C) 72
(D) 144

- 21** The equation $2x^2 + 12x + c = 0$, where c is a constant, has two distinct real solutions. What is the greatest possible integer value of c ?

Your answer

- 22** The graph of $y = (x - a)(x - 7)$, where a is a constant, is a parabola in the xy -plane whose vertex has an x -coordinate of 4. What is the y -coordinate of the vertex?

Your answer

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$-\frac{1}{3}$	-1/3 -.3333 -0.333	-.33 -0.33

- 1** If $\frac{x}{3} + \frac{x}{4} = 14$, what is the value of x ?

Your answer

- 2** A taxi company charges a \$4.00 pickup fee plus \$2.50 per mile. If a ride cost \$29.00, how many miles long was the ride?

- (A) 7.6
(B) 10
(C) 11.6
(D) 76.5

- 3** The function f is defined by $f(x) = x^2 - 6x + k$, where k is a constant. If the minimum value of $f(x)$ is 4, what is the value of k ?

- (A) 4
(B) 9
(C) 13
(D) 22

- 4 A circle has a circumference of 30π . Minor arc AB of the circle has a length of 5π . What is the measure, in degrees, of the central angle that intercepts arc AB ?

(A) 12
(B) 30
(C) 36
(D) 60

- 5 A cyclist rides at a constant speed of 18 kilometers per hour. How many **minutes** does it take the cyclist to ride 4.5 kilometers?

(A) 0.25
(B) 4
(C) 13.5
(D) 15

- 6 The function p is defined by $p(x) = (x - 2)(x^2 + 4x - 5)$. What is the sum of the distinct real zeros of p ?

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

- 7 Tank A holds 500 liters of water and is being drained at a rate of 12 liters per minute. At the same time, Tank B holds 140 liters of water and is being filled at a rate of 18 liters per minute. After how many minutes will the two tanks hold the same amount of water?

(A) 12
(B) 20
(C) 30
(D) 36

8

$$ax + 6y = 15$$

$$4x + by = 10$$

In the system of equations above, a and b are constants. If the system has infinitely many solutions, what is the value of $a + b$?

(A) 5
(B) 8
(C) 10
(D) 13

9

Two right circular cones are similar, and the ratio of their heights is $2 : 3$. The volume of the smaller cone is 48π cubic inches. What is the volume, in cubic inches, of the larger cone?

(A) 72π
(B) 108π
(C) 162π
(D) 216π

10

The amount of a substance remaining t days after an experiment begins is modeled by $A(t) = 80 \left(\frac{1}{2}\right)^{t/14}$. Which of the following is equivalent to $A(t)$ and shows, as a constant or coefficient, the factor by which the amount is multiplied each day?

(A) $80 (0.5^{14})^t$
(B) $80 \left(\frac{0.5}{14}\right)^t$
(C) $80 \left(1 - \frac{0.5}{14}\right)^t$
(D) $80 (0.5^{1/14})^t$

11

In the equation $(k - 3)x + 12 = 4x + 2k$, k is a constant. If the equation has no solution, what is the value of k ?

Your answer

- 12 A researcher recruited 200 adult volunteers and randomly assigned half of them to use a new sleep-tracking app for one month; the other half did not use the app. On average, the volunteers who used the app slept 25 minutes more per night than those who did not. Which of the following conclusions is most appropriate?

- (A) Using the app will increase the nightly sleep of every adult who uses it.
- (B) Using the app causes adults in general to sleep about 25 minutes more per night.
- (C) No conclusion about the app's effect can be drawn, because the volunteers were not selected at random.
- (D) Using the app likely caused an increase in nightly sleep for people similar to the volunteers.

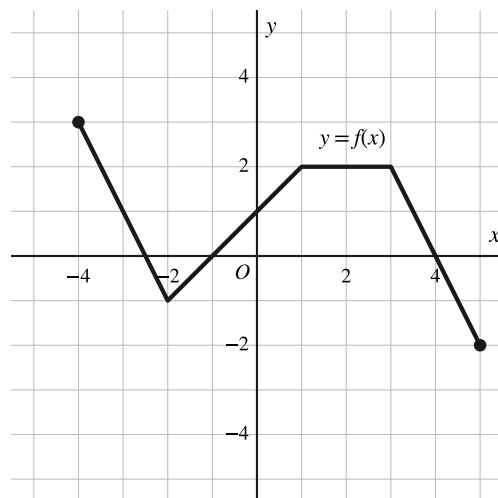
- 13 The equation $x^2 + bx + 2b = 0$, where b is a nonzero constant, has exactly one real solution. What is that solution?

Your answer

- 14 An angle in standard position in the xy -plane measures $\frac{7\pi}{6}$ radians. What is the sine of the angle?

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

- 15 The graph of $y = f(x)$ is shown. For how many values of x is $f(x) = 1$?



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

16

$$y > 2x - 3$$

$$y < -x + 6$$

For which of the following values of a is the point $(a, 4)$ a solution to the system of inequalities above?

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

17

From 2020 to 2022, a town's population increased by 10% each year. From 2022 to 2024, the population decreased by 10% each year. The town's population in 2024 was what percent of its population in 2020?

- (A) 96%
- (B) 98.01%
- (C) 100%
- (D) 101.99%

- 18 If a and b are positive numbers such that $a^2 + b^2 = 34$, $ab = 15$, and $a > b$, what is the value of $a - b$?

Your answer

- 19 In the xy -plane, a line is tangent to the circle $(x - 4)^2 + (y + 2)^2 = 25$ at the point $(7, 2)$. What is the slope of the line?

- (A) $-\frac{4}{3}$
(B) $-\frac{3}{4}$
(C) $\frac{3}{4}$
(D) $\frac{4}{3}$

- 20 The function f is defined by $f(x) = (x + 3)(x - 1)(x - 5)$. How many integers x satisfy both $-5 \leq x \leq 5$ and $f(x) < 0$?

- (A) 2
(B) 3
(C) 5
(D) 7

- 21 One gallon of paint covers 350 square feet and costs \$42. A painter must apply two coats of paint to walls with a total area of 1,300 square feet, and the paint is sold only in whole gallons. What is the minimum cost, in dollars, of the paint the painter must buy?

Your answer

- 22 The function f is defined by $f(x) = 4x^2 + kx + 9$, where k is a negative constant. The vertex of the graph of $y = f(x)$ in the xy -plane lies on the x -axis. What is the x -coordinate of the vertex?

Your answer

STOP. This is the end of Math, Module 2.

Answer Sheet

Fill in one bubble per question. Write grid-in answers in the boxes.

Reading and Writing, Module 1

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

Math, Module 1

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

Reading and Writing, Module 2

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

Math, Module 2

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

Answer Key

Count your correct answers in each module

Reading and Writing, Module 1

1	A	Words in Context
2	B	Words in Context
3	C	Words in Context
4	B	Words in Context
5	C	Text Structure and Purpose
6	A	Text Structure and Purpose
7	C	Text Structure and Purpose
8	D	Cross-Text Connections
9	B	Central Ideas and Details
10	A	Central Ideas and Details
11	A	Command of Evidence (Textual)
12	C	Command of Evidence (Textual)
13	B	Command of Evidence (Quantitative)
14	D	Command of Evidence (Quantitative)
15	A	Inferences
16	D	Inferences
17	A	Boundaries
18	B	Form, Structure, and Sense
19	C	Form, Structure, and Sense
20	D	Boundaries
21	D	Form, Structure, and Sense
22	C	Form, Structure, and Sense
23	B	Transitions
24	A	Transitions
25	D	Rhetorical Synthesis
26	C	Rhetorical Synthesis
27	B	Rhetorical Synthesis

Math, Module 1

1	C	Linear equations in one variable
2	A	Ratios and proportions
3	A	Linear functions
4	54	Lines and angles
5	D	Nonlinear functions (exponential)
6	5	Systems of linear equations
7	A	One-variable data: center
8	4	Nonlinear equations (quadratic)
9	B	Linear inequalities

Reading and Writing, Module 2

1	A	Words in Context
2	D	Words in Context
3	B	Words in Context
4	C	Words in Context
5	A	Text Structure and Purpose
6	C	Text Structure and Purpose
7	D	Text Structure and Purpose
8	D	Cross-Text Connections
9	A	Cross-Text Connections
10	D	Central Ideas and Details
11	B	Command of Evidence (Textual)
12	C	Command of Evidence (Textual)
13	C	Command of Evidence (Quantitative)
14	A	Command of Evidence (Quantitative)
15	B	Inferences
16	A	Inferences
17	B	Form, Structure, and Sense
18	B	Form, Structure, and Sense
19	D	Form, Structure, and Sense
20	C	Boundaries
21	B	Boundaries
22	B	Form, Structure, and Sense
23	A	Transitions
24	A	Transitions
25	C	Rhetorical Synthesis
26	C	Rhetorical Synthesis
27	D	Rhetorical Synthesis

Math, Module 2

1	24	Linear equations in one variable
2	B	Linear equations in one variable
3	C	Nonlinear functions (quadratic)
4	D	Circles (arcs and angles)
5	D	Rates and units
6	A	Polynomials (zeros)
7	A	Linear equations in one variable
8	C	Systems of linear equations
9	C	Volume and similarity

10	B	Distance in the coordinate plane
11	37.5 or 75/2	Rates and units
12	B	Function notation (composition)
13	D	Linear equations in two variables
14	A	Equivalent expressions
15	C	Probability
16	D	Exponents and radicals
17	B	Right triangle trigonometry
18	C	Nonlinear functions (quadratic)
19	C	Systems of linear equations
20	D	Area
21	17	Nonlinear equations: discriminant
22	-9	Nonlinear functions (quadratic)

10	D	Equivalent expressions (exponential)
11	7	Linear equations (no solution)
12	D	Evaluating statistical claims
13	-4	Nonlinear equations: discriminant
14	B	Trigonometry (unit circle)
15	A	Functions from graphs
16	A	Systems of linear inequalities
17	B	Percentages
18	2	Nonlinear equations
19	B	Circles (tangent lines)
20	C	Polynomials (sign analysis)
21	336	Rates and units
22	3/2 or 1.5	Nonlinear functions (quadratic)

Estimate your Reading and Writing score

Add your correct answers from both Reading and Writing modules (out of 54).

Raw	Score	Raw	Score
0	200	28	520
1	220	29	520
2	240	30	530
3	250	31	540
4	270	32	550
5	290	33	560
6	300	34	570
7	320	35	580
8	340	36	580
9	350	37	590
10	360	38	600
11	370	39	610
12	380	40	620
13	390	41	630
14	400	42	640
15	410	43	650
16	420	44	660
17	420	45	680
18	430	46	690
19	440	47	700
20	450	48	710
21	460	49	730
22	470	50	740
23	480	51	760
24	480	52	770
25	490	53	780
26	500	54	800
27	510		

Estimate your Math score

Add your correct answers from both Math modules (out of 44). Add the two section scores for your total.

Raw	Score	Raw	Score
0	200	23	540
1	220	24	550
2	240	25	560
3	260	26	570
4	280	27	580
5	310	28	590
6	330	29	600
7	350	30	610
8	370	31	620
9	390	32	640
10	400	33	650
11	410	34	660
12	430	35	680
13	440	36	690
14	450	37	700
15	460	38	710
16	470	39	730
17	480	40	740
18	490	41	760
19	500	42	770
20	510	43	790
21	520	44	800
22	530		

Reading and Writing, Module 1

1. A. The colon describes a report that takes no position: no recommendation, no indication of which argument is stronger. That is *noncommittal*. *Conciliatory* (trying to placate) describes a tone, not an absence of a position; *incendiary* is the opposite.

2. B. “Although” sets the critics against the later scholars, who say the choice was “carefully considered.” So the critics thought the opposite: that it was *arbitrary*. **Trap:** *deliberate* is the scholars’ view, not the critics’. Check which side of the “although” the blank sits on.

3. C. The two had argued for days about the sign; turning it to face the street ends the argument. “Settled the matter” means *resolved* it. **Trap:** *calmed* borrows from “quietly” and the sense of “settle down,” but a matter isn’t calmed.

4. B. The plants look tough, yet they die quickly in ordinary garden conditions. Their hardiness gives a false impression of general toughness: it is *deceptive*. *Inherent* works against the point, since the toughness turns out to depend on conditions.

5. C. “The sentence before this *asked* how small birds carry enough fuel, and this part *answers* it”: by storing fat. A is wrong because ornithologists “wondered”; they didn’t hold an assumption that’s overturned. Nothing is an exception (B) or about avoiding the Gulf (D).

6. A. The passage ends with Noor picturing a farmer acting “on her word”: an unseen listener she affects. Nothing suggests anxiety (B), the technical detail is one phrase (C), and her upbringing is never mentioned (D).

7. C. The sentence before the colon says farmers respond to “a risk that outsiders tend to overlook,” and the underlined portion names that risk. **Trap:** A picks up content words (“outperforms,” “good year”) but the portion’s job is to explain the risk, not to show that yields are higher.

8. D. The critics say returning objects deprives researchers of evidence. Molina’s cases show research expanding: new knowledge from communities and new collaborations. A concedes the critics’ premise, which Molina disputes; B contradicts her point about catalogs; C invents a policy.

9. B. The ticking was “beneath notice” until it stopped; its absence is what he notices. Nothing suggests resentment (A) or fear of damage (C), and the final image of the room “stopped breathing with him” suggests loss, not a preference for silence (D).

10. A. The last sentence gives the finding directly. B, C, and D introduce comparisons and behaviors the text never reports.

11. A. Only A measures the house against her memory: a doorframe once out of reach now barely clears her head. B and C describe change but not size; D is memory without any comparison of scale.

12. C. C shows the predicted speed advantage *and* shows it is specific to family relationships, which rules out a general difference in speed. A is about usage, not recall; B applies to everyone; D concerns setting, not relationships.

13. B. The claim contrasts species: some survive freezing, some don’t. B sets a freezing-tolerant species (pine, 88%) beside a species that fails at the same temperature (oak, 0%). A and C each describe one species only. D is false: cacao (0%) is lower than oak (4%) at 15°C.

14. D. Read the axis label before the bars: “minutes *before* sunrise,” so a taller bar means *earlier*. High light: 41 minutes before; low light: 12 minutes before; the difference is 29 minutes. **Traps:** A turns “before” into “after”; B reads taller bars as later (the flip); C reverses the medium and high bars.

15. A. A cause can’t come fifteen years after its effect begins, so soot can’t explain the *start*. It could still have mattered after 1870, which is why A’s qualification is right and C overreaches. B contradicts the first sentence. D throws out the evidence the argument depends on.

16. D. New apartment buildings near only the participating libraries is a rival explanation for more library cards. D names it and draws the modest conclusion. A and B aren’t supported; C is a recommendation the text doesn’t make.

17. A. “However” begins a second independent clause, so the clauses need a semicolon (or period) before it and a comma after it. B and D are comma splices; C has no boundary at all.

18. B. The main verb already exists: “The Vault...*stores*.” The phrase between the commas must be a modifier, so the blank takes the participle *built*. A, C, and D each add a second finite verb (D adds a subject too) inside a phrase set off by commas.

19. C. The subject is “the number,” which is singular, not “species.” The sentence is set in the past (“had been declining,” “planted”). Only *rose* works for a singular subject in the past. A, B, and D are plural, and D is also present tense.

20. D. “Marine biologist” is a title that directly precedes the name, so no punctuation separates them, and no comma belongs between the subject and its verb “discovered.” A sets the name off as if it were extra information, but removing it leaves “Marine biologist discovered,” which doesn’t work. B splits the subject with a single comma, and C puts a comma between the subject and its verb.

21. D. The killing happened before Fleming noticed it, in the past, so the past perfect *had killed* is needed. The present (B), present perfect (A), and future (C) clash with “noticed” in 1928.

22. C. Compare like with like: a wingspan with a wingspan. “That of” stands for “the wingspan of.” A compares a wingspan to a bird; D compares a span to a wing; B uses a plural pronoun for the singular “wingspan.”

23. B. The sentence gives the evidence behind “proved otherwise,” so it builds on the previous sentence. *In fact* does that. The contrast (“although such disks are indeed disturbed”) is already inside the sentence. **Trap:** the other three are contrast words reacting to the internal “although,” not to the previous sentence.

24. A. Suspicion about poison is the reason the plant was grown for looks rather than eaten: cause and effect. *Nevertheless* would wrongly imply the ornamental use happened despite the suspicion.

25. D. This time the goal is a *similarity*. D gives two. **Trap:** C opens with “both,” but its emphasis lands on a difference (and “orbit the Sun” isn’t in the notes). A and B are differences. The signal word never decides it; the content does.

26. C. Finding = result. C gives the measured difference. A is Albrecht’s interpretation, B is the method, and D is the research question.

27. B. A generalization describes the whole category. B says what CAM plants as a group do and why. A, C, and D are statements about particular plants.

Reading and Writing, Module 2

1. A. The rebuttal (“far from being radical breaks with tradition”) tells you what the critics claimed: that the works break with tradition, or are *iconoclastic*. **Trap:** *derivative* describes the author’s view (the works borrow from folk songs), not the critics’.

2. D. A whole chapter on his own mistake, with his critics quoted at length: he doesn’t spare himself. *Unsparring*. *Self-serving* is the opposite; *laconic* (using few words) contradicts “at length”; *equivocal* (deliberately vague) contradicts the directness.

3. B. “She allowed that some hands were quicker... but she held that...”: she grants a point and then makes her real claim. That’s *conceded*. **Trap:** *permitted* is the everyday meaning, but she isn’t giving permission for anything.

4. C. “Although” sets the opponents’ description against the fact that the money was secured long ago. The opponents must have called it insecure: *precarious*. *Lavish* is a different complaint (too much money), which the rebuttal doesn’t answer.

5. A. “The sentence before said guides taught visitors what to feel, and this part *gives an instance*”: a guide dictating the time, vantage point, and vehicle for the first view. B misreads “spoil the effect” as a visitor’s complaint; it’s the guide’s warning. C and D aren’t supported.

6. C. Accepted model → prediction → conflicting evidence (identical isotopes) → Roth’s proposal, which keeps the collision but makes it more violent. A is wrong because Roth refines the model rather than abandoning it. Isotopes are a fingerprint here, not a dating tool (B).

7. D. Behavior (bridges) → apparent cost (ants not carrying food) → research showing a net benefit, with the stopping rule as further evidence. Nothing is rejected (A), traced through evolution (B), or compared across species (C).

8. D. Mendes confirms the association (“indeed more likely”) and then names confounding traits of the same cities. D keeps both halves. A ignores his confirmation; B and C make claims he never makes.

9. A. The critics blame end-of-ice-age climate. The island’s mammoths *survived* that climate, so the island case cuts against the critics, and their much later death came from drying lakes, a separate local cause. **Trap:** D grabs “died out... before any people arrived” without noticing *when* and *why* they died, details that sit at the very end of Text 2. B gets the climate evidence backwards.

10. D. “Performance mattered, but less than procedural fairness.” D states that ranking. A overreaches (“no effect” contradicts “performance mattered”); B ignores that trust held up in fair countries; C compares two kinds of performance the text never separates.

11. B. The claim needs both the reserve *and* the feeling underneath. B has both: he never said it, yet the nightly second cup reveals grief. A and C show only reserve; D shows neither.

12. C. Mensah’s evidence works only if the mineral mix points specifically to the local riverbed. If the same mix occurs near trading centers, the clay could have come from there, which is C. B *supports* local production; A is weak and indirect; D is irrelevant.

13. C. Bars below zero are declines. The least permanent water (temporary ponds, -42%) has the steepest drop, then seasonal wetlands (-27%), permanent ponds (-8%), and streams (+3%). C walks that order. **Traps:** A and B both misread the sign (streams are the only group *above* zero; -42% is a decline). D reverses -27% and -8%.

14. A. Weekly earnings = hours $\times$ wage. Retail: $32 \times 14 = 448$ to $30 \times 17 = 510$, up about 14%, while the wage rose $\frac{3}{14} \approx 21\%$. That gap is Morgan's point exactly. D is false (earnings rose). B and C are true but don't show wages and earnings diverging; for health care they move together.

15. B. Three facts chain together: songs are fixed early, forest males learn simpler songs, and females everywhere prefer complex songs. So a forest-raised male in grassland sings a simpler song than local males and is at a disadvantage. A contradicts "do not change them afterward"; C reverses the preference; D is unsupported.

16. A. If the earliest northern sites were coastal and are now underwater, the missing evidence is a preservation problem, not proof of a late arrival. B contradicts the route described; C and D contradict the explanation itself.

17. B. The main clause is "researchers named the substance," so the opening must be a modifier, not a clause. *Having identified* works and correctly describes the researchers. A and C create comma splices. D, the bare past participle, would mean the researchers *were* identified.

18. B. Strip the sentence to its core: "Researchers [who analyzed...], [a lake whose...], ___ that..." "Analyzed" belongs to the relative clause and "have accumulated" to the appositive. The subject "Researchers" still has no verb, so the blank needs the finite *concluded*.

19. D. With *neither...nor*, the verb agrees with the nearer subject, "editors," which is plural. The sentence is set in 1962, so the past plural *were* is needed. A treats the subject as "novelist"; B and C are singular and in the wrong tense.

20. C. An independent clause followed by a second clause explaining how both partners benefit: a colon fits. A is a comma splice, B a fused sentence, and D puts a semicolon before the coordinating conjunction "for."

21. B. The comma after "batteries" closes a nonessential example phrase, so it must open with a comma too. Without it (A), a lone comma would separate the subject "technologies" from its verb "depend."

22. B. The measurements belong to two observatories: plural possessive, *observatories'*. A is singular possessive; C has no possessive; D misspells the plural.

23. A. This sentence shows *how* she anticipated the objection, so it confirms and develops the previous sentence: *Indeed*. The concession ("while acknowledging...") is inside the sentence already. **Trap:** the three contrast words answer that internal "while," not the sentence before.

24. A. The two sentences describe opposite cases (dairy history $\rightarrow$ common; no dairy history $\rightarrow$ rare). *Conversely* marks that reversal. *Thus* would claim the rarity follows from the commonness, which it doesn't.

25. C. Goal in three words: *difference, oscillations counted*. C contrasts what each clock counts and how fast. **Traps:** A and D wrap similarities in contrast words. B is a real difference, but in accuracy, not in the oscillations.

26. C. Surprise needs an expectation and a violation: scientists believed life needed sunlight, and these communities run on chemical energy. Only C states both. A reports the discovery, B describes vents, D gives a consequence.

27. D. Two jobs: identify the Danube for a newcomer (a European river of a given length) and name what is unusual (more countries than any other river). D does both. A states the fact without introducing the river or saying it's a record; B's distinction is shared with many rivers; C's contrast doesn't connect.

Math, Module 1

1. C. $2x = 20 \Rightarrow x = 10$, so $x + 5 = 15$. **Trap:** 10 is x .

2. A. Sugar is $\frac{2}{3}$ of flour: $7.5 \times \frac{2}{3} = 5$. **Traps:** 11.25 multiplies by $\frac{3}{2}$, the ratio upside down; 6.5 keeps the *difference* (1 cup) instead of the ratio.

3. A. When $n = 0$, $P = -3,600$: the company loses \$3,600 if it sells nothing (its fixed costs). The profit per item is 12; break-even is $n = 300$.

4. 54. $x + (2x + 18) = 180 \Rightarrow 3x = 162 \Rightarrow x = 54$. The other angle is 126. The question asks for the **smaller** one, so 54.

5. D. The base 2 is raised to $\frac{t}{6}$, which increases by 1 every 6 hours, so the count doubles every 6 hours. **Traps:** $\frac{1}{6}$ is the coefficient of t in the exponent; 2 is the growth factor, not a time.

6. 5. From $x = 7 - y$: $21 - 3y - 2y = 16 \Rightarrow y = 1$, so $x = 6$ and $x - y = 5$.

7. A. Median: 18 becomes $\frac{18+21}{2} = 19.5$, up 1.5. Mean: $\frac{131}{7} \approx 18.71$ becomes $\frac{211}{8} \approx 26.38$, up about 7.7. An extreme value pulls the mean far more than the median.

8. 4. $(x - 3)(x - 7) = 0$, so the solutions are 3 and 7, and their positive difference is 4.

9. B. $35 + 0.10(t - 200) \leq 50 \Rightarrow t - 200 \leq 150 \Rightarrow t \leq 350$. **Traps:** 150 counts only the extra texts; 500 divides the whole bill by 0.10 and ignores both the base fee and the 200 free texts.

10. B. $\sqrt{(5 - (-3))^2 + (-2 - 4)^2} = \sqrt{64 + 36} = \sqrt{100} = 10$. **Traps:** 14 adds the legs, 100 forgets the square root, and 8 is only the horizontal distance.

- 11. 37.5 or 75/2.** Chain the units: $2,700 \text{ ft}^3 \times 7.5 \frac{\text{gal}}{\text{ft}^3} = 20,250 \text{ gal}$; $\div 9 \frac{\text{gal}}{\text{min}} = 2,250 \text{ min}$; $\div 60 \frac{\text{min}}{\text{hr}} = 37.5 \text{ hr}$. Converting cubic feet to gallons *multiplies* (each cubic foot holds 7.5 gallons); every other step divides. Check that the units cancel to hours.
- 12. B.** Work inside out: $g(-2) = 2$, then $f(2) = 3(4) - 2 = 10$. **Traps:** 14 is $g(f(-2))$, the composition in the wrong order; 2 stops after the inner step.
- 13. D.** Parallel means slope $-\frac{3}{4}$: $y + 1 = -\frac{3}{4}(x - 8) \Rightarrow y = -\frac{3}{4}x + 5$. **Traps:** 3 is line k 's intercept; -1 is the given point's y -coordinate; -5 comes from flipping both signs in point-slope form.
- 14. A.** $4x^2 - 12x + 9 - (4x^2 - x - 5) = -11x + 14$. Distributing the minus sign to only the $4x^2$ gives $-13x + 4$; missing it on the constant gives $-11x + 4$.
- 15. C.** Red: $\frac{3}{12} \times 60 = 15$, plus 6 is 21. The total also grows: $66 \cdot \frac{21}{66} = \frac{7}{22}$. **Traps:** $\frac{7}{20} = \frac{21}{60}$ adds red marbles without adding them to the total; $\frac{1}{4}$ ignores the new marbles.
- 16. D.** $\frac{1}{2} + \frac{3}{2} - (-1) = 3$. **Trap:** 1 subtracts the -1 exponent the wrong way ($2 + (-1)$).

Math, Module 2

- 1. 24.** $\frac{4x+3x}{12} = 14 \Rightarrow 7x = 168 \Rightarrow x = 24$.
- 2. B.** Undo in reverse order: remove the fee first, then divide by the rate. $\frac{29-4}{2.5} = 10$. **Traps:** 7.6 divides first and then subtracts the fee ($29/2.5 - 4$); 11.6 ignores the fee; 76.5 runs the formula forward.
- 3. C.** Complete the square: $f(x) = (x - 3)^2 + (k - 9)$. The minimum is $k - 9 = 4$, so $k = 13$. **Traps:** 4 is the minimum itself; 9 is the square you complete with.
- 4. D.** The arc is $\frac{5\pi}{30\pi} = \frac{1}{6}$ of the circle, and $\frac{1}{6} \times 360^\circ = 60^\circ$. **Trap:** 30 takes $\frac{1}{6}$ of 180° instead of 360° .
- 5. D.** Time = $\frac{\text{distance}}{\text{rate}} = \frac{4.5}{18} = 0.25 \text{ hour} = 15 \text{ minutes}$. **Traps:** 0.25 is right in hours but the question asks for minutes; 4 is $18 \div 4.5$, the rate divided the wrong way.
- 6. A.** $x^2 + 4x - 5 = (x + 5)(x - 1)$, so the zeros are 2, -5 , and 1. Their sum is -2 . **Trap:** 2 flips the signs of the zeros (reading them straight off the factors).
- 7. A.** $500 - 12t = 140 + 18t \Rightarrow 360 = 30t \Rightarrow t = 12$. **Traps:** 20 and 30 divide the 360-liter gap by only one tank's rate; the gap closes at $12 + 18 = 30$ liters per minute.
- 8. C.** Infinitely many solutions means the first equation is a multiple of the second. The constants give the multiplier: $15 = 1.5(10)$. So $a = 1.5(4) = 6$ and $6 = 1.5b \Rightarrow b = 4$, and $a + b = 10$.

- 17. B.** $\cos A = \frac{AC}{AB}$, so $AC = 0.6(20) = 12$. Then $BC = \sqrt{20^2 - 12^2} = 16$. **Trap:** 12 is AC , the side adjacent to A ; BC is opposite A .
- 18. C.** The vertex is at $p = \frac{-800}{2(-20)} = 20$, and $R(20) = -8,000 + 16,000 = 8,000$. **Traps:** 20 is the best price; 16,000 is $800p$ alone.
- 19. C.** $1.5(12 - n) + 3.5n = 32 \Rightarrow 18 + 2n = 32 \Rightarrow n = 7$. **Trap:** 5 is the number of pens.
- 20. D.** $\pi r^2 = 36\pi \Rightarrow r = 6$, so the square's side equals the diameter, 12, and its area is 144. **Traps:** 12 is the side length; 36 uses the radius as the side.
- 21. 17.** Two distinct real solutions means discriminant > 0 : $144 - 8c > 0 \Rightarrow c < 18$. Strict inequality, so the greatest integer is 17. **Trap:** 18 makes the discriminant 0 (one repeated solution).
- 22. -9.** The vertex lies midway between the zeros: $\frac{a+7}{2} = 4 \Rightarrow a = 1$. Then $y = (4 - 1)(4 - 7) = -9$. **Traps:** 1 is a ; 4 is the x -coordinate the question gave you.

- 9. C.** Volumes scale by the *cube* of the length ratio: $48\pi \left(\frac{3}{2}\right)^3 = 48\pi \cdot \frac{27}{8} = 162\pi$. **Traps:** 72π uses the ratio once (linear); 108π squares it (area).
- 10. D.** $\left(\frac{1}{2}\right)^{t/14} = \left(0.5^{1/14}\right)^t$, so the daily factor is $0.5^{1/14} \approx 0.952$. A would halve 14 times per day; B and C divide the factor or the rate instead of taking a root.
- 11. 7.** No solution: equal x -coefficients but different constants. $k - 3 = 4 \Rightarrow k = 7$. Check the constants: $12 \neq 2(7) = 14$. (If the constants had matched, there would be infinitely many solutions.)
- 12. D.** Random *assignment* supports a cause-and-effect conclusion. But the volunteers weren't randomly *selected* from all adults, so the conclusion is limited to people like them. B overgeneralizes; A claims it works for everyone; C confuses selection with assignment.
- 13. -4.** Exactly one solution means discriminant $= 0$: $b^2 - 8b = 0 \Rightarrow b = 8$ (since $b \neq 0$). The equation is then $x^2 + 8x + 16 = (x + 4)^2 = 0$, so $x = -4$. **Trap:** 8 is b , not the solution.
- 14. B.** $\frac{7\pi}{6} = \pi + \frac{\pi}{6}$, in Quadrant III, where sine is negative. The reference angle $\frac{\pi}{6}$ has sine $\frac{1}{2}$, so the answer is $-\frac{1}{2}$. **Traps:** $-\frac{\sqrt{3}}{2}$ is the cosine; $\frac{1}{2}$ misses the sign.
- 15. A.** Draw the horizontal line $y = 1$. It crosses the graph at $x = -3$, $x = 0$, and $x = 3.5$. The flat piece between $x = 1$ and $x = 3$ sits at $y = 2$, so it doesn't count: 3 values.

16. A. Substitute $y = 4$: $4 > 2a - 3 \Rightarrow a < 3.5$, and $4 < -a + 6 \Rightarrow a < 2$. Both hold only for $a < 2$. **Trap:** $a = 2$ gives $4 < 4$, which is false, because the inequality is strict.

17. B. $1.1 \times 1.1 \times 0.9 \times 0.9 = 1.21 \times 0.81 = 0.9801$, or 98.01%. Equal percent increases and decreases don't cancel; the decreases act on a larger base.

18. 2. $(a - b)^2 = a^2 + b^2 - 2ab = 34 - 30 = 4$, so $a - b = \pm 2$. Since $a > b$, $a - b = 2$. (Here $a = 5$ and $b = 3$.)

19. B. The radius from the center $(4, -2)$ to $(7, 2)$ has slope $\frac{4}{3}$. A tangent is perpendicular to the radius, so its slope is $-\frac{3}{4}$. **Trap:** $\frac{4}{3}$ is the radius's slope; $-\frac{4}{3}$ flips only the sign.

20. C. Zeros at -3 , 1 , and 5 split the line: $f < 0$ for $x < -3$ and for $1 < x < 5$. In range: -5 , -4 and 2 , 3 , 4 , which is 5 integers. The zeros themselves give $f = 0$, not $f < 0$.

21. 336. Area to cover: $2 \times 1,300 = 2,600 \text{ ft}^2$. Gallons: $2,600 \div 350 \approx 7.43$, which rounds *up* to 8 whole gallons. Cost: $8 \times 42 = 336$. **Traps:** one coat gives $4 \times 42 = 168$; not rounding up gives about \$312.

22. 3/2 or 1.5. Vertex on the x -axis means exactly one zero, so discriminant $= 0$: $k^2 = 144 \Rightarrow k = -12$ (negative). Then $f(x) = (2x - 3)^2$, and the vertex is at $x = \frac{-k}{2a} = \frac{12}{8} = 1.5$. **Traps:** -12 is k ; $k = +12$ would put the vertex at -1.5 .