

# Reading Test

60 MINUTES, 47 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage or pair of passages below is followed by a number of questions. After reading each passage or pair, choose the best answer to each question based on what is stated or implied in the passage or passages and in any accompanying graphics (such as a table or graph).

Questions 1-9 are based on the following passage.

This passage is from Yia Lee, “Broken Chords.”  
©2011 by Yia Lee.

Her place was run-down and small. It was late spring in Fresno, very hot and dry, and a window was open to catch a breeze. I liked her house because it smelled similar to mine: sweet and starchy like rice.

Over in the far corner, almost hidden underneath a pile of clothes, was a piano. It caught my attention like a beacon. A piano doesn’t typically grace a Hmong household. This one was an old upright. Kalia and I were friends, but this was the first time I’d been inside her house. I didn’t recall her saying she played music.

I wandered to it without trying to seem like I was heading directly there. But Kalia saw. She was a small girl, with skin the color of wet sand on the beach. Her shiny black hair was pulled back into its usual ponytail. She smiled as I stopped in front of the piano.

“Do you play, Katie?” she asked, getting up and sweeping away the clothes. She put them on the couch, and then she lifted the lid to the keyboard. The white and black keys winked at me.

I sat down and plinked out a few notes. “It’s in tune,” I said. Why had it been carelessly buried under all those clothes?

She gestured for me to begin, so I started Mozart’s Twelve Variations on Twinkle, Twinkle, Little Star. It was one of my favorites. Deceptively simple, yet full of energy and whim. My fingers were bouncing around a rush of sixteenth notes, when a voice startled me.

“Aaron, shut up!” A booming male voice yelled in Hmong.

The music faltered and then I stopped. Kalia appeared calm, but her black eyes were annoyed.

“It’s not Aaron, she’s my friend!” she called back in English.

“Oh, sorry, my bad.” A body attached itself to the voice: a young man appeared in the doorway. He glanced at us carelessly and went away.

“That was my older brother. Ignore him, he’s an idiot.” Kalia tried to be lighthearted, and I smiled for her sake.

“He doesn’t like piano?” I asked.

She shrugged. “He’ll be leaving soon—he hardly seems to live here anymore. Why don’t you finish the song?”

I finished the song, although the frolicking notes seemed false now. “Do you play?”

Kalia shook her head.

I thought, then asked, “Who’s Aaron?”

“He’s Aaron.” Kalia motioned with her head and I realized that there was another person at the doorway. He must have been standing there as I was playing, for his face had an intent, pleased expression. His skinny frame was drowning in baggy clothes and there was a gold stud in his left ear. Now that we were paying attention to him he flashed us a small smile. His black eyes seemed vaguely familiar.

“How was detention?” Kalia asked him drily.

“Good,” he answered.

“Maybe if you do your homework, you’d avoid it,” Kalia suggested.

“Maybe,” said Aaron.

"Perhaps if you showed up in class once in a while, that would help, too."

"Perhaps," Aaron said, his voice too pleasant.

65 It sounded like an old argument. Kalia looked angry, and more tired than ever. I wasn't sure what to do; my fingers hit a couple of keys accidentally.

The sound of the piano shifted their attention to me. Aaron stepped into the room and approached  
70 me. "That's my piano," he said.

I got off the bench. "I'm sorry . . ."

"Don't be, it's just that it hasn't been played on for a long time," he said, trailing a finger along the white keys. "It's weird, coming here and hearing it  
75 again . . ."

"Well, then, why don't you play something?" I said. The question just popped out of me and he hesitated. I sneaked a glance at Kalia; she was watching Aaron closely. There were undercurrents that I wasn't sure  
80 how to read. I was wondering if I'd somehow made a mistake when he sat down abruptly on the bench and let his fingers hover over the keys. Then he pressed them down.

He played Chopin, the etude nicknamed Ocean.  
85 His fingers flew as the music swept over the room. He was good. Not perfect, but he had good technique and he knew the music. I could see it in his eyes, the way they blazed a vivid crystal black.

When Aaron stopped, there was a silence.  
90 I struggled to say something. Kalia beat me to words.

"Aaron, this is my friend Katie Yang," she introduced. "Katie, this is my little brother Aaron."

I said hello to him, he nodded and said,  
95 "Whatssup?"

Then Kalia told him to go away and leave us alone; we were working on a project. But her tone was less angry and had more humor. When he left I looked at the piano. I could still hear the notes rolling in my mind.

1

Based on the passage, Katie's interactions at Kalia's house suggest that Katie has

- A. stumbled upon a mystery that concerns Kalia and the piano.
- B. learned a lot about Kalia and the dynamics of Kalia's household.
- C. found herself at odds with Kalia because they lack common interests.
- D. grown increasingly uncomfortable as she learns more about Kalia's brothers.

2

In the passage, Katie primarily presents herself as someone who is

- A. shy, because she is at a loss for words when Kalia's brothers speak to her.
- B. perceptive, because she is aware of the tension among Kalia and her siblings.
- C. critical, because she is quick to make judgments based on the appearance of Kalia's home.
- D. troublesome, because she disturbs Kalia's brothers when she plays the piano.

3

In line 7, the narrator's description of the piano as being "like a beacon" most likely serves to

- A. contrast the new piano with the old home.
- B. suggest how dark it is in Kalia's home.
- C. emphasize how drawn Katie is to the piano.
- D. support the idea that Katie likes Kalia's home.

4

The main effect of the words “winked” (line 20), “plinked” (21), and “bouncing” (line 27) is to

- A. establish a contrast between Katie’s musical abilities and Aaron’s.
- B. create a playful tone that highlights Katie’s enjoyment of the piano.
- C. imply that the old upright piano doesn’t sound very good.
- D. illustrate the effect Katie’s playing has on Kalia.

5

Which choice best characterizes Kalia’s attitude about Katie playing the household’s piano?

- A. Inviting
- B. Overjoyed
- C. Uncomfortable
- D. Annoyed

6

Which choice provides the best evidence for the answer to the previous question?

- A. lines 5-6 (“Over . . . piano”)
- B. lines 7-8 (“A piano . . . household”)
- C. lines 17-19 (“Do you . . . keyboard”)
- D. lines 21-23 (“I sat . . . clothes”)

7

According to the passage, the Mozart composition Katie chooses to play is

- A. less cheerful than Chopin’s Ocean.
- B. a dignified piece of music.
- C. more intricate than it seems.
- D. a piece often favored by children.

8

Based on the passage, when Aaron hears Katie playing the piano, he seems to

- A. feel annoyed that someone else is playing his piano.
- B. be intrigued and gratified to hear someone playing the piano.
- C. feel joyful and excited by the music that Katie is playing.
- D. be envious that Katie is such an accomplished pianist.

9

Which choice provides the best evidence for the idea that Aaron’s playing made a strong impression on Katie?

- A. lines 84-86 (“He played . . . good”)
- B. lines 87-88 (“I could . . . black”)
- C. lines 97-98 (“But . . . humor”)
- D. lines 98-100 (“When . . . mind”)

**Questions 10-19 are based on the following passages.**

Passage 1 is adapted from Suchen Christine Lim, "Singapore Literature: A Moral Force to Be Reckoned With." ©2016 by Singapore Press Holdings Ltd. Co. Regn. No. 198402868E. Passage 2 is adapted from Lauren Elkin, "National Literature: An International Question." ©2008 by Guardian News and Media Limited.

**Line Passage 1**

A nation's literature is the mirror through which people see themselves. Children and adults need to see themselves in their country's fiction and poetry. Lois-  
 5 Ann Yamanaka, the Pushcart Prize-winning poet and author of the book *Name Me Nobody*, said: "... until you see yourself in literature, in the written word, you don't exist." This is why every national school curriculum includes the study of its nation's literary  
 10 works.

Reading the literature of a country is like listening to its heartbeat. One hears the hopes, fears and angst of ordinary folks like you and me. At the universal level, literature is the bridge built by Imagination to help us  
 15 cross over into the interior landscape of those who are different from us, and yet the same, and as extraordinary and odd as ourselves.

The writer's focus provides readers with insights into their society. To express the unexpressed, to say  
 20 the unsaid, to give voice to those with no voice—this has always been one of literature's many contributions. In literature, king or beggar, prime minister or dialect-speaking squatter, all are equal; all can take centre stage as the main character. No other school subject  
 25 focuses on the individual or marginalised in the way literature does. This, in itself, is a moral force in a world in which numbers count, and wealth, power and intellect dominate.

Singapore literature has something to offer us, and  
 30 the world. It is neither monocultural nor monolingual. Comprising the poetry and fiction of four official languages, Singapore literature writes across language and culture. The congregation of English and Asian voices is part of our national fabric and identity as a  
 35 people.

The Singapore novelist writing in English accepts the challenge of recreating and rendering the variety of Asian voices and languages into English. Our literary fiction, poetry and plays offer the reader multiple perspectives and individual narratives that question,  
 40 challenge and broaden our views of ourselves beyond the national Singapore Story and the officially sanctioned founding myth. In the long run, while geography and politics continue to shape our nation, our literature will reveal our collective soul.

**Line Passage 2**

"As a nation we have no literature," the literary  
 45 critic Belinsky cries in despair in part one of Tom Stoppard's play *The Coast of Utopia*, lamenting the influence of European writers on Russian writers, and stressing the importance of creating a national story of their own.

50 With storytelling comes a sense of identity. But national literatures evolve in stages, and the need for a literature of one's own changes according to the political situation of the nation in question. A new nation, or a nation struggling to declare its  
 55 independence, will be driven to create something that is theirs, a literature that tells their national story. But the flux of modern history makes this a more or less impossible task.

"The universal idea speaks through humanity itself,  
 60 and differently through each nation in each stage of its history," Belinsky says, later in the same speech. The need for a national literature changes according to the moment the nation is experiencing, and Stoppard catches this exactly—on one hand the ardent yearning  
 65 for one, and on the other, the contingency of the literature on the historical moment.

At the recent Festival America in Paris, the question of a writer's nationality and ethnic identity preoccupied most of the discussions. Chimamanda Ngozi Adichie,  
 70 the Nigerian-born author of *Half of a Yellow Sun*, argued for Nigerian literature to be taught in Nigerian schools. "It's a paradox," she said. "People can be considered educated while knowing nothing about our history. [They] read English books, not Nigerian  
 75 books! What this means is we really don't have a sense of our own history." Such history, she said, could not be written by outsiders. "The stories of Africa should be written by Africans," she declared.

10

In Passage 2, the quotation from the character Belinsky in line 44 primarily serves to

- A. characterize writers who focus on national literature as overly dramatic and emotional about the subject.
- B. provide a counterpoint to the opinions of the writer Chimamanda Ngozi Adichie, who is also quoted in the passage.
- C. illustrate Elkin's claim about historical change with a specific example from a creative work.
- D. represent the frustrations of people who desire the development of a literature unique to their culture.

11

Which choice from Passage 1 best supports Lim's idea that a country's literature can affect individuals' perceptions of who they are?

- A. lines 2-4 ("A nation's . . . poetry")
- B. lines 11-12 ("Reading . . . heartbeat")
- C. lines 13-17 ("At the . . . ourselves")
- D. lines 22-24 ("In literature . . . character")

12

What is the main effect of the phrase "To express the unexpressed, to say the unsaid, to give voice to those with no voice" (lines 19-20)?

- A. To highlight the defining characteristics of high-quality national literature
- B. To emphasize the unique potential that national literature has to champion the oppressed
- C. To convince readers of the importance of national literature in the civic education of all citizens
- D. To encourage writers who focus on national literature to include characters of diverse backgrounds

13

As used in line 51, "stages" most nearly means

- A. platforms.
- B. phases.
- C. arenas.
- D. levels.

14

Which choice best describes Elkin's perspective, as expressed in Passage 2, on people's desire for their own national literature?

- A. She appreciates that they want to establish an impressive account of their nation's history, but she notes that this might lead them to discourage the inclusion of regrettable historical events in their national literature.
- B. She sympathizes with their concern that writing from other nations can taint the development of a new nation's literature while observing that all literature eventually becomes irrelevant as a result of historical shifts.
- C. She understands that the desire for a national literature changes according to the historical situation, which makes capturing the spirit of a nation in the form of literature very challenging.
- D. She challenges the isolated nature of national literature and instead encourages people to read

15

Which choice provides the best evidence for the answer to the previous question?

- A. lines 44-49 ("As a nation . . . own")
- B. line 50 ("With . . . identity")
- C. lines 61-66 ("The need . . . moment")
- D. lines 76-78 ("Such . . . declared")

16

According to Passage 2, Adichie and others at Festival America were especially concerned with

- A. issues common to American writers living abroad.
- B. changes in recent history and their impact on national literature.
- C. the role of literature in encouraging positive relationships among cultures.
- D. writers' national and ethnic identities.

17

Which choice best describes a main difference between the overall structure and approach of Passage 1 compared with Passage 2?

- A. Passage 1 proposes a nuanced theory for the emergence of national literature in Singapore, while Passage 2 provides a lighthearted personal reflection on the topic of national literature.
- B. Passage 1 is a sweeping narrative of the history of Singaporean literature, whereas Passage 2 is a detailed report of different writers' perspectives on national literature.
- C. Passage 1 presents a zealous defense of the need for national literature, while Passage 2 offers an impartial description of the general characteristics of national literature.
- D. Passage 1 is a celebration of national literature in general and Singaporean literature in particular, whereas Passage 2 is an exploration of tensions within the concept of national literature.



18

Based on the passages, both Lim and Elkin would most likely agree that national literature exists primarily to

- A. chronicle the significant events and leaders in a nation's history.
- B. reflect the identities and experiences of a nation's people and connect them to one another.
- C. accurately portray the culture of a nation to readers from other nations.
- D. prove to already established nations that a new nation is legitimately independent.

19

Based on Passage 1, Lim would most likely respond to Adichie's argument in Passage 2 that Nigerian literature should be taught in Nigerian schools by

- A. agreeing that a nation's literature is essential to include in its classroom teaching.
- B. asserting that Singaporean literature is more diverse than Nigerian literature, and therefore a better choice for teaching young people.
- C. arguing that national literature has little to do with learning about a nation's history.
- D. extending Adichie's point to say that a nation's schools should exclusively teach literature from that nation.

**Questions 20-28 are based on the following passage and supplementary material.**

This passage is adapted from Emily Underwood, "Even in the Wild, Mice Run on Wheels." ©2014 by American Association for the Advancement of Science.

In 2009, neurophysiologist Johanna Meijer set up an unusual experiment in her backyard. In an ivy-tangled corner of her garden, she and her colleagues at Leiden University in the Netherlands placed a rodent running wheel inside an open cage and trained a motion-detecting infrared camera on the scene. Then they put out a dish of food pellets and chocolate crumbs to attract animals to the wheel and waited.

Wild house mice discovered the food in short order, then scampered into the wheel and started to run. Rats, shrews, and even frogs found their way to the wheel—more than 200,000 animals over 3 years. The creatures seemed to relish the feeling of running without going anywhere.

The study "puts a nail in the coffin" of the debate over whether mice and rats will run on wheels in a natural setting, says Ted Garland, an evolutionary physiologist at the University of California, Riverside. More importantly, he says, the findings suggest that like (some) humans, mice and other animals may simply exercise because they like to. Figuring out why certain strains of mice are more sedentary than others could help shed light on genetic differences between more active and sedentary people, he adds.

Even before Meijer got creative in her yard, researchers knew that captive mice are exercise maniacs. In laboratories and bedrooms, they frequently log more than 5 km per night on stationary running wheels. But scientists didn't know why the animals did it.

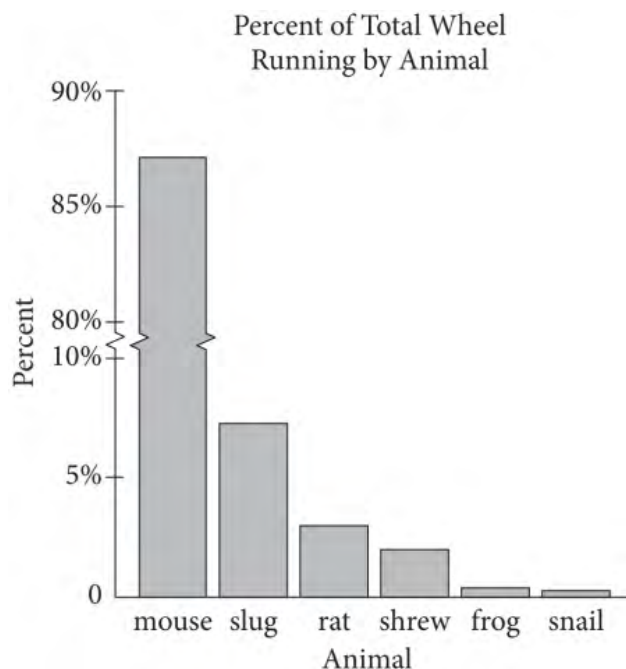
One thing was clear: they seem to enjoy it. Mice find exercise rewarding; just as they can be trained to press a lever dozens of times to release a pellet of food, the rodents will go to great lengths to unlock a running wheel when it has a brake on, and get back to spinning, Garland says. But is the drive to run normal, or is it an aberrant, obsessive behavior triggered by living in a shoebox-sized cage?

Meijer's work seems to have answered that question. On average, the backyard mice she and colleagues observed ran in 1- to 2-minute stints, roughly the same duration as that seen in lab mice. The team also set up a second wheel in a nearby nature preserve of grassy dunes and attracted a similar crowd of enthusiasts. The animals kept running even when Meijer removed the food from the garden site, although they came in smaller numbers, she notes. Sometimes the rodents were so eager to run

that they couldn't wait to take turns, she says: At one point, a large mouse sent a smaller mouse flying when it climbed on to the wheel and started running in the opposite direction.

The fact that the wild mice and other animals were bold enough to enter the cage and use the wheel is "very weird," but perhaps not as surprising when one considers that many domesticated animals also like to run on wheels, including dogs and chickens, says Justin Rhodes, a neuroscientist at the University of Illinois, Urbana-Champaign.

Although the common house mice observed in the study tend to be more leery of novel structures than other species—an evolutionary adaptation to the human penchant for building mousetraps—Garland suggests that the wheel may provide a more secure way for the animals to run than darting across an open field. "There's something attractive about being able to get in a wheel and run unfettered."



20

The main purpose of the second paragraph (lines 9–14) is to

- A. report on some of the results of Meijer's experiment.
- B. identify the factors that caused Meijer to revise her hypothesis.
- C. emphasize the benefits to animals of running on Meijer's wheel.
- D. rank the animals in Meijer's garden according to their interest in the wheel.

21

The primary purpose of the passage is to

- A. explain the innovative method used in a study.
- B. summarize an ongoing scientific debate.
- C. discuss a research project and its significance.
- D. describe the development of a theory.

22

As used in line 5, "trained" most nearly means

- A. formed.
- B. practiced.
- C. focused.
- D. drilled.



23

Which choice provides the best evidence that the setting in which a wheel is placed is unrelated to the amount of time mice will typically spend on the wheel?

- A. lines 12-14 (“The creatures . . . anywhere”)
- B. lines 38-40 (“On average . . . mice”)
- C. lines 41-43 (“The team . . . enthusiasts”)
- D. lines 46-50 (“Sometimes . . . direction”)

24

As used in line 21, “strains” most nearly means

- A. kinds.
- B. qualities.
- C. efforts.
- D. traces.

25

It can reasonably be inferred from the passage that if Meijer had placed an obstacle at the entrance of the cage surrounding the running wheel, the mice would likely have

- A. become disoriented and started running aimlessly.
- B. explored the area near the cage in search of another wheel.
- C. lost interest in the dish of food pellets and crumbs inside the cage.
- D. attempted to find a way around the obstacle to get to the wheel.

26

Which choice provides the best evidence for the answer to the previous question?

- A. lines 25-26 (“Even . . . maniacs”)
- B. lines 30-35 (“Mice . . . says”)
- C. lines 43-46 (“The animals . . . notes”)
- D. lines 51-57 (“The fact . . . Urbana-Champaign”)

27

Which statement is best supported by the data presented in the graph?

- A. The percent of wheel running by mice is roughly equal to the combined percent of all the other animals shown.
- B. Rats and shrews each accounted for a smaller percent of the total wheel running than did slugs.
- C. The percent of wheel running by house mice exceeded that of field mice.
- D. Slugs were approximately half as likely as mice to run on the wheels.

28

Which statement best describes the relationship between the graph and the passage?

- A. The graph presents data collected during Meijer’s study.
- B. The graph depicts the phenomenon that inspired Meijer’s research.
- C. The graph shows competing interpretations of Meijer’s results.
- D. The graph compares new information with Meijer’s data.

**Questions 29-37 are based on the following passage and supplementary material.**

This passage is adapted from Leonard Mlodinow, *Subliminal: How Your Unconscious Mind Rules Your Behavior*. ©2012 by Leonard Mlodinow.

Twentieth-century psychologist Frederic Bartlett believed that the distortions he had observed in people's recall could be accounted for by assuming that their minds followed certain unconscious mental scripts, which were  
 5 aimed at filling in gaps and making information consistent with the way they thought the world to be. Wondering whether our social behavior might also be influenced by some unconscious playbook, cognitive psychologists postulated the idea that many of our daily actions proceed  
 10 according to predetermined mental "scripts"—that they are, in fact, mindless.

In one test of that idea, an experimenter sat in a library and kept an eye on the copier. When someone approached it, the experimenter rushed up and tried to cut in front,  
 15 saying, "Excuse me, I have five pages. May I use the Xerox machine?" Unless the subject was making a great many more than five copies, the experimenter has provided no justification for the intrusion, so why yield? Apparently a good number of people felt that way: 40 percent of the  
 20 subjects gave the equivalent of that answer, and refused. The obvious way to increase the likelihood of compliance is to offer a valid and compelling reason why someone should let you go first. And indeed, when the experimenter said, "Excuse me, I have five pages. May I use the Xerox  
 25 machine, because I'm in a rush?" the rate of refusals fell radically, from 40 percent to just 6 percent. That makes sense, but the researchers suspected that something else might be going on; maybe people weren't consciously assessing the reason and deciding it was a worthy one.  
 30 Maybe they were mindlessly—automatically—following a mental script.

That script might go something like this: Someone asks a small favor with zero justification: say no; someone asks a small favor but offers a reason, any reason: say yes. The idea  
 35 is easy to test. Just walk up to people approaching a photocopier and to each of them say something like "Excuse me, I have five pages. May I use the Xerox machine, because xxx," where "xxx" is a phrase that, though parading as the reason for the request, really provides no  
 40 justification at all. The researchers chose as "xxx" the phrase "because I have to make some copies," which merely states the obvious and does not offer a legitimate reason for butting in. If the people making copies consciously weighed this nonreason against their own needs, one would expect  
 45 them to refuse in the same proportion as in the case in which no reason was offered

29

As used in line 29, "assessing" most nearly means

- A. judging.
- B. determining.
- C. estimating.
- D. calculating.

30

According to the passage, the experiment involving the library copier was intended to test which hypothesis?

- A. Unconscious mental scripts cause people to experience distortions in their recall of everyday activities.
- B. Successful multitasking requires that people follow unconscious mental scripts.
- C. Reliance on unconscious mental scripts increases when people have to make decisions quickly.
- D. People carry out some routine actions in accordance with unconscious mental scripts.

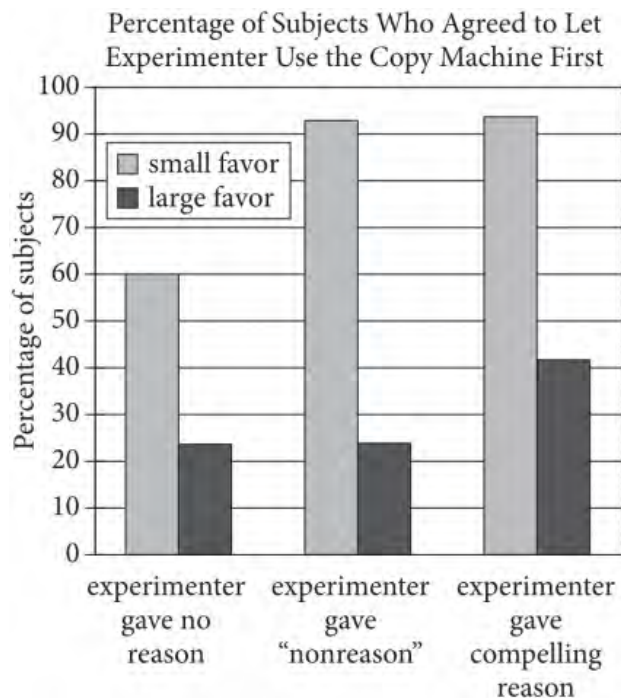
31

The passage indicates that the reason the experimenter "kept an eye on the copier" (line 13) was to

- A. verify that it was in proper working order.
- B. make sure that no library employees would interfere with it.
- C. be ready to intercept anyone coming to use it.
- D. see how subjects behaved when they saw that it was not in use

—about 40 percent. But if the very act of giving a reason was important enough to trigger the “yes” aspect of the script, regardless of the fact that the  
 50 excuse itself had no validity, only about 6 percent should refuse, as occurred in the case in which the reason provided—“I’m in a rush”—was compelling. And that’s exactly what the researchers found. When the experimenter said, “Excuse me, I have five pages.  
 55 May I use the Xerox machine, because I have to make some copies?” only 7 percent refused, virtually the same number as when a valid and compelling reason was given. The lame reason swayed as many people as the legitimate one.

60 In their research report, those who conducted this experiment wrote that to unconsciously follow preset scripts “may indeed be the most common mode of social interaction. While such mindlessness may at times be troublesome, this degree of selective attention,  
 65 of tuning the external world out, may be an achievement.” Indeed, here is the unconscious performing its usual duty, automating tasks so as to free us to respond to other demands of the environment. In modern society, that is the essence of  
 70 multitasking—the ability to focus on one task while, with the aid of automatic scripts, performing others.



32

The author presents the assumption that people who recognize that a request contains an illegitimate justification

- A. are more likely to agree to such a request than they are to agree to a request that includes a legitimate justification.
- B. would normally accept such a request except when that request had been immediately preceded by a request that included no justification of any kind.
- C. generally reject such a request regardless of whether the needs of the person making the request outweigh their own needs.
- D. would typically give the same answer to such a request as they would to a request that contains no justification at all.

33

Which choice provides the best evidence for the answer to the previous question?

- A. lines 32-34 (“That . . . yes”)
- B. lines 35-40 (“Just . . . all”)
- C. lines 43-47 (“If the . . . 40 percent”)
- D. lines 47-52 (“But if . . . compelling”)

34

Which choice best supports the idea that the author believes that the experimental subjects’ reliance on unconscious mental scripts is a specific instance of a general mental phenomenon?

- A. lines 53-57 (“When . . . given”)
- B. lines 57-58 (“The lame . . . one”)
- C. lines 62-64 (“While . . . achievement”)
- D. lines 64-67 (“Indeed . . . environment”)

35

As used in line 58, “swayed” most nearly means

- A. deflected.
- B. persuaded.
- C. wielded.
- D. fluctuated.

36

According to the graph, the percentage of subjects who agreed to let the experimenter use the copy machine when the experimenter asked for a large favor and provided a nonreason was between

- A. 0 and 10 percent.
- B. 20 and 30 percent.
- C. 70 and 80 percent.
- D. 90 and 100 percent.

37

Data in the graph most strongly suggest that overall, the likelihood that a subject would let the experimenter use the copy machine first was affected by the

- A. number of people waiting to use the copy machine after the subject.
- B. percentage of other subjects who agreed to the request.
- C. amount of conscious attention that the subject gave to the experimenter’s request.
- D. size of the favor the experimenter asked for.

Questions 38-47 are based on the following passage.

This passage is adapted from Elizabeth Pennisi, “How Do Microbes Shape Animal Development?” ©2013 by American Association for the Advancement of Science.

Animals and plants have always shared space with bacteria, fungi, viruses, and other microbes, coevolving through the millennia. In the mid-1800s, however,   
 Line scientists came to view microbes primarily as enemies   
 5 and fought hard with antibiotics, vaccines, and good hygiene to get the best of them. But the microscopic world is so intertwined with macroscopic life that the idea that each multicellular animal exists as a separate individual defined by its genome is falling by the   
 10 wayside. There is a growing realization that microbes and their genes are partners in each animal’s journey from egg through adulthood. “What we understand to be the ‘individual’ develops as a consortium of animal cells and microbes,” says Scott Gilbert, a developmental   
 15 biologist from Swarthmore College in Pennsylvania. “Microbes came before us, so all development that takes place in all organisms has basically been taking place in the presence of the microbiota,” adds Sven Pettersson of the Karolinska Institute in Stockholm.   
 20 The evidence for coevolution in developmental processes is coming from far corners of the animal kingdom. Whereas marine biologists once thought that the drifting larvae of coral, snails, and other oceangoing invertebrates randomly settled down to become adults,   
 25 they now know that many respond to cues from bacterial biofilms (colonies of microorganisms that adhere to a surface) to pick their new homes. And while many animals develop in wombs or eggs apparently free of microbes, they may still rely on microbes to set in   
 30 motion or complete certain aspects of postnatal development. Mammals acquire microbial partners after birth and seem to have evolved strategies to encourage the right species to settle in specific places. Human milk, for example, contains complex sugars that infants   
 35 cannot digest but which promote the growth of intestinal bifidobacteria.

But what do these microbial partners do? Germfree mice have finally allowed researchers to begin addressing this question. These are mice that lack the   
 40 usual complement of gut bacteria because they are bred and raised in sterile environments and eat sterilized food. Studies of such mice make an increasingly strong case

that bifidobacteria and other gut bacteria guide the postnatal maturation of the intestinal and immune systems, and even parts of the brain, in mammals. The microbes turn on mammalian genes important for cellular differentiation (the process by which less specialized cells become more specialized) and produce metabolic products that may also affect development. Gut-associated lymphoid tissue and the capillary beds of the villi of the intestine fail to adequately develop in germfree mice, for example.

The evidence for a role for symbionts (the smaller participant in a relationship between two different organisms) in the postnatal developing brain is more preliminary but nonetheless intriguing. More and more connections are being found between the gut microbiota and behavior. In 2011, Pettersson and his colleagues tested anxiety levels and locomotor activity in germfree mice and found that the rodents are hyperactive and have a decreased level of anxiety compared with mice with a healthy microbiota. There were also differences in the activity of genes associated with motor activity and anxiety. There seems to be a window of activity for the microbiota to influence behavior patterns: Colonizing germfree mice with normal mouse microbes negated these differences in young, but not older, mice, they reported.

Some work suggests that gut microbes influence behavior through the vagus nerve, which connects the brain with the digestive system, but Pettersson and others suspect a role for blood-borne bacterial products as well. These products, which make up 10% or more of the metabolites in blood, may extend the reach of the gut microbiota throughout the body.

That realization may mean that prenatal development in mammals isn't as free from microbial influence as everyone has thought. In mammals, the developing fetus is virtually bacteria-free; hence, researchers have focused on finding a role for bacteria in development after birth. Yet blood-borne metabolites from a mother's gut germs could exert an effect on a growing fetus. "That was one of the assumptions, that pregnancy did not involve microbes," Gilbert says. "But it probably does."

38

The author's central claim in the passage is that

- A. animals are both positively and negatively affected by microbes.
- B. animals depend on microbes for proper development.
- C. animal behavior is controlled by the metabolites of microbes.
- D. animals benefit microbes in ways as yet undiscovered.

39

Which choice best describes the method by which the author develops the third paragraph (lines 20-36)?

- A. Argument followed by rebuttal
- B. Analogy followed by explanation
- C. Claim followed by examples
- D. Chronology of findings followed by conclusion

40

According to the passage, "bacterial biofilms" (line 26) can

- A. influence where drifting larvae situate for maturation.
- B. regulate the feeding behavior of snail larvae.
- C. trigger larvae production in invertebrates.
- D. protect larvae from predation.



41

Which of the following conclusions about germfree mice is most supported by the passage?

- A. Their nervous systems deteriorate in adulthood.
- B. Their digestive systems are unable to absorb complex sugars.
- C. Their intestinal tracts lack significant features.
- D. Their reproductive systems are fully functioning.

42

Which choice provides the best evidence for the answer to the previous question?

- A. lines 37-39 (“Germfree . . . question”)
- B. lines 39-40 (“These . . . bacteria”)
- C. 46-48 (“The . . . differentiation”)
- D. 51-53 (“Gut-associated . . . example”)

43

As used in line 33, “settle” most nearly means

- A. filter.
- B. resolve.
- C. quiet.
- D. locate.

44

As used in line 35, “promote” most nearly means

- A. support.
- B. raise.
- C. upgrade.
- D. recommend.

45

Which choice best supports the claim that behavioral changes seen in germfree mice may be reversible under certain conditions?

- A. lines 59-63 (“In 2011 . . . microbiota”)
- B. lines 63-65 (“There . . . anxiety”)
- C. lines 65-66 (“There . . . patterns”)
- D. lines 66-69 (“Colonizing . . . reported”)

46

Which question does the discussion of “blood-borne bacterial products” in lines 70-76 serve to answer?

- A. How can the metabolites of gut bacteria access multiple systems throughout the body?
- B. Why do microbes have a window of activity with respect to certain aspects of brain function?
- C. How are microbial metabolites isolated in the blood?
- D. Do the metabolites found in maternal blood pose a risk to a mother’s developing fetus?

47

The final paragraph suggests that a mammalian fetus is

- A. protected from prenatal exposure to microbial by-products but requires postnatal exposure to them.
- B. less likely to be influenced by bacteria it is exposed to prenatally than by bacteria it encounters after birth.
- C. unique among animals in that it develops in a virtually bacteria-free environment.
- D. likely to be exposed to microbial by-products and may derive developmental benefits from them.

# Writing and Language Test

35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage below is accompanied by a number of questions. For some questions, you will consider how the passage might be revised to improve the expression of ideas. For other questions, you will consider how the passage might be edited to correct errors in sentence structure, usage, or punctuation. A passage or a question may be accompanied by one or more graphics (such as a table or graph) that you will consider as you make revising and editing decisions.

Some questions will direct you to an underlined portion of a passage. Other questions will direct you to a location in a passage or ask you to think about the passage as a whole.

After reading each passage, choose the answer to each question that most effectively improves the quality of writing in the passage or that makes the passage conform to the conventions of standard written English. Many questions include a “NO CHANGE” option. Choose that option if you think the best choice is to leave the relevant portion of the passage as it is.

Questions 1-11 are based on the following passage.

### Crowdfunding for Musicians

For musicians, signing a contract with a record company to produce an album is a dream that only a lucky few achieve. But musicians don't have to rely on this traditional model for getting their music out to the world anymore. They would do well to consider an alternate method called crowdfunding. Crowdfunding is the practice of soliciting money **1** from where the public—typically through Internet platforms such as Kickstarter and PledgeMusic—to fund personal projects. Musicians can create fund-raising **2** campaigns. A campaign can cover expenses such as renting a studio, making an

1

- A. NO CHANGE
- B. from
- C. by
- D. out of

2

Which choice most effectively combines the sentences at the underlined portion?

- A. campaigns while covering
- B. campaigns, and they do so to cover
- C. campaigns to cover
- D. campaigns, and then they cover

album, or going on tour, to name a few. In return, if the campaign reaches its financial goal, pledgers receive rewards based on how much they initially contributed.

3 Even before Kickstarter and PledgeMusic, bands were using the Internet business model to fund their music. One of these early success stories was the British band Marillion. In 1996 the band's members set up their own website to help finance their upcoming North American tour, and they 4 manage to raise \$60,000 from their fans. A few years later, facing conflict with their record label and management team, they turned again to the public, 5 asking fans to preorder their next album—essentially as a way of funding its production.

3

Which choice provides the best transition from the previous paragraph to the information that follows in the next sentence?

- A. NO CHANGE
- B. Despite such assumptions, the early pioneers of crowdfunding were not American, but British.
- C. Though it seems like they have been around much longer, Kickstarter and PledgeMusic actually launched in 2009.
- D. Invariably, given the nature of the model, some bands promote projects that never come into being.

4

- A. NO CHANGE
- B. managed
- C. will manage
- D. were managing

5

The writer is considering deleting the underlined portion, adjusting the punctuation as needed. Should the underlined portion be kept or deleted?

- A. Kept, because it provides details about what the band asked fans to help finance.
- B. Kept, because it illustrates how the band differed from other early users of the Internet business model.
- C. Deleted, because it fails to discuss why the band's members disagreed with their record label and management team.
- D. Deleted, because it does not address how preordering benefits the consumer.

About 12,000 people **6** contributed, this enabled the band to record and release its album *Anoraknophobia* in 2001.

**7** They can also use crowdfunding to gain financial support over a longer period of time, rather than for a particular project. This can allow performers to make a living from their music. On her crowdfunding website Mission Control, Canadian singer Kim Boekbinder asks her fans to pledge a given amount of money each month: \$5 per month, for example, allows a supporter to download any new songs she releases, while \$1,000 per month will get a supporter much more, such as a song written specifically for him or her. With this approach, Boekbinder has been able to guarantee **8** herself; a regular income—and a regular audience.

6

- A. NO CHANGE
- B. contributed; enabling
- C. contributed; which then enabled
- D. contributed, enabling

7

- A. NO CHANGE
- B. Those
- C. He or she
- D. Musicians

8

- A. NO CHANGE
- B. herself
- C. herself;
- D. herself—

9 Disputes have arisen when projects haven't been fully funded. Those contemplating a campaign should have an established fan base since people are unlikely to contribute money, especially on a 10 commonplace basis, to a musician whose work they do not already know—for instance, someone at the very beginning of his or her career. Musicians also need to devote a significant amount of time and effort to their campaigns, all for an uncertain outcome. However, for some musicians, crowdfunding is an attractive and viable financial model, one that enables them to earn a 11 livelihood and reach new music listeners who may otherwise never have heard of them.

9

Which choice best sets up the counterarguments that are discussed in the paragraph?

- A. NO CHANGE
- B. Subscription-based services have existed for centuries.
- C. Some people use crowdfunding for nonmusical endeavors.
- D. Crowdfunding may not work for everyone, though.

10

- A. NO CHANGE
- B. regular
- C. normal
- D. standard

11

Which choice most effectively concludes the paragraph by reinforcing the main argument of the passage?

- A. NO CHANGE
- B. livelihood; it's also a way for them to support their fellow musicians.
- C. livelihood while trying to appeal to the widest possible audience.
- D. livelihood and pursue new music projects on their own terms.



Questions 12-22 are based on the following passage.

### Do Goats Look to Us for Help?

Scientists have long known that some animals that have been bred to interact with humans, such as dogs and horses, will make eye contact to communicate with their human companions. A recent study by scientists at Queen Mary University of London examined whether goats, animals that have been bred as livestock rather than as companions or working animals, could also utilize eye contact.

In the study, goats were habituated to friendly interactions with **12** humans, they were trained to open a transparent plastic box to retrieve food. The goats were then divided into two groups and placed one at a time in a pen with an **13** experimenter who put food into an unopenable box, leaving the food visible but **14** impassable. For goats in the first group, the experimenter then continued to look at the food box, his face fully visible to the goats. For goats in the second group, the experimenter turned his back on the food box, a position that prevented the goats from seeing his face.

12

- A. NO CHANGE
- B. humans and trained
- C. humans and being trained
- D. humans, were training

13

- A. NO CHANGE
- B. experimenter, who,
- C. experimenter who:
- D. experimenter; who

14

- A. NO CHANGE
- B. inaccessible.
- C. insurmountable.
- D. unapproachable.

**15** Some goats were unable to complete training trials before the tests began and could not be used in the experiment. Previous studies showed that dogs and horses in similar situations would use directed gazes toward humans to request help, and researchers **16** were curious whether the goats would do the same. The researchers analyzed gaze latency (how long it took the goats to look at the experimenter), frequency (how often they did **17** so); and duration (how long the gazes lasted) for goats in each of the two groups.

15

Which choice provides the most effective introduction to the paragraph?

- A. NO CHANGE
- B. Each goat was monitored so that researchers could see how it would react upon being unable to retrieve the food.
- C. When cats have been tested in similar experiments, they have tended not to perform as well as dogs or horses.
- D. The goats had been given access to hay before the experiment began, so they were not necessarily hungry.

16

- A. NO CHANGE
- B. couldn't wait to find out
- C. fixated on
- D. were dying to know

17

- A. NO CHANGE
- B. so) and,
- C. so), and
- D. so); and,

Whether or not the experimenter faced the food box had a large **18** affect on the goats' behavior, the researchers found. When the experimenter was facing away, the goats barely looked in his direction: the researchers obtained a median result of **19** zero for gaze duration and 5.14 for gaze frequency. **20** Likewise, when the experimenter faced the food box, the goats tended to look at him multiple times (the median number of gazes was 2.50) and hold each gaze (the median duration of these gazes was **21** 2.50 seconds). These differences suggest that the potential for eye contact was important in prompting the animals' gaze.

Goat Experimental Responses

Goat behavior (medians shown)

Experimenter orientation	Gaze duration (seconds)	Gaze latency (seconds)	Gaze frequency (number of gazes)
Facing toward the food box	5.14	29.39	2.5
Facing away from the food box	0	120 (full length of the trial)	0

18

- A. NO CHANGE
- B. affect for
- C. effect to
- D. effect on

19

Which choice provides accurate data from the table?

- A. NO CHANGE
- B. 2.50 for gaze duration and zero for
- C. zero for gaze duration and 29.39 for
- D. zero for both gaze duration and

20

- A. NO CHANGE
- B. In contrast,
- C. Regardless,
- D. In particular,

21

Which choice provides accurate data from the table?

- A. NO CHANGE
- B. zero
- C. more than 5
- D. almost 30

The results are surprising, according to Laurie Santos, a specialist in animal cognition at Yale University, because the goats were distinct from the other animals that have demonstrated such **22** behaviors, having been bred not as companion animals but as livestock. “This is exciting,” says Santos, “as it shows how little we still understand about how the process of domestication can shape rich social understanding.” Scientists are hopeful that future studies will provide further insights into the social interactions between humans and animals.

22

- A. NO CHANGE
- B. behaviors, they have
- C. behaviors; having
- D. behaviors and having

Questions 23-33 are based on the following passage and supplementary material.

### A Home in Harlem

In 1924 Regina Anderson and Ethel Ray Nance

**23** moved, into an apartment with Louella Tucker, at 580 Saint Nicholas Avenue in New York City.

**24** Calling it “Dream Haven” or simply “580” among those who congregated there, the apartment was

**25** located on the fifth floor of a six-story building.

At 580, Anderson and Nance offered a wide range of support to many of the era’s **26** big-time figures.

The women were particularly interested in reaching out to talented individuals and encouraging them to join the growing arts community in Harlem. For many of these artists, 580 became a home away from home—sometimes literally.

**23**

- A. NO CHANGE
- B. moved into an apartment, with Louella Tucker
- C. moved, into an apartment, with Louella Tucker
- D. moved into an apartment with Louella Tucker

**24**

- A. NO CHANGE
- B. Having called it
- C. Knowing it as
- D. Known as

**25**

Which choice most effectively introduces the main topic of the passage?

- A. NO CHANGE
- B. a hub of the artistic and cultural movement known as the Harlem Renaissance.
- C. only a short walk from City College of New York.
- D. a gathering place for people who had attended events at the 135th Street YMCA.

**26**

- A) NO CHANGE
- B) foremost
- C) big-name
- D) primo



27 For example, when Nance convinced the painter Aaron Douglas to leave his job in Kansas City to come to New York, 28 he let them sleep on a couch in 580 upon his arrival. The apartment served a similar purpose for author and anthropologist Zora Neale Hurston, who arrived in New York without any money more than a decade before writing her celebrated novel *Their Eyes Were Watching God*.

The home also 29 frequently played host to W. E. B. Du Bois, who lived nearby on Saint Nicholas Avenue. Through events held at 580, young writers such as Countee Cullen and Langston Hughes were able to meet and discuss their interests and concerns with experienced authors and publishers.

27

- A. NO CHANGE
- B. Moreover,
- C. Nevertheless,
- D. As a result,

28

- A. NO CHANGE
- B. they let her
- C. she let him
- D. he let her

29

Which choice best sets up the information that follows in the paragraph?

- A. NO CHANGE
- B. provided the backdrop for a historic photograph featuring such Harlem Renaissance luminaries as Charles S. Johnson and Rudolph Fisher.
- C. helped connect artists in the movement with opportunities for critical attention and publication.
- D. was conveniently located near the 135th Street branch of the New York Public Library, where many literary events took place.

The success of one such gathering led Anderson and others to organize a meeting at a larger venue, Manhattan’s Civic Club. **30** The speeches and conversations at the Civic Club so **31** impressed editor and publisher Paul Kellogg that he devoted an issue of his magazine *Survey Graphic* to what at the time was known as the “New Negro Movement.” The issue, titled “Harlem: Mecca of the New Negro,” sold 40,000 copies in just two weeks and was later expanded into the anthology *The New Negro*, which scholars consider one of the defining texts of the Harlem Renaissance. Nance contributed to the endeavor as well, recommending Aaron Douglas’s paintings to Kellogg. After Kellogg featured him in the magazine and the anthology, Douglas became established as **32** one of the foremost visual artist of the movement.

Although Anderson and Nance were instrumental in the development of the Harlem Renaissance while they lived together, this period in their lives was relatively brief. Within two years, 580 had broken **33** up, Nance had to return home to Duluth, Minnesota, because of an illness in her family. Anderson and Nance’s influence lived on, however, in the success of Douglas, Hughes, and the other writers and artists whose careers were nurtured at 580 Saint Nicholas Avenue.

30

At this point, the writer is considering adding the following sentence.

Gatherings like the one that inspired the Civic Club event made the apartment so well known that visitors would just say they were going to “580.”

Should the writer make this addition here?

- A. Yes, because it expands on the example mentioned earlier in the paragraph.
- B. Yes, because it provides a transition to the next sentence.
- C. No, because it repeats information mentioned earlier in the passage.
- D. No, because it is irrelevant to the discussion of Anderson and Nance.

31

- A. NO CHANGE
- B. imprinted
- C. engraved
- D. inscribed

32

- A. NO CHANGE
- B. one of the foremost visual artists
- C. among the foremost visual artist
- D. among one of the foremost visual artists

33

- A. NO CHANGE
- B. up; because
- C. up, it was because
- D. up, as

Questions 34-44 are based on the following passage.

### Unearthing the Origins of the Maya

The Maya famously built grand pyramids, **34** crafting a complex written language, and constructed an impressive numerical system. Archaeologists have excavated **35** many numerous sites and learned much about how the Maya lived, but they know much less about Maya origins. Although a definitive account is impossible, scholars have two competing theories to explain the Maya civilization's **36** rise: cultura madre and cultura hermana.

**37** The proponents of cultura madre, or mother culture, believe that chemical analysis of Olmec pottery proves their theory. The Olmec civilization is considered the oldest in the Americas. Mother-culture proponents think the Maya adopted the customs of the Olmec, including their calendar system and their politically important ball games. While the Maya did not copy the Olmec entirely—they didn't sculpt colossal stone heads—the mother-culture proponents believe the similarities are sufficient to claim that the Olmec were the source of Maya civilization.

34

- A. NO CHANGE
- B. also crafting
- C. crafted
- D. they crafted

35

- A. NO CHANGE
- B. and dug up many sites
- C. sites they dug up
- D. numerous sites

36

- A. NO CHANGE
- B. rise. Cultura
- C. rise; these being cultura
- D. rise, these are cultura

37

Which choice best introduces the paragraph?

- A. NO CHANGE
- B. Under the theory of cultura madre, or mother culture, the Maya civilization was directly influenced by the Olmec.
- C. The theory of cultura madre, or mother culture, holds that artistic products and clothing styles of the ancient Mesoamerican world were all derived from the Olmec.
- D. Jeffrey P. Blomster supports the cultura madre theory and studies the Olmec.

On the other hand, the theory of cultura **38** hermana or sister culture, holds that the Maya emerged independently from the Olmec and that later interactions with the Olmec and other societies brought about a mutual cultural sharing. Although recognizing the Olmec's **39** most excellent triumphs, sister-culture advocates such as archaeologist Susan Gillespie claim that there were other peoples "taking steps on their own toward the development of Mesoamerican civilization." Sister-culture proponents also contend that the mother-culture theory is outdated and ethnocentric **40** because it bases its notion of "civilization" on European standards of the 1800s, such as the presence of monuments.

38

- A. NO CHANGE
- B. hermana, or sister culture,
- C. hermana, or sister culture
- D. hermana or, sister culture

39

- A. NO CHANGE
- B. cool accomplishments,
- C. remarkable achievements,
- D. indisputably awe-inspiring undertakings,

40

The writer is considering deleting the underlined portion and ending the sentence with a period. Should the underlined portion be kept or deleted?

- A. Kept, because it explains what the sister-culture proponents mean by "outdated and ethnocentric."
- B. Kept, because it reinforces the main claim of the passage about the primacy of the sister-culture theory.
- C. Deleted, because it undermines the assertion that the Maya civilization originated alongside the Olmec civilization.
- D. Deleted, because it blurs the paragraph's primary focus on the beliefs of the sister-culture proponents.

Recent finds, **41** however, show that the Olmec weren't necessarily mother or sister to the Maya. At the Ceibal site in Guatemala, archaeologists Takeshi **42** Inomata, and Daniela Triadan, led a team to dig deeper. From 2005 to 2012, they excavated below large Maya monuments and found evidence of ceremonial architecture dating back to 1000 BCE. These ceremonial spaces are significant because San Lorenzo, the Olmec's oldest city, dating to 1400 BCE, didn't have any. Also, the ceremonial spaces that were at the Olmec city La Venta date to around 800 BCE. Thus, the Olmec likely didn't influence the earlier structures at Ceibal.

Inomata, Triadan, and **43** her team believe that the finds at Ceibal and later monuments at La Venta were indicative of a significant societal change. According to Inomata, **44** "Instead of starting with villages, they made a ceremonial center." Perhaps the Olmec civilization wasn't a mother or sister to the Maya, but instead both were part of larger conversations.

41

- A. NO CHANGE
- B. for instance,
- C. moreover,
- D. instead,

42

- A. NO CHANGE
- B. Inomata, and Daniela Triadan
- C. Inomata and Daniela Triadan,
- D. Inomata and Daniela Triadan

43

- A. NO CHANGE
- B. his
- C. his or her
- D. their

44

Which quotation from Takeshi Inomata in National Geographic best supports the point made in the previous sentence and sets up the sentence that follows?

- A. NO CHANGE
- B. "Determining labels for these early people is quite a tricky question—we're not sure if residents of early Ceibal were wholly Mayan."
- C. "It seems more likely that there was a broad history of interactions across these regions, and through these interactions, a new form of society developed."
- D. "This does not mean that the Maya developed independently."

# STOP

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





# Math Test – No Calculator

25 MINUTES, 17 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

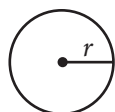
## DIRECTIONS

For questions 1-15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 16-20, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

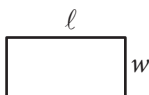
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

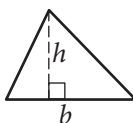


$$A = \pi r^2$$

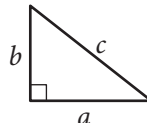
$$C = 2\pi r$$



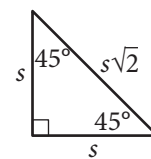
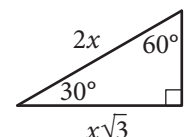
$$A = \ell w$$



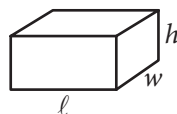
$$A = \frac{1}{2}bh$$



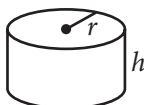
$$c^2 = a^2 + b^2$$



Special Right Triangles



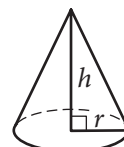
$$V = \ell wh$$



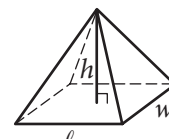
$$V = \pi r^2 h$$



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



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



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

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

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

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



1

$$y = x + 2$$
$$2x + 4y = 8$$

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

2

$$(4x^3 - 5x^2 + 3) - (6x^3 + 2x^2 - x)$$

Which of the following expressions is equivalent to the expression above?

- A.  $(-10x^3 - 3 + x + 3)$
- B.  $(-2x^3 - 7x^2 + x + 3)$
- C.  $(-2x^3 - 3x^2 + x + 3)$
- D.  $(10x^3 - 7x^2 - x + 3)$

3

$$(x + 2)(x + 3) = (x - 2)(x - 3) + 10$$

Which of the following is a solution to the given equation?

- A. 1
- B. 0
- C. -2
- D. -5

4

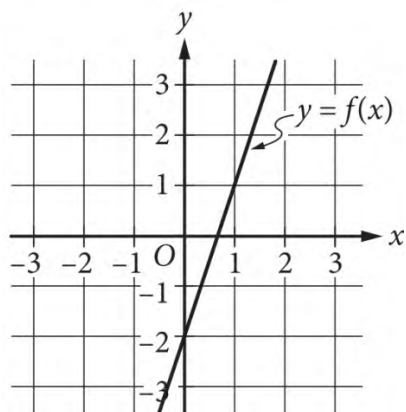
$x$	$y$
-3	3
1	3
5	3

The values of  $x$  and their corresponding values of  $y$  in the table shown represent 3 points on line  $t$  in the  $xy$ -plane. What is the  $y$ -intercept of line  $t$ ?

- A.  $(0, -3)$
- B.  $(0, 1)$
- C.  $(0, 3)$
- D.  $(0, 5)$



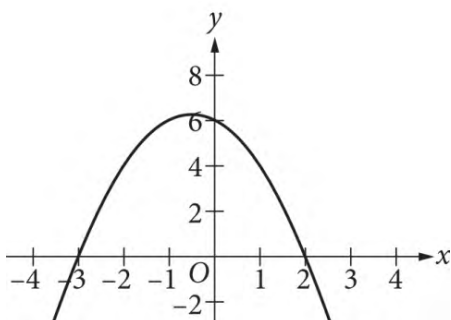
5



The graph of the function  $f$  is shown in the  $xy$ -plane. Which of the following could define  $f$ ?

- A.  $f(x) = 2x - 3$
- B.  $f(x) = 2x + 3$
- C.  $f(x) = 3x - 2$
- D.  $f(x) = 3x + 2$

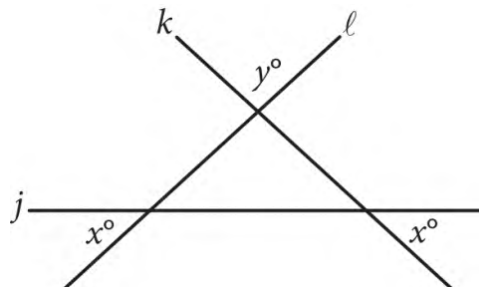
6



Which of the following is an equation of the parabola graphed in the  $xy$ -plane shown?

- A.  $y = -(x + 2)(x - 3)$
- B.  $y = -(x - 2)(x + 3)$
- C.  $y = (x + 2)(x - 3)$
- D.  $y = (x - 2)(x + 3)$

7



In the figure above, lines  $j$ ,  $k$ , and  $l$  intersect as shown. Which of the following must be equal to  $y$ ?

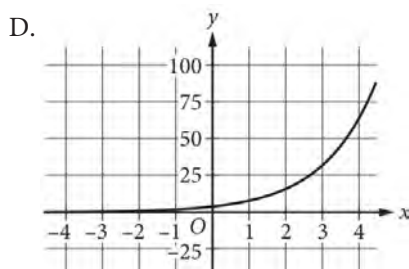
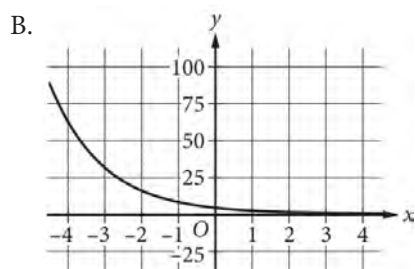
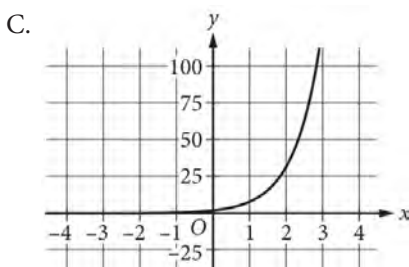
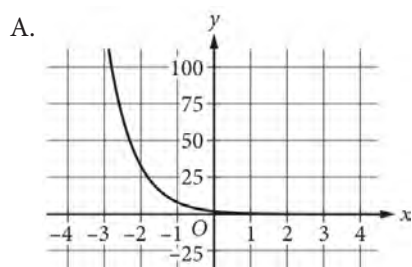
- A.  $90 - x$
- B.  $180 - x$
- C.  $108 - 2x$
- D.  $360 - 2x$



8

$$y = 4(2^x)$$

Which of the following is the graph in the  $xy$ -plane of the given equation?



9

$$D = 5640(1.9)^t$$

The equation above estimates the global data traffic  $D$ , in terabytes, for the year that is  $t$  years after 2010. What is the best interpretation of the number 5,640 in this context?

- A. The estimated amount of increase of data traffic, in terabytes, each year
- B. The estimated percent increase in the data traffic, in terabytes, each year
- C. The estimated data traffic, in terabytes, for the year that is  $t$  years after 2010
- D. The estimated data traffic, in terabytes, in 2010

10

$$6w + 14 = kw + 7$$

In the given equation,  $k$  is a constant. If the equation has exactly one solution, which of the following CANNOT be the value of  $k$ ?

- A. 1
- B. 6
- C. 7
- D. 14



11

If  $u - 3 = \frac{6}{t - u}$ , what is  $t$  in terms of  $u$ ?

- A.  $t = \frac{6}{t - u}$
- B.  $t = \frac{2u - 9}{u}$
- C.  $t = \frac{1}{u - 3}$
- C.  $t = \frac{2u}{u - 3}$

12

An economist modeled the demand  $Q$  for a certain product as a linear function of the selling price  $P$ . The demand was 20,000 units when the selling price was \$40 per unit, and the demand was 15,000 units when the selling price was \$60 per unit. Based on the model, what is the demand, in units, when the selling price is \$55 per unit?

- A. 16,250
- B. 16,500
- C. 16,750
- D. 17,500

13

$$(x - 4)(x + 2)(x - 1) = 0$$

What is the product of the solutions to the given equation?


- A. 16,250
- B. 16,500
- C. 16,750
- D. 17,500

**DIRECTIONS**

For questions 14-17, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.

- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded

as 3.5 or  $7/2$ . (If  is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)

- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Answer:  $\frac{7}{12}$

Write answer in boxes. →

Grid in result. →

7	/	1	2
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

← Fraction line

Answer: 2.5

	2	.	5
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

← Decimal point

Acceptable ways to grid  $\frac{2}{3}$  are:

	2	/	3
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8

.	6	6	6
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8

.	6	6	7
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8

Answer: 201 – either position is correct

	2	0	1
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3

2	0	1	
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



14

The function  $f$  is defined by  $f(x)$  equals,  $mx + b$ , where  $m$  and  $b$  are constants. If  $f(0) = 18$  and  $f(1) = 20$ , what is the value of  $m$ ?

15

$$2x^2 + 5x - 12$$

If the given expression is rewritten in the form  $(2x - 3)(x + k)$  where  $k$  is a constant, what is the value of  $k$ ?

16

A buret is a tool designed to transfer precise amounts of liquid. A buret initially contains 70.00 milliliters (mL) of a solution, and a beaker initially contains 20.00 mL of the solution. The buret drips solution into the beaker. Each drip contains 0.05 mL of solution. After how many drips will the volumes of the solutions in the buret and beaker be equal?

17

One serving of Havarti cheese has 110 calories. Assume all the calories in the cheese are from fat and protein. Fat provides 9 calories per gram, and protein provides 4 calories per gram. The combined mass of the fat and protein in the serving of cheese is 15 grams. How many grams of protein are in the serving of cheese?

**STOP**

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



# Math Test – Calculator

45 MINUTES, 31 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

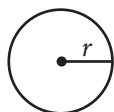
## DIRECTIONS

For questions 1-27, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 28-31, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

1. The use of a calculator **is permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

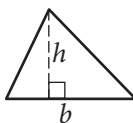


$$A = \pi r^2$$

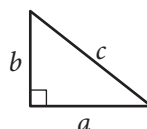
$$C = 2\pi r$$



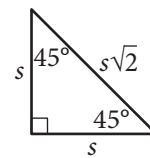
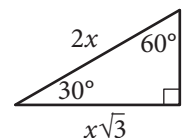
$$A = \ell w$$



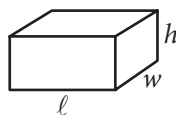
$$A = \frac{1}{2}bh$$



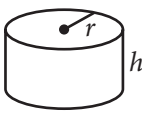
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = \ell wh$$



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



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



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



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

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

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

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





1

Data set A: 1, 2, 3, 4, 5, 6, 7

Data set B: 1, 1, 2, 2, 3, 3, 4

Which of the following statements correctly compares the means of data set A and data set B?

- A. The mean of each data set is 2.
- B. The mean of each data set is 4.
- C. The mean of data set A is less than the mean of data set B.
- D. The mean of data set A is greater than the mean of data set B.

2

2, 2, 2, 3, 4, 11

What is the median of the seven data values shown?

- A. 2
- B. 3
- C. 4
- D. 9

3

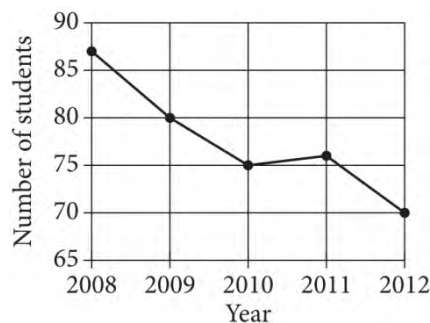
High School	Year				
	2008	2009	2010	2011	2012
Foothills	87	80	75	76	70
Valley	44	54	65	76	82
Total	131	134	140	152	152

The Table above shows the number of students at each high school who completed school. No student attended both schools

Of the students who completed a summer internship in 2010, which of the following represents the fraction of students who were from Valley High School?

- A.  $10/140$
- B.  $65/140$
- C.  $75/140$
- D.  $65/75$

4



The line graph above displays information about the number of high school students who completed summer internships for the years 2008 through 2012. What does the graph represent?

- A. The number of students from Foothill High School who completed summer internships
- B. The number of students from Valley High School who completed summer internships
- C. The number of students from both Foothill and Valley High Schools who completed summer internships
- D. The increase in the total number of students from both Foothill and Valley High Schools from the previous year who completed summer internship



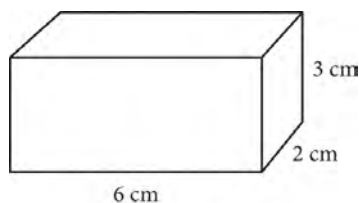
5

Which of the following statements are true about the number of students who completed summer internships for the 5 years shown?

- I. The mean number from Foothill High School is greater than the mean number from Valley High School.
- II. The median number from Foothill High School is greater than the median number from Valley High School.

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

6



The figure shows the lengths, in centimeters (cm), of the edges of a right rectangular prism. The volume  $V$  of a right rectangular prism is  $lwh$ , where  $l$  is the length of the prism,  $w$  is the width of the prism, and  $h$  is the height of the prism. What is the volume, in cubic centimeters, of the prism?

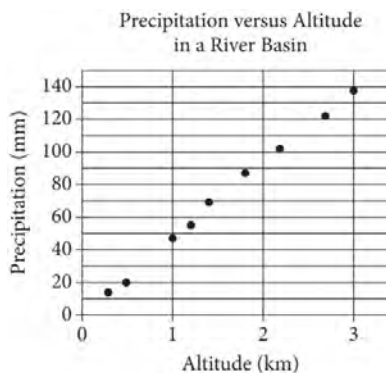
- A. 36
- B. 24
- C. 12
- D. 11

7

Of the registered voters in the city of Bella Vista, 45% cast votes on a proposed school budget. Of those who voted, 68% voted to pass the school budget. What percent of registered voters in Bella Vista voted to pass the school budget?

- A. 37.4%
- B. 30.6%
- C. 18.9%
- D. 14.4%

8



The scatterplot above shows the precipitation, in millimeters (mm), during a month in a river basin at different altitudes, in kilometers (km), within the river basin. The slope of a line of best fit for the data is 45. Which of the following is the best interpretation of the slope in this context?

- A. The minimum predicted precipitation in the river basin for the month is 45 mm.
- B. The maximum predicted precipitation in the river basin for the month is 45 mm.
- C. For every increase of 0.45 km in altitude in the river basin, the predicted increase in precipitation for the month is 10 mm.
- D. For every increase of 1 km in altitude in the river basin, the predicted increase in precipitation for the month is 45 mm.



9

There are  $n$  nonfiction books and 12 fiction books on a bookshelf. If one of these books is selected at random, what is the probability of selecting a nonfiction book, in terms of  $n$ ?

- A.  $\frac{n}{12}$
- B.  $\frac{n}{n+12}$
- C.  $\frac{12}{n}$
- D.  $\frac{12}{n+12}$

10

At an awards ceremony, each of 460 students was called up individually to receive an award, and their names were called at a constant rate. In the first 5 minutes of the ceremony, the names of 20 students were called. At this rate, how many minutes did it take to call all 460 names?

- A. 23
- B. 88
- C. 92
- D. 115

11

The function  $g$  is a linear function with  $g(0) = u$  and  $g(2) = 3u$ , where  $u$  is a positive constant. Which of the following defines  $g(x)$ ?

- A.  $g(x) = ux$
- B.  $g(x) = x + u$
- C.  $g(x) = ux + u$
- D.  $g(x) = 2ux + u$



12

$$3(2x - 6) - 11 = 4(x - 3) + 6$$

If  $x$  is the solution to the equation above, what is the value of  $x - 3$ ?

- A.  $\frac{23}{2}$
- B.  $\frac{17}{2}$
- C.  $\frac{15}{2}$
- D.  $-\frac{15}{2}$

13

The population density of Iceland, in people per square kilometer of land area, increased from 2.5 in 1990 to 3.3 in 2014. During this time period, the land area of Iceland was 100,250 square kilometers.

By how many people did Iceland's population increase from 1990 to 2014?

- A. 330,825
- B. 132,330
- C. 125,312
- D. 80,200

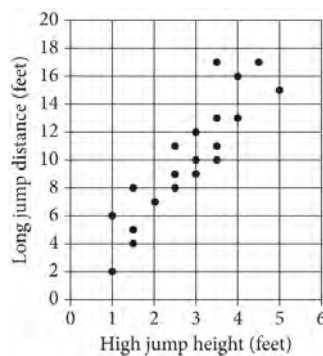
14

$$\sqrt{\frac{x+4}{(x-1)^2}}$$

Which of the following is equivalent to the expression above for  $x > 1$ ?

- A.  $\frac{\sqrt{x} + 4}{x - 1}$
- B.  $\frac{\sqrt{x} + 2}{x - 1}$
- C.  $\frac{\sqrt{x + 4}}{x - 1}$
- D.  $\frac{\sqrt{x + 2}}{x - 1}$

15

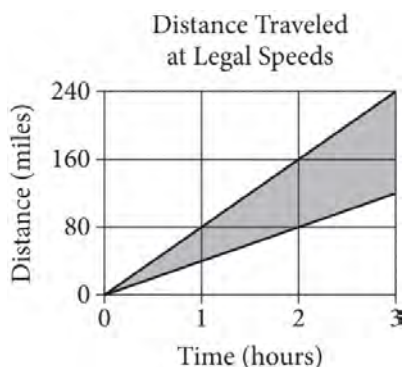


Each dot in the scatterplot above represents the height  $x$ , in feet, in the high jump, and the distance  $y$ , in feet, in the long jump, made by each student in a group of twenty students. The graph of which of the following equations is a line that most closely fits the data?

- A.  $y = 0.82x + 3.30$
- B.  $y = 0.82x + 3.30$
- C.  $y = 0.82x + 3.30$
- D.  $y = 0.82x + 3.30$



16



The shaded region of the graph above represents all possible distances  $d$ , in miles, that a car can travel along a certain road in  $t$  hours if the driver obeys the minimum and maximum posted speed limits and drives without stopping. Which of the following systems of inequalities best represents the shaded region, where 0 is less than or equal to  $t$ , which is less than or equal to 3?

- A.  $t \leq 40d$   
 $t \geq 80d$
- B.  $t \geq 40d$   
 $t \leq 80d$
- C.  $d \leq 40t$   
 $d \geq 80t$
- D.  $d \geq 40t$   
 $d \leq 80t$

17

If  $x^2 = a + b$  and  $y = a + c$ , which of the following is equal to  $(x^2 - y)^2$ ?

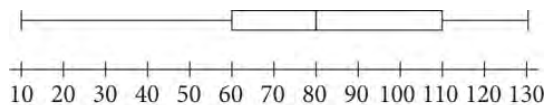
- A.  $a^2 - 2ac + c^2$
- B.  $b^2 - 2bc + c^2$
- C.  $4a^2 - 4abc + c^2$
- D.  $4a^2 - 2abc + b^2c^2$

18

Which of the following represents the result of increasing the quantity  $x$  by 9%, where  $x > 0$ ?

- A.  $1.09x$
- B.  $0.9x$
- C.  $x + 9$
- D.  $x + 0.09$

19



The box plot above shows the distribution of a data set that consists of a total of 60 data values, where no two data values are the same. What percent of the values in the data set are greater than 80?

- A. 25%
- B. 33%
- C. 50%
- D. 67%



20

$$\text{If } \left(\frac{1}{3}x + \frac{1}{4}\right) + 2 = 3\left(\frac{1}{3}x + \frac{1}{4}\right)$$

what is the value of  $\frac{1}{3}x + \frac{1}{4}$ ?

- A.  $\frac{1}{4}$
- B.  $\frac{1}{3}$
- C.  $\frac{1}{2}$
- D. 1

21

A certain college had 3,000 students enrolled in 2015. The college predicts that after 2015, the number of students enrolled each year will be 2% less than the number of students enrolled the year before. Which of the following functions models the relationship between the number of students enrolled,  $f(x)$ , and the number of years after 2015,  $x$ ?

- A.  $f(x) = 0.02x(3000)^x$
- B.  $f(x) = 0.98x(3000)^x$
- C.  $f(x) = 3000(0.02)^x$
- D.  $f(x) = 3000(0.98)^x$

22

One of the two equations in a linear system is  $2x + 6y = 10$ . The system has no solution. Which of the following could be the other equation in the system?

- A.  $x + 3y = 5$
- B.  $x + 3y = -20$
- C.  $6x - 2y = 0$
- D.  $6x + 2y = 10$

23

$$D = T - \frac{9}{25}(100 - H)$$

The formula above can be used to approximate the dew point  $D$ , in degrees Fahrenheit, given the temperature  $T$ , in degrees Fahrenheit, and the relative humidity of  $H$  percent, where  $H > 50$ . Which of the following expresses the relative humidity in terms of the temperature and the dew point?

- A.  $H = \frac{25}{9}(D - T) + 100$
- B.  $H = \frac{25}{9}(D - T) - 100$
- C.  $H = \frac{25}{9}(D + T) + 100$
- D.  $H = \frac{25}{9}(D + T) - 100$



24

An object's kinetic energy, in joules, is equal to the product of one-half the object's mass, in kilograms, and the square of the object's speed, in meters per second. What is the speed, in meters per second, of an object with a mass of 4 kilograms and kinetic energy of 18 joules?

- A. 3
- B. 6
- C. 9
- D. 36

25

Alvin and Becky attend the same school. Alvin lives 7 miles from the school, and Becky lives 13 miles from the school. The distance, in miles, between Alvin's house and Becky's house is  $d$ . Which of the following represents all possible values of  $d$ ?

- A.  $6 \leq d \leq 13$
- B.  $7 \leq d \leq 13$
- C.  $6 \leq d \leq 20$
- D.  $7 \leq d \leq 20$

26

In the  $xy$ -plane, line  $k$  is defined by  $x + y = 0$ . Line  $j$  is perpendicular to line  $k$ , and the  $y$ -intercept of line  $j$  is the point with coordinates  $(0, 3)$ . Which of the following is an equation of line  $j$ ?

- A.  $x + y = 3$
- B.  $x + y = -3$
- C.  $x - y = 3$
- D.  $x - y = -3$

27

Sample	Mean weight (pounds)	Margin of error (pounds)	Standard deviation (pounds)
X	650	15.99	25.8
Y	650	12.92	25.8

The table shows the estimated mean weight, in pounds, and the associated margin of error for each of two samples of male Galápagos tortoises selected at random. Which of the following best explains why the margin of error for sample X is greater than the margin of error for sample Y?

- A. Sample Y was selected before sample X.
- B. Sample Y was selected after sample X.
- C. The size of sample Y is less than the size of sample X.
- D. The size of sample Y is greater than the size of sample X.



**DIRECTIONS**

For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or  $7/2$ . (If 

3	1	/	2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

 is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer in boxes. →

Grid in result. →

Answer:  $\frac{7}{12}$

7	/	1	2
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	0	0	0
1	1	<input checked="" type="radio"/>	1
2	2	2	<input checked="" type="radio"/>
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
<input checked="" type="radio"/>	7	7	7
8	8	8	8
9	9	9	9

← Fraction line

Answer: 2.5

	2	.	5
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	0	0	0
1	1	1	1
2	<input checked="" type="radio"/>	2	2
3	3	3	3
4	4	4	4
5	5	5	<input checked="" type="radio"/>
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

← Decimal point

Acceptable ways to grid  $\frac{2}{3}$  are:

	2	/	3
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	0	0	0
1	1	1	1
2	<input checked="" type="radio"/>	2	2
3	3	3	<input checked="" type="radio"/>
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8

.	6	6	6
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
7	7	7	7
8	8	8	8

.	6	6	7
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	<input checked="" type="radio"/>	<input checked="" type="radio"/>	6
7	7	7	<input checked="" type="radio"/>
8	8	8	8

Answer: 201 – either position is correct

	2	0	1
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	0	<input checked="" type="radio"/>	0
1	1	1	<input checked="" type="radio"/>
2	<input checked="" type="radio"/>	2	2
3	3	3	3

2	0	1	
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input checked="" type="radio"/>	0	0
1	1	<input checked="" type="radio"/>	1
<input checked="" type="radio"/>	2	2	2
3	3	3	3

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



28

$$(x - 4)(x - 2)(3x - 2) = 0$$

What is the product of all values of  $x$  that satisfy the equation above?

29

$$y = \frac{k}{3}x + 2$$

If  $k$  were equal to 1 in the equation above, the slope of the graph of the equation in the  $xy$ -plane would be  $\frac{1}{3}$ . If instead the slope of the graph of the equation is greater than  $\frac{1}{6}$  and less than  $\frac{1}{5}$ , what is one possible value of  $k$ ?

Satellite

Orbital period  
(hours)Surface area  
(millions of square km)

Ganymede

171.7

87.0

Europa

85.23

30.6

Io

42.46

41.7

30

kilometers. The surface area of Europa is  $p$  percent of the surface area of Earth. What is the value of  $p$ , to the nearest whole number?

31

The orbital period of Ganymede is  $g$  times as long as the orbital period of Io. What is the value of  $g$ , to the nearest integer?

## Score Conversion (continued)

Wednesday, Oct. 30 Test Form

Raw Score (# of correct answers)	Reading Test Score	Writing and Language Test Score	Math Test Score
48			38
47	38		37.5
46	37		37
45	36		36
44	36	38	35
43	35	36	34
42	34	34	33.5
41	34	33	32.5
40	33	33	32
39	32	32	32
38	31	31	31.5
37	31	30	31
36	30	30	30.5
35	29	29	30
34	29	28	30
33	28	28	29.5
32	27	27	29
31	27	27	29
30	26	26	28.5
29	26	26	28
28	25	25	27.5
27	25	24	27.5
26	24	24	27
25	24	23	26.5
24	23	22	26
23	23	22	25.5
22	22	21	25
21	22	20	24.5
20	21	20	24
19	21	19	23.5
18	20	19	23
17	20	18	22.5
16	19	18	22
15	19	17	21.5
14	18	17	20.5
13	18	16	20
12	17	16	19
11	17	15	18.5
10	16	15	17.5
9	16	14	17
8	15	14	16
7	15	13	15
6	14	13	14
5	13	12	13
4	12	11	12
3	11	10	11
2	10	10	10
1	9	9	9
0	8	8	8

## Answer Key (continued)

### Wednesday, Oct. 30, Answer Key 3

Reading Test	Writing and Language Test	Math Test – No Calculator
SECTION 1	SECTION 2	SECTION 3
1 B	1 B	1 A
2 B	2 C	2 B
3 C	3 A	3 A
4 B	4 B	4 C
5 A	5 A	5 C
6 C	6 D	6 B
7 C	7 D	7 C
8 B	8 B	8 D
9 D	9 D	9 D
10 D	10 B	10 B
11 A	11 D	11 D
12 B	12 B	12 A
13 B	13 A	13 D
14 C	14 B	14 2
15 C	15 B	15 4
16 D	16 A	16 500
17 D	17 C	17 5
18 B	18 D	
19 A	19 D	
20 A	20 B	
21 C	21 C	
22 C	22 A	
23 B	23 D	
24 A	24 D	
25 D	25 B	
26 B	26 C	
27 B	27 A	
28 A	28 C	
29 A	29 C	
30 D	30 C	
31 C	31 A	
32 D	32 B	
33 C	33 D	
34 D	34 C	
35 B	35 D	
36 B	36 A	
37 D	37 B	
38 B	38 B	
39 C	39 C	
40 A	40 A	
41 C	41 A	
42 D	42 D	
43 D	43 D	
44 A	44 C	
45 D		
46 A		
47 D		

Math Test – Calculator
SECTION 4
1 D
2 B
3 B
4 A
5 C
6 A
7 B
8 D
9 B
10 D
11 C
12 B
13 D
14 C
15 C
16 D
17 B
18 A
19 C
20 D
21 D
22 B
23 A
24 A
25 C
26 D
27 D
28 $\frac{4}{3}, 1.33$
29 $\frac{1}{2} < x < \frac{3}{5}, .5 < x < .6$
30 6
31 4

### Wednesday, Oct. 30, Answer Key 4

Reading Test	Writing and Language Test	Math Test – No Calculator
SECTION 1	SECTION 2	SECTION 3
1 B	1 B	1 C
2 C	2 A	2 A
3 B	3 B	3 B
4 A	4 B	4 A
5 C	5 A	5 C
6 B	6 C	6 B
7 C	7 D	7 B
8 B	8 D	8 C
9 D	9 B	9 D
10 A	10 C	10 D
11 B	11 A	11 D
12 D	12 B	12 A
13 C	13 C	13 D
14 C	14 A	14 4
15 B	15 B	15 2
16 D	16 A	16 5
17 D	17 D	17 500
18 B	18 D	
19 A	19 B	
20 C	20 D	
21 A	21 B	
22 C	22 D	
23 B	23 C	
24 A	24 D	
25 D	25 A	
26 B	26 B	
27 B	27 B	
28 A	28 C	
29 C	29 A	
30 A	30 A	
31 D	31 D	
32 D	32 D	
33 C	33 C	
34 D	34 D	
35 B	35 D	
36 B	36 B	
37 D	37 C	
38 B	38 A	
39 C	39 C	
40 A	40 C	
41 A	41 C	
42 C	42 A	
43 D	43 B	
44 D	44 D	
45 D		
46 A		
47 D		

Math Test – Calculator
SECTION 4
1 D
2 B
3 B
4 A
5 C
6 A
7 D
8 B
9 D
10 B
11 C
12 D
13 C
14 C
15 C
16 C
17 D
18 D
19 B
20 A
21 C
22 D
23 B
24 A
25 A
26 D
27 D
28 $\frac{1}{2} < x < \frac{3}{5}, .5 < x < .6$
29 $\frac{4}{3}, 1.33$
30 4
31 6