CollegeBoard SAT®

**MARCH 9, 2019**
**INTERNATIONAL**

# The SAT®

# Test Book

## IMPORTANT REMINDERS

**1**

**A No. 2 pencil is required for the test. Do not use a mechanical pencil or pen.**

**2**

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**Test begins on the next page.**

# Reading Test

## 65 MINUTES, 52 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 1-10 are based on the following passage.**

This passage is adapted from Jennine Capó Crucet, *Make Your Home Among Strangers*. ©2015 by Jennine Capó Crucet. Lizet's biology professor has sent her an email asking to meet.

I scanned my mind for what this could be about. Had I left a supply closet or fridge unlocked? Had I open centrifuged one of the specimens she'd
Line asked me to look at when it was supposed to be
5 closed centrifuged? Had she glanced over my shoulder at my class notes and seen the list of embarrassing questions only I seemed to have and which I'd scribbled under the heading *Things to Look Up Later*? I'd been so careful around her so far,
10 hoping to make up for all the times I raised my hand and revealed how little I knew, all the times she caught me pretty much fondling the equipment—the elegant pipettes, the test tube racks that kept everything snug and in place, the magical autoclave
15 incinerating all evidence of use and making everything perfect over and over again. It could've been any or all of these things: she was so smart that I was certain she'd put these observations together and conclude, long before I figured it out, that though I
20 was eager and good at keeping contamination at bay, I wasn't cut out for the hard sciences. I wrote her back, composing my e-mail in a word processing program first to make sure the green squiggly line of grammar impropriety didn't show up under every
25 clause, and confirmed that I could meet with her Monday at noon, right after class. She wrote back a cryptic, *That will be more than fine*.

The three hours of that week's lab class felt like a goodbye. I stacked each petri dish as if it were the last
30 time I'd be allowed to handle those delicate circles of glass. I swished saline solution for longer than was needed, looked at the agar coating the bottom of plates as if its nutrients were intended for me and were about to be withheld. When a question popped
35 into my head, I kept my hand down and didn't even bother to write it in my notebook.

I watched Professor Kaufmann for clues all class but saw nothing, though she'd already proven herself good at masking frustration with kindness. You
40 could drop an entire tray of beakers, and she would smile and in a too-high voice say, *That's OK!* I sometimes thought I was the only one in the class who saw through her, could tell how very upset she was at all that shattered glass on the floor: I knew it
45 from the way she'd say *Hmmm* as she accosted the student culprit with a broom and stood over them, pointing out a missed shard here, a tiny speck there. She'd wait until they put the broom away before noticing another piece, then instruct them to go back
50 to the closet and bring the broom again.

I approached her lab bench once everyone had left. She was scribbling something on graph paper, and I glanced at what she wrote once I was closer.

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CONTINUE

Whatever it was, it was in German—probably not a good sign—and it was underneath a series of equations that meant nothing to me and which were in no way related to our class.

—Liz! she said. Oh, super! Come here, please!

She stood and let me have her seat. I sat there for a good minute, watched her keep working as if she hadn't just asked me to sit down. Her pen dug into the paper and I wondered if she had two brains—wondered if there were a way I could split my own mind like that, be in one place but let my mind hang out wherever it wanted.

She slapped the pen down on her notebook, and without even apologizing for the awkward three or so minutes we'd been right next to each other but not speaking, she said, Thank you for staying after class. I see you're eager to know what this is about.

—Yes, I said. I tried to keep my back straight; I found trying to maintain good posture more painful than just slouching. Even seated on her high stool, I was still looking up at her. I said, Is everything okay?

—Yes, of course. Thank you for asking.

I figured then that I should stop talking lest I incriminate myself, but she smiled at me and nodded as if I'd kept speaking, as if I was saying something at that very moment.

—Yes, so, she said. You are enjoying the lab so far?

—I love it, I blurted out. It's my favorite class this semester.

—Super! she said. That's super.

She nodded some more. After a few additional seconds of painful silence and sustained eye contact she asked, Are you interested in becoming a research scientist?

I thought I wanted to be a doctor, but that didn't seem like the right answer.

—Yes, I said. I am.

—Good, super. Because there is something you should do then, a program. It's a summer position at our field laboratory off the coast of Santa Barbara, in California. You would be perfect for it.

**1**

In the passage, a major source of tension for the narrator is between her

A) artistic pursuits and medical ambitions.
B) romantic ideals and practical considerations.
C) childhood dreams and adult responsibilities.
D) scientific aspirations and personal insecurities.

**2**

Which choice best supports the idea that when the narrator is in class, she is expected to pay attention to details?

A) Lines 1-2 ("I scanned . . . about")
B) Lines 2-5 ("Had I left . . . closed centrifuged")
C) Lines 5-9 ("Had she . . . *Later*")
D) Lines 9-12 ("I'd been . . . equipment")

**3**

The main purpose of the words "elegant," "snug," and "magical" in lines 13-14 is to emphasize the narrator's

A) admiration for the equipment.
B) determination to succeed at all costs.
C) satisfaction with her chosen career.
D) attraction to art instead of science.

**4**

As presented in the passage, the narrator is someone who

A) sacrifices leisure time willingly to secure her dreams.
B) cares deeply about Professor Kaufmann's opinion of her.
C) readily dismisses those who neglect important duties.
D) finds it difficult to interact with her peers.

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5

The passage most strongly suggests that Professor Kaufmann's email reply worries the narrator because

A) the wording of the email is uncharacteristic of Professor Kaufmann.

B) Professor Kaufmann admits that she had not expected a reply.

C) the email fails to clarify why Professor Kaufmann wants to meet with her.

D) Professor Kaufmann reveals that she has little respect for the narrator.

6

Which choice best represents the different meanings of "good" as used in line 55, line 60, and line 72, respectively?

A) Fortunate; acceptable; dependable

B) Proper; ample; therapeutic

C) Favorable; full; correct

D) Accurate; pure; healthy

7

The narrator assumes that, compared with herself, Professor Kaufmann is more

A) capable of performing multiple tasks simultaneously.

B) patient in helping others master new skills.

C) interested in recent discoveries in biology.

D) confident about the long-term benefits of her research.

8

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

A) Lines 37-39 ("I watched . . . kindness")

B) Lines 41-44 ("I sometimes . . . floor")

C) Lines 61-65 ("Her pen . . . wanted")

D) Lines 85-88 ("After . . . scientist")

9

The passage indicates that early in her conversation with Professor Kaufmann, the narrator decides to stop speaking in order to avoid seeming

A) involved in too many extracurricular activities.

B) inarticulate in classroom discussions.

C) overly attracted to nonscientific subjects.

D) guilty of some type of offense.

10

In the context of the passage, the last paragraph primarily functions to

A) underscore that Professor Kaufmann is kind.

B) demonstrate that the narrator's apprehensions are unfounded.

C) downplay that Professor Kaufmann is frustrated.

D) confirm that the narrator is overly critical.

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**Questions 11-20 are based on the following passage.**

This passage is adapted from a speech that Benjamin Franklin delivered to the United States Constitutional Convention in 1787.

There are two passions which have a powerful influence in the affairs of men. These are ambition and avarice; the love of power and the love of money. Separately, each of these has great force in prompting men to action; but, when united in view of the same object, they have, in many minds, the most violent effects. Place before the eyes of such men a post of honor, that shall, at the same time, be a place of profit, and they will move heaven and earth to obtain it. The vast number of such places it is that renders the British Government so tempestuous. The struggles for them are the true source of all those factions which are perpetually dividing the nation, distracting its councils, hurrying it sometimes into fruitless and mischievous wars, and often compelling a submission to dishonorable terms of peace.

And of what kind are the men that will strive for this profitable pre-eminence, through all the bustle of cabal, the heat of contention, the infinite mutual abuse of parties, tearing to pieces the best of characters? It will not be the wise and moderate, the lovers of peace and good order, the men fittest for the trust. It will be the bold and the violent, the men of strong passions and indefatigable activity in their selfish pursuits. These will thrust themselves into your government, and be your rulers. And these, too, will be mistaken in the expected happiness of their situation, for their vanquished competitors, of the same spirit, and from the same motives, will perpetually be endeavoring to distress their administration, thwart their measures, and render them odious to the people.

Besides these evils, . . . though we may set out in the beginning with moderate salaries, we shall find that such will not be of long continuance. Reasons will never be wanting for proposed augmentations; and there will always be a party for giving more to the rulers, that the rulers may be able, in return, to give more to them. Hence, as all history informs us, there has been in every state and kingdom a constant kind of warfare between the governing and the governed; the one striving to obtain more for its support, and the other to pay less. And this has alone occasioned great convulsions, actual civil wars, ending either in dethroning of the princes or enslaving of the people. Generally, indeed, the ruling power carries its point, and we see the revenues of princes constantly increasing, and we see that they are never satisfied, but always in want of more. The more the people are discontented with the oppression of taxes, the greater need the prince has of money to distribute among his partisans, and pay the troops that are to suppress all resistance, and enable him to plunder at pleasure. There is scarce a king in a hundred, who would not, if he could, follow the example of Pharaoh, —get first all the people's money, then all their lands, and then make them and their children servants forever. It will be said that we do not propose to establish kings, I know it. But there is a natural inclination in mankind to kingly government. It sometimes relieves them from aristocratic domination. They had rather have one tyrant than five hundred. It gives more of the appearance of equality among citizens; and that they like. I am apprehensive, therefore, —perhaps too apprehensive, —that the government of these States may, in future times, end in a monarchy. But this catastrophe, I think, may be long delayed, if in our proposed system we do not sow the seeds of contention, faction, and tumult, by making our posts of honor places of profit.

**11**

The main purpose of the passage is to

A) support the establishment of a democratic government.

B) caution against overcompensating government officials.

C) propose limitations to executive authority in the United States.

D) express regret over humanity's propensity toward autocratic rule.

**12**

As used in line 2, "affairs" most nearly means

A) expectations.

B) procedures.

C) controversies.

D) activities.

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CONTINUE

13

As used in line 7, "effects" most nearly means

A) impact.
B) appearance.
C) advantage.
D) meaning.

14

According to Franklin, the continuous unrest in Britain is ultimately due to the

A) loss of revenue from former colonies.
B) competition for the numerous posts in the government.
C) tensions between the different branches of the government.
D) battles between the local ruling councils.

15

The main purpose of the second paragraph (lines 17-32) is to

A) characterize those who seek power and money in government posts.
B) examine the corrupting influence of money on a nation's most upstanding leaders.
C) describe how citizens' trust is affected by the decisions of selfish rulers.
D) detail the routes by which self-interested individuals typically ascend to power.

16

In the passage, Franklin argues that profitable positions in government are likely to attract individuals who are primarily

A) shrewd judges of their political opponents.
B) strong advocates of the rule of law.
C) able to lead under adverse conditions.
D) relentlessly determined to achieve their goals.

17

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

A) Lines 17-21 ("And of . . . characters")
B) Lines 21-23 ("It will not . . . trust")
C) Lines 23-26 ("It will be . . . rulers")
D) Lines 26-28 ("And these . . . situation")

18

Franklin implies that citizens have actively opposed the government in those situations in which they were

A) caught between aggressive rulers and those rulers' rivals.
B) forced to fight in wars for which they were ill prepared.
C) burdened with taxes that enriched the governing power.
D) ruled by leaders who lacked sufficient authority.

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CONTINUE

19

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

A) Lines 12-16 ("The struggles . . . peace")

B) Lines 50-54 ("The more . . . pleasure")

C) Lines 54-58 ("There is . . . forever")

D) Lines 59-61 ("But there . . . government")

20

According to Franklin, people prefer being governed by a monarch to being governed by an aristocracy because

A) the rule of a single leader creates the impression of broad social equality.

B) a monarch has less impact on most citizens' lives than aristocrats do.

C) aristocrats are the source of most conflict between citizens and their governments.

D) monarchy is a more familiar form of government than aristocratic rule is.

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CONTINUE

**Questions 21-31 are based on the following passage and supplementary material.**

This passage and accompanying figure are adapted from Richard Dawkins. *The Greatest Show on Earth: The Evidence for Evolution*. ©2009 by Richard Dawkins.

There are two small islets off the Croatian coast called Pod Kopiste and Pod Mrcaru. In 1971 a population of common Mediterranean lizards, *Podarcis sicula*, which mainly eat insects, was present on Pod Kopiste but there were none on Pod Mrcaru. In that year experimenters transported five pairs of *Podarcis sicula* from Pod Kopiste and released them on Pod Mrcaru. Then, in 2008, another group of mainly Belgian scientists, associated with Anthony Herrel, visited the islands to see what had happened. They found a flourishing population of lizards on Pod Mrcaru, which DNA analysis confirmed were indeed *Podarcis sicula*. These are presumed to have descended from the original five pairs that were transported. Herrel and his colleagues made observations on the descendants of the transported lizards, and compared them with lizards living on the original ancestral island. There were marked differences. The scientists made the probably justified assumption that the lizards on the ancestral island, Pod Kopiste, were unchanged representatives of the ancestral lizards of thirty-six years before. In other words, they presumed they were comparing the evolved lizards of Pod Mrcaru with their unevolved 'ancestors' (meaning their contemporaries but of ancestral type) on Pod Kopiste. Even if this presumption is wrong—even if, for example, the lizards of Pod Kopiste have been evolving just as fast as the lizards of Pod Mrcaru—we are still observing evolutionary divergence in nature, over a timescale of decades: the sort of timescale that humans can observe within one lifetime.

And what were the differences between the two island populations, differences that had taken a mere thirty-seven years or so to evolve? Well, the Pod Mrcaru lizards—the 'evolved' population—had significantly larger heads than the 'original' Pod Kopiste population: longer, wider, and taller heads. This translates into a markedly greater bite force. A change of this kind typically goes with a shift to a more vegetarian diet and, sure enough, the lizards of Pod Mrcaru eat significantly more plant material than the 'ancestral' type on Pod Kopiste. From the almost exclusive diet of insects still enjoyed by the modern Pod Kopiste population, the lizards on Pod Mrcaru had shifted to a largely vegetarian diet, especially in summer.

Why would an animal need a stronger bite when shifting to a vegetarian diet? Because plant, but not animal, cells have walls stiffened by cellulose. Herbivorous mammals like horses, cattle, and elephants have great millstone-like teeth for grinding cellulose, quite different from the shearing teeth of carnivores and the needly teeth of insectivores. And they have massive jaw muscles, and correspondingly robust skulls for the muscle attachments (think of the stout midline crest along the top of a gorilla's skull). Vegetarians also have characteristic peculiarities of the gut. Animals generally can't digest cellulose without the aid of bacteria or other microorganisms, and many vertebrates set aside a blind alley in the gut called the caecum, which houses such bacteria and acts as a fermentation chamber. The caecum, and other parts of the gut, can become quite elaborate in specialist herbivores. Carnivores usually have simpler guts than herbivores, and smaller too. Among the complications that become inserted in herbivore guts are things called caecal valves. Valves are incomplete partitions, sometimes muscular, which can serve to regulate or slow down the flow of material through the gut, or simply increase the surface area of the interior of the caecum. Now the fascinating thing is that, although caecal valves don't normally occur in *Podarcis sicula* and are rare in the family to which it belongs, those valves have actually started to evolve in the population of *P. sicula* on Pod Mrcaru, the population that has, for only the past thirty-seven years, been evolving towards herbivory. The investigators discovered other evolutionary changes in the lizards of Pod Mrcaru. The population density increased, and the lizards ceased to defend territories in the way that the 'ancestral' population on Pod Kopiste did. I should repeat that the only thing that is really exceptional about this whole story, and the reason I am telling it here, is that it all happened so extremely rapidly, in a matter of a few decades: evolution before our very eyes.

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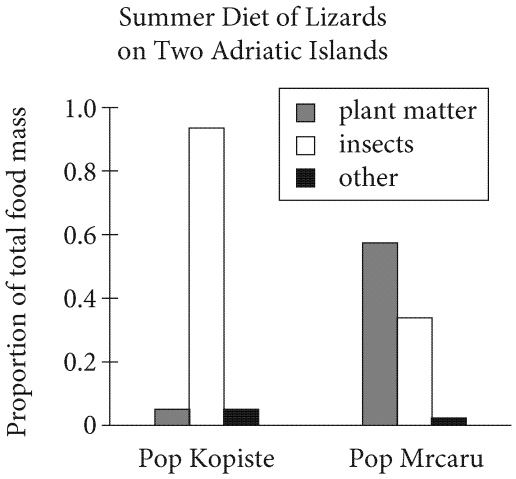


**21**

The main purpose of the passage is to

A) illustrate the physical changes that have occurred in lizards throughout the years.

B) compare the environments of lizards living on two nearby islets.

C) present an example of evolution in lizards occurring over a relatively short period of time.

D) analyze the results of two different scientific studies about lizard evolution.

**22**

Based on the passage, Herrel and his colleagues' presumption that the lizards on Pod Mrcaru were descended from the five pairs the earlier scientists released depended on

A) identifying the lizards as *Podarcis sicula* and assuming that the species was absent from Pod Mrcaru until 1971.

B) determining that the physical characteristics observed in the lizards on Pod Mrcaru were also found in some individuals on Pod Kopiste.

C) using DNA analysis to determine family relationships between lizards on Pod Mrcaru and those on Pod Kopiste.

D) eliminating the possibility that any lizards other than *Podarcis sicula* could have become established on Pod Mrcaru since 1971.

**23**

As used in lines 14 and 18, "original" most nearly means

A) innovative.

B) standard.

C) initial.

D) resourceful.

**24**

Which choice best supports the conclusion that the lizards on Pod Mrcaru showed evolutionary changes other than those directly related to chewing and digesting plant matter?

A) Lines 19-22 ("The scientists . . . before")

B) Lines 40-43 ("A change . . . Pod Kopiste")

C) Lines 51-54 ("Herbivorous . . . insectivores")

D) Lines 80-83 ("The population . . . did")

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CONTINUE

25

Based on the passage, how might the scientists have justifiably responded to a challenge to their assumption described in lines 19-22?

A) By conceding that further studies needed to be undertaken in order to confirm the evolutionary status of the Pod Kopiste lizards

B) By suggesting that the Pod Kopiste lizards have less in common with the lizards on Pod Mrcaru than had previously been assumed

C) By replying that there is sufficient proof to support the contention that the Pod Kopiste lizards evolved much less rapidly than the Pod Mrcaru lizards

D) By arguing that the specific evolution of the Pod Kopiste lizards is ultimately not relevant to the most important implications of the study

26

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

A) Lines 11-13 ("They found . . . *Podarcis sicula*")

B) Lines 15-18 ("Herrel . . . island")

C) Lines 23-26 ("In other . . . Pod Kopiste")

D) Lines 26-32 ("Even if . . . lifetime")

27

As used in line 56, "robust" most nearly means

A) sturdy.

B) versatile.

C) rough.

D) vigorous.

28

The main purpose of the parenthetical statement included in lines 56-57 is to

A) illustrate the strength and agility of Pod Mrcaru lizards compared with that of other animals.

B) provide an analogy to illuminate a structural detail of the head of Pod Mrcaru lizards.

C) offer a contrast between Pod Mrcaru lizards and species of animals found in other habitats.

D) demonstrate the unique nature of the physical shape of Pod Mrcaru lizards.

29

According to the graph, insects compose what approximate proportion of total food mass of the lizards' summer diet on Pod Kopiste?

A) 0.05

B) 0.40

C) 0.60

D) 0.95

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CONTINUE

30

Which statement comparing the summer diets of the lizards on the two islets is best supported by the graph?

A) The amount of plant matter consumed by the lizards of Pod Mrcaru increased more gradually than the amount of plant matter consumed by the lizards of Pod Kopiste.

B) The proportion of total food mass derived from plant matter on Pod Kopiste is generally equal to the proportion of total food mass derived from insects on Pod Mrcaru.

C) The proportion of food mass that is neither plant matter nor insects is roughly equivalent for the lizards of Pod Kopiste and the lizards of Pod Mrcaru.

D) The total mass of insects consumed by the lizards of Pod Kopiste has increased more than has the mass of insects consumed by Pod Mrcaru lizards.

31

Based on the passage, which choice best identifies a likely difference between the graph and a hypothetical graph providing data about the lizards' winter diet that measured the same three dietary sources?

A) The gray Pod Mrcaru bar would be shorter, and either or both of the remaining Pod Mrcaru bars would be longer.

B) The gray Pod Kopiste bar would be longer, and either or both of the remaining Pod Kopiste bars would be shorter.

C) The white Pod Mrcaru bar would be longer, and the black Pod Mrcaru bar would be shorter.

D) The black Pod Kopiste bar would be shorter, and the gray and the black Pod Mrcaru bars would both be longer.

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**Questions 32-42 are based on the following passage and supplementary material.**

This passage is adapted from Wray Herbert, *On Second Thought: Outsmarting Your Minds Hard-Wired Habits*. ©2010 by Wray Herbert.

Princeton psychologist Daniel Oppenheimer and his New York University colleague Adam Alter believe that many of the economic decisions we make have little to do with objective value. Market choices have much more to do with the brain's basic internal perception of the world and the way those perceptions shape our feelings of comfort and ease. In this view, even currency has no clear and absolute value within one national economy. Regardless of those numbers on bills and coins, money derives its true value at least in part from the individual mind. In a series of experiments, these two psychologists have been studying the marketplace cues that trigger psychological comfort or discomfort, and thus shape us as economic beings.

The basic idea is that it's human nature to get anxious and wary when the world is strange or challenging. We're more at ease around the familiar and comprehensible. But the cues that signal us to be on guard in the modern social world—including the financial world—may not be obvious. Indeed, they may be almost undetectable at times. It's these nuanced signals that the psychologists have been exploring in the lab.

Here's an example of their work. Oppenheimer and Alter asked a group of volunteers to estimate how much of various commodities they could buy with a dollar. They were ordinary things like paper clips and gumballs and paper napkins. Some of the volunteers were given a regular old dollar bill, with George Washington on it, while others were given less familiar currency of the same value: a Susan B. Anthony $1 coin, for example. Invariably, the volunteers believed that the familiar old dollar bill was worth more—that it had more buying power—than the unusual currency.

That's not logical, of course. But it was not a fluke. They got the same result when they gave some people a rare $2 bill and others two singles. It's not as though people never see a $2 bill, and it does have Thomas Jefferson on it, after all. But just the slight unfamiliarity of the denomination was enough to make people devalue it. Why would this be? Oppenheimer and Alter believe this irrational behavior is rooted in our most fundamental mental processes: The world is full of stimuli of various kinds, some more familiar than others, and the brain is tuned to process the familiar ones rapidly, effortlessly, and intuitively. This cognitive strategy is known as the "fluency heuristic." More difficult or alien cues require more mental work, more plodding deliberation; the brain switches to its more cautious and calculating style to be on the safe side. We intuitively know that familiar $1 bills are valuable items, but the dollar coin is an unknown commodity—and the difference shows just how hard it is for us to know "the value of a dollar."

This is humbling to know. But there's more. The psychologists wanted to see if the same cognitive bent shapes our perceptions and attitudes toward goods themselves, and they decided to use typeface manipulation to find out. In this experiment, they gave everyone the same currency—the familiar dollar bill—but they made the commodities more or less accessible. Some of the "consumers" purchased the gumballs and paper clips from a form that was printed in a clear black font, while others had to select from a form printed in difficult-to-read gray script—basically the same manipulation described before. The idea was to make the strangeness as subtle as possible, to reduce it to basic perception. Even at this most fundamental level, the differences shaped economic judgment: volunteers in the study consistently rated identical goods as less valuable when they came in an unfamiliar, cognitively challenging form.

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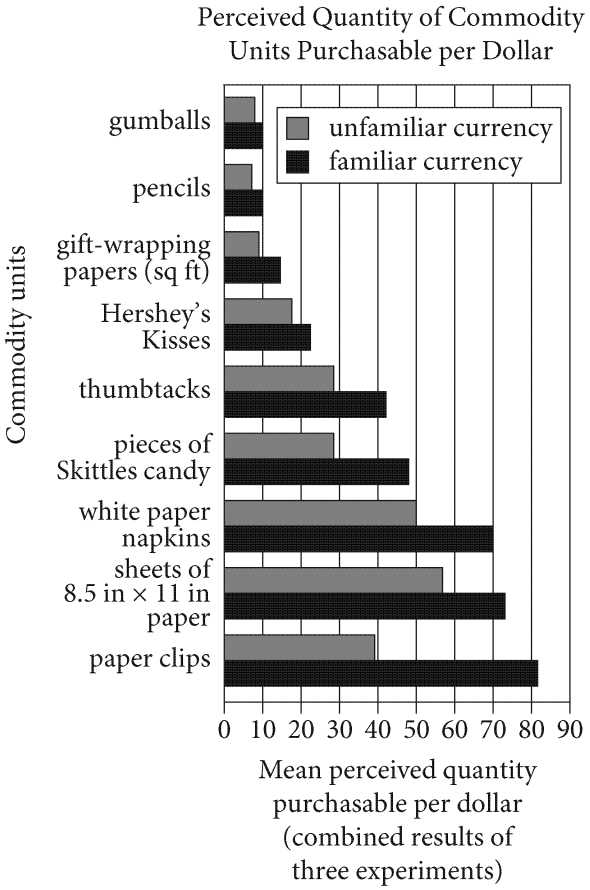


Adapted from Adam L. Alter and Daniel M. Oppenheimer, "Easy on the Mind, Easy on the Wallet: The Roles of Familiarity and Processing Fluency in Valuation Judgments." ©2008 by Psychonomic Society, Inc.

**32**

The main idea of the passage is that

A) even relatively sophisticated consumers can be manipulated psychologically.

B) marketplace decisions can be influenced by individuals' sense of psychological discomfort.

C) the perceived value of any currency varies significantly based on the material with which it is made.

D) certain unfamiliar stimuli have little effect on the ability of a consumer to make rational decisions.

**33**

As used in line 6, "basic" most nearly means

A) fundamental.

B) indispensable.

C) undeveloped.

D) simple.

**34**

As used in line 9, "absolute" most nearly means

A) definitive.

B) arbitrary

C) perfect.

D) positive.

**35**

As used in lines 30 and 34, "old" most nearly means

A) threadbare.

B) commonplace.

C) antiquated.

D) long-standing.

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CONTINUE

36

The author implies that the image of a respected historical figure would be expected to

A) reinforce the credibility of currency that is encountered infrequently.

B) make a particular denomination of currency seem more valuable than it really is.

C) inspire confidence in the financial system that uses that currency.

D) reassure users of paper money that it is as legitimate as coins made of precious metals.

37

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

A) Lines 25-28 ("Oppenheimer . . . dollar")

B) Lines 29-33 ("Some . . . example")

C) Lines 33-36 ("Invariably . . . currency")

D) Lines 39-41 ("It's not . . . after all")

38

The author most strongly suggests that Oppenheimer and Alter's research supports the idea that

A) most everyday objects are significantly overpriced.

B) people often make irrational economic judgments.

C) unfamiliar currency is used more often than most people assume.

D) the use of actual currency is becoming increasingly outmoded.

39

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

A) Lines 46-49 ("The world . . . intuitively")

B) Lines 49-50 ("This . . . heuristic")

C) Lines 54-57 ("We intuitively . . . a dollar")

D) Lines 59-62 ("The psychologists . . . find out")

40

Which choice best describes the function of the last paragraph?

A) It attempts to clarify certain complex problems.

B) It suggests that certain findings may need qualification.

C) It supports and expands on the preceding discussion.

D) It proposes a new interpretation of existing data.

41

According to the graph, participants thought they could buy between 20 and 30 units of which commodity for one dollar of familiar currency?

A) Gift-wrapping paper

B) Hershey's Kisses

C) Thumbtacks

D) Pieces of Skittles candy

42

Which of the following questions CANNOT be answered using the graph alone?

A) For which of the commodities in the study did the currency used make the least difference to the perceived quantity purchasable?

B) What is the likely reason for differences in the magnitude of the effect of using unfamiliar currency to purchase commodities?

C) Do any of the commodities have a higher perceived value in familiar currency than they do in unfamiliar currency?

D) Which of the commodities has the greatest proportional difference between the perceived quantity purchasable using unfamiliar currency and the perceived quantity purchasable using familiar currency?

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CONTINUE

**Questions 43-52 are based on the following passages.**

Passage 1 is adapted from Robert M. Hazen, *Genesis: The Scientific Quest for Life's Origin*. ©2005 by Robert M. Hazen. Passage 2 is adapted from University of North Carolina School of Medicine, "Biochemists Resurrect 'Molecular Fossils': Findings Challenge Assumptions about Origins of Life." ©2013 by ScienceDaily, LLC.

**Passage 1**

Few events have electrified the origin-of-life community as much as the early 1980s discovery of RNA ribozymes—strands of RNA that not only carry genetic information, but also act as catalysts. Sidney Altman of Yale and Thomas Cech of the University of Colorado independently demonstrated that a particular segment of RNA can accelerate key biochemical reactions. This startling finding, which won Altman and Cech the Nobel Prize in 1989, inspired a new vision of life's origin.

Modern life relies on two complexly interrelated molecules: DNA, which carries information, and proteins, which perform chemical functions. This interdependence leads to a kind of chicken-and-egg dilemma: Proteins make and maintain DNA, but DNA carries the instructions to make proteins. Which came first? RNA, it turns out, has the potential to do both jobs.

The RNA World theory quickly emerged following the discovery of ribozymes. It champions the central role of genetic material in the dual tasks of catalyst and information transfer. Over the years, "RNA World" has come to mean different things to different people, but three precepts are common to all versions of the theory: (1) Once upon a time, RNA rather than DNA stored genetic information; (2) ancient RNA replication followed the same rules as modern DNA replication by matching pairs of bases: A-U (the pyrimidine uracil, whose DNA equivalent is thymine) and C-G; and (3) ancient RNA played the same catalytic roles as modern protein enzymes. In this scenario, the first life-form was simply a self-replicating strand of RNA, perhaps enclosed in a protective lipid membrane. According to most versions of this hypothesis, modern metabolism emerged later, as a means to make RNA replication more efficient.

**Passage 2**

For the RNA World hypothesis to be correct, ancient RNA catalysts would have had to copy multiple sets of RNA blueprints nearly as accurately as do modern-day enzymes. That's a hard sell; scientists calculate that it would take much longer than the age of the universe for randomly generated RNA molecules to evolve sufficiently to achieve the modern level of sophistication. Given Earth's age of 4.5 billion years, living systems run entirely by RNA could not have reproduced and evolved either fast or accurately enough to give rise to the vast biological complexity on Earth today.

"The RNA World hypothesis is extremely unlikely," says biochemist Charles Carter. "It would take forever."

Moreover, there's no proof that such ribozymes even existed billions of years ago. To buttress the RNA World hypothesis, scientists use 21st century technology to create ribozymes that serve as catalysts. "But most of those synthetic ribozymes," Carter said, "bear little resemblance to anything anyone has ever isolated from a living system."

Carter, who has been an expert in ancient biochemistry for four decades, took a different approach. His experiments are deeply embedded in consensus biology.

Our genetic code is translated by two super-families of modern-day enzymes. Carter's research team created and superimposed digital three-dimensional versions of the two super-families to see how their structures aligned. Carter found that all the enzymes have virtually identical cores that can be extracted to produce "molecular fossils" he calls Urzymes—Ur meaning earliest or original. The other parts, he said, are variations that were introduced later, as evolution unfolded.

These two Urzymes are as close as scientists have gotten to the actual ancient enzymes that would have populated Earth billions of years ago.

"Once we identified the core part of the enzyme, we cloned it and expressed it," Carter said. "Then we wanted to see if we could stabilize it and determine if it had any biochemical activity." They could and it did.

Both Urzymes are very good at accelerating the two reactions necessary to translate the genetic code.

"Our results suggest that there were very active protein enzymes very early in the generation of life, before there were organisms," Carter said. "And those enzymes were very much like the Urzymes we've made."

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CONTINUE

The finding also suggests that Urzymes evolved from even simpler ancestors—tiny proteins called peptides. And over time those peptides coevolved with RNA to give rise to more complex life-forms.

In this "Peptide–RNA World" scenario, RNA would have contained the instructions for life while peptides would have accelerated key chemical reactions to carry out those instructions.

**43**

Which choice best expresses the perspective of the author of Passage 1 regarding the discovery of RNA ribozymes?

A) It was conceptually interesting but of little practical value.
B) It conclusively resolved a debate that had long divided scientists.
C) It was a major breakthrough that gave rise to a credible theory.
D) It was underappreciated at the time, but now its importance is recognized.

**44**

As used in line 4, "carry" most nearly means.

A) cover.
B) capture.
C) contain.
D) compensate.

**45**

Which choice from Passage 1 provides the best support for the idea that the established relationship between DNA and proteins calls into question how life arose?

A) Lines 11-13 ("Modern . . . functions")
B) Lines 15-17 ("Proteins . . . first")
C) Lines 25-26 ("Once . . . information")
D) Lines 32-34 ("In this . . . membrane")

**46**

As used in line 59, "isolated" most nearly means

A) quarantined.
B) alienated.
C) concealed.
D) extracted.

**47**

Based on Passage 2, the results of Carter's structural alignment studies suggest that the Urzyme

A) is the chemical component in modern-day cells that stores genetic information.
B) is the region of modern-day enzymes that has remained relatively unchanged over time.
C) evolved from RNA and functions to make metabolism more efficient in modern-day cells.
D) arose fairly recently in evolutionary time and is now considered a modern-day enzyme.

**48**

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

A) Lines 64-68 ("Our . . . aligned")
B) Lines 68-73 ("Carter . . . unfolded")
C) Lines 77-81 ("Once . . . did")
D) Lines 89-92 ("The finding . . . life-forms")

**49**

Which molecules are presented in Passage 2 as the earliest ancestors of modern enzymes?

A) Lipids
B) Urzymes
C) Peptides
D) Ribozymes

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CONTINUE

50

Which choice best describes the relationship between the two passages?

A) Passage 1 provides an overview of a theory, while Passage 2 critiques that theory and describes an alternative to it.

B) Passage 1 explains an influential theory, while Passage 2 discusses an application of that theory and its shortcomings.

C) Passage 1 summarizes two viewpoints of a theory, while Passage 2 argues that all viewpoints of the theory are essentially consistent.

D) Passage 1 describes findings that support an established theory, while Passage 2 argues that there is insufficient evidence to evaluate that theory.

51

Based on the passages, which of the three precepts of the RNA World theory listed in Passage 1 would Carter (Passage 2) most strongly object to and why?

A) Precept 1, because Carter believes that in early life-forms, DNA rather than RNA stored genetic information.

B) Precept 2, because Carter believes that ancient RNA replication did not follow the same rules as modern DNA replication.

C) Precept 2, because Carter believes that ancient life-forms did not contain the pyrimidine uracil.

D) Precept 3, because Carter believes the catalytic role was played by protein enzymes rather than by RNA.

52

According to the passages, which choice describes the role of ancient RNA according to the RNA World theory and the Peptide-RNA World scenario, respectively?

A) To synthesize lipid membranes; to store the genetic code and act as a catalyst

B) To store the genetic code; to activate protein enzymes

C) To convert uracil to thymine; to accelerate chemical reactions

D) To store the genetic code and act as a catalyst; to store the genetic code only

# STOP

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

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# 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.**

### Dickens Takes the Stage

Most fans of Charles Dickens know him because of his popular novels, but his talents extended to the theater as well. Having acted in several plays before turning to 1 writing—Dickens continued to participate in a variety of productions while writing such novels as *Oliver Twist*, *The Pickwick Papers*, and *Nicholas Nickleby*. In 1853, he discovered a way to combine these passions. Using his theatrical flair, Dickens staged dynamic public readings of 2 their works that inspired audiences to engage with the author and his writing in new ways.

**1**

A) NO CHANGE
B) writing;
C) writing.
D) writing,

**2**

A) NO CHANGE
B) his
C) its
D) one's

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CONTINUE

3 Tickets for a Dickens performance were priced inexpensively so that working-class audiences could afford them. Though his stage set was austere—consisting of little more than a reading desk, a pitcher of water, and a drinking glass—Dickens set the scene with 4 just his presence and voice. Reading from an annotated copy of a 5 book; in which he had scrawled stage directions, he would impersonate as many as 23 fictional characters in a single two-hour performance.

**3**

Which choice best introduces the main idea of the paragraph?

A) NO CHANGE
B) Audiences of the time tended to favor humorous entertainment.
C) A Dickens reading was not simply a recitation; it was a one-man show.
D) Future publishing success was not guaranteed, so Dickens needed another source of income.

**4**

A) NO CHANGE
B) just his presence and his voice as well.
C) simply his presence and just his voice, too.
D) his presence and with the addition of his voice.

**5**

A) NO CHANGE
B) book
C) book:
D) book—

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CONTINUE

6 As a young man, Dickens had put on plays with his friends. According to one audience member, Dickens 7 will perform the character of Scrooge from *A Christmas Carol* by drawing "his face down into his collar, like a great turtle drawing in his head, [putting] on a surly look and [speaking] in a gruff voice"; then, in the next moment, he spoke as Scrooge's clerk Bob Cratchit, with a soft voice and cowering posture. Bringing characters to life in ways that surprised and delighted audiences, Dickens created performances that augmented his texts.

**6**

Which choice best sets up the details that follow in the next sentence?

A) NO CHANGE
B) However, he was unprepared for the rigorous travel schedule his performances required.
C) John Forster, a close friend, argued that the performances were inappropriate for a gentleman.
D) Each character was dramatized with distinctive gestures, mannerisms, and speech patterns.

**7**

A) NO CHANGE
B) would have performed
C) is performing
D) performed

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CONTINUE

8 Dickens's previous experience with stage production included creating scenery and designing costumes. In his warm greetings to the audience before each performance, the author ceased being a remote 9 figure, he became a friend. Dickens further enhanced this intimacy by inviting audience members to express their reactions openly, and he was often inspired by their gasps, chuckles, and applause to improvise lines to prolong moments of comedy or pathos. For example, when acting out a scene from *A Christmas Carol* in which a fiddler at a party "plunged his hot face into a pot of porter," Dickens added hyperbolic exclamations to encourage the audience to laugh. He laughed 10 big time along with them.

**8**

Which choice provides the most effective transition from the previous paragraph to this one?

A) NO CHANGE
B) Dickens admired Charles Mathews, a contemporary comic actor who was famous for his impersonations.
C) These animated performances enabled fans to connect with Dickens himself as well as with his characters.
D) Dickens's enthusiasm for the theater is evident in works such as *Nicholas Nickleby*.

**9**

A) NO CHANGE
B) figure; and
C) figure—but
D) figure:

**10**

Which choice is most consistent with the tone established throughout the passage?

A) NO CHANGE
B) his head off
C) heartily
D) himself silly

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CONTINUE

From 1853 to 1870, Dickens performed an astonishing 472 readings throughout Great Britain and the United States. Historians have said that Dickens, who sold out every show he scheduled, was perhaps the first author to become a celebrity as much for his performances as for his written works. 11 Creating an unprecedented role for both author and audience, Dickens ultimately became a public figure as well known and as beloved as his most popular characters.

11

Which choice best sets up the summary of the main idea of the passage?

A) NO CHANGE
B) Though he continued to perform as his health waned,
C) Proving that comedic acting could be lucrative,
D) With a solid background in journalism,

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CONTINUE

**Questions 12-22 are based on the following passage.**

**Fritz Pollard beyond the Gridiron**

Frederick Douglass "Fritz" Pollard first became famous for his impressive achievements as a football player and coach between 1915 and 1937. Over the course of a long and entrepreneurial career, Pollard used the 12 considerate celebrity he gained from sports to advance professional opportunities for his fellow African Americans.

12

A) NO CHANGE
B) considered
C) consolidated
D) considerable

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CONTINUE

One of the many entrepreneurial ventures Pollard pursued was publishing a newspaper, the *New York Independent* 13 *News*. He wrote a weekly sports column for the newspaper called Sports by Fritz. He used this platform to highlight the accomplishments of African American athletes, such as heavyweight boxing champion Joe Louis, and to advocate the end of racial segregation in the National Football League and other professional sports organizations. Pollard also used his column to discuss the parallel roles played by athletes and entertainers in the African American community. 14 At a time when African Americans were denied many avenues for economic and social advancement, sports and entertainment offered opportunities for fame and success; Pollard believed it was essential to preserve and 15 elongate African Americans' access to these industries.

**13**

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

A) *News*; for it, he wrote a weekly sports column—it was called Sports by Fritz.

B) *News*, and a weekly sports column in it, Sports by Fritz, was written by him.

C) *News*, for which he wrote a weekly sports column, Sports by Fritz.

D) *News*; for that newspaper, he wrote a weekly sports column, Sports by Fritz.

**14**

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

> Pollard founded his own football team, which was based in New York.

Should the writer make this addition here?

A) Yes, because it supports a point made earlier in the passage about Pollard's celebrity status.

B) Yes, because it provides additional context for the paragraph's description of the *Independent News*.

C) No, because it contradicts the point made about athletes and entertainers in the previous sentence.

D) No, because it interrupts the paragraph's discussion of Pollard's newspaper column.

**15**

A) NO CHANGE

B) stretch

C) expand

D) accumulate

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CONTINUE

Pollard's engagement with issues of racial equality was not limited to commentary. Pollard also worked as a talent agent, **16** improving the prospects of many African American entertainers who hired him to promote their careers and book their performances. **17** Pollard began his career, early on, as an agent when he allowed a friend to turn vacant office space at the *Independent News* into a recording studio, dubbed Suntan Studios. Suntan provided African American musicians much-needed space to record and rehearse. At the studio, Pollard became acquainted with many performers, including Billie Holiday and Dizzy Gillespie, who became his clients. Pollard drew on the network of relationships he **18** would cultivate as an athlete, particularly his friendship with the renowned actor and singer Paul Robeson (who, like Pollard, had begun his career as a football player), to find work for Holiday, Gillespie, and many others. **19** By contrast, Pollard often secured engagements for his clients in venues that had previously been segregated. "I got hundreds and hundreds of acts into places where they never got [in] before," he recalled in an interview with biographer John M. Carroll.

**16**

A) NO CHANGE
B) his improving
C) and improving
D) he improved

**17**

A) NO CHANGE
B) Pollard began his career as an agent
C) Beginning his career as an agent, Pollard became one
D) His career as an agent just beginning, Pollard started his career

**18**

A) NO CHANGE
B) will cultivate
C) had cultivated
D) has cultivated

**19**

A) NO CHANGE
B) Furthermore,
C) Instead,
D) Besides,

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CONTINUE

20 He played a number of other professional roles in his extraordinarily far-ranging career, including investment advisor, 21 filmmaker, and, tax consultant. Yet for all the roles he played, one thing about Pollard never changed: 22 the importance of his athletic career in establishing his reputation.

**20**

A) NO CHANGE
B) Pollard
C) Carroll
D) This man

**21**

A) NO CHANGE
B) filmmaker; and
C) filmmaker and,
D) filmmaker, and

**22**

The writer wants to conclude the passage by underscoring the main characteristic of Pollard that has been discussed throughout the passage. Which choice best accomplishes this goal?

A) NO CHANGE
B) his willingness to switch to a new field whenever he saw an opportunity.
C) the way he used connections he had made during his time at Brown University.
D) his commitment to creating more chances for African Americans to excel in their chosen fields.

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CONTINUE

**Questions 23-33 are based on the following passage.**

**Why We Still Need Mapmakers**

For centuries, cartography—the art and science of mapmaking—was the work of skilled individuals who relied on their own explorations, drawing abilities, and knowledge of astronomy and mathematics to chart the world around them. In recent decades, advances in technology and software have 23 taken over. As applications such as Google Maps re-create the world in precise detail, some people wonder if there is anything left to map and 24 is there still a need for cartographers at all. Yet whether they are overseeing complex software to ensure accuracy or innovating content and form to expand our understanding of a particular place, trained cartographers remain essential.

**23**

A) NO CHANGE
B) relegated such labor-intensive hard work to past history.
C) rendered much of the manual labor of mapmaking obsolete.
D) made some work of cartography and mapmaking unnecessary.

**24**

A) NO CHANGE
B) if we still need cartographers at all.
C) do we still need cartographers at all.
D) if cartographers are still needed at all?

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CONTINUE

Although software programs known as geographic information systems (GIS) now perform many of the technical aspects of mapping, such as data analysis and projections, 25 their complete capabilities have yet to be fully realized. A satellite image can show a landscape in impressive detail, but it may fail to reflect a new construction detour or a road washed out by recent flooding. To ensure that maps accurately reflect a world in perpetual flux, mapmakers must be 26 vigilant, about monitoring data, and integrating new information. Moreover, digital mapmaking requires input from skilled designers, whose artistic decisions about details ranging from font selection to color scheme 27 influences how effectively information is communicated to users.

**25**

Which choice most effectively helps the sentence establish the main topic of the paragraph?

A) NO CHANGE
B) they are occasionally prone to computer viruses and bugs.
C) their implementation raises both practical and ethical questions.
D) they require significant human oversight.

**26**

A) NO CHANGE
B) vigilant, about monitoring data
C) vigilant about monitoring data,
D) vigilant about monitoring data

**27**

A) NO CHANGE
B) influence
C) has influenced
D) is influencing

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CONTINUE

Mapmakers are more than just GIS experts and 28 designers though, they're storytellers who craft narratives through the selection, arrangement, and juxtaposition of spatial information. In *Infinite City: A San Francisco Atlas*, a 2010 collection by Rebecca Solnit, each of the atlas's twenty-two maps tells a distinct story. A map pinpointing the city's coffee shops also charts sewer lines and 29 reservoirs to show how commerce, infrastructure, and natural resources are interrelated. Another relays the rise and decline of cinema culture in San Francisco by juxtaposing sites where Alfred Hitchcock filmed his iconic movie *Vertigo* with locations where movie theaters have recently closed. Of this collection, *L.A. Times* reviewer Lynell George wrote, 30 "We often speak of inhabiting a place—a country, a city or our own small plot of land—but seldom do we pause to deeply consider how that place inhabits us."

**28**

A) NO CHANGE
B) designers, though,
C) designers, though
D) designers, though:

**29**

A) NO CHANGE
B) reservoirs. Showing
C) reservoirs to which show
D) reservoirs, which it shows

**30**

The writer wants to conclude the paragraph with a quotation from George's review that reinforces the paragraph's central claim. Which choice best accomplishes this goal?

A) NO CHANGE
B) "*Infinite City* examines that San Francisco, a physically compact place that contains multitudes."
C) "This book alters the focus and point of view; it tells the story of a city through the voices of its inhabitants' obsessions, dreams, predilections, passions. It allows what lies beneath the surface to speak."
D) "Passing through these newly mapped territories, we begin to see that 'place,' as Solnit emphasizes, is an imprecise word."

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CONTINUE

Maps such as those in *Infinite City* don't necessarily show us how to travel from point A to point B. **31** Likewise, they create imaginative, nuanced portraits of the spaces we inhabit. **32** Career opportunities in the GIS industry are plentiful and varied for individuals who possess the right technical expertise. Mapmakers have the ability to reorient our thinking about complex problems; they help us envision alternative narratives and solutions. **33**

**31**

A) NO CHANGE
B) Rather,
C) Furthermore,
D) For example,

**32**

The writer is considering deleting the underlined sentence. Should the writer make this deletion?

A) Yes, because the sentence interrupts the flow of the paragraph with irrelevant information.
B) Yes, because the sentence contradicts the passage's point about the role of mapmakers.
C) No, because the sentence provides concrete details about a career as a mapmaker.
D) No, because the sentence supports the passage's argument about the viability of mapmaking careers.

**33**

The writer wants to conclude the passage with a brief statement that supports the passage's main claim. Which choice best accomplishes this goal?

A) Maps are valuable historical artifacts.
B) The work they have done will endure for centuries.
C) The maps of our world are constantly changing.
D) Without them, we'd be lost.

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CONTINUE

**Questions 34-44 are based on the following passage and supplementary material.**

### The Art of a Cat's Lap

"I always thought that my cat, in lapping her milk, curled her tongue up, but now it's revealed that she curls her tongue down. In other words, she brings the milk up on the underside of her tongue," narrates Pete Smith in the 1940 short documentary *Quicker'n a Wink*. Using stroboscopic photography, the documentary rendered common events—such as a house cat lapping milk—in slow motion. 34 This technique allowed viewers to perceive details that, in an everyday setting, occur too quickly for the human eye to perceive.

34

At this point, the writer wants to provide information to explain the significance of stroboscopic photography as it pertains to the passage. Which choice best accomplishes this goal?

A) NO CHANGE

B) The film also showed a hummingbird in flight, and Smith states that this recording allowed the filmmakers to determine the number of times a hummingbird's wings stroke per second.

C) The events shown in the film were all demonstrated by Harold "Doc" Edgerton, who is credited with creating stroboscopic photography and recognizing its educational value.

D) Perhaps due to its informative portrayal of photographic advancements, *Quicker'n a Wink* was honored with an Oscar for Best Short Subject in 1941.

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CONTINUE

Smith's description suggests that the underside of a house cat's tongue works as a 35 conduit for milk that moves milk into a cat's mouth. At the time, Smith's explanation, which had no scientific support, may have been strengthened through observation of a house cat's other well-known 36 uses for its tongue. A house cat commonly uses its tongue for grooming and tearing meat from bones. Filiform papillae, backward-facing projections on the cat's tongue, give the tongue a sandpaper quality and allow it to act as both hairbrush and cutlery. Smith could have assumed that these projections also acted as an adhesive for liquid.

35

A) NO CHANGE
B) cat's conduit that
C) conduit that
D) natural conduit that unconsciously

36

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

A) uses for its tongue: grooming and
B) uses, which commonly include grooming and even
C) activities, like grooming—also the act of
D) activities—grooming and other such uses like

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CONTINUE

[1] In 2010 a 37 team, of researchers, at the Massachusetts Institute of Technology recorded high-speed movies of house cats lapping water. [2] By studying the recordings, they determined that Smith's explanation was partially true: a house cat's tongue does curl on its way to a water bowl, and water then adheres to the back of the tongue. [3] The researchers discovered that the speed and precision of a house cat's laps also 38 plays important roles in the lapping process. [4] When lapping, a house cat's tongue flicks downward at an extraordinary speed and touches the water's surface with just its tip. [5] The tongue then quickly retracts, which causes the water to be drawn 39 upward, it forms a column of liquid. [6] The cat closes its mouth around the column just before it separates, thereby capturing the greatest volume of water. [7] The column stretches due to the motion of the cat's tongue, but the pull of gravity causes the column to thin. 40

**37**

A) NO CHANGE
B) team of researchers,
C) team of researchers
D) team, of researchers

**38**

A) NO CHANGE
B) are playing
C) play
D) have played

**39**

A) NO CHANGE
B) upward, forming
C) upward forms
D) upward; forming

**40**

To make this paragraph most logical, sentence 6 should be placed

A) where it is now.
B) after sentence 3.
C) after sentence 4.
D) after sentence 7.

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CONTINUE

The researchers then collected data from a zoo in New England 41 and watched online videos of larger cats lapping liquid. They found that the frequency of lapping varies 42 dependent of the mass of the cat. For

41

A) NO CHANGE
B) watching
C) and watching
D) watched

42

A) NO CHANGE
B) depending on
C) dependent with
D) depending for

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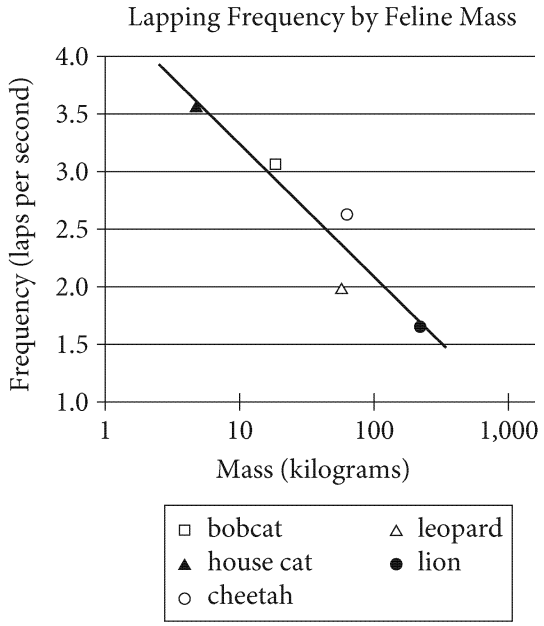
CONTINUE

example, while house cats lap between three-and-a-half and four times every second, lions lap **43** between one-and-a-half and two times every second. **44** How did the researchers solve this mystery? The researchers reasoned that larger felines' wider tongues create columns of liquid that are thicker and weigh more, so these cats must be attuned to the threat of gravity. If drawn up too rapidly, their heavier columns will collapse. Larger felines, therefore, lap slower to ensure they secure the maximum amount of liquid in their jaws. Lapping, it seems, really is a precise art.




Adapted from Pedro M. Reis et al., "How Cats Lap: Water Uptake by *Felis catus*." ©2010 by Pedro M. Reis et al.

**43**

Which choice offers the most accurate interpretation of the data in the graph?

A) NO CHANGE
B) between two-and-a-half and three
C) approximately two
D) exactly one-and-a-half

**44**

Which choice provides the best transition from the previous sentence to the next one?

A) NO CHANGE
B) What are the rates of other large felines' laps?
C) Do speed and gravity, then, affect this process?
D) So what accounts for this difference?

# STOP

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

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# Math Test – No Calculator

## 25 MINUTES, 20 QUESTIONS

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

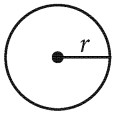
**DIRECTIONS**

**For questions 1-15**, solve each problem, choose the best answer from the choices provided, and fill in the corresponding bubble 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.

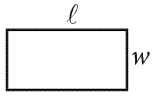
**NOTES**

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.

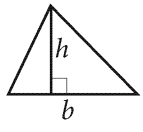
**REFERENCE**



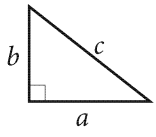

$A = \pi r^2$
$C = 2\pi r$



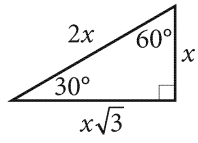

$A = \ell w$

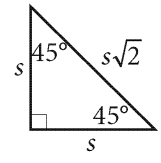



$A = \frac{1}{2}bh$

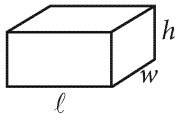



$c^2 = a^2 + b^2$

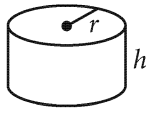


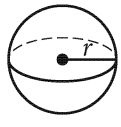

Special Right Triangles



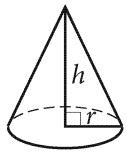

$V = \ell wh$



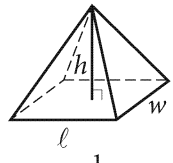

$V = \pi r^2 h$




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




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




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

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.

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CONTINUE

**1**

$$y = x + 3$$

In the equation above, what is the value of $y$ when $x = 3$ ?

A) 6

B) 3

C) 0

D) −3

**2**

What is the solution to $3x - 5 = 4(x + 2)$ ?

A) $\frac{13}{7}$

B) $\frac{3}{7}$

C) −7

D) −13

**3**

On April 1, a bamboo stalk had a height of 18 inches. This type of bamboo grows at an average rate of 12 inches per day. At this rate, which of the following represents the estimated height $h$, in inches, of the bamboo stalk $d$ days after April 1?

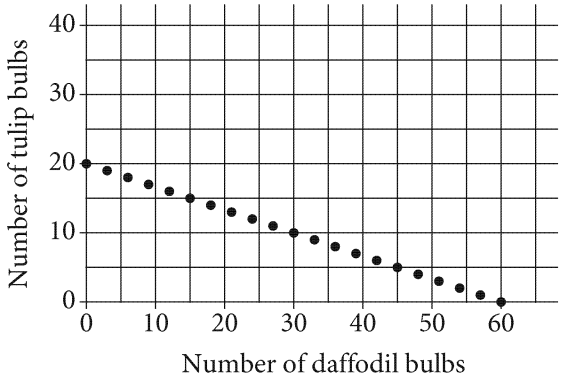
A) $h = 12d$

B) $h = 12d + 18$

C) $h = 18d$

D) $h = 18d + 12$

**4**




Alice is shopping at a garden center where tulip bulbs cost $1.50 each and daffodil bulbs cost $0.50 each. Each point on the graph above represents one combination of tulip and daffodil bulbs that Alice can buy using her entire gardening budget. Based on the graph, if Alice spends her entire budget on daffodil bulbs, how many daffodil bulbs does she buy?

A) 20

B) 30

C) 60

D) 80

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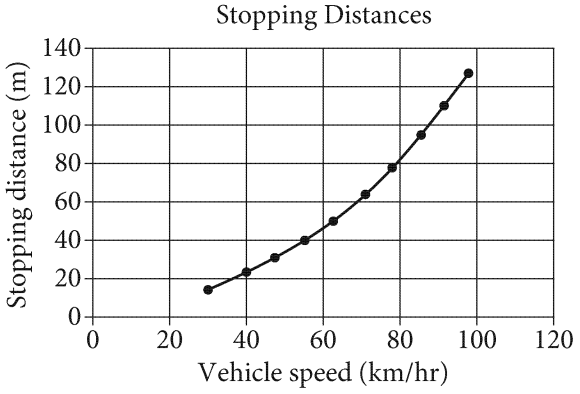
CONTINUE

5




The graph above shows the quadratic function $f$. The stopping distance $f(x)$, in meters (m), is the distance required to stop a vehicle based on the speed $x$, in kilometers per hour (km/hr), of the vehicle. Which of the following is the best interpretation of the equation $f(91) = 110$ in the context of the problem?

A) A vehicle traveling 91 km/hr requires 110 m to stop.

B) A vehicle traveling 110 km/hr requires 91 m to stop.

C) The vertex of the graph of $f$ is (91, 110).

D) The $x$- and $y$-intercepts of the graph of $f$ are 91 and 110, respectively.

6

What is the degree measure of an angle with a measure of $\pi$ radians?

A) 90°

B) 180°

C) 225°

D) 270°

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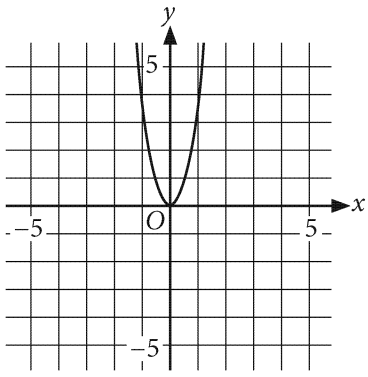
CONTINUE

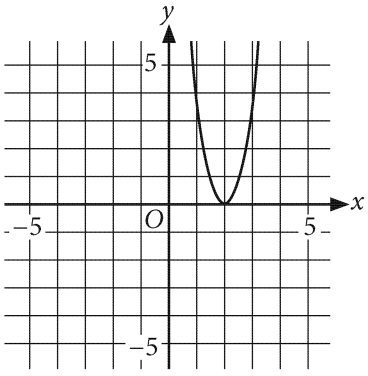
7

The graph of $y = f(x)$ is shown in the $xy$-plane.

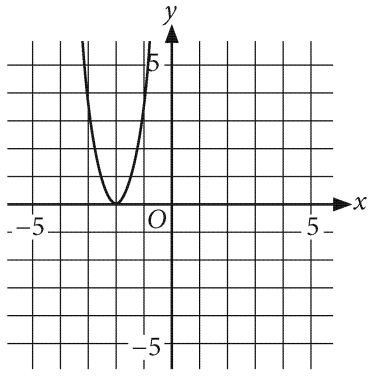



Which of the following graphs could be the graph of $y = f(x) + 2$ in the $xy$-plane?

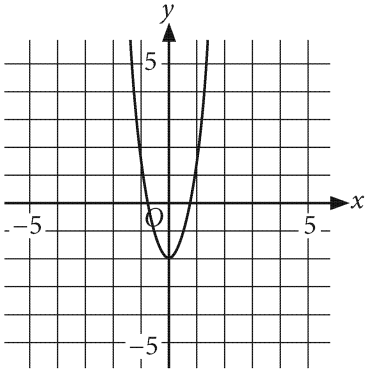
A)



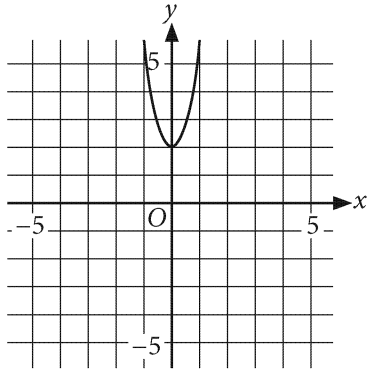

B)




C)




D)

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CONTINUE

8

$$\sqrt{5x} = 10$$

What are all values of $x$ that satisfy the given equation?

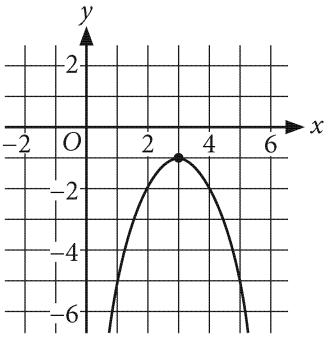
A) 2 only

B) 20 only

C) $-2$ and 2

D) $-20$ and 20

9




Which of the following is an equation of the quadratic function graphed in the $xy$-plane above?

A) $y = -(x - 3)^2 - 1$

B) $y = -(x + 3)^2 - 1$

C) $y = (x + 3)^2 + 1$

D) $y = (x - 3)^2 + 1$

10

$$\frac{x^4 - 16}{x - 2}$$

Which of the following is equivalent to the expression above, where $x > 2$ ?

A) $x^3 - 8$

B) $x^3 + 8$

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

D) $(x + 2)(x^2 + 4)$

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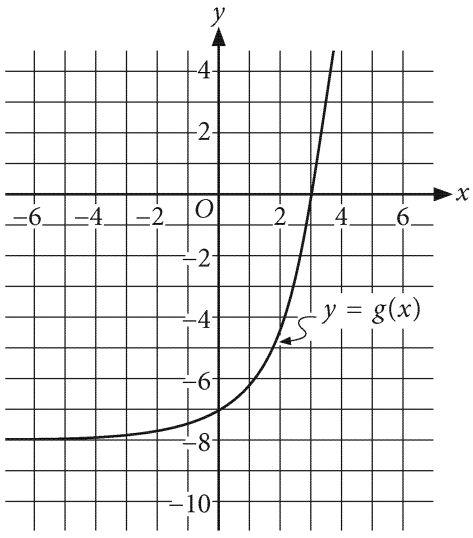
CONTINUE

**11**




The exponential function $g$ is graphed in the $xy$-plane shown, where $y = g(x)$. If $g(m) = 0$, where $m$ is a constant, what is the value of $m$ ?

A) $-8$

B) $-7$

C) $0$

D) $3$

**12**

Which of the following is a solution of the equation $x^2 + 2 = 5x$ ?

A) $\frac{-5+\sqrt{21}}{2}$

B) $\frac{-5+\sqrt{17}}{2}$

C) $\frac{5-\sqrt{21}}{2}$

D) $\frac{5-\sqrt{17}}{2}$

**13**

A small rectangular box has a volume of 2 cubic feet. A large rectangular box is 5 yards long, 3 yards wide, and 6 inches deep. What is the ratio of the volume of the large box to the volume of the small box? (1 yard = 3 feet, and 1 foot = 12 inches.)

A) 45 to 2

B) 45 to 1

C) 135 to 4

D) 135 to 1

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CONTINUE

14

$$3x - 5y = 7$$
$$ax + 15y = 11$$

In the system of equations above, $a$ is a constant. If the system of equations has no solution, what is the value of $a$ ?

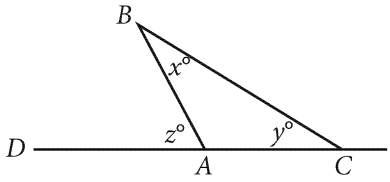
A) $-9$

B) $-3$

C) $3$

D) $9$

15




In triangle $ABC$ above, side $\overline{CA}$ is extended to point $D$. Which of the following expresses $x$ in terms of $y$ and $z$ ?

A) $y + z$

B) $-y + z$

C) $-2y + z$

D) $180 - y + z$

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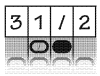
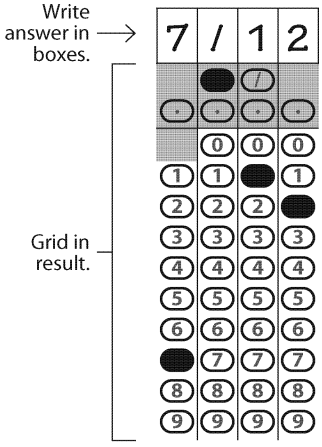
CONTINUE

**DIRECTIONS**

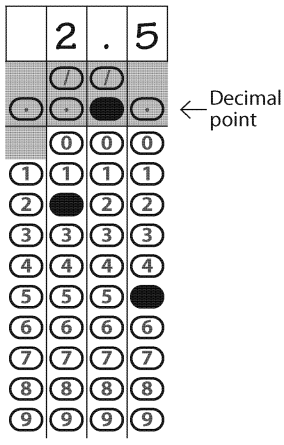
**For questions 16-20**, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

1. 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 bubbles accurately. You will receive credit only if the bubbles are filled in correctly.
2. Mark no more than one bubble in any column.
3. No question has a negative answer.
4. Some problems may have more than one correct answer. In such cases, grid only one answer.
5. **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 $3\frac{1}{2}$.)
6. **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.

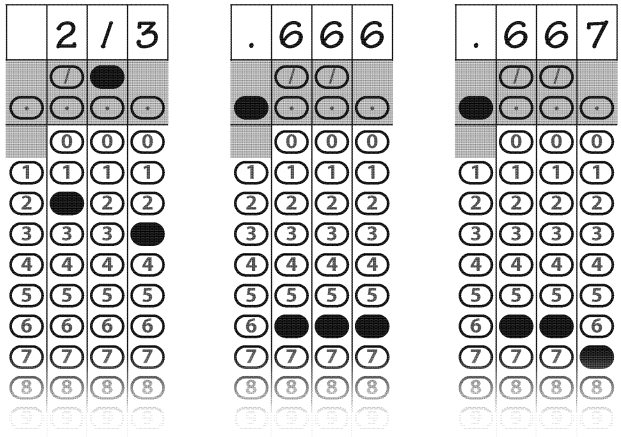
**Answer: $\frac{7}{12}$ are:**



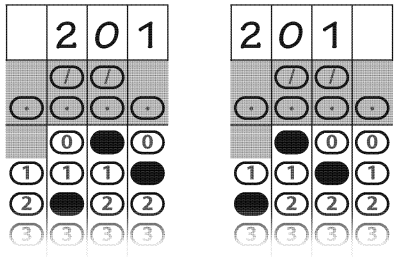

**Answer: 2.5**




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




**Answer: 201 – either position is correct**




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

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CONTINUE

16

If $2x + 3 = 8$, what is the value of $6x + 9$ ?

17

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

18

| $x$ | $y$ |
|---|---|
| 7 | 4 |
| 4 | 10 |
| 1 | 16 |

The table above shows the coordinates of three points on a line in the $xy$-plane. What is the value of $x$ when $y = 0$ ?

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CONTINUE

19

At a certain college, the economics club plans to sell T-shirts as a fund-raiser. The president of the club estimates that when the price of a T-shirt is $18, there will be 60 T-shirts sold, and for every $1 the price of the shirt is reduced, 10 additional T-shirts will be sold. Based on this estimate, what is the maximum amount of revenue, in dollars, the club can earn from T-shirt sales? (Revenue equals price times number sold. Disregard the $ sign when gridding your answer.)

20

$$0 \leq x \leq y \leq 6$$

What is the area, in the $xy$-plane, of the region consisting of all points that satisfy the inequality above?

# STOP

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

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# Math Test – Calculator

## 55 MINUTES, 38 QUESTIONS

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

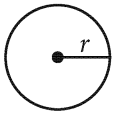
**DIRECTIONS**

**For questions 1-30**, solve each problem, choose the best answer from the choices provided, and fill in the corresponding bubble on your answer sheet. **For questions 31-38**, 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.

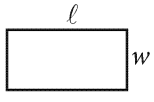
**NOTES**

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.

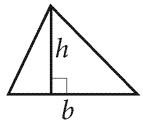
**REFERENCE**



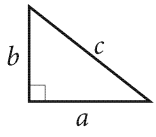

$A = \pi r^2$
$C = 2\pi r$



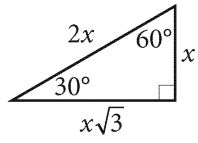

$A = \ell w$

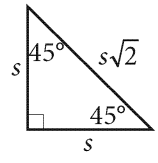



$A = \frac{1}{2}bh$

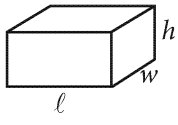



$c^2 = a^2 + b^2$

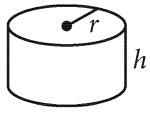


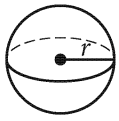

Special Right Triangles



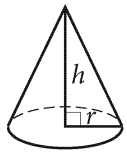

$V = \ell wh$



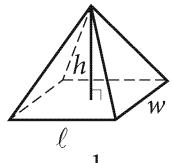

$V = \pi r^2 h$




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




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




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

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.

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CONTINUE

**1**

Every 1 inch on a scale model of a car represents 32 inches on the actual car. The diameter of a wheel on the scale model is 0.5 inch. Which of the following is the diameter, in inches, of a wheel on the actual car?

A) 32

B) 16

C) 2

D) 1

**2**

Chirag was given a $50 gift card to a local market. Each day, Chirag used the gift card to purchase only breakfast from the market. The total cost per breakfast, including taxes, was $4.50, and no additional money was added to the card. Which of the following expressions represents the amount $A$, in dollars, left on the gift card after $d$ days of use?

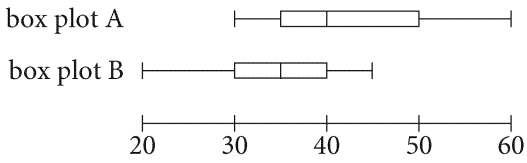
A) $A = 50 - 4.50d$

B) $A = 50 + 4.50d$

C) $A = 50d - 4.50$

D) $A = 50d + 4.50$

**3**




Based on the two box plots above, which of the following statements is true?

A) The range of box plot A is greater than the range of box plot B.

B) The range of box plot A is less than the range of box plot B.

C) The range of box plot A is equal to the range of box plot B.

D) It cannot be determined if the range of box plot A is different from the range of box plot B.

**4**

Which of the following expressions is equivalent to $2(x^2 - 1) + 3(x^2 + 2)$ ?

A) $2x^2 - 6$

B) $5x^2 + 3$

C) $5x^2 + 4$

D) $6x^2 - 2$

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CONTINUE

## 5

| | Purchase equipment | Rent equipment | Total |
|---|---|---|---|
| Floor sander | 347 | 211 | 558 |
| Power washer | 286 | 134 | 420 |
| Total | 633 | 345 | 978 |

The table above shows the numbers of customers who have purchased or rented either a floor sander or a power washer from a home-improvement store. Based on the table, what proportion of the floor-sander customers purchased their equipment?

A) $\frac{347}{633}$

B) $\frac{558}{978}$

C) $\frac{347}{558}$

D) $\frac{633}{978}$

## 6

A certain beverage contains 6% fruit juice by volume. How much fruit juice, in ounces, is in a bottle filled with 20 ounces of this beverage?

A) 0.6

B) 1.2

C) 6.0

D) 12.0

## 7

A company charges \$0.30 per word to write the first 400 words of a résumé and \$0.20 per word to write each word after the first 400 words. The company charges a standard \$10 formatting fee for each résumé. What is the company's total charge for writing a 475-word résumé?

A) \$145

B) \$135

C) \$125

D) \$115

## 8

Oona purchased $p$ pounds of peanuts and $a$ pounds of almonds. The peanuts cost \$2.45 per pound, and the almonds cost \$3.15 per pound. Oona spent a total of \$14.35 on peanuts and almonds. The equation below represents this situation.

$$2.45p + 3.15a = 14.35$$

What is the meaning of the term $3.15a$ in this context?

A) The total cost of almonds in Oona's purchase

B) The total cost of peanuts in Oona's purchase

C) The total pounds of almonds Oona purchased

D) The total pounds of peanuts Oona purchased

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CONTINUE

**Questions 9-11 refer to the following information.**

| Average distance (AU) | Absolute magnitude |
|---|---|
| 1.83 | 18.4 |
| 1.99 | 16.6 |
| 2.24 | 16.8 |
| 2.35 | 16.2 |
| 2.37 | 17.9 |
| 2.40 | 17.2 |
| 2.51 | 16.5 |
| 2.61 | 17.6 |
| 2.66 | 17.3 |
| 2.75 | 15.8 |
| 2.82 | 17.1 |
| 2.91 | 15.6 |
| 2.98 | 17.0 |
| 3.14 | 15.4 |
| 3.23 | 15.8 |

The average distance from the Sun, in astronomical units (AU), and the corresponding absolute magnitude of 15 asteroids are shown in the table.

An astronomical unit (AU) is approximately 150 million kilometers. Absolute magnitude is a measure of brightness.

**9**

What is the median of the distances from the Sun, in AU, of the 15 asteroids listed in the table?

A) 2.56

B) 2.59

C) 2.61

D) 2.66

**10**

Of the asteroids in the table having an average distance from the Sun of less than 2.50 AU, one asteroid is to be selected at random. What is the probability that the selected asteroid will have an absolute magnitude greater than 17.0 ?

A) $\frac{2}{5}$

B) $\frac{1}{2}$

C) $\frac{3}{5}$

D) $\frac{3}{4}$

**11**

What is the range of the absolute magnitudes of the asteroids listed in the table?

A) 0.1

B) 3.0

C) 15.8

D) 16.8

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CONTINUE

12

$$5x + 2y = 40$$
$$5x + 4y = 60$$

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

A) 5

B) 10

C) 15

D) 20

13

$$P = 0.1747 + 0.0639t$$

The equation above models the average price $P$, in dollars, of a loaf of white bread in the United States $t$ years after 1970. According to the model, which of the following is the best interpretation of the coefficient 0.0639 in this context?

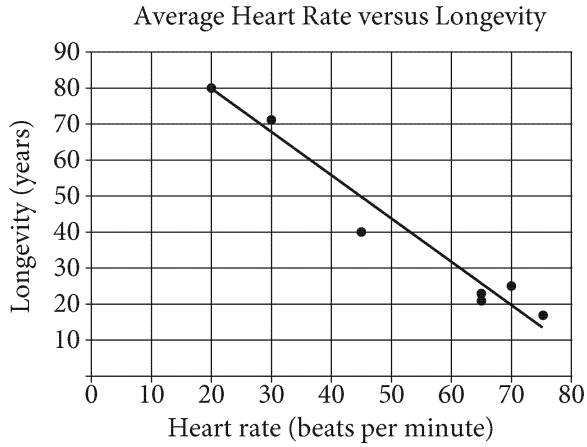
A) In 1970, the predicted average price of a loaf of white bread was approximately \$0.0639.

B) The predicted average price of a loaf of white bread $t$ years after 1970 is 0.0639 times greater than the predicted average price of a loaf of white bread in 1970.

C) Each year after 1970, the predicted average price of a loaf of white bread has increased by approximately \$0.0639.

D) Every 0.0639 year after 1970, the predicted average price of a loaf of white bread has increased by \$1.

14




The scatterplot above shows the average heart rate and longevity for 7 different types of animals. A line of best fit for the data is also shown. According to the line of best fit, which of the following best estimates the decrease in longevity, in years, for each increase of 10 beats per minute of heart rate?

A) 1

B) 12

C) 24

D) 32

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CONTINUE

**15**

$$T(x) = 24(0.97)^x$$

A sample of bacteria in a liquid growth medium that has an initial temperature of 24 degrees Celsius (°C) is placed in a refrigerator with the temperature set to 0°C. The function above approximates the temperature $T$, in °C, of the medium $x$ minutes after being placed in the refrigerator. Which of the following best approximates the amount that the temperature, in °C, of the medium has decreased after 20 minutes?

A) $T(0)$

B) $T(20)$

C) $\dfrac{T(20)}{T(0)}$

D) $T(0) - T(20)$

**16**

| $x$ | $y$ |
|---|---|
| 0 | 2 |
| 3 | 0 |

The table above shows the coordinates of two points that lie on line $\ell$ in the $xy$-plane. If the slope of line $\ell$ is $m$, what is the value of $m$ ?

A) $-\dfrac{3}{2}$

B) $-\dfrac{2}{3}$

C) $\dfrac{2}{3}$

D) $\dfrac{3}{2}$

**17**

In the $xy$-plane, line $k$ has a slope of $-3$ and passes through the point $(-2, 7)$. Which of the following is an equation of line $k$ ?

A) $3x + y = 1$

B) $2x + y = 3$

C) $-2x + y = 11$

D) $-3x + y = 13$

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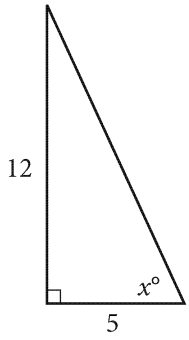
CONTINUE

18




A right triangle is shown above. What is the value of $\cos x°$ ?

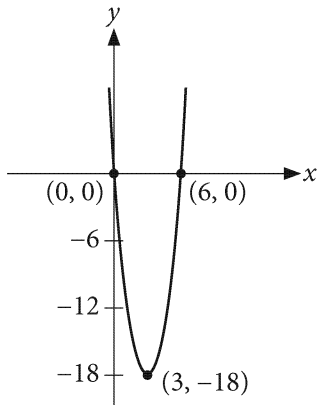
A) $\frac{5}{12}$

B) $\frac{12}{5}$

C) $\frac{5}{13}$

D) $\frac{12}{13}$

19




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

A) $y = \frac{1}{2}x(x + 6)$

B) $y = \frac{1}{2}x(x - 6)$

C) $y = -2x(x + 6)$

D) $y = 2x(x - 6)$

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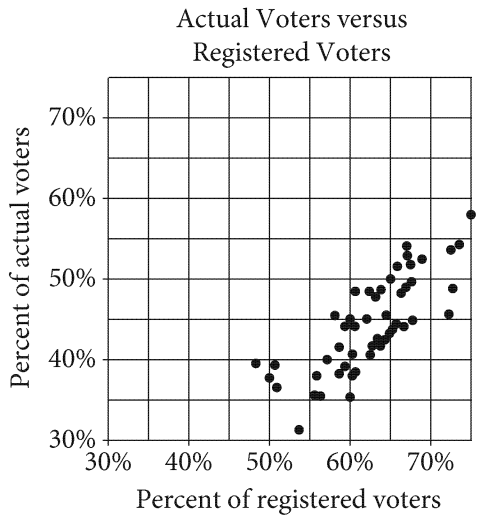
CONTINUE

**20**




The scatterplot above shows the percent of residents who were registered to vote, $x$, and the percent of residents who actually voted, $y$, on election day in 2010, for each of the 50 states in the United States. Which of the following could be the slope of a line of best fit for the data?

A) −6.4
B) 0.8
C) 6.4
D) 8.8

**21**

The 2010 population of Tulsa, Oklahoma, was 391,886. Three years later, the population had grown by 1.59%. The 2013 population was how many times the 2010 population?

A) 1.0159
B) 1.159
C) 1.59
D) 2.59

**22**

If $\frac{1}{x} + \frac{1}{2x} = 2$, where $x > 0$, what is the value of $\frac{2x}{3}$?

A) 8
B) $\frac{3}{2}$
C) $\frac{1}{2}$
D) $\frac{1}{9}$

**23**

In ancient Egypt, from 2810 BC to 2800 BC, the course of the Nile riverbed moved eastward at least 2 meters per year but no more than 3 meters per year. Which of the following inequalities represents all possible values for the total distance $d$, in meters, the Nile riverbed moved eastward for 4 consecutive years during this time period?

A) $0 \leq d \leq 2$
B) $2 \leq d \leq 3$
C) $4 \leq d \leq 8$
D) $8 \leq d \leq 12$

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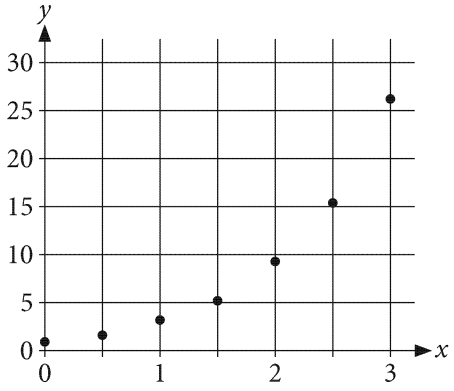
CONTINUE

24




Which of the following exponential equations best models the data shown?

A) $y = 2^{-x}$

B) $y = 2^{x}$

C) $y = 3^{-x}$

D) $y = 3^{x}$

25

$$y = 2x + a$$

$$y = x^2 + a$$

In the system of equations above, $a$ is a positive constant. If the system is graphed in the $xy$-plane, which of the following ordered pairs represents a point where the two graphs intersect?

A) $(0, a)$

B) $(a, 0)$

C) $(2, a)$

D) $(a, 2)$

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CONTINUE

**26**

Sphere A has radius $k$, and sphere B has radius $3k$. Which of the following are true? (The surface area of a sphere with radius $r$ is $4\pi r^2$.)

I. The surface area of sphere B is 9 times the surface area of sphere A.

II. The volume of sphere B is 27 times the volume of sphere A.

A) I only
B) II only
C) I and II
D) Neither I nor II

**27**

A town newspaper polled 500 voters selected at random from a list of all registered voters in the town. Of those polled, 41% approved of their state governor's performance. Which of the following is the largest population to which the results of the poll can be applied?

A) All registered voters who receive the newspaper
B) All registered voters who participated in the poll
C) All registered voters in the state
D) All registered voters in the town

**28**

The height of a triangle is one-fourth the length of its base. Which of the following equations gives the area, $A$, of this triangle in terms of its base, $b$ ?

A) $A = \frac{b^2}{16}$

B) $A = \frac{b^2}{8}$

C) $A = \frac{b^2}{4}$

D) $A = \frac{b^2}{2}$

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CONTINUE

29

A study estimated that the mean number of times per year each person in the town of Shelton shops at a grocery store is 91, with an associated margin of error of 3. The study also estimated that the mean number of times per year each person in the town of Whitsville shops at a grocery store is 95, with an associated margin of error of 4. Based on the study, which of the following is an appropriate conclusion?

A) The people of Whitsville shop at a grocery store more times per person per year than the people of Shelton.

B) The people of Shelton shop at a grocery store more times per person per year than the people of Whitsville.

C) The people of both towns shop at a grocery store the same number of times per person per year.

D) There is insufficient information to determine which town's people shop at a grocery store more times per person per year.

30

$$2x - 3y = 5m$$
$$10x + ky = 25$$

In the system of equations above, $k$ and $m$ are constants. If the system has infinitely many solutions, what is the value of $\frac{k}{m}$?

A) $-15$

B) $-\frac{1}{15}$

C) $\frac{1}{15}$

D) $15$

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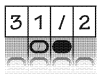
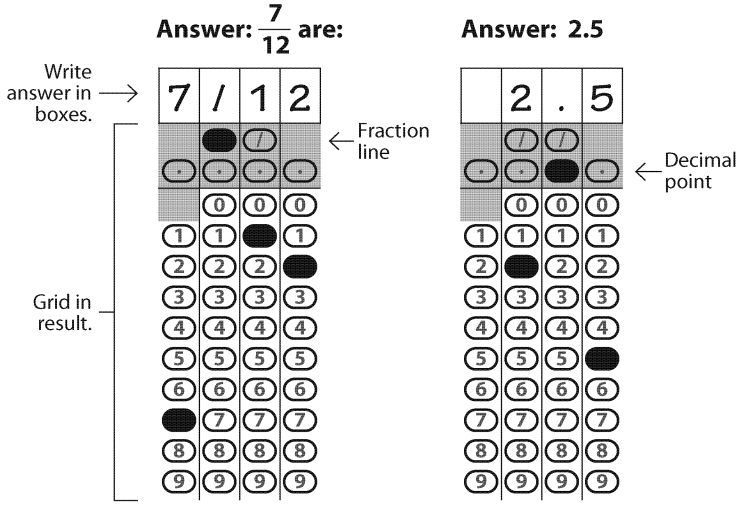
CONTINUE

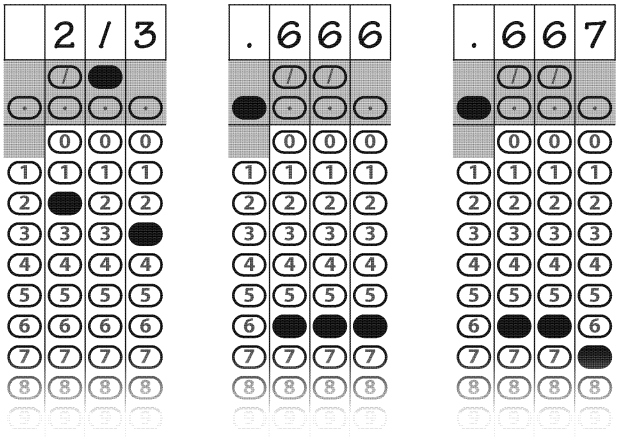
**DIRECTIONS**

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

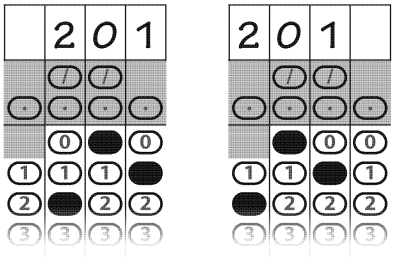
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the bubbles accurately. You will receive credit only if the bubbles are filled in correctly.
2. Mark no more than one bubble in any column.
3. No question has a negative answer.
4. Some problems may have more than one correct answer. In such cases, grid only one answer.
5. **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 $3\frac{1}{2}$.)
6. **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.




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




**Answer: 201 – either position is correct**




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

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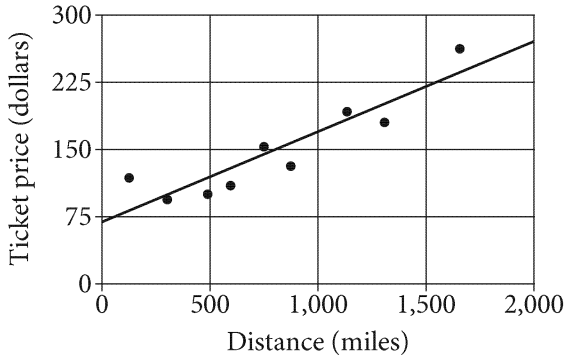
CONTINUE

**31**

Each point in the scatterplot below shows the distance between two cities and the price of a ticket for a direct airplane flight between those cities. A line of best fit is also shown.




How many of the nine tickets have a higher price than the price predicted by the line of best fit?

**32**

A contractor is installing a new concrete runway at an airport, and 28,620 cubic yards of concrete will be required. The concrete supplier can pour 180 cubic yards of concrete per hour. If 4320 cubic yards of concrete have already been poured, how many more hours will it take to pour the rest of the concrete?

**33**

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

If the equation above is true, what is the value of $x$ ?

**34**

A microbiologist is growing mammalian cells in a liquid culture. At the beginning of each day, there are twice as many cells in the culture as there were at the beginning of the preceding day. If there are 100 cells at the beginning of day 1, how many cells will be in the culture at the beginning of day 6 ?

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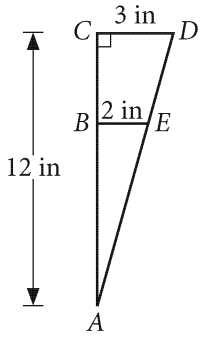
CONTINUE

35




In right triangle $ACD$ above, $\overline{BE}$ is parallel to $\overline{CD}$. What is the length, in inches, of $\overline{AB}$ ?

36

A fish tank in a pet store was less than half full of water when a worker turned on a hose to fill the tank at a constant rate. After the hose was on for 5 minutes, the tank was exactly half full. After the hose was on for 30 minutes, the tank was three-quarters full. How many minutes did it take after the hose was turned on for the tank to be completely filled with water?

**Questions 37 and 38 refer to the following information.**

A town's chamber of commerce printed a map of the business district. The map is 12 inches square, and 1 inch on the map represents an actual distance of 300 feet.

37

On the map, a parking lot for one business is represented by a square with side length 0.25 inches. What is the actual area, in square feet, of the parking lot?

38

A larger version of the same map of the business district is printed with the side length 50% longer than the side length of the previous map. On the larger map, what is the actual distance, in feet, represented by 1 inch?

# STOP

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

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# March 9, 2019 International

## ANSWER KEY

### Reading Test Answers

| | | | | |
|---|---|---|---|---|
| 1 D | 12 D | 23 C | 34 A | 45 B |
| 2 B | 13 A | 24 D | 35 B | 46 D |
| 3 A | 14 B | 25 D | 36 A | 47 B |
| 4 B | 15 A | 26 D | 37 D | 48 B |
| 5 C | 16 D | 27 A | 38 B | 49 C |
| 6 C | 17 C | 28 B | 39 C | 50 A |
| 7 A | 18 C | 29 D | 40 C | 51 D |
| 8 C | 19 B | 30 C | 41 B | 52 D |
| 9 D | 20 A | 31 A | 42 B | |
| 10 B | 21 C | 32 B | 43 C | |
| 11 B | 22 A | 33 A | 44 C | |

READING TEST RAW SCORE (NUMBER OF CORRECT ANSWERS)

### Writing and Language Test Answers

| | | | |
|---|---|---|---|
| 1 D | 12 D | 23 C | 34 A |
| 2 B | 13 C | 24 B | 35 C |
| 3 C | 14 D | 25 D | 36 A |
| 4 A | 15 C | 26 D | 37 C |
| 5 B | 16 A | 27 B | 38 C |
| 6 D | 17 B | 28 D | 39 B |
| 7 D | 18 C | 29 A | 40 D |
| 8 C | 19 B | 30 C | 41 A |
| 9 D | 20 B | 31 B | 42 B |
| 10 C | 21 D | 32 A | 43 A |
| 11 A | 22 D | 33 D | 44 D |

WRITING AND LANGUAGE TEST RAW SCORE (NUMBER OF CORRECT ANSWERS)

### Math Test – No Calculator Answers

| | |
|---|---|
| 1 A | 11 D |
| 2 D | 12 D |
| 3 B | 13 C |
| 4 C | 14 A |
| 5 A | 15 B |
| 6 B | 16 24 |
| 7 D | 17 15 |
| 8 B | 18 9 |
| 9 A | 19 1440 |
| 10 D | 20 18 |

MATH TEST – NO CALCULATOR RAW SCORE (NUMBER OF CORRECT ANSWERS)

### Math Test – Calculator Answers

| | | | |
|---|---|---|---|
| 1 B | 11 B | 21 A | 31 4 |
| 2 A | 12 B | 22 C | 32 135 |
| 3 A | 13 C | 23 D | 33 2 |
| 4 C | 14 B | 24 D | 34 3200 |
| 5 C | 15 D | 25 A | 35 8 |
| 6 B | 16 B | 26 C | 36 55 |
| 7 A | 17 A | 27 D | 37 5625 |
| 8 A | 18 C | 28 B | 38 200 |
| 9 C | 19 D | 29 D | |
| 10 B | 20 B | 30 A | |

MATH TEST – CALCULATOR RAW SCORE (NUMBER OF CORRECT ANSWERS)



For more material, find us on t.me/threewrongoneright