CollegeBoard

SAT Test 14

SAT PRACTICE ANSWER SHEET

COMPLETE MARK ●

EXAMPLES OF INCOMPLETE MARKS

Name: _____

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SECTION 1

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

SECTION 2

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

SECTION 3

1 A B C D	4 A B C D	7 A B C D	10 A B C D	13 A B C D
2 A B C D	5 A B C D	8 A B C D	11 A B C D	14 A B C D
3 A B C D	6 A B C D	9 A B C D	12 A B C D	15 A B C D

16 ____ 17 ____ 18 ____ 19 ____ 20 ____

SECTION 4

1 A B C D	7 A B C D	13 A B C D	19 A B C D	25 A B C D
2 A B C D	8 A B C D	14 A B C D	20 A B C D	26 A B C D
3 A B C D	9 A B C D	15 A B C D	21 A B C D	27 A B C D
4 A B C D	10 A B C D	16 A B C D	22 A B C D	28 A B C D
5 A B C D	11 A B C D	17 A B C D	23 A B C D	29 A B C D
6 A B C D	12 A B C D	18 A B C D	24 A B C D	30 A B C D

31 ____ 32 ____ 33 ____ 34 ____ 35 ____ 36 ____ 37 ____ 38 ____

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 Philip Roth, *American Pastoral*. ©1997 by Philip Roth. "The Swede" was the nickname of Seymour Levov, a talented athlete from the narrator's hometown.

One night in the summer of 1985, while visiting New York, I went out to see the Mets play the Astros, and while circling the stadium with my friends, looking for the gate to our seats, I saw the Swede, thirty-six years older than when I'd watched him play baseball for Upsala. He wore a white shirt, a striped tie, and a charcoal-gray summer suit, and he was still terrifically handsome. The golden hair was a shade or two darker but not any thinner; no longer was it cut short but fell rather fully over his ears and down to his collar. In this suit that fit him so exquisitely he seemed even taller and leaner than I remembered him in the uniform of one sport or another. The woman with us noticed him first. "*Who* is that? That's—that's . . . Is that Mayor Lindsay?" she asked. "No," I said. "My God. You know who that is? It's Swede Levov." I told my friends, "that's the Swede!"

A skinny, fair-haired boy of about seven or eight was walking alongside the Swede, a kid under a Mets cap pounding away at a first basemen's mitt that dangled, as had the Swede's, from his left hand. The two, clearly a father and his son, were laughing about something together when I approached and introduced myself. "I knew your brother at Weequahic."

"You're Zuckerman?" he replied, vigorously shaking my hand. "The author?"

"I'm Zuckerman the author."

"Sure, you were Jerry's great pal."

"I don't think Jerry had great pals. He was too brilliant for pals. He just used to beat my pants off at Ping-Pong down in your basement. Beating me at Ping-Pong was very important to Jerry."

"So you're the guy. My mother says, 'And he was such a nice, quiet child when he came to the house.' You know who this is?" the Swede said to the boy. "The guy who wrote those books. Nathan Zuckerman."

Mystified, the boy shrugged and muttered, "Hi."

"This is my son Chris."

"These are friends," I said, sweeping an arm out to introduce the three people with me. "And this man," I said to them, "is the greatest athlete in the history of Weequahic High. A real artist in three sports. Played first base like Hernandez[1]—thinking. A line-drive doubles hitter. Do you know that?" I said to his son. "Your dad was our Hernandez."

"Hernandez is left-handed," he replied.

"Well, that's the only difference," I said to the little literalist, and put out my hand again to his father. "Nice to see you, Swede."

"You bet. Take it easy, Skip."

"Remember me to your brother," I said.

He laughed, we parted, and someone was saying to me, "Well, well, the greatest athlete in the history of Weequahic High called you 'Skip.'"

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CONTINUE

1

"I know. I can't believe it." And I did feel almost as wonderfully singled out as I had the one time before, at the age of ten, when the Swede had got so personal as to recognize me by the playground nickname I'd acquired because of two grades I skipped in grade school.

Midway through the first inning, the woman with us turned to me and said, "You should have seen your face—you might as well have told us he was Zeus.[2] I saw just what you looked like as a boy."

[1] First baseman for the New York Mets in the mid-1980s

[2] In Greek mythology, the ruler of the gods

1

The main purpose of the passage is to

A) show how an event forced the narrator to reevaluate his perspective on his childhood.

B) analyze how past experiences shaped the narrator's and another character's future.

C) reflect upon the changes that people go through as they give up on their childhood dreams.

D) describe an accidental meeting that reveals the narrator's relationship with a character.

2

A main theme of the passage is that

A) friends who get back in touch after many years often find that everything has changed.

B) encountering a memorable person from the past can make an adult feel like a child again.

C) playing sports together is an experience that connects people for the rest of their lives.

D) older people tend to remember the past as being better than it really was.

3

As used in line 11, "exquisitely" most nearly means

A) skillfully.

B) perfectly.

C) primly.

D) formally.

4

Which choice best supports the conclusion that Chris, the Swede's son, reminds the narrator of the Swede?

A) Lines 18-21 ("A skinny . . . hand")

B) Lines 46-47 ("Do you . . . Hernandez")

C) Line 48 ("Hernandez . . . replied")

D) Lines 49-51 ("Well . . . father")

5

A meaningful irony in the passage is that, while the narrator had admired the young Swede's accomplishments, the Swede

A) had trained his son to follow in his footsteps.

B) appreciated the narrator's accomplishments as an adult.

C) had failed to achieve his promise as the years went by.

D) envied the achievements of his more scholarly classmates.

6

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

A) Lines 22-24 ("The two . . . myself")

B) Lines 34-38 ("So you're . . . Zuckerman")

C) Line 52 ("You bet . . . Skip")

D) Lines 54-56 ("He laughed . . . Skip")

7

Chris, the Swede's son, responds to the narrator's comparison of his father to another baseball player by

A) comparing his father to a different player.

B) revealing his admiration for his father.

C) pointing out a problem with the comparison.

D) showing his gratitude to the narrator.

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CONTINUE

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8

When someone repeats the narrator's phrase "the greatest athlete in the history of Weequahic High" (lines 55-56), the main effect is to

A) admit that the narrator was right about the Swede.

B) show appreciation for the Swede's accomplishments.

C) tease the narrator for his enthusiasm in meeting the Swede.

D) help the narrator remember an incident involving the Swede.

9

Based on the passage, the reason the narrator was amazed that the Swede had called him "Skip" was most probably that the narrator

A) thought adults should refer to each other by their formal names.

B) still felt lucky to receive personal attention from the Swede.

C) had not been called "Skip" since he was ten.

D) was not aware that the Swede had ever known his nickname.

10

The reference to "Zeus" in line 66 mainly serves to

A) emphasize that the narrator held the Swede in high regard.

B) show that the Swede intimidated those around him.

C) suggest that the narrator was surprised that the Swede had recognized him.

D) indicate the narrator's shock at seeing a man from his past.

Questions 11-20 are based on the following passage.

This passage is adapted from Mary Robinson, *A Letter to the Women of England on the Injustice of Mental Subordination.* Originally published in 1799 under the pseudonym Anne Frances Randall.

Woman is destined to pursue no path in which she does not find an enemy. If she is liberal, generous, careless of wealth, friendly to the
Line unfortunate, and bountiful to persecuted merit, she is
5 deemed prodigal, and over-much profuse; all the good she does, every tear she steals from the downcast eye of modest worth, every sigh she converts into a throb of joy, in grateful bosoms, is, by the world, forgotten; while the ingenuous liberality of
10 her soul excites the imputation of folly and extravagance. If, on the contrary, she is wary, shrewd, thrifty, economical, and eager to procure and to preserve the advantages of independence; she is condemned as narrow-minded, mean, unfeeling,
15 artful, mercenary, and base: in either case she is exposed to censure. If liberal, unpitied; if sordid, execrated! In a few words, a generous woman is termed a *fool*; a prudent one, a *prodigal.*

If WOMAN is not permitted to assert a majesty of
20 mind, why fatigue her faculties with the labours of any species of education? Why give her books, if she is not to profit by the wisdom they inculcate? The parent, or the preceptress, who enlightened her understanding, like the dark lantern, to spread its
25 rays internally only, puts into her grasp a weapon of defence against the perils of existence; and at the same moment commands her not to use it. Man says you *may* read, and you *will* think, but you shall not evince your knowledge, or employ your thoughts,
30 beyond the boundaries which we have set up around you. Then wherefore burthen the young mind with a gaudy outline which man darkens with shades indelible? Why expand the female heart, merely to render it more conscious that it is, by the tyranny of
35 custom, rendered vulnerable? Let man remember, that

"A little learning is a dangerous thing."

Let him not hope for a luxurious mental harvest, where the sun of cultivation is obscured by
40 impenetrable prejudice; that cloud which has too long spread over the mind of woman a desolating darkness. So situated, woman is taught to discriminate just sufficiently to know her own unhappiness. She, like Tantalus, is placed in a

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CONTINUE

situation where the intellectual blessing she sighs for is within her view; but she is not permitted to attain it: she is conscious of possessing equally strong mental powers; but she is obliged to yield, as the weaker creature. Man says, "you shall be initiated in all the arts of pleasing; but you shall, in vain, hope that we will contribute to your happiness one iota beyond the principle which constitutes our own." Sensual Egotists! Woman is absolutely necessary to your felicity; nay, even to your existence: yet she must not arrogate to herself the power to interest your actions. You idolize her personal attractions, as long as they influence your senses; when they begin to pall, the magick is dissolved; and prejudice is ever eager to condemn what passion has degraded. . . .

Supposing women were to act upon the same principle of egotism, consulting their own inclinations, interest, and amusement only, (and there is no law of Nature which forbids them; none of any species but that which is framed by man;) what would be the consequences? The annihilation of all moral and religious order. So that every good which cements the bonds of civilized society, originates wholly in the forbearance, and conscientiousness of woman.

11

The main purpose of the passage is to

A) analyze a series of historical events.
B) persuade readers to support an unusual practice.
C) alert readers to an urgent societal problem.
D) describe the underlying causes of a political change.

12

The author's central claim in the passage is that

A) women have as much right to a rigorous education as men have.
B) women are hindered from fully developing and using their intellectual capabilities.
C) education has prevented women from realizing their goals rather than helping meet them.
D) methods of education need to be developed that appeal equally to men and to women.

13

Which choice best supports the idea that women, if they choose, are entitled to act as men do?

A) Lines 33-35 ("Why expand . . . vulnerable")
B) Lines 38-40 ("Let him . . . prejudice")
C) Lines 46-49 ("but she . . . creature")
D) Lines 63-65 ("and there . . . man")

14

As used in line 20, "faculties" most nearly means

A) natural instincts.
B) intellectual abilities.
C) practical capabilities.
D) granted privileges.

15

The purpose of the adage in line 37 is to

A) suggest an innovative way of analyzing a pervasive challenge.
B) deride a viewpoint that has been gaining popularity.
C) summarize an old-fashioned belief that is often overlooked.
D) warn that a situation may have negative consequences.

16

As used in line 45, "sighs for" most nearly means

A) dismisses.
B) craves.
C) exhales.
D) suffers.

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CONTINUE

1

17

What does the author suggest primarily motivates men's behavior toward women?

A) A selfish desire to deprive women of even the smallest joy

B) A pragmatic impulse to maximize contentment

C) A cruel tendency to afford and then withhold affections

D) A well-meaning but ultimately ineffectual intent to act fairly

18

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

A) Lines 19-21 ("If WOMAN . . . education")

B) Lines 44-46 ("She . . . view")

C) Lines 49-52 ("Man . . . own")

D) Lines 53-56 ("Woman . . . actions")

19

In line 53, the author includes the exclamation most likely to

A) express contempt about the excessive regard of men for their presumed privileges.

B) show anger about the failure of men to provide women with useful educations.

C) emphasize disappointment about the fact that men always put their own needs ahead of those of their loved ones.

D) indicate frustration about the unwillingness of men to demonstrate openly their sensitivity.

20

The passage indicates that compared to men, women behave in ways that are typically more

A) suggestive of general dissatisfaction.

B) enhanced by a desire for independence.

C) beneficial to the functioning of society.

D) focused on the achievement of future goals.

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1

Questions 21-30 are based on the following passage.

This passage is adapted from Yudhijit Bhattacharjee, "Star-Crossing Planets Literally Strut Their Stuff." ©2014 by American Association for the Advancement of Science. Exoplanets are planets outside of our solar system.

When exoplanet hunters announced in January of 2014 that they had found a tribe of "mini-Neptunes" and the lightest planet ever detected outside our solar system, they highlighted more than just the diversity of exoplanets. The results, announced at a meeting of the American Astronomical Society, also show the power of an up-and-coming method of calculating the masses of alien worlds from the way they eclipse their stars.

The new technique, called transit timing variation (TTV), is enabling astronomers to fill out their picture of dozens of exoplanets detected by NASA's Kepler spacecraft. The eclipses, or "transits," that Kepler detected reveal only a planet's size and orbital period. To know whether it is rocky, gaseous, or some mixture of the two, astronomers also need its mass. Traditionally, they have resorted to ground-based telescopes to determine it, by measuring the wobble of the star as the planet tugs on it. But TTV can determine masses from transit data alone.

The technique was the brainchild of Matthew Holman, an astrophysicist at Harvard University, and others. If two or more planets happened to be orbiting a star in close proximity, they reasoned, their gravitational tugs on each other would alter their orbital periods. If one of them was a transiting planet—dimming the light of its parent star as it passed between the star and Earth—astronomers would see its transit timing vary over multiple orbits, betraying the presence of a companion planet. If *both* planets were transiting, astronomers could measure the perturbations in both their orbits and work out the planets' masses.

Holman and a colleague published the idea in 2005, and Eric Agol of the University of Washington, Seattle, and colleagues put forward a similar scheme almost simultaneously. For years afterward, however, astronomers failed to detect transit timing variations because almost all known exoplanets were gas giants spinning around their stars in tight orbits. Theorists think such planets formed farther from the star and later barreled inward, clearing away any potential wobble-inducing companions.

The technique became practical thanks to the Kepler spacecraft, which until 2013 was monitoring the brightness of 160,000 nearby stars for the telltale dimming due to transiting planets. Kepler began delivering data on dozens of planetary systems, many of them consisting of multiple planets. In 2010, astronomers began making TTV detections. Their expertise has been growing ever since.

David Kipping, an astronomer at the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts, and his colleagues came across KOI-314c while combing Kepler data for TTV signatures due to exomoons, which should cause transiting exoplanets to wobble and change their transit timing. But the transits seen around the star KOI-314, a red dwarf some 200 light-years from Earth, pointed instead to the presence of two planets. Their transit times were varying in lockstep: when one planet slowed down in its orbit around the star, the other would speed up, and vice versa. "We saw the same TTV signature, just in opposite phase to each other," Kipping says. "It was obvious that these two planets must be interacting."

By simulating the dance on a computer, the researchers worked out the masses of the two planets. They found that the outer, KOI-314c, which orbits the star every 23 days, has the same mass as Earth, although it is about 60% larger than Earth in radius. Kipping and his colleagues infer that the planet—the lightest exoplanet so far discovered—has a rocky core and a thick, gaseous atmosphere. The inner planet, KOI-314b, is similar in size but about four times as massive.

Meanwhile, researchers led by Yoram Lithwick, an astronomer at Northwestern University in Evanston, Illinois, were looking at the TTV signatures of 163 exoplanets found by Kepler. The team determined that about 60 of them occupy a mass range between Earth and Neptune and are larger than expected for a rocky planet of that mass, suggesting they are blanketed by thick, extended atmospheres. They also found a pattern: as the planets grew bigger in radius, their density declined. "If you make something twice as big, it becomes four times less dense," Lithwick says. "So from going from a less than two Earth radii to four Earth radii, the density goes from rock-like all the way to gas." Lithwick predicts the surprising finding "will have big implications for understanding planet formation."

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CONTINUE

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21

The main purpose of the passage is to

A) discuss the use of a new astronomical technique.
B) provide preliminary data about certain planets.
C) argue in favor of a controversial experiment.
D) suggest an innovative alternative to an established scientific procedure.

22

The author's central claim in the passage is that

A) TTV has enabled astronomers to determine more accurately than before the mass of certain planets outside of our solar system.
B) NASA's Kepler spacecraft provided richer data about exoplanets than had been anticipated by the astronomical community.
C) there are more planets outside of our solar system with an atmosphere similar to that of Earth than had previously been hypothesized.
D) astronomers have gradually become more and more skilled in using TTV to calculate the composition of planets.

23

Over the course of the passage, the main focus shifts from a

A) summary of the results of several experiments to a chronicle of the process used in one of those experiments.
B) reflection regarding the traditional difficulties of a scientific problem to a consideration of a new technique rendering that problem obsolete.
C) description of an innovative procedure to an account of some specific applications of that procedure.
D) defense of a controversial scientific practice to a demonstration of that practice's ultimate usefulness.

24

Based on the passage, which question are astronomers unable to answer unless they know a particular exoplanet's mass?

A) How similar to Earth is that planet in its ratio of rock to gas?
B) Was that planet formed at about the same time that Earth was?
C) What is the size of the parent star that planet orbits?
D) Does that planet orbit a parent star in conjunction with a companion planet?

25

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

A) Lines 5-9 ("The results . . . stars")
B) Lines 15-17 ("To know . . . mass")
C) Lines 31-34 ("If *both* . . . masses")
D) Lines 70-72 ("They . . . radius")

26

As used in line 17, "traditionally" most nearly means

A) authentically.
B) properly.
C) historically.
D) conservatively.

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1

27

According to the passage, why was the TTV technique difficult to implement before the data from the Kepler spacecraft became available?

A) TTV requires the existence of companion planets, and most known exoplanets prior to Kepler did not show evidence of companions.

B) TTV requires several different sets of data for confirmation, and prior to Kepler only a single set of data was available.

C) TTV requires that a planet orbit a parent star, and prior to Kepler the location of the parent stars of exoplanets was difficult to determine.

D) TTV requires that the mass of a planet be known, and prior to Kepler the masses of exoplanets were impossible to ascertain.

28

As used in line 45, "practical" most nearly means

A) ordinary.

B) workable.

C) systematic.

D) qualified.

29

What would be the effect on Lithwick's findings of the discovery of a planet with a radius four times greater than Earth's and a density similar to Earth's?

A) Such a discovery would have no effect on Lithwick's findings, because Lithwick's research was restricted to planets with gaseous atmospheres.

B) Such a discovery would bolster Lithwick's findings, because such a planet would have a proportionate size and density.

C) Such a discovery would bolster Lithwick's findings, because human beings would be likely to survive on such a planet.

D) Such a discovery would challenge Lithwick's findings, because such a planet would not conform to his expectations.

30

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

A) Lines 68-69 ("By simulating . . . planets")

B) Lines 73-75 ("Kipping . . . atmosphere")

C) Lines 78-81 ("Meanwhile . . . Kepler")

D) Lines 86-89 ("They . . . says")

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Questions 31-41 are based on the following passage and supplementary material.

This passage is adapted from Michael Balter, "Farming Conquered Europe at Least Twice." ©2011 by American Association for the Advancement of Science.

The rise of agriculture in the Middle East, nearly 11,000 years ago, was a momentous event in human prehistory. But just how farming spread from there into Europe has been a matter of intense research. A new study of ancient DNA from 5,000-year-old skeletons found in a French cave suggests that early farmers entered the European continent by at least two different routes and reveals new details about the social structures and dairying practices of some of their societies.

Scientists studying the spread of farming into Europe have numerous questions: Was agriculture brought in primarily by Middle Eastern farmers who replaced the resident hunter-gatherers? Or did agriculture advance through the spread of technology and ideas rather than people? And was there just one wave of farming into the continent or multiple waves and routes?

Until recently, researchers had to rely on the genetic profiles of modern-day Europeans and Middle Easterners for clues. Numerous such studies, especially of Y chromosomes, which are transmitted via the paternal line, suggest that actual farmers, not just their ideas, spread westward over the millennia, eventually reaching the British Isles. Yet other studies, based on mitochondrial DNA (mtDNA), which is inherited maternally, have come to the opposite conclusion, suggesting that farmers had local European ancestry.

In recent years, studies have begun to resolve these issues by sequencing the DNA of the prehistoric farmers themselves. Some of this research, most notably in Germany, suggests that male farmers entering central Europe mated with local female hunter-gatherers—thus possibly resolving the contradiction between the Y chromosome and mtDNA results.

The new study backs up that idea. A team led by molecular anthropologist Marie Lacan reports work on ancient DNA—both mitochondrial and Y-chromosomal—from more than two dozen skeletons found in the 1930s in a cave called Treilles in southern France. Archaeologists think Treilles is a communal grave site because the bones add up to 149 individuals. The team took DNA in such a way as to ensure that each individual was sampled only once (using teeth that were still attached to a lower jaw) and was able to obtain ancient DNA from 29 people.

The team found that the female and male lineages seemed to have different origins. The mtDNA showed genetic markers previously identified as having deep roots in ancient European hunter-gatherer populations, but the Y chromosomes showed the closest affinities to Europeans currently living along the Mediterranean regions of southern Europe, such as Turkey, Cyprus, Portugal, and Italy. The team concludes that, in addition to the spread of farming into central Europe suggested by the German studies, there appears to have been at least one additional route via southern Europe.

The communal grave also yielded additional intriguing details about these ancient Europeans. Most of the skeletons were males, and many appeared to be very closely related: At least two pairs of individuals were almost certainly father and son, and another pair were brothers. That suggests that the incoming male farmers established a so-called patrilocal society, in which the men stay put on their land but mate with women who come in from surrounding regions, the team concludes.

The study also showed that, in contrast to ancient DNA findings from central Europe, the people from Treilles lacked a key genetic variant that allows the body to digest lactose [a type of sugar found in milk] into adulthood. That's consistent with other archaeological evidence that central European farmers herded dairy cows, whereas Mediterranean farmers herded sheep and goats and drank fermented milk, which has much lower lactose levels.

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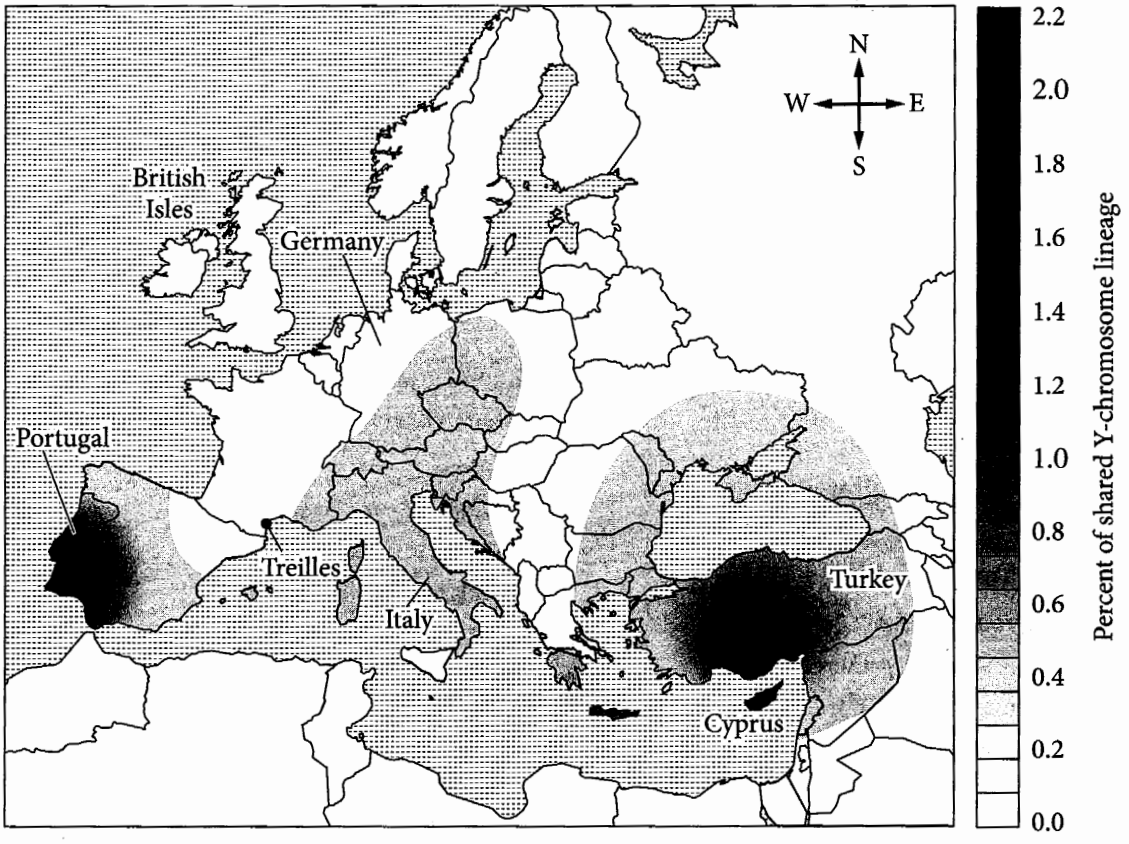

The map shows the Y lineages shared between Treilles individuals and current European populations. The gray gradient indicates the percentage of shared lineages between Treilles individuals and current European populations.

Adapted from Marie Lacan et al., "Ancient DNA Reveals Male Diffusion through the Neolithic Mediterranean Route." ©2011 by National Academy of Sciences.

31

The main purpose of the passage is to

A) discuss research into the origins of ancient European farmers.

B) resolve a debate about when farming first appeared in Europe.

C) consider a study of the farming methods of ancient Europeans.

D) explain the conflict between archaeological and genetic evidence about the first European farmers.

32

The main purpose of lines 12-18 ("Was . . . routes") is to pose questions that

A) remain largely unaddressed by researchers other than Lacan.

B) were presumed to have been answered prior to Lacan's work.

C) motivated the research of Lacan and other scientists.

D) have become more difficult to answer following Lacan's study.

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33

DNA evidence discussed in the passage most strongly suggests that modern Europeans

A) show more diversity in their mtDNA than in their Y chromosomes.

B) can trace their ancestry primarily to people from ancient southern Europe.

C) descended at least in part from people who originated further east.

D) have hereditary links to hunter-gatherers who migrated westward across Europe.

34

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

A) Lines 21-25 ("Numerous . . . Isles")

B) Lines 32-35 ("Some . . . hunter-gatherers")

C) Lines 50-51 ("The team . . . origins")

D) Lines 65-66 ("Most . . . related")

35

According to the passage, seemingly contradictory findings about the spread of farming in ancient Europe began to be reconciled once scientists

A) analyzed the genetic makeup of prehistoric farmers.

B) unearthed a large number of skeletons from the Treilles cave.

C) sequenced Y-chromosomal DNA from modern Europeans.

D) examined mtDNA apart from other genetic materials.

36

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

A) Lines 25-29 ("Yet other . . . ancestry")

B) Lines 30-32 ("In recent . . . themselves")

C) Lines 38-43 ("A team . . . France")

D) Lines 51-54 ("The mtDNA . . . populations")

37

As used in line 31, "resolve" most nearly means

A) reduce.

B) dispel.

C) settle.

D) declare.

38

As used in line 63, "yielded" most nearly means

A) relinquished.

B) submitted.

C) cultivated.

D) furnished.

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CONTINUE

1

39

It can most reasonably be inferred that the "archaeological evidence" referred to in line 78

A) introduces an unresolved complication into an evolving theory about the spread of farming in ancient Europe.

B) confirms an earlier hypothesis about the use of fermented milk by farmers living in southern Europe.

C) highlights a genetic factor that likely influenced the settlement patterns of Middle Eastern immigrants in Europe.

D) bolsters a conclusion about the spread of farming in Europe that Lacan's team members drew from their analysis of DNA.

40

According to the map, the population of which of the following regions has the highest percentage of shared Y lineages with Treilles individuals?

A) Southern Portugal

B) The British Isles

C) Southern Germany

D) Northern Italy

41

Data presented on the map most strongly support Lacan's view that ancient European farmers

A) had local European ancestry.

B) traveled as far as the British Isles.

C) arrived via a southern European route.

D) established patrilocal societies in central Europe.

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CONTINUE

1

Questions 42-52 are based on the following passages and supplementary material.

Passage 1 is adapted from Dana Blumenthal, "Interrelated Causes of Plant Invasion." ©2005 by American Association for the Advancement of Science. Passage 2 relates to the information and ideas discussed in Passage 1.

Passage 1

An occasional stem of leafy spurge in the prairie would not threaten native species. Nor would it bother ranchers. But the millions of hectares of this Line Eurasian species that inhabit western North America 5 have displaced native plant species and reduced forage for both wild and domestic animals, costing hundreds of millions of dollars annually. The problems caused by such invasive species are the direct result of their success in colonizing new 10 habitats, and understanding why they are so successful is essential to controlling their spread. Although there are many competing ideas to explain invasion, it is possible that two of the most important are interrelated: The plant species that benefit the 15 most from high resource availability may also gain the most from escaping enemies upon moving to a new range.

Due to the enormous variety of invasive plants, attempts to explain invasion have led 20 to an array of partially overlapping hypotheses. Hypotheses explaining the exceptional success of exotic species are based upon ways in which a species' new range differs from its native range: fewer insects and diseases, less competitive environments, 25 and competitors that are more susceptible to chemicals produced by the invader. Hypotheses explaining colonization in general, irrespective of whether the colonizing species are native or exotic, rely on characteristics of the colonizer or the 30 colonized plant community. For example, fast-growing species with high seed production make good colonizers. Plant communities with lots of disturbance, high resource availability, or reduced species diversity tend to be easily colonized.

35 Of primary interest are two mechanisms of invasion that are particularly well supported by existing studies of plant invasions: release from natural enemies and increased resource availability. The enemy release hypothesis attributes the success 40 of exotic species to their escape from diseases and herbivores upon moving to a new range. This gives them an advantage when competing with native species still burdened by enemies. Not only are enemies missing in exotic species' new ranges, but 45 the absence of enemies is correlated with invasiveness. Enemy release provides the greatest benefit to exotic species that are highly susceptible to enemies in their native range.

The resource hypothesis suggests that plant 50 invasion is caused by availability of resources such as light, water, and soil nutrients. Resources become available when resource supply increases, as with atmospheric nitrogen deposition, or when resource capture by other plants decreases, as with 55 disturbances such as fire or plowing. High resource availability benefits fast-growing native or exotic species.

Passage 2

Erodium cicutarium, an invasive species commonly known as pinweed, has been slowly 60 replacing the native species *Erodium texanum*, or heronbill, in North America's Sonoran Desert. Biologist Sarah Kimball conducted a series of experiments to understand how pinweed plants are overtaking heronbill plants.

65 At the beginning of a growing season, Kimball located a region of the desert in which both pinweed and heronbill had established growth. She divided the region into sixteen control plots and sixteen experimental plots. The experimental plots were 70 sprayed weekly with insecticides to eliminate insects that feed on plants, while control plots were left unsprayed. At the end of the growing season, Kimball determined, for each plot, the number of each species of plant, the number of fruits on each 75 plant, and the mass of each plant. The results were not significantly different between the control and experimental plots, indicating that insects were not a determining factor in pinweed's mechanism of invasion.

80 Additional studies by Kimball in the same region measured the growth rates of the two plant species during two growing seasons. She found that the growth rates of the two species were nearly the same in the season (2007–2008) with close to average 85 annual rainfall but that the invasive pinweed plants exhibited a greater growth rate than did the native heronbill plants in the season (2004–2005) when there was much more rainfall than in a typical year. She also found that the invasive plants lost less water 90 each day through the pores in their leaves than the

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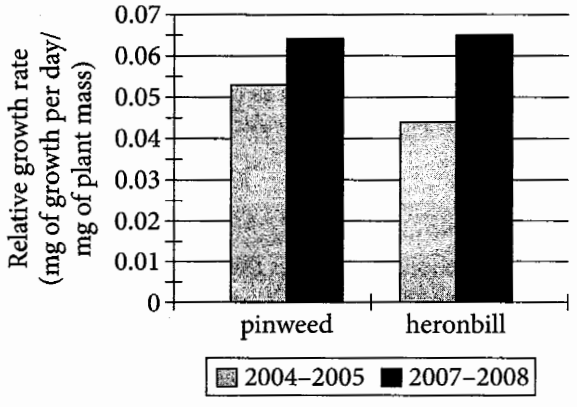
CONTINUE

1

native plants did regardless of the growing season. This water conservation along with the higher growth rate when water is abundant seems to account for the invasive plants' ability to outcompete the native plants.

Growth Rates of Native and Invasive Plants in the Sonoran Desert during Two Growing Seasons



Adapted from Sarah Kimball et al., "High Water-Use Efficiency and Growth Contribute to Success of Non-Native *Erodium cicutarium* in a Sonoran Desert Winter Annual Community." ©2014 by Sarah Kimball et al.

42

As used in line 16, "gain" most nearly means

A) profit.
B) increase.
C) traverse.
D) reach.

43

Based on the information in Passage 1, which area would be LEAST likely to be colonized by a fast-growing invasive plant species?

A) A wetland area that was recently converted to farmland but now commonly experiences flooding and soil erosion
B) A forested area that has numerous species of plants and has received a nearly normal amount of rainfall over the last five years
C) A previously forested area that experienced a fire within the last year and currently has few species of grasses and herbaceous plants growing
D) A plains area that has experienced drought over the last seven years and has fewer species of plants than before the drought began

44

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

A) Lines 7-11 ("The problems . . . spread")
B) Lines 12-17 ("Although . . . range")
C) Lines 21-26 ("Hypotheses . . . invader")
D) Lines 32-34 ("Plant . . . colonized")

45

As used in line 36, "supported" most nearly means

A) championed.
B) assisted.
C) braced.
D) substantiated.

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1

46

Which choice provides the best evidence from Passage 2 that plant growth in Kimball's experimental plots and control plots was similar over the growing season?

A) Lines 69-72 ("The experimental . . . unsprayed")

B) Lines 72-75 ("At the . . . mass of each plant")

C) Lines 75-79 ("The results . . . invasion")

D) Lines 82-88 ("She found . . . year")

47

In Passage 2, the main purpose of the information in lines 89-91 ("She . . . season") is to

A) provide background information about leaf structure in desert plants.

B) refute the claim made by the author of Passage 1 about the resource hypothesis.

C) refute the claim presented in Passage 2 that pinweed plants are overtaking heronbill plants in the Sonoran Desert.

D) support the conclusion that water availability is essential to pinweed's mechanism of invasion.

48

According to the graph, the relative growth rate in the 2007–2008 season, in mg of growth per day/mg of plant mass, of the heronbill plants in Kimball's study was closest to which of the following?

A) 0.045

B) 0.050

C) 0.060

D) 0.065

49

An idea central to both Passage 1 and Passage 2 is that

A) competition for the acquisition of space exists between native and nonnative plant species.

B) a hypothesis should not be tested without the proper use of experimental and control groups.

C) efforts to control the spread of invasive plants in North America have been unsuccessful.

D) natural events such as fires and hurricanes can have a devastating effect on plant life.

50

Which choice best states the relationship between the two passages?

A) Passage 2 expands on the research study discussed in Passage 1.

B) Passage 2 presents support for a controversial policy presented in Passage 1.

C) Passage 2 questions the conclusions drawn by the author of Passage 1.

D) Passage 2 presents a specific example of the general topic discussed in Passage 1.

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CONTINUE

51

Which claim from Passage 1 about an area colonized by an invasive species was directly tested in the experiment described in the second paragraph of Passage 2 (lines 65-79)?

A) Native plants are susceptible to chemicals produced by an invasive species.

B) An invasive species' colonization of a new range is facilitated by having fewer insects that feed on it.

C) Fast-growing native plants can effectively colonize areas with abundant resources.

D) High resource availability benefits fast-growing invasive species.

52

Based on information in the passages, do the data in the graph better support the enemy release hypothesis or the resource hypothesis?

A) The enemy release hypothesis, because in the 2007–2008 growing season, the growth rates of the pinweed plants and the heronbill plants were the same.

B) The enemy release hypothesis, because the growth rate of the pinweed plants was greater in a growing season that was free of insects than in a growing season in which insects were present.

C) The resource hypothesis, because the pinweed plants had a greater relative growth rate than the heronbill plants did in a season with greater-than-average rainfall.

D) The resource hypothesis, because the mass of the fruits on the pinweed plants was the same as the mass of the fruits on the heronbill plants in the 2007–2008 growing season.

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 and supplementary material.

New National Parks

Under the Antiquities Act of 1906, the Organic Act of 1916, and other federal laws, the US government has the power to take custody of land 1 when having historical significance or great natural beauty. The designation of a territory as a national park, national monument, or other 2 types of protected area can limit activities such as oil drilling and logging and provide funding for staff to work on preservation, maintenance, and visitor assistance. Federally protected lands are

1

A) NO CHANGE
B) for its having
C) that has
D) for it has

2

A) NO CHANGE
B) type of protected area
C) type of protected areas
D) protected area types

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CONTINUE

extremely popular, 3 with 270 million visitors each year to national parks alone, but in recent years critics have complained that these public lands are a burden on the federal budget that limits economic development. In fact, however, maintaining and expanding the land under public protection would be an economic benefit to many parts of the United States.

Some commentators claim that there 4 is an excess of too many pressing constraints on the federal budget to commit funds to federal land protection. But the 2014 budgets of the National Park Service, Fish and Wildlife Service, Forest Service, and Bureau of Land Management totaled significantly less than 1 percent of the national budget—hardly enough to make a considerable difference in overall government spending. Where protection does have a major economic impact is in local 5 communities visitors to protected lands need food, fuel, and lodging, and businesses that cater to these needs provide job opportunities in the surrounding communities.

3

A) NO CHANGE
B) being
C) to have
D) some

4

A) NO CHANGE
B) is too much of an excess of
C) are, in abundance, too many
D) are too many

5

A) NO CHANGE
B) communities; while visitors
C) communities, visitors
D) communities. Visitors

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2

6 In the western United States, federal control of large areas of land has been a source of political controversy. According to a report from Headwaters Economics, a research group that studies land management in the West, rural counties with more than 30 percent of their land under federal protection 7 saw job growth of more than 300 percent from 1970 to 2010. Rural counties with no protected land saw smaller increases in employment than did counties with protected land. A look at the economic effects of Yellowstone National Park reveals the profound impact

6

Which choice provides the best introduction to the paragraph?

A) NO CHANGE

B) The influx of money from tourism is particularly important in areas such as the western United States, where most federally protected lands are located.

C) The national park that has the most dramatic economic impact on the surrounding area is Yellowstone National Park, which is spread across parts of Wyoming, Montana, and Idaho.

D) It is often a challenge to balance the interests of local industries with those of visitors to federally protected lands.

7

Which choice provides accurate and relevant information from the graph?

A) NO CHANGE

B) saw slightly less job growth than those with less than 10 percent of lands under federal protection

C) had rates of job growth that were considerably higher than those of rural counties in the eastern United States

D) saw job growth decline from nearly 350 percent to just under 300 percent

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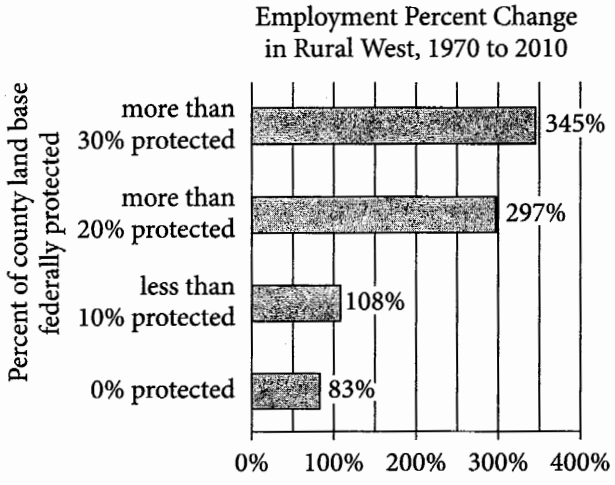
2

protected lands can have in a rural region. In 2013, Yellowstone had more than 3 million 8 tourists. They spent a total of nearly $380 million in and around the park. 9



Adapted from Headwaters Economics, "West Is Best: How Public Lands in the West Create a Competitive Economic Advantage." ©2012 by Headwaters Economics.

8

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

A) tourists, the ones who spent
B) tourists; spent was
C) tourists, who spent
D) tourists, but they spent

9

At this point, the writer wants to use information from the table below.

Economic Contribution of Tourists to the Region of Yellowstone National Park

	Park visitors	Park visitor spending	Jobs created
Total	3,188,030	$381,763,000	5,300
From tourists	3,090,679	$379,900,000	5,277
Percent from tourists	96.95%	99.51%	99.57%

Adapted from Catherine Cullinane Thomas, Christopher Huber, and Lynne Koontz, *2013 National Park Visitor Spending Effects: Economic Contributions to Local Communities, States, and the Nation*. Published in 2014 by the National Park Service.

Which choice provides accurate and relevant evidence from the table to support the paragraph's claim?

A) These tourists made up nearly 97 percent of all the visitors to the park in that year.
B) This incoming money was enough to support more than 5,000 jobs in the Yellowstone region.
C) Residents of the region tended to spend less money in and around the park than tourists did.
D) As per-visitor spending in the park shows, visiting Yellowstone is a relatively economical vacation.

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2

Many communities in the United States could gain significant tourist **10** revenue: if sites of natural beauty or historical significance—such as Idaho's Boulder-White Clouds and Utah's Cedar Mesa Plateau—were granted national park status. Given the economic benefits of protecting these and other proposed wilderness areas around the country, **11** additional laws are needed to ensure that the natural and historical legacy of the United States is preserved for future generations.

10

A) NO CHANGE
B) revenue, if sites of natural beauty,
C) revenue if sites of natural beauty,
D) revenue if sites of natural beauty

11

Which choice most logically concludes the passage?

A) NO CHANGE
B) national parks would provide more economic gains if they were managed more like businesses.
C) it is time for the federal government to consider an additional investment in protected lands.
D) protected lands should be extended to more urban parts of the country as well.

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CONTINUE

2

Questions 12-22 are based on the following passage.

Going into Historical Detail

Many films depict a historical figure, event, or time period. Take, for example, Steven Spielberg's 2012 historical drama *Lincoln*, a film focused on the life of former president Abraham Lincoln, or Steve McQueen's 2013 film *12 Years a Slave*, based on an 1853 memoir by former American slave Solomon Northup. Both Spielberg and McQueen hired historical consultants to provide expert opinion on the costumes, props, and dialogue used in these films.

Some filmmakers expect historical consultants to commit to long-term **12** projects. Other filmmakers give historical consultants tasks that can be completed in a short period of time. In the 2003 historical film *Master and Commander*, a team of consultants was tasked with re-creating life aboard an 1805 warship. One of these consultants spent months training actors to operate cannons. Regardless of a project's scope, however, the task of a historical consultant is always the same: to enhance the accuracy of a film. Henry Louis Gates Jr., a prominent scholar of African American history, vetted the script of *12 Years a Slave* and **13** serves as the director of Harvard University's Hutchins Center for African and African American Research.

12

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

A) projects, while others assign tasks

B) projects, but some historical consultants have filmmakers give them tasks

C) projects; meanwhile, other filmmakers give historical consultants other tasks

D) projects; there are also tasks given by filmmakers

13

Which choice gives a second example that best supports the point the writer is making in this paragraph?

A) NO CHANGE

B) even wrote the film's concluding credits about the mystery surrounding Northup's disappearance in 1857.

C) has also authored numerous books on African American literature and culture.

D) played a large role in discovering and disseminating the earliest novels written by African Americans in the 1850s.

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While historical integrity is important, 14 some directors spend too much time worrying about it. For instance, a historical consultant for *Master and Commander* 15 will say the director's desire to emphasize the camaraderie of the ship's officers meant 16 dumping the period's formal social protocol. Duncan Henderson, the film's producer, acknowledged this tension between the competing demands of accuracy and 17 art: "The more real it is, the more the movie moves effortlessly forward because people are quickly taken into that world. [But] you don't want to give up the drama of the story just to be technically correct."

This deliberate decision to forgo accuracy for cinematic effect, 18 however, may be met with public criticism. When Tony Kushner, the screenwriter for *Lincoln*, portrayed two Connecticut congressmen as voting against the Thirteenth Amendment to the

14

Which choice most effectively sets up the example discussed in this paragraph?

A) NO CHANGE
B) many actors struggle with finding a balance between being historically accurate and conveying emotion.
C) audiences often don't realize when there are errors in a historical film.
D) other concerns may take precedence.

15

A) NO CHANGE
B) said
C) had been saying
D) will have said

16

A) NO CHANGE
B) ditching
C) scrapping
D) disregarding

17

A) NO CHANGE
B) art—'The
C) art; the
D) art, the

18

A) NO CHANGE
B) therefore,
C) likewise,
D) particularly,

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CONTINUE

2

US Constitution, a current Connecticut congressman wrote a letter to the movie studio urging it to correct this error. Kushner responded by stating *Lincoln* upheld the expectations of a dramatic film because it illustrated the amendment's narrow vote, and Doris Kearns Goodwin, the film's historical **19** consultant, defending Kushner's script.

20 Why, then, is historical accuracy important in films? Kate Williams, a British **21** historian—believes that "filmmakers have a great responsibility. How they present the past is how it gets remembered." Historical consultants must **22** assure that filmmakers take this responsibility seriously. As films continue to engage with history, historical consultants will continue to preserve history's intricacies.

19

A) NO CHANGE
B) consultant, who defended
C) consultant, defended
D) consultant to defend

20

Which choice provides the most effective transition from the previous paragraph?

A) NO CHANGE
B) What about directors who are less concerned about historical accuracy?
C) Consequently, do movies that take place in the very recent past require historical consultants?
D) What sources should filmmakers consult to ensure historical accuracy in their films?

21

A) NO CHANGE
B) historian
C) historian,
D) historian;

22

A) NO CHANGE
B) ensure that
C) ensure for
D) insure for

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Questions 23-33 are based on the following passage.

Legal Nonrepresentation

"All my life," the sculptor Constantin Brancusi remarked, "I have been seeking to capture the essence of flight." 23 *Bird in Space* is a work of abstract art: it is not a readily recognizable representation of the bird in its title but rather a polished arc of bronze that calls to mind the animal's graceful airborne motion. With 24 it's end's tapering into points, much of the slender 53-inch curve 25 appear suspended in the air above its marble base. More than just a visually arresting sculpture, 26 then, *Bird in Space* was responsible for changing how the US government recognizes art.

23

The writer is considering adding the following sentence.

> More than any of Brancusi's other works, the 1926 sculpture *Bird in Space* manages to achieve that aim.

Should the writer make this addition here?

A) Yes, because it helps explain why the US government would eventually recognize *Bird in Space* as a work of art.
B) Yes, because it provides an effective transition between the presentation of Brancusi's goal and the discussion of *Bird in Space.*
C) No, because it presents information about *Bird in Space* that is repeated later in the paragraph.
D) No, because it interrupts the explanation of the nature of abstract art.

24

A) NO CHANGE
B) it's ends
C) its' ends
D) its ends

25

A) NO CHANGE
B) is appearing
C) has appeared
D) appears

26

A) NO CHANGE
B) at any rate,
C) though,
D) therefore,

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CONTINUE

In the 1920s, abstract art like Brancusi's was a new phenomenon, a sharp contrast to more traditionally representational paintings and statues, so it is perhaps unsurprising that *Bird in Space* received a mixed reception. The general public struggled to find artistic value in the sculpture; indeed, many struggled to see it as a work of art at all. One newspaper likened it to "half an airplane propeller," while **27** also calling it "a tall, slender, highly polished object." Within the art world, however, *Bird in Space* was recognized as a beautiful and innovative work of modern sculpture. Such recognition led the art collector Edward Steichen to buy the piece and have it shipped to his New York City home from Brancusi's Paris studio.

The importation of the sculpture brought it to the attention of the US Customs Bureau. The agency's view reflected that of the general public: when *Bird in Space* came to the United States from France, the Customs Bureau classified it not as a work of art but as an industrial object. That classification carried with it substantial consequences. Works of **28** art, could be imported to the United States duty-free, but industrial materials were taxed at rates of up to 40 percent of **29** their purchase value. As a result, *Bird in Space* faced an import tax of $229.35—more than a third of the $600 Steichen paid for it.

27

Which choice gives a second supporting example that is most similar to the example already in the sentence?

A) NO CHANGE
B) another mocked it as an "expensive potato masher."
C) Brancusi considered it "a symbol of flight liberating man from the narrow confines of lifeless matter."
D) art critic Frank Crowninshield stated that it had "the suggestion of flight."

28

A) NO CHANGE
B) art—could
C) art could
D) art could,

29

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

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Brancusi, in turn, sued the US government, aiming to 30 score recognition of his sculpture as art. The resultant 1927 court case, *Brancusi v. United States*, attempted to answer for the American public the question of whether abstract works like Brancusi's should be considered art. After hearing a lineup of 31 well-known, famous art critics testify to the aesthetic value and originality of nonrepresentational art like *Bird in Space*, 32 the court's ruling was in favor of Brancusi. The decision 33 meant that the public had finally come to recognize the artistic value of nonrepresentational art.

30

A) NO CHANGE
B) secure
C) land
D) gather up

31

A) NO CHANGE
B) well-known and famous
C) famously well-known
D) famous

32

A) NO CHANGE
B) the ruling of the court was in favor of Brancusi.
C) the court ruled in favor of Brancusi.
D) Brancusi was the favorable receiver of the court's ruling.

33

The writer wants a conclusion that reiterates the main idea expressed in the passage. Which choice best accomplishes this goal?

A) NO CHANGE
B) was a great victory for art collectors like Steichen: a major impediment to their ability to import artworks from Europe had been eliminated.
C) would forever broaden the range of art acknowledged by the US government: from then on, customs law would recognize both abstract and traditional works within the category of art.
D) concerning the value of abstract works such as *Bird in Space* would take many more years to be made in the court of public opinion, however.

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CONTINUE

Questions 34-44 are based on the following passage.

Petrified Lightning

Scientists estimate that 34 two thousand is roughly the number of thunderstorms that rage over Earth at any given time and that lightning strikes the ground twenty times every second. Lightning bolts can be up to five times hotter than the surface of the 35 Sun. This is far hotter than the melting point of silica, the compound that is the primary constituent of sand and most types of rock. (Silica is also the essential ingredient used in making glass.) Under certain circumstances, when lightning strikes sand or rock, evidence of the strike is left behind in the form of a fulgurite, sometimes called petrified lightning.

34

A) NO CHANGE
B) approximately two thousand thunderstorms
C) right around two thousand thunderstorms
D) two thousand is approximately how many thunderstorms

35

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

A) Sun; this temperature of the lightning bolts is
B) Sun, and this temperature is
C) Sun; however, this is
D) Sun—

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2

[1] First discovered in 1706, these formations are found in two varieties: sand fulgurites and the much less common rock fulgurites. [2] As it cools, the silica lining forms a glass-walled cavity that may look like **36** a plants' root system. [3] Sand that adhered to the molten silica as it solidified forms a casing around the fragile glassy structure. [4] Sand fulgurites form when the intense energy of a lightning bolt rapidly heats moist air trapped in sandy soil and the resulting explosive expansion creates a void lined with melted silica. [5] Rock fulgurites, found almost exclusively on the peaks of mountains, appear as a thin, glassy crust on **37** the surface of a rock or along fractures within them. **38**

Because glass is very resistant to weathering, fulgurites may last a very long **39** time; the oldest example is estimated to be 250 million years old—and give scientists a unique window into the past. The formation of a fulgurite occurs in only a fraction of a

36

A) NO CHANGE
B) a plant's root system.
C) a plant's root systems'.
D) plants root system's.

37

A) NO CHANGE
B) the rocky surface
C) a rock's surface
D) the surface of rocks

38

To make this paragraph most logical, sentence 4 should be placed

A) where it is now.
B) after sentence 1.
C) after sentence 2.
D) after sentence 5.

39

A) NO CHANGE
B) time. The
C) time, the
D) time—the

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CONTINUE

2

second, so air bubbles are often trapped in the cooling glass and can be analyzed to reveal the atmospheric composition at the time the fulgurite was created. 40

There is also a practical reason for studying fulgurites. 41 When researchers dig them up very carefully, fulgurites can remain intact after they are extracted from the ground. Aboveground power lines are often struck by lightning, causing power outages, but the 42 affects of lightning on buried power lines were not investigated until the 1990s. Research at the University of Florida has shown that lightning can also disable

40

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

> Gases trapped 15,000 years ago in fulgurites from the Sahara desert, for example, demonstrate that the region was once much wetter and prone to thunderstorms.

Should the writer make this addition here?

A) Yes, because it provides an example of the paragraph's point about the uses of fulgurites in research.

B) Yes, because it continues the passage's explanation of how fulgurites are formed.

C) No, because it blurs the paragraph's focus by introducing a discussion of changing climates.

D) No, because it undermines the paragraph's claim about how quickly fulgurites form.

41

Which choice best introduces the information that follows?

A) NO CHANGE

B) Lightning plays a major role in power distribution system failures in areas where thunderstorm activity is high.

C) One project conducted in 1996 excavated the world's longest known fulgurite, which has three branches measuring eight, fourteen, and sixteen feet.

D) Seasonal variations in storms mean that certain times of the year are best for collecting data on lightning.

42

A) NO CHANGE

B) affects from

C) effects of

D) effects by

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underground power systems because the strikes keep moving below ground. Examination of fulgurites around buried power systems 43 help scientists determine the most effective shielding materials for power lines. Florida averages about twenty-five to forty lightning strikes per square mile each 44 year, so the scientists hope their work can help mitigate the damage caused by so many strikes.

43

A) NO CHANGE
B) have helped
C) are helping
D) is helping

44

Which choice most effectively completes the paragraph?

A) NO CHANGE
B) year, and lightning strikes are dangerous to residents of the state as well as damaging to its infrastructure.
C) year, but it is difficult to determine precisely how many of those strikes leave behind fulgurites.
D) year.

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.

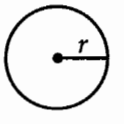
DIRECTIONS

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

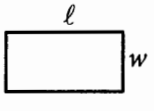
NOTES

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

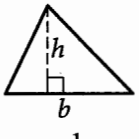
REFERENCE



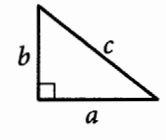
$A = \pi r^2$
$C = 2\pi r$



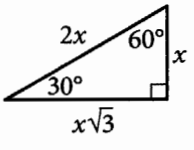
$A = \ell w$

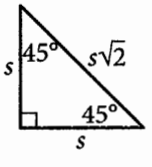


$A = \frac{1}{2}bh$

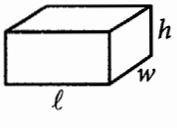


$c^2 = a^2 + b^2$

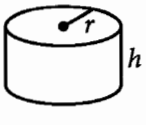




Special Right Triangles

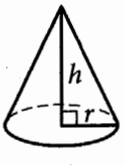


$V = \ell wh$

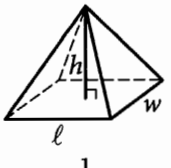


$V = \pi r^2 h$

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



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



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

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The sum of the measures in degrees of the angles of a triangle is 180.

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1

In the xy-plane, what is the y-intercept of the line with equation $y = 4x - 1$?

A) 4

B) $\frac{1}{4}$

C) $-\frac{1}{4}$

D) -1

2

$$f(x) = \frac{x+3}{2}$$

For the function f above, what is the value of $f(7) - f(5)$?

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

B) 1

C) 2

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

3

$$3(x+y) = 12$$
$$\frac{x}{2} = 3$$

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

A) -6

B) -2

C) 2

D) 6

4

$$D = 60 - \frac{3}{4}P$$
$$S = \frac{1}{4}P$$

In economics, the equilibrium price is defined as the price at which quantity demanded and quantity supplied are equal. If the quantity demanded, D, and quantity supplied, S, in terms of the price in dollars, P, are given by the equations above, what is the equilibrium price?

A) \$0

B) \$60

C) \$80

D) \$120

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CONTINUE

5

If $(x-2)^2 - 6(x-2) + 9 = 0$, what is the value of x ?

A) 2

B) 3

C) 5

D) 7

6

A chef plans to cook a maximum of 100 entrées for a dinner party; each entrée will include either chicken or fish. The cost of ingredients for each chicken entrée is \$7, and the cost of ingredients for each fish entrée is \$9. If no more than \$850 can be spent on ingredients for the entrées and the chef cooks c chicken entrées and f fish entrées, which of the following systems best represents the constraints on c and f ?

A) $c + f = 16$
$7c + 9f \leq 100$

B) $c + f \leq 100$
$7c + 9f > 850$

C) $c + f \leq 100$
$7c + 9f \leq 850$

D) $c + f = 100$
$7c + 9f < 850$

7

If $x + y = 13$ and $x - y = 2$, what is the value of $x^2 - y^2$?

A) 4

B) 26

C) 121

D) 165

8

Every Saturday, Bob bakes loaves of bread to sell at the farmer's market. Each loaf costs him \$1 to make, and he sells the loaves for \$3 each. He also pays a vendor's fee of \$75 every Saturday to set up his booth. What is the least number of loaves of bread Bob needs to sell every Saturday to cover the cost of the vendor's fee?

A) 38

B) 37

C) 25

D) 19

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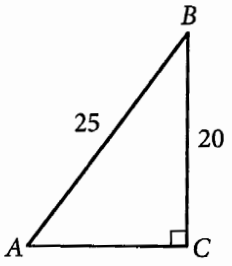
CONTINUE

9



In the right triangle above, the tangent of $\angle A$ is $\frac{4}{3}$.

What is the sine of $\angle B$?

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

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

C) $\frac{4}{5}$

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

10

$$wxy + xyz = wx + yz$$

In the equation above, w, x, and z are each greater than 1. Which of the following is equivalent to y ?

A) $-x$

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

C) $\frac{1}{xz - z}$

D) $\frac{wx}{wx + xz - z}$

11

The pressure exerted on an object under water increases by 1 atmosphere every 33 feet below the surface of the water. At sea level, the pressure is 1 atmosphere. Which equation gives the total pressure p, in atmospheres, exerted on an underwater object at a depth of f feet below sea level?

A) $p = \frac{f}{33}$

B) $p = 33f$

C) $p = 33f + 1$

D) $p = \frac{f}{33} + 1$

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12

Which of the following equations has a graph in the xy-plane with no x-intercepts?

A) $y = x^2 + 3x + 4$

B) $y = x^2 - 5x - 6$

C) $y = 3x^2$

D) $y = 2x - 5$

13

$$y = 5x + 1$$
$$y = x^2 + 3x + 2$$

What is the y-coordinate of the point of intersection, in the xy-plane, of the graphs of the equations above?

A) 1

B) 2

C) $\frac{9}{4}$

D) 6

14

Which of the following expressions is equivalent to $(16x^2)^{\frac{1}{2}}$?

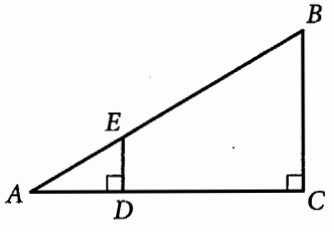
A) $4|x|$

B) $8|x|$

C) $\sqrt{8x}$

D) $16x$

15



In the figure above, $BC = 5$, and the length of line segment AD is half the length of line segment CD. What is the length of line segment DE ?

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

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

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

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

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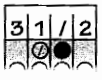
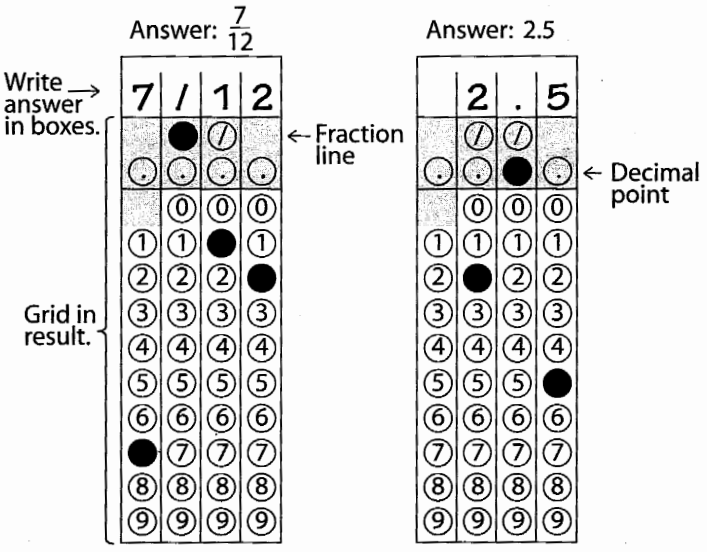
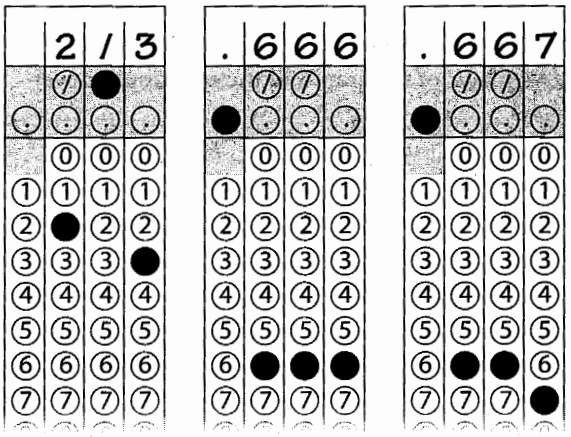
DIRECTIONS

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

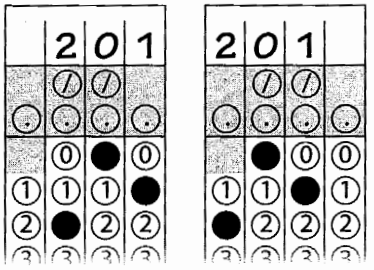
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
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

16

In the equations $a = x - 4$ and $b = x + 4$, a and b are constants. When the product ab is written in the form $x^2 - c$, where c is a constant, what is the value of c ?

17

Isabella sells only rings and necklaces on her website. Rings sell for \$50 each, and necklaces sell for \$30 each. If Isabella sold 25 pieces of jewelry and her sales totaled \$1050, how many necklaces did Isabella sell?

18

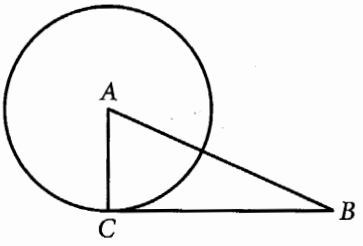
$$1.2(h + 2) = 2h - 1.2$$

What value of h is the solution of the equation above?

19

If $r > 0$ and $\sqrt[3]{\frac{9r}{2}} = \frac{1}{2}r$, what is the value of r ?

20



Note: Figure not drawn to scale.

In the figure above, the circle has center A, and line segment CB is tangent to the circle at point C. If $AB = 1.0$ and $CB = 0.8$, what is the length of the diameter of the circle?

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 circle 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 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTES

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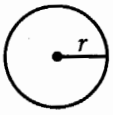
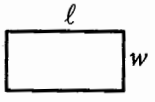
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

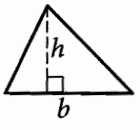
REFERENCE



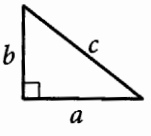
$A = \pi r^2$
$C = 2\pi r$



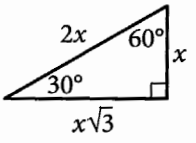
$A = \ell w$

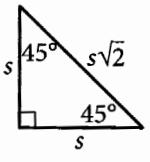


$A = \frac{1}{2}bh$

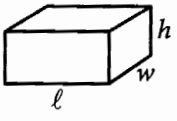


$c^2 = a^2 + b^2$

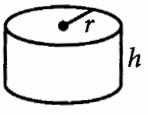




Special Right Triangles

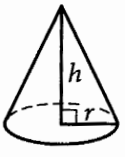


$V = \ell wh$

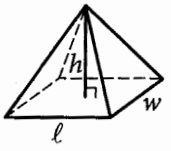


$V = \pi r^2 h$

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



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



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

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The sum of the measures in degrees of the angles of a triangle is 180.

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1

Ms. Anderson currently has 550 contacts on an online professional networking site. Her goal is to have at least 1,000 contacts. If she wants to meet this goal in 25 weeks, what is the minimum number of contacts per week, on average, she should add?

A) 18
B) 19
C) 21
D) 22

2

At her summer job, Paula earns the same amount of money for each hour she works. If she earns $240 for working 20 hours, how much does she earn for 5 hours?

A) $12
B) $50
C) $60
D) $100

3

If $3x = 24$, what is the value of $2x - 3$?

A) 8
B) 10
C) 11
D) 13

4

Yuna sold boxes of cookies and bags of candy. The ratio of the number of boxes of cookies she sold to the number of bags of candy she sold was 2 to 1. If Yuna sold 8 boxes of cookies, how many bags of candy did she sell?

A) 4
B) 8
C) 10
D) 16

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CONTINUE

5

For each repair job, an elevator technician charges r dollars per hour for each hour worked plus a flat fee of k dollars. If the technician charges $210 for a 2-hour job, which of the following represents the relationship between r and k ?

A) $210 = k + 2r$

B) $210 = 2k + r$

C) $210 = 2r - k$

D) $210 = r - 2k$

6

A box in the shape of a right rectangular prism has a volume of 60 cubic inches. If the dimensions of the box are 3 inches by 5 inches by h inches, what is the value of h ?

A) 3

B) 4

C) 5

D) 6

7

A 15-foot wire and a 5-foot wire were each cut completely into 10-inch pieces. How many more 10-inch pieces resulted from the 15-foot wire than from the 5-foot wire? (12 inches = 1 foot)

A) 6

B) 9

C) 12

D) 18

8

Parabola D in the xy-plane has equation $x - 2y^2 - 8y - 11 = 0$. Which equation shows the x-intercept(s) of the parabola as constants or coefficients?

A) $x = 2y^2 + 8y + 11$

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

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

D) $y = -\sqrt{\frac{x-3}{2}} - 2$

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CONTINUE

9

The sum of two different numbers x and y is 70, and the difference when the smaller number is subtracted from the larger number is 30. What is the value of xy ?

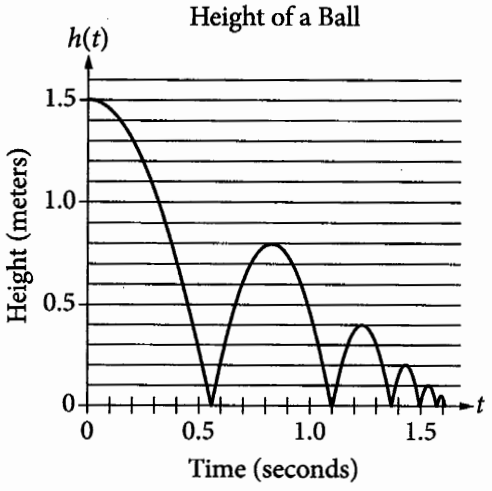
A) 100

B) 210

C) 1,000

D) 2,100

10



A ball was dropped from a height of 1.5 meters and hit the ground several times. The graph above represents the height h, in meters, of the ball t seconds after it was dropped. Of the following, which best approximates the maximum height, in meters, of the ball between the second and third time it hit the ground?

A) 0.2

B) 0.4

C) 0.8

D) 1.5

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11

Which of the following is an equation of the circle in the xy-plane that has center $(0, 0)$ and radius 4 ?

A) $x^2 + y^2 = 4$

B) $x^2 + y^2 = 8$

C) $x^2 + y^2 = 16$

D) $x^2 + y^2 = 64$

12

Which of the following expressions is equivalent to $\left(16x^9y^3\right)^{\frac{1}{2}}$, where $x \geq 0$ and $y \geq 0$?

A) $4x^3y^{\frac{3}{2}}$

B) $4x^{\frac{9}{2}}y^{\frac{3}{2}}$

C) $8x^3y^3$

D) $8x^{\frac{9}{2}}y^3$

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13

At the beginning of a laboratory experiment, Miguel had 10 milliliters of a solution in a flask. The first step of the experiment consisted of Miguel pouring x milliliters of the solution into a beaker and y milliliters of the solution into a different beaker. There remained at least 4 milliliters of the solution in the flask after the first step. Which of the following inequalities can be used to correctly represent this situation?

A) $10 - x - y \geq 4$

B) $10 - x + y \geq 4$

C) $4 - x - y \geq 5$

D) $4 - x + y \geq 5$

14

To determine if cooking with olive oil reduces the risk of heartburn for men, researchers interviewed a random sample of 5,500 men who had no history of heartburn. Study participants were identified as either regular or occasional olive oil users. Five years later, researchers interviewed the men again. They found that the proportion of men who experienced frequent heartburn was significantly lower for men identified as regular olive oil users. Which of the following is the most appropriate conclusion of the study?

A) Olive oil use causes a reduction in the risk of heartburn for men and women.

B) Olive oil use causes a reduction in the risk of heartburn for men but not necessarily for women.

C) There is an association between olive oil use and the risk of heartburn for men and women, but it is not necessarily a cause-and-effect relationship.

D) There is an association between olive oil use and the risk of heartburn for men, but it is not necessarily a cause-and-effect relationship, and the association may not exist for women.

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CONTINUE

Questions 15 and 16 refer to the following information.

$$h = 3c$$

A wildlife biologist uses the formula above to estimate the height h, in centimeters, of an elephant from its foot to its shoulder, based on the circumference c, in centimeters, of the elephant's footprint.

15

If the wildlife biologist finds a circular elephant footprint that has a diameter of 30 centimeters (cm) while on a zoological study, which of the following is closest to the biologist's estimate of the elephant's height?

A) 90.0 cm
B) 94.2 cm
C) 188.4 cm
D) 282.6 cm

16

The circumference c of a mother elephant's circular footprint is 4 times the circumference of a baby elephant's circular footprint. What is the ratio of the height of the mother to the height of the baby?

A) 1 to 4
B) 1 to 3
C) 4 to 1
D) 4 to 3

17

If $(x^{24})^a = (x^2)^4$, and $x > 1$, what is the value of a ?

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

18

$$x^2 + y = 7$$
$$x - y = 5$$

Which value is a y-coordinate of a solution to the system of equations above?

A) -8
B) -3
C) -2
D) 6

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CONTINUE

Questions 19 and 20 refer to the following information.

$$d = 2{,}565 - 500t$$

An airplane flies directly from a city in Pennsylvania to a city in Ecuador. The equation above estimates the distance d, in miles, from the city in Ecuador of the airplane t hours after taking off from the city in Pennsylvania.

19

Which of the following is the best interpretation of the number 2,565 in this context?

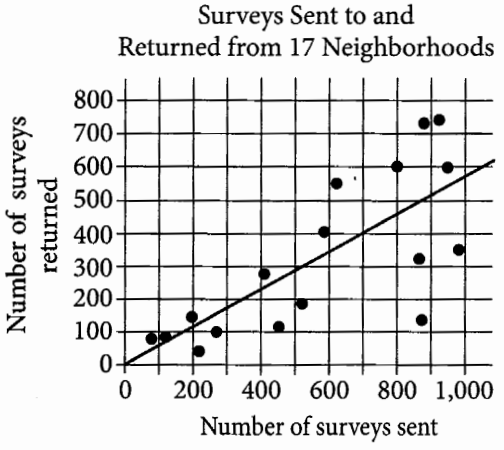
A) The speed, in miles per hour, of the airplane
B) The distance, in miles, the airplane travels in one hour
C) The distance, in miles, the airplane travels between the two cities
D) The time, in minutes, it takes the airplane to reach the city in Ecuador

20

According to the equation, approximately how many hours will it take the airplane to travel between the two cities?

A) 6.2
B) 5.8
C) 5.3
D) 5.1

21



The scatterplot above shows the number of surveys sent to and returned from people in 17 different neighborhoods. A line of best fit for the data is also shown. For the neighborhood that had surveys sent to 800 people, which of the following is closest to the positive difference between the actual number of surveys returned and the number predicted by the line of best fit shown?

A) 150
B) 170
C) 200
D) 250

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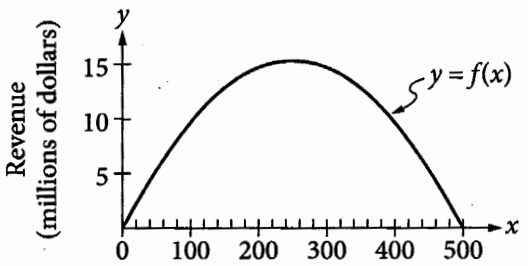
Questions 22 and 23 refer to the following information.

Annual Production (thousands of units)

	Factory W	Factory Z
Product P	21	32
Product Q	14	24

Projected Annual Revenue from Sales of Product P (millions of dollars)

$f(x) = a(x - 250)^2 + k$



A company makes and sells only two products, P and Q, and makes all products at factories W and Z. The table above shows the number of units of each product made at each factory during a year. The function f above represents the projected annual revenue from sales of product P as a function of the price per unit, where a and k are constants.

22

Based on the graph of f, which of the following is a factor of $f(x)$?

A) $x - 15$

B) $x - 240$

C) $x - 250$

D) $x - 500$

23

Which of the following is closest to the percent of the total number of units of products P and Q combined that are made at factory Z annually?

A) 38%

B) 56%

C) 62%

D) 91%

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CONTINUE

24

For 5 consecutive even integers, the sum of the first and third integer is 20 less than 3 times the fourth integer. What is the fifth integer?

A) 12

B) 14

C) 16

D) 26

25

A polling agency wanted to test whether a ballot measure would pass with greater than 50% yes votes. The agency sampled 1,000 registered voters selected at random, and 50.6% of the voters favored the ballot measure. The margin of error associated with this poll was ±3%. Based on the poll's results, which of the following statements must be true?

A) The percentage of voters who will vote yes for the ballot measure is 50.6%.

B) The ballot measure will pass with more yes votes than no votes, but the percentage of votes it will receive cannot be predicted.

C) The ballot measure will pass with at least 53.6% of the vote.

D) The poll's results do not provide sufficient evidence to conclude that the ballot measure will pass.

26

Treatment	Number of plants		
	Regressed	Thrived	Total
A	80	120	200
B	140	60	200

The table above shows the results of an experiment involving the effect of two treatments, A and B, on plants. Based on the results, what fraction of the plants that thrived received treatment A ?

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

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

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

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

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27

A sample of seawater is 3.5% salt by mass and contains 1,000 grams of salt. Which of the following is closest to the mass, in grams, of the sample of seawater?

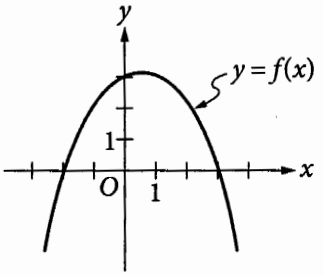
A) 28,600

B) 27,600

C) 965

D) 35

28



x	$g(x)$
−1	−2
0	2
1	0
2	−1
3	1

The graph of the function f is shown in the xy-plane above, and selected values for the function g are shown in the table. For which of the following values of x is $g(x) > f(x)$?

A) 0

B) 1

C) 2

D) 3

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29

$$h(t) = -\frac{1}{175}t + 481$$

An archeologist estimates that, as a result of erosion, the height of the Great Pyramid of Giza has been decreasing at a constant rate since it was built. The function above is used by the archeologist to model the height $h(t)$, in feet, of the pyramid t years after it was built. According to the function, which of the following statements is true?

A) Every 1,750 years the height of the pyramid decreases by 10 feet.

B) Every 175 years the height of the pyramid decreases by 0.1 foot.

C) Every 100 years the height of the pyramid decreases by 1.75 feet.

D) Every year the height of the pyramid decreases by 175 feet.

30

A biologist grows a culture of bacteria as part of an experiment. At the start of the experiment, there are 75 bacteria in the culture. The biologist observes that the population of bacteria doubles every 18 minutes. Which of the following equations best models the number, n, of bacteria t hours after the start of the experiment?

A) $n = 75(2)^{\frac{t}{18}}$

B) $n = 75\left(1 + \frac{t}{18}\right)$

C) $n = 75(2)^{\frac{10t}{3}}$

D) $n = 75\left(1 + \frac{10}{3}t\right)$

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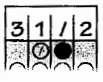
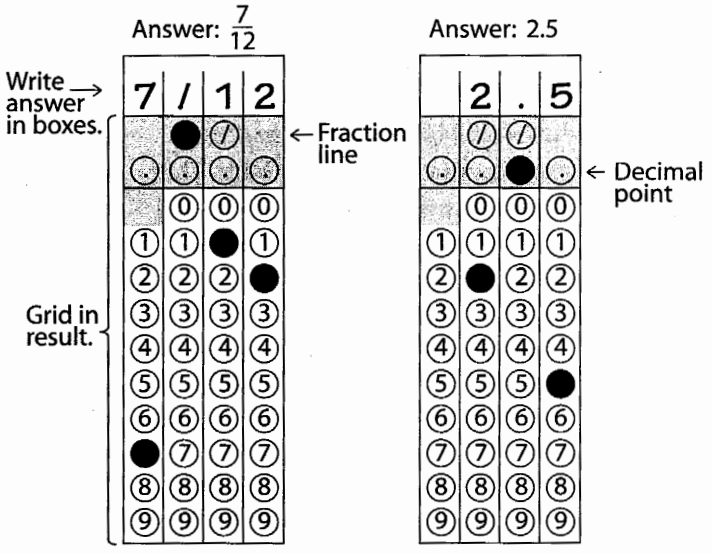
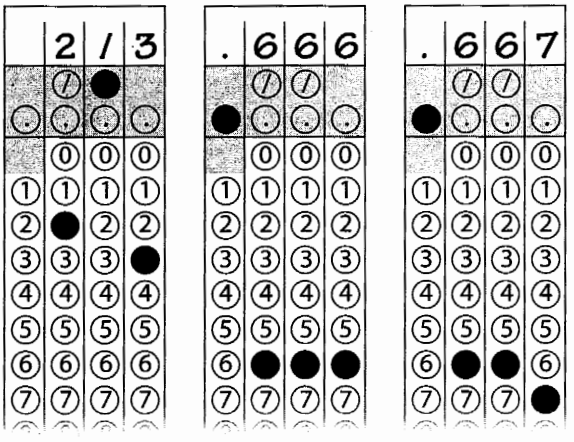
DIRECTIONS

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

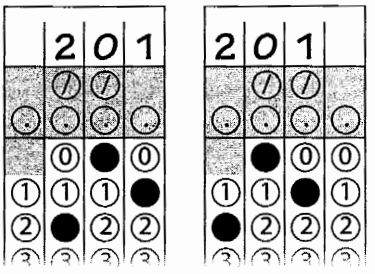
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
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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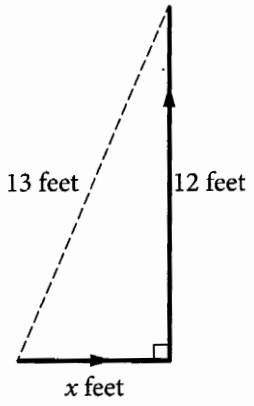
CONTINUE

31



The solid lines in the figure above represent the route of a football player, and the dashed line represents the distance from his starting point to the point at which the player was stopped. What is the value of x ?

32

Last year, Gary's tomato plants produced 24 kilograms of tomatoes. This year, Gary increased the number of tomato plants in his garden by 25%. If his plants produce tomatoes this year at the same rate per plant as last year, how many kilograms of tomatoes can Gary expect the plants to produce this year?

33

Median Ages of Populations of Selected Countries, 2012

Country	Median age of population (years)
Brazil	29.6
China	35.9
Germany	45.3
India	26.5
Indonesia	28.5
Nigeria	17.9
Philippines	23.1
Russia	38.8
United States	37.1

What is the range, in years, of the median ages of the populations for the countries in the table above?

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34

$$\frac{1}{2}x = a$$
$$x + y = 5a$$

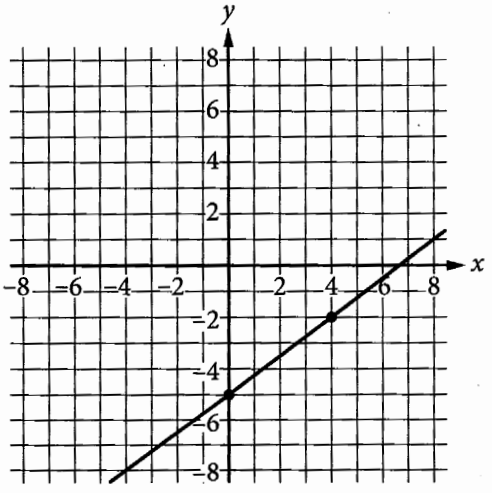
In the system of equations above, a is a constant such that $0 < a < \frac{1}{3}$. If (x, y) is a solution to the system of equations, what is one possible value of y ?

35

$$\frac{x^2 + 17x + 66}{x + 6}$$

If the expression above is equivalent to an expression of the form $x + a$, where $x \neq -6$, what will be the value of a ?

36



A line is shown in the xy-plane above. A second line (not shown) is parallel to the line shown and passes through the points (1, 1) and (3, c), where c is a constant. What is the value of c ?

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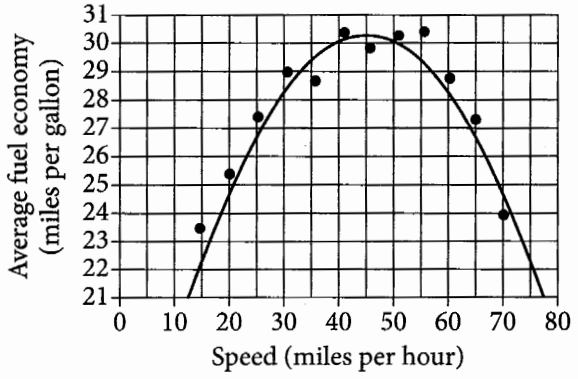
Questions 37 and 38 refer to the following information.



The scatterplot above shows the average fuel economy for a certain class of car driven at 12 different speeds. The graph of a quadratic model for the data is also shown.

37

For what fraction of the 12 speeds does the model overestimate the average fuel economy?

38

The quadratic model predicts the average fuel economy to be 26 miles per gallon for how many different speeds?

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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Essay

DIRECTIONS

The essay gives you an opportunity to show how effectively you can read and comprehend a passage and write an essay analyzing the passage. In your essay, you should demonstrate that you have read the passage carefully, present a clear and logical analysis, and use language precisely.

Your essay must be written on the lines provided in your answer booklet; except for the Planning Page of the answer booklet, you will receive no other paper on which to write. You will have enough space if you write on every line, avoid wide margins, and keep your handwriting to a reasonable size. Remember that people who are not familiar with your handwriting will read what you write. Try to write or print so that what you are writing is legible to those readers.

REMINDERS

1. **Do not write your essay in this booklet.** Only what you write on the lined pages of your answer booklet will be evaluated.
2. **An off-topic essay will not be evaluated.**

You have 50 minutes to read the passage and write an essay in response to the prompt provided inside this booklet.

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As you read the passage below, consider how Richard Schiffman uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

Adapted from Richard Schiffman, "Why We Should Work Less." ©2012 by The Washington Post Company. Originally published January 28, 2012.

1 Recently a friend confided over dinner that her job was "killing" her. I was surprised. She is a director of a midsize nonprofit that is doing citizen diplomacy work in the Middle East, and she has often remarked on how gratifying it is to be involved in a program that brings historical enemies face to face to share their stories.

2 But 2011 was a tough year for fundraisers, and my friend has been doing double duty as her understaffed organization struggles to make up the shortfall. Like many nowadays, she takes her work home with her, which has taken a toll on her personal life, health and sleep. She is thinking of leaving the nonprofit but is afraid to do so before she finds another job.

3 Another friend, who is employed by a large insurance company, is routinely forced to work late and at home on weekends—often without pay—on the projects she didn't have time to finish at the office. With the threat of layoffs ever-present, she dares not complain. . . .

4 Americans already work hundreds of hours a year more than their counterparts in other developed countries, including workaholic Japan. They also have fewer days off than Europeans, who typically take four to six weeks of paid vacation a year.

5 Companies argue that grueling work schedules are necessary to boost productivity. But consider that, despite the recession, the productivity of U.S. workers has increased more than fourfold since the 1950s. Meanwhile, the buying power of wages has remained stagnant and in recent years has even begun to decline. Someone is getting rich off the exponential rise in productivity, but it is not the American worker.

6 In the past, unions struggled not only to raise pay but also to shorten the hours that their members had to work. The trend toward shorter hours continued unabated from the Civil War through the end of the Great Depression and the enactment, in 1938, of the Fair Labor Standard Act's 40-hour-week provision. But during World War II work hours increased sharply, and it has not been a significant public issue since.

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7 Given the recent troubles in the U.S. economy, this may seem an odd moment to reconsider the value of working less. But this crisis is not due to poor productivity; U.S. workers' productivity is at an all-time high. Neither is it a crisis in corporate profitability, which continues to soar despite tough economic times for ordinary Americans. It is arguably a crisis in corporate greed, one created by financial entities pushing for ever higher growth rates and levels of profitability regardless of the cost to the long-term health of the economy or for those whose hard work made that economy flourish over the past century.

8 Americans know that we can no longer afford a corporate culture on steroids that generates unsustainable profits by systematically cannibalizing our nation and the people who make it work. So a good place to start applying the brakes on this runaway train would be making sure that we don't have to kill ourselves at work just to make a living.

9 A widescale reduction in work hours would spread out the national workload and help to make more jobs available for the unemployed. Historically, shorter workweeks have been as large a creator of new jobs as market growth, sociology professor Juliet Schor argued last year.

10 While shorter hours would mean less income for many, nearly half of Americans surveyed in 2004 by the Center for a New American Dream said that they would be willing to accept a smaller paycheck in return for more time with their families and leisure. This would help explain the popularity of four-day workweeks; a pilot program in Utah found 82 percent of state workers surveyed said that they liked the change and wanted to stick with it.

11 The benefits of shortening the workweek would be incalculable for Americans' health and well being. And it would even be good for the planet. A 2006 study by the Center for Economic and Policy Research estimated that, if the United States were to emulate the shorter workweeks of Western Europe, energy consumption would decline about 20 percent and our country could significantly diminish its carbon footprint. Millions of Americans could live with less stress and more happiness and fulfillment.

12 With so much to gain, we need to cut work hours while there is still time.

Write an essay in which you explain how Richard Schiffman builds an argument to persuade his audience that Americans need to work fewer hours. In your essay, analyze how Schiffman uses one or more of the features listed in the box above (or features of your own choice) to strengthen the logic and persuasiveness of his argument. Be sure that your analysis focuses on the most relevant features of the passage.

Your essay should not explain whether you agree with Schiffman's claims, but rather explain how Schiffman builds an argument to persuade his audience.

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As you read the passage below, consider how Nancy Kalish uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

Adapted from Nancy Kalish, "The Early Bird Gets the Bad Grade." ©2008 by The New York Times Company. Originally published January 14, 2008.

1 It's Monday morning, and you're having trouble waking your teenagers. You're not alone. Indeed, each morning, few of the country's 17 million high school students are awake enough to get much out of their first class, particularly if it starts before 8 a.m. Sure, many of them stayed up too late the night before, but not because they wanted to.

2 Research shows that teenagers' body clocks are set to a schedule that is different from that of younger children or adults. This prevents adolescents from dropping off until around 11 p.m., when they produce the sleep-inducing hormone melatonin, and waking up much before 8 a.m. when their bodies stop producing melatonin. The result is that the first class of the morning is often a waste, with as many as 28 percent of students falling asleep, according to a National Sleep Foundation poll. Some are so sleepy they don't even show up, contributing to failure and dropout rates.

3 Many of our presidential candidates have been relatively silent on how they plan to save our troubled education system. For those still searching for a policy that might have a positive impact, here's an idea: . . . support changing the hours of the school day, starting it later for teenagers and ending it later for all children.

4 Indeed, no one does well when they're sleep-deprived, but insufficient sleep among children has been linked to obesity and to learning issues like attention deficit/hyperactivity disorder. You'd think this would spur educators to take action, and a handful have.

5 In 2002, high schools in Jessamine County in Kentucky pushed back the first bell to 8:40 a.m., from 7:30 a.m. Attendance immediately went up, as did scores on standardized tests, which have continued to rise each year. Districts in Virginia and Connecticut have achieved similar success. In Minneapolis and Edina, Minn., which instituted high school start times of 8:40 a.m. and 8:30 a.m. respectively in 1997, students' grades rose slightly and lateness, behavioral problems and dropout rates decreased.

6 Later is also safer. When high schools in Fayette County in Kentucky delayed their start times to 8:30 a.m., the number of teenagers involved in car crashes dropped, even as they rose in the state.

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7 So why hasn't every school board moved back that first bell? Well, it seems that improving teenagers' performance takes a back seat to more pressing concerns: the cost of additional bus service, the difficulty of adjusting after-school activity schedules and the inconvenience to teachers and parents.

8 But few of these problems actually come to pass, according to the Center for Applied Research and Educational Improvement at the University of Minnesota. In Kentucky and Minnesota, simply flipping the starting times for the elementary and high schools meant no extra cost for buses. Nor have after-school jobs and activities been affected as anticipated. And though team practices and matches might have to start a bit later, student participation has usually stayed the same. Some districts have even witnessed improved performance from better-rested athletes.

9 Of course, when school starts later, it has to end later. But instead of viewing this as a liability, we should see it as an opportunity to extend the day even further until 5 p.m. or later, not just for high school students but for those in elementary and middle school as well. It would help working parents if their children were on the same basic schedule.

10 But there are other reasons to start and end school at a later time. According to Paul Reville, a professor of education policy at Harvard and chairman of the Massachusetts Board of Education, "Trying to cram everything our 21st-century students need into a 19th-century six-and-a-half-hour day just isn't working." He says that children learn more at a less frantic pace, and that lengthening the school day would help "close the achievement gap between disadvantaged students and their better-off peers."

11 Massachusetts has opened more than a dozen "expanded learning time" schools, which add about three hours to the school day. Students spend additional time on subjects like math and English, but also enjoy plentiful art, music, physical education and recess—all of which are being slashed at many schools. . . .

12 So if candidates want the parent vote, here's a wake-up call. Stand up for an educational policy that allows students' real needs—rather than outdated time constraints—to dictate how and when our children learn best.

Write an essay in which you explain how Nancy Kalish builds an argument to persuade her audience that high school start time should be later in the day. In your essay, analyze how Kalish uses one or more of the features listed in the box above (or features of your own choice) to strengthen the logic and persuasiveness of her argument. Be sure that your analysis focuses on the most relevant features of the passage.

Your essay should not explain whether you agree with Kalish's claims, but rather explain how Kalish builds an argument to persuade her audience.

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Answer Key – Determine Raw Scores

Reading Test Answers

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

Reading Test Raw Score
(Number of Correct Answers)

Writing and Language Test Answers

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

Writing and Language Test Raw Score
(Number of Correct Answers)

"U" indicates a question that did not perform as expected and has been removed from scoring.

Answer Key – Determine Raw Scores (continued)

Math Test – No Calculator Answers

Question #	Correct Answer	Question #	Correct Answer	Question #	Correct Answer	Question #	Correct Answer
1	D	5	C	9	A	13	D
2	B	6	C	10	D	14	A
3	B	7	B	11	D	15	C
4	B	8	A	12	A		

Question #	Correct Answer
16	16
17	10
18	9/2,4.5
19	6
20	1.2,6/5

Math Test – No Calculator Raw Score
(Number of Correct Answers)

Math Test – Calculator Answers

Question #	Correct Answer	Question #	Correct Answer	Question #	Correct Answer	Question #	Correct Answer
1	A	9	C	17	B	25	D
2	C	10	B	18	C	26	D
3	D	11	C	19	C	27	A
4	A	12	B	20	D	28	D
5	A	13	A	21	A	29	A
6	B	14	D	22	D	30	C
7	C	15	D	23	C		
8	A	16	C	24	B		

Question #	Correct Answer
31	5
32	30
33	27.4,137/5
34	0<x<1
35	11
36	2.5,5/2
37	1/4,.25
38	2

Math Test – Calculator Raw Score
(Number of Correct Answers)

"U" indicates a question that did not perform as expected and has been removed from scoring.

CONVERSION TABLES

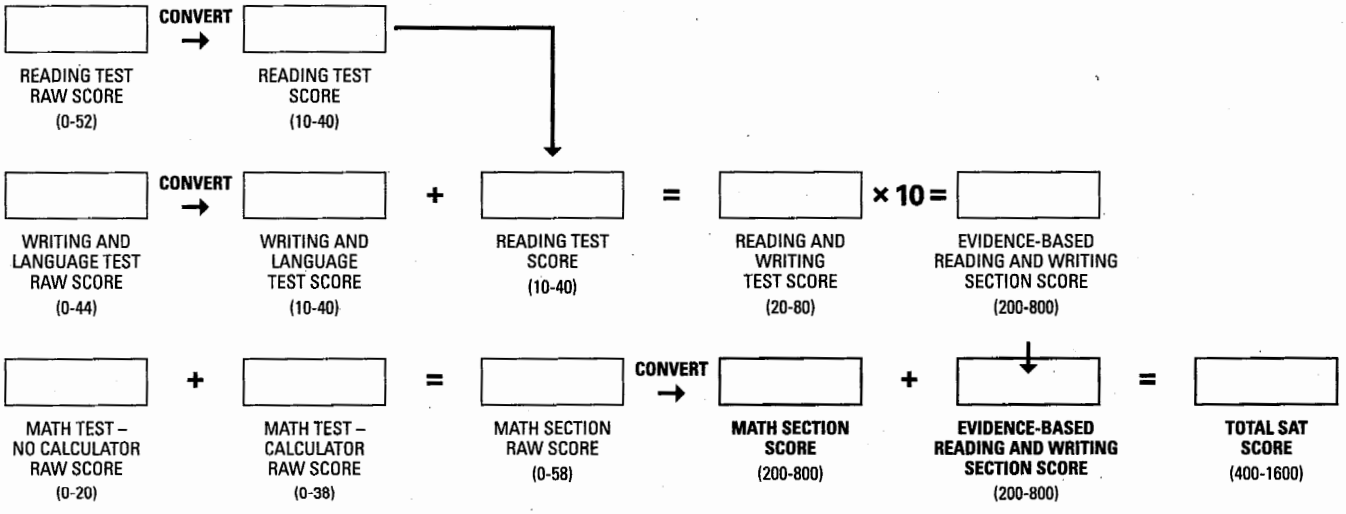
Raw Score Conversion – Section and Test Scores

Section and Test Scores

RAW SCORE CONVERSION TABLE 1

Raw Score (# of correct answers)	Math Section Score	Reading Test Score	Writing and Language Test Score
0	200	10	10
1	200	10	10
2	210	10	10
3	230	10	11
4	240	11	11
5	260	12	12
6	270	13	13
7	290	14	14
8	300	15	15
9	310	15	16
10	330	16	16
11	340	17	17
12	350	17	18
13	370	18	18
14	380	18	19
15	390	19	20
16	410	19	21
17	420	20	22
18	430	20	22
19	440	21	23
20	450	21	24
21	470	22	25
22	480	23	25
23	490	23	26
24	500	24	27
25	510	24	27
26	510	25	28
27	520	25	29
28	530	26	29
29	530	27	30

Raw Score (# of correct answers)	Math Section Score	Reading Test Score	Writing and Language Test Score
30	540	27	30
31	550	28	31
32	550	28	31
33	560	29	32
34	570	30	33
35	580	30	33
36	590	31	34
37	590	31	34
38	600	32	35
39	610	32	36
40	620	33	37
41	630	34	38
42	640	34	39
43	640	35	39
44	650	36	40
45	660	37	
46	670	38	
47	680	38	
48	690	39	
49	700	39	
50	710	39	
51	720	40	
52	730	40	
53	740		
54	750		
55	770		
56	780		
57	790		
58	800		

Section and Test Scores

CONVERSION EQUATION 1