



## Chapter 26

### Practice Test 4

# 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 describes the life and work of Phyllis Wheatley (1753-1784), a poet from Massachusetts.

The role of African-American authors in what we more broadly call “American literature” is now well-known. Not only is Toni Morrison widely revered as the greatest novelist of the era after World War II, Zora Neale Hurston’s *Their Eyes Were Watching God* (1937) is the most-read book in American high schools. What many do not realize, however, is that the tradition of African-American literature goes back to the origins of the country itself. While the widespread practice of slavery (and its attendant prohibitions on literacy) stained American history for many hundreds of years, a few remarkable individuals wrote on, and not just in the form of slave narratives (like that of Frederick Douglass), but in the less overtly political arts of poetry and fiction.

Perhaps one of the most curious of these early authors is Phyllis Wheatley, the first published African-American poet in the United States. Although the exact circumstances are unknown, Wheatley was born in West Africa (Wheatley scholars hypothesize that it was either modern-day Gambia or Senegal) around 1753. When Wheatley was 8 years old, she was captured by slave traders and sold to wealthy Boston merchant John Wheatley. This single event contains so many facets that point to just how remarkable and tragic Wheatley’s story is. Her very name, Phyllis Wheatley, is a combination of the name of her master and the slave ship, *The Phillis*, that abducted her from her homeland. Then, she was a slave in Massachusetts,

a state known for its abolitionists, in that brief period before 1783, when slavery was effectively abolished in the northern state. All of these circumstances and contradictions certainly go some of the way to explaining Wheatley’s remarkable achievements, but they do just as much to make us wonder how she was able to achieve them at all.

While his honorary term may seem like a cruel oxymoron to us today, John Wheatley was a “progressive” slave owner, which meant primarily that he devoted some of his resources to his slaves’ thorough education. By the time she was twelve years old, Phyllis could read the New Testament in Greek, and she was familiar with the great Roman works in their original Latin. Seeing that Phyllis had a special aptitude for these subjects, the Wheatleys soon gave Phyllis’s duties to other slaves and allowed her to focus on her studies and, soon, her poetry.

Wheatley’s story only becomes more fantastic from there. In 1776, Wheatley sent a copy of her poem “To His Excellency, George Washington” to Washington himself, and she was invited to his headquarters in Cambridge, MA, to meet him soon after. Thomas Paine included “To His Excellency” in the *Pennsylvania Gazette* in April 1776, and Thomas Jefferson praised Wheatley’s poems in *Notes on the State of Virginia* (1801-1805).

Tragically, for all her favorable circumstances, Wheatley would not continue her successes. John Wheatley freed Wheatley at his death in 1778. Shortly thereafter, Wheatley married a “free man of color,” but the couple was soon wracked with debt and hardship.

By the time of her death in 1784, at the young age of 31, Wheatley was completely impoverished, surviving on the meager wages she earned from domestic work. Even though Wheatley had been freed in a “progressive” state, racism and sexism were rampant in all parts of the country at that time, and Wheatley could not find a place as a plain citizen, let alone as a famous poet.

Today, Wheatley’s story seems to provide more questions than answers. For one, Wheatley was never outwardly critical of or resistant to her place as a slave. Her most famous poem, “On Being Brought From Africa to America,” begins with the curious lines, “’Twas mercy brought me from my Pagan land,/ Taught my benighted soul to understand.” Nothing of abduction or cruelty at all, until the final lines, “Remember Christians, Negroes, black as Cain,/ May be refin’d, and join th’ angelic train.” But even here, Wheatley seems to be suggesting that all Africans can be, in a sense, redeemed by an experience like the one she had—that is, an experience as the slave of a “refin’d” white owner.

Wheatley’s poems are more read today than they have been in many years. And while her story does not seem to contain all the hallmarks of overcoming adversity that we might expect from a freed slave, the story nevertheless shows a triumph over the odds and a revealing look into the mind of one from among history’s most voiceless groups.

1

The primary purpose of the passage as a whole is to

- A) criticize readers for not having read more works by authors subjected to adverse circumstances.
- B) describe the life and work of an author while noting some of the complications of that life and work.
- C) outline a general history of African-American literature and discuss its major figures.
- D) praise one slaveholder for his particularly forward-thinking views by showing his kindness to slaves.

2

Based on the information in the passage, Phyllis Wheatley’s life can best be described as

- A) difficult, because she was never freed from slavery despite her fame as a poet.
- B) charmed, because she was given so many wonderful opportunities upon arriving at the Wheatleys’ home.
- C) impressive, although it contains many aspects that are troubling or confusing to present-day readers.
- D) contemplative, although some of the sentiments in her work show a refusal to think deeply about her own life.

3

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

- A) Lines 18-24 (“Although . . . Wheatley”)
- B) Lines 48-56 (“Wheatley’s story . . . 1805”)
- C) Lines 57-69 (“Tragically . . . poet”)
- D) Lines 84-90 (“Wheatley’s poems . . . groups”)

4

The passage suggests which of the following about Phyllis Wheatley’s popularity?

- A) Her family was prominent in Massachusetts, and she gained all of her connections through the family.
- B) She was admired in the United States, but she achieved greater fame in Europe.
- C) She was considered one of the greatest poets in the country, but few people consider her a great poet today.
- D) She was admired by prominent people, but such admiration did not make her life less difficult.

5

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

- A) Lines 1-6 and 84-90
- B) Lines 24-32 and 73-83
- C) Lines 44-47 and 84-90
- D) Lines 48-56 and 57-65

6

The reference to Frederick Douglass in lines 13-14 serves primarily to

- A) name a writer whose life story is less interesting than Wheatley's.
- B) allude to a type of literary achievement distinct from Wheatley's.
- C) note a discrepancy in literary history that is not often acknowledged.
- D) refer to a friend of Wheatley's who encouraged the publication of her work.

7

In context, the "circumstances" in line 19 refer to

- A) precise and complete biographical details.
- B) unintended consequences and failures.
- C) climate and weather conditions.
- D) general context and historical events.

8

The information in lines 41-47 primarily illustrates Phyllis Wheatley's

- A) remarkable aptitude.
- B) poetic nature.
- C) vicious subjection.
- D) confounding life.

9

The word "progressive" appears in quotations in line 39 and line 66 in order to emphasize

- A) the remarkable achievement of those who behave well before it is common to do so.
- B) the awkwardness of using contemporary terms to described past events.
- C) the difficult nature of describing negative behavior in a positive way.
- D) the fact that the word comes from Wheatley's poetry and essays.

10

As used in line 86, "hallmarks" most nearly means

- A) distinctive features.
- B) cordial greetings.
- C) political leanings.
- D) troublesome qualities.

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

This passage is adapted from a “fireside chat” given on May 7, 1933, by Franklin Roosevelt. Roosevelt gave these addresses to the American public over the new technology of radio. The “chats,” as the name implies, were intended as simplified versions and explanations of the challenges facing the country at that time.

On a Sunday night a week after my Inauguration I used the radio to tell you about the banking crisis and the measures we were taking to meet it. I think that  
 Line in that way I made clear to the country various facts  
 5 that might otherwise have been misunderstood and in general provided a means of understanding which did much to restore confidence.

Tonight, eight weeks later, I come for the second time to give you my report—in the same spirit and by  
 10 the same means to tell you about what we have been doing and what we are planning to do.

Two months ago we were facing serious problems. The country was dying by inches. It was dying because trade and commerce had declined to dangerously low  
 15 levels; prices for basic commodities were such as to destroy the value of the assets of national institutions such as banks, savings banks, insurance companies, and others. These institutions, because of their great needs, were foreclosing mortgages, calling loans,  
 20 refusing credit. Thus there was actually in process of destruction the property of millions of people who had borrowed money on that property in terms of dollars which had had an entirely different value from the level of March, 1933. That situation in that crisis did  
 25 not call for any complicated consideration of economic panaceas or fancy plans. We were faced by a condition and not a theory.

Today we have reason to believe that things are a little better than they were two months ago.  
 30 Industry has picked up, railroads are carrying more freight, farm prices are better, but I am not going to indulge in issuing proclamations of overenthusiastic assurance. We cannot bally-ho ourselves back to prosperity. I am going to be honest at all times with  
 35 the people of the country. I do not want the people of this country to take the foolish course of letting this improvement come back on another speculative wave. I do not want the people to believe that because of unjustified optimism we can resume the ruinous  
 40 practice of increasing our crop output and our factory output in the hope that a kind providence will find

buyers at high prices. Such a course may bring us immediate and false prosperity but it will be the kind of prosperity that will lead us into another tailspin.

45 It is wholly wrong to call the measure that we have taken Government control of farming, control of industry, and control of transportation. It is rather a partnership between Government and farming and industry and transportation, not partnership in profits,  
 50 for the profits would still go to the citizens, but rather a partnership in planning and partnership to see that the plans are carried out.

We are working toward a definite goal, which is to prevent the return of conditions which came very close to destroying what we call modern civilization.  
 55 The actual accomplishment of our purpose cannot be attained in a day. Our policies are wholly within purposes for which our American Constitutional Government was established 150 years ago.



Source: *Global Financial Data*

11

Roosevelt’s primary purpose in this speech is to

- A) criticize his detractors while drumming up support for his re-election campaign.
- B) plead for more time to make adjustments to an unsuccessful plan.
- C) reassure the public about the efficacy and appropriateness of actions the government has taken.
- D) showcase his own achievements as a leader and ask for greater indulgence.

12

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

- A) Lines 1-7 (“On a Sunday . . . confidence”)
- B) Lines 18-24 (“These institutions . . . 1933”)
- C) Lines 34-35 (“I am . . . country”)
- D) Lines 53-59 (“We are . . . ago”)

13

As used in line 13, “by inches” most nearly means

- A) with that form of measurement.
- B) in a gradual way.
- C) in a short time.
- D) on its feet.

14

Based on the information in lines 12-20, Roosevelt believes that the “national institutions” are

- A) criminals who are stealing from those who have invested money in their institutions.
- B) overly dependent on the value of commodities to run successful businesses.
- C) devoted to the implementation of economic theories that were unsuccessful.
- D) struggling in such a way that they do unfortunate things to investors.

15

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

- A) Lines 8-11 (“Tonight . . . do”)
- B) Lines 13-24 (“It . . . 1933”)
- C) Lines 28-33 (“Today . . . assurance”)
- D) Lines 35-42 (“I . . . high prices”)

16

In lines 26-27, what is the most likely reason that Roosevelt refers to a “condition and not a theory”?

- A) He is issuing a proclamation on new health initiatives within the United States.
- B) He is suggesting that the problem is concrete rather than abstract.
- C) He is holding economic theorists responsible for the current economic turmoil.
- D) He is implying that the current economic crisis cannot be solved.

17

In lines 28-33, Roosevelt makes a distinction between

- A) politicians and citizens.
- B) conditions and theories.
- C) cautious optimism and full-throated support of a recovery
- D) bankers and farmers.

18

Based on the information in the fourth paragraph (lines 28-52), the economic situation in the United States has improved in all of the following ways EXCEPT

- A) increased railroad traffic.
- B) increased industry.
- C) a second speculative wave.
- D) improved crop prices.

19

As used in line 41, “providence” most nearly means

- A) religion.
- B) luck.
- C) prayer.
- D) industry.

20

Which of the following gives accurate information based on the graph?

- A) Roosevelt's purpose was accomplished in 2008 when the unemployment rate hit an all-time low of 6.1%.
- B) Government control of farming, industry, and transportation resulted in a steady decrease in unemployment through the 1940s.
- C) The partnership between government and farming brought an end to unemployment in 1943.
- D) Roosevelt was addressing Americans at a time when unemployment was higher than it would be for the next 70 years.

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

The following passage comes from George Washington Cable's *The Silent South*, published in *The Century* in 1885. In the passage, Cable defends attacks against his previous article, "The Freedman's Case in Equity," which advanced full civil rights and equality for the slaves freed in 1865 amid national Civil War.

Line 5 But now that we have clearly made out exactly what this immovable hostility is, the question follows—and half the nation are asking it today with perplexed brows—*why* is it? Yet the answer is simple. Many white people of the South sincerely believe that the recognition of rights proposed in the old Civil Rights bills or "The Freedman's Case in Equity" would precipitate a social chaos. They believe Civil Rights means Social Equality. This may seem a transparent error, but certainly any community in the world that believed it, would hold the two ideas in equal abomination; and it is because of the total unconsciousness and intense activity of this error at the South, and the subtle sense of unsafety that naturally accompanies it,—it is because of this, rather than for lack of clearness in its statement of the subject, that the article on "The Freedman's Case in Equity" is so grossly misinterpreted even by some who undoubtedly wish to be fair. That this is the true cause of the misinterpretation is clear in the fact that from the first printing of the article until now the misconstruction has occurred only among those whose thinking still runs in the grooves of the old traditions.

Nothing in that paper touches or seeks to touch the domain of social privileges. The standing of the magazine in which it appears is guarantee against the possibility of the paper containing any such insult to the intelligence of enlightened society. Social equality is a fool's dream. The present writer wants quite a little of it as the most fervent traditionist of the most fervent South. The North, the West, the East, and the rest of the intelligent world, want quite as little of it as the South wants. Social equality can never exist where a community, numerous enough to assert itself, is actuated, as every civilized community is, by an intellectual and moral ambition. No form of laws, no definition of rights, from Anarchy to Utopia, can bring it about. The fear that this or that change will produce it ought never to be any but a fool's fear. And yet there is this to be added; that no other people in America are doing so much for social equality as those who, while

they warmly charge it upon others, are themselves thrusting arbitrary and cheap artificial distinctions into the delicate machinery of society's self-distribution as it revolves by the power of our natural impulses, and of morality, personal interest, and personal preferences. This, of course, is not the intention, and even these persons retard only incidentally, unawares and within narrow limits, nature's social distributions, while taking diligent and absolutely needless pains to apart two races which really have no social affinity at all.

Do we charge any bad intention or conscious false pretense? Not at all! They are merely making the double mistake of first classing as personal social privileges certain common impersonal rights of man, and then turning about and treating them as rights definable by law—which social amenities are not and cannot be.

For the sake of any who might still misunderstand, let us enlarge here a moment. The family relation has rights. Hence marital laws and laws of succession. But beyond the family circle there are no such things as social rights; and when our traditionists talk about a too hasty sympathy having "fixed by enactment" the negro's social and civil rights they talk—unwisely. All the relations of life that go by *impersonal right* are Civil relations. All that go by *personal choice* are Social relations. The one is all of right, it makes no difference who we are; the other is all of choice, and it makes all the difference who we are; and it is no little fault against ourselves as well as others, to make confusion between the two relations. For the one we make laws; for the other everyone consults his own pleasure; and the law that refuses to protect a civil right, construing it a social privilege, deserves no more regard than if it should declare to be a civil right. Social *choice*, civil rights; but a civil *privilege*, in America, is simply heresy against both our great national political parties at once.

21

In the article, the role that Cable plays can best be described as that of

- A) a traditionalist attacking an article published in a magazine.
- B) a theorist defending his views against those who misconstrue them.
- C) an ideologue creating social unrest with his uncompromising views.
- D) an observer describing two sides of an argument with equal sympathy.



22

Based on the information presented in Cable’s article, it can be inferred that those who oppose civil equality for African-Americans

- A) have refused to read his earlier article with adequate care.
- B) willfully misunderstand the basic tenets of the U.S. Constitution.
- C) believe that such equality will lead to an undesirable social mixing.
- D) cite legal technicalities in order to further their own arguments.

23

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

- A) Lines 8-9 (“They . . . Equality”)
- B) Lines 24-25 (“Nothing . . . privileges”)
- C) Lines 36-38 (“No . . . about”)
- D) Lines 39-46 (“And . . . preferences”)

24

As used in line 23, “runs in the grooves of” most nearly means

- A) corresponds with.
- B) dances along to.
- C) cuts an irregular pattern in.
- D) breaks violently from.

25

The principal rhetorical effect of the phrase in lines 31-32 (“The North . . . world”) is to

- A) identify the disagreements described in the article as those of particular regions.
- B) outline the places that have already accepted Cable’s views and to encourage the South to join them.
- C) suggest that there is widespread agreement about a single fundamental principle.
- D) praise some parts of the United States for being more intelligent than others.

26

Cable refers to “the delicate machinery of society’s self-distribution” (line 44) in order to

- A) demonstrate that his detractors violate a natural order with a misguided set of rules.
- B) praise the United States for its perfect alignment with natural human needs.
- C) use figurative language that encapsulates his views on the substance of a debate.
- D) scold readers for their belief in an unworkable and impractical system of government.

27

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

- A) Lines 5-8 (“Many . . . chaos”)
- B) Lines 47-51 (“This . . . at all”)
- C) Lines 52-58 (“Do we . . . cannot be”)
- D) Lines 60-61 (“The family . . . succession”)

28

The primary purpose of the third paragraph (lines 52-58) as it relates to the passage as a whole is to

- A) speak ironically of people’s good intentions while disparaging those who disagree.
- B) concede the good intentions of detractors while introducing a main point.
- C) summarize the arguments presented in the first two paragraphs in much the same language.
- D) close the debate by refusing to acknowledge the views of another side.

29

As used in line 73, “pleasure” most nearly means

- A) discretion.
- B) hedonism.
- C) manipulation.
- D) fun.

30

In the final paragraph of the passage, Cable's attitude toward those who cite social rights (lines 61-63) can best be described as

- A) hostile.
- B) legalistic.
- C) skeptical.
- D) supportive.

31

Based on the final paragraph, Cable's definition of civil rights includes all of the following EXCEPT

- A) legal protection for all races.
- B) rights that can be dictated by law.
- C) nothing about social interaction.
- D) interactions based on personal preference.

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

The following two passages are adapted from a special issue of a scientific journal, in which the origins of human bipedalism (walking on two legs rather than four) are discussed.

**Passage 1**

One of the central mysteries of human evolution is that of *bipedalism*, or walking on two legs rather than four. If humans have four limbs like their primate

ancestors, why do they use only two of them to walk?

A number of theories have been proposed over the years, but one of the most compelling remains Charles Darwin's own. The advanced intelligence of the early human ancestors meant that they had more uses for their two free limbs. Imagine bringing the groceries in from the car: if you were using all four of your limbs to walk inside, how much could you carry? Not much, and the same was true for our early human ancestors.

Early humans could not only carry more food back to their families. They could also begin to use the tools of the Stone Age: the early tools that archaeologists and others have found were operated manually, suggesting that early human hands evolved to have more dexterity than feet do. With more dexterity came more delicacy; early human feet were meant to plod along, while early human hands were involved in higher-order operations.

In other words, bipedalism and human intelligence are mutually constitutive. Modern humans can't have one without the other. The obvious truth of such a claim is evident in any of the other decidedly human evolutions: we write with our hands, not our feet, for instance, and all of the tremendous advances in medical science, particularly in surgery, are frankly inconceivable without this combination of superior intelligence and dexterity. Human evolution, in this sense, can be seen as the evolution of human handiness, and the split from our nearest primate ancestors 4 to 7 million years ago can be explained by the idea that we stood up as they continued to walk on all fours.

**Passage 2**

The author of Passage 1 cites an early theory from the Father of Evolution, but recent studies have shown the matter to be more than a question of human intelligence. After all, Darwin's theory shows more than anything a researcher's bias. If he seeks to prove,

ultimately, that humans are an "evolved" species, then all of his theories must necessarily support this idea.

This is not to say that Darwin's theory is necessarily wrong; it may be merely incomplete. It is conceivable, for instance, that bipedalism did ultimately contribute to the evolution of human intelligence, but such a theory does not explain the cause. We do not accept Passage 1's proposition that "bipedalism and human intelligence are mutually constitutive." Bipedalism must have come first. It may have led to increased human intelligence, but to imagine some divine model of an already-intelligent brain saying, "Let us walk on two legs!" is something that reason cannot brook.

A study issued in 2007 in the *Proceedings of the National Academy of Sciences* shows definitively the scientific basis for bipedalism: energy. Three researchers studied the various perambulatory habits of chimpanzees (humans' closest living ancestor) and humans. With both the humans and the chimpanzees on a treadmill, the researchers used oxygen masks to record energy expenditure. They found that the chimpanzees expended equal amounts of energy walking on two and four limbs. The humans, however, used 75 percent less energy walking upright than walking on all fours.

These data show clearly that bipedalism was an energy-saving measure for humans. This initial bipedalism led to a number of other evolving traits: humans tended to use smaller muscles, which helped with energy efficiency, and evolved longer legs and thicker bones, which helped to distribute the weight in more efficient ways. It is plausible that this eventually led to a particularly bipedal kind of intelligence, but we can't know for sure. That must be a matter for the speculators. For the scientists, however, we have solved the mystery of bipedalism.

32

The author mentions primate ancestors (lines 3-4) in order to

- A) suggest that scientists have wondered about bipedalism since before written history.
- B) doubt the claims of evolutionary biologists who cite monkeys as human ancestors.
- C) establish a link between two groups that shows how significantly one of those groups has changed.
- D) answer the question posed in the second half of the sentence.

33

In Passage 1, the reference to “two free limbs” (line 9) serves to

- A) emphasize that the two limbs used for walking have grown much stronger.
- B) explain why animals that walk on all fours cannot go grocery shopping.
- C) criticize bipedal animals for not taking full advantage of all of their limbs.
- D) imply that bipedal animals can use some of their limbs for higher-order functions.

34

As used in line 16, “manually” most nearly means

- A) without technology.
- B) by hand.
- C) with difficulty.
- D) by humans.

35

In discussing the nature of human handiness, the author of Passage 1 suggests that

- A) humans’ intellectual ability is inseparable from skillful use of hands.
- B) humans’ hands were useless for a long while before humans developed sufficient intellectual sophistication.
- C) human dexterity took approximately 4 to 7 million years to develop.
- D) humans would be just as intelligent if they wrote with their feet rather than their hands.

36

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

- A) Lines 1-3 (“One . . . four”)
- B) Lines 14-18 (“They . . . do”)
- C) Lines 24-30 (“The . . . dexterity”)
- D) Lines 30-35 (“Human . . . fours”)

37

As used in line 53, “brook” most nearly means

- A) stream.
- B) allow.
- C) flow.
- D) block.

38

The third paragraph of Passage 2 (lines 54-65) primarily serves to

- A) question research methods that would put monkeys on treadmills.
- B) criticize the author of Passage 1 for his outmoded research.
- C) introduce new findings that offer a new take on an old debate.
- D) give a detailed account of an average laboratory research setup.

39

From the information presented in Passage 2, it can be inferred that

- A) humans and primates stemmed from a common ancestor.
- B) the author of Passage 2 rejects Darwin’s theory of human evolution.
- C) human ancestors required a certain level of intelligence before they could see the efficiency of bipedalism.
- D) the debate surrounding human bipedalism was resolved in 2007.

40

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

- A) Lines 39-40 (“After . . . bias”)
- B) Lines 44-47 (“It is . . . cause”)
- C) Lines 54-56 (“A study . . . energy”)
- D) Lines 56-59 (“Three . . . humans”)

41

The authors of both passages would most likely agree with which of the following?

- A) Bipedalism and human intelligence evolved at the same time in history.
- B) If primates were to walk on two legs, they would expend less energy.
- C) Primates would expend as much energy as humans if the two went grocery shopping.
- D) Human use of hands and human intelligence are likely connected in the evolutionary process.

42

What is the primary difference in the way Passages 1 and 2 incorporate new information?

- A) Passage 1 uses contemporary analogies while Passage 2 uses modern scientific research.
- B) Passage 1 dismisses newer scientific research while Passage 2 uses it sparingly.
- C) Passage 1 uses new scientific research while Passage 2 is more interested in deductive reasoning.
- D) Passage 1 is eager to incorporate new materials while Passage 2 dismisses any theories that come after Darwin’s.

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

The following article is adapted from Robert Martone, “Scientists Discover Children’s Cells Living in Mothers’ Brains,” in *Scientific American* (December 4, 2014).

The link between a mother and child is profound, and new research suggests a physical connection even deeper than anyone thought. The profound psychological and physical bonds shared by the mother and her child begin during gestation when the mother is everything for the developing fetus, supplying warmth and sustenance, while her heartbeat provides a soothing constant rhythm.

The physical connection between mother and fetus is provided by the placenta, an organ built of cells from both the mother and fetus, which serves as a conduit for the exchange of nutrients, gasses, and wastes. Cells may migrate through the placenta between the mother and the fetus, taking up residence in many organs of the body including the lung, thyroid, muscle, liver, heart, kidney and skin. These may have a broad range of impacts, from tissue repair and cancer prevention to sparking immune disorders.

It is remarkable that it is so common for cells from one individual to integrate into the tissues of another distinct person. We are accustomed to thinking of ourselves as singular autonomous individuals, and these foreign cells seem to belie that notion and suggest that most people carry remnants of other individuals. As remarkable as this may be, stunning results from a new study show that cells from other individuals are also found in the brain. In this study, male cells were found in the brains of women and had been living there, in some cases, for several decades. What impact they may have had is now only a guess, but this study revealed that these cells were less common in the brains of women who had Alzheimer’s disease, suggesting they may be related to the health of the brain.

We all consider our bodies to be our own unique being, so the notion that we may harbor cells from other people in our bodies seems strange. Even stranger is the thought that, although we certainly consider our actions and decisions as originating in the activity of our own individual brains, cells from other individuals are living and functioning in that complex structure. However, the mixing of cells from genetically distinct individuals is not at all uncommon. This condition is called *chimerism* after

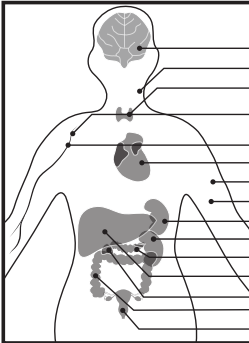
the fire-breathing Chimera from Greek mythology, a creature that was part serpent, part lion, and part goat. Naturally occurring chimeras are far less ominous though, and include such creatures as the slime mold and corals.

*Microchimerism* is the persistent presence of a few genetically distinct cells in an organism. This was first noticed in humans many years ago when cells containing the male “Y” chromosome were found circulating in the blood of women after pregnancy. Since these cells are genetically male, they could not have been the women’s own, but most likely came from their babies during gestation.

In this new study, scientists observed that microchimeric cells are not only found circulating in the blood, they are also embedded in the brain. They examined the brains of deceased women for the presence of cells containing the male “Y” chromosome. They found such cells in more than 60 percent of the brains and in multiple brain regions. Since Alzheimer’s disease\* is more common in women who have had multiple pregnancies, they suspected that the number of fetal cells would be greater in women with AD compared to those who had no evidence for neurological disease. The results were precisely the opposite: there were fewer fetal-derived cells in women with Alzheimer’s. The reasons are unclear.

Microchimerism most commonly results from the exchange of cells across the placenta during pregnancy; however, there is also evidence that cells may be transferred from mother to infant through nursing. In addition to exchange between mother and fetus, there may be exchange of cells between twins *in utero*, and there is also the possibility that cells from an older sibling residing in the mother may find their way back across the placenta to a younger sibling during the latter’s gestation. Women may have microchimeric cells both from their mothers as well as from their own pregnancies, and there is even evidence for competition between cells from grandmother and infant within the mother.

\*a neurogenerative disease that, among other symptoms, causes problems with memory.



Organ	Presumed cell type	Maternal origin Mc	Fetal origin Mc
Brain	Neurons(murine)		x
Lymph node	Hematopoietic cells		x
Thyroid	Epithelial cells, thyrocytes		x
Blood	T cells, Bcells, monocytes/macrophages, NK cells, granulocytes	x	x
Blood	Lymphoid progenitor cells		x
Heart	Cardiac myocytes	x	x
Skin	Endothelial cells		x
Skin	Keratinocytes	x	
Spleen	Hematopoietic cells		x
Kidney	Renal tubular cells	x	
Pancreas	Islet beta cells	x	
Liver	Hepatocytes	x	x
Gallbladder	Epithelial cells		x
Intestine	Epithelial cells		x
Cervix	Epithelial cells		x

Various types of microchimerisms affect humans. The common mother-Mc and fetus-Mc and the organs/presumed cell types affected by them are shown.

43

What is the rhetorical effect of the opening line of the passage?

- A) To elicit a response from the reader about his or her personal experience
- B) To cast doubt on a cliché idea that is now outmoded
- C) To introduce a well-known topic to which the author will add new information
- D) To question the fallacy that a mother is closer to her children than a father is

44

Which of the following models the structure of the author's argument throughout the passage?

- A) He outlines a common misconception, shows new evidence to the contrary, then offers a new solution.
- B) He presents his own original research, discusses his methods for acquiring it, then critiques earlier studies.
- C) He questions a new set of data, shows its inconsistencies, then offers his own new hypothesis.
- D) He starts from a point of basic agreement, introduces new information, and speculates about that new information.

45

What is the primary purpose of the passage?

- A) To explain how, while we each have a unique genetic code, cells from other unique individuals may live inside our bodies
- B) To suggest that Alzheimer's disease is caused by cells with "Y" chromosomes
- C) To illustrate the difficulty of drawing conclusions from scientific research
- D) To show how the common conception of the bond between mothers and children is wrong

46

As used in line 22, "autonomous" most nearly means

- A) self-governing.
- B) reliant.
- C) independent.
- D) sovereign.

47

According to the passage, what is one potential outcome of a woman's brain containing dormant male cells?

- A) Women with such cells may be less susceptible to memory disorders.
- B) Women with such cells are less likely to suffer from immune disorders.
- C) Women with such cells tend to be more aggressive and physically stronger.
- D) Women with such cells are more likely to live with men for several decades at a time.

48

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

- A) Lines 16-18 (“These . . . disorders”)
- B) Lines 30-34 (“What . . . brain”)
- C) Lines 51-54 (“This . . . pregnancy”)
- D) Lines 72-76 (“Microchimerism . . . nursing”)

49

Which idea best describes the function of the statement “We all . . . strange” (lines 35-37)?

- A) Many people with certain disorders prefer not to come into contact with strangers.
- B) After birth, children often help their mothers and fathers through difficult times.
- C) The idea that everyone is unique in some way is no longer scientifically provable.
- D) The notion of total individuality may be inconsistent with scientific reality.

50

According to the passage, non-twin siblings may have some cells in common because they

- A) share at least the mother’s half of their genetic makeup.
- B) are present for one another’s significant illnesses.
- C) are less likely to suffer from the memory disorders that afflict the elderly.
- D) may have exchanged unique cells as the younger sibling was in the womb.

51

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

- A) Lines 55-57 (“Since . . . gestation”)
- B) Lines 64-69 (“Since . . . disease”)
- C) Lines 76-81 (“In addition . . . gestation”)
- D) Lines 81-85 (“Women . . . mother”)

52

Based on the information in the passage and the graphic, which of the following most accurately describes an effect of microchimerism?

- A) It is possible that a mother’s cells would be found in the brain of an infant to whom she has given birth.
- B) A women and her fetus exchange an equal number of liver cells during gestation.
- C) It has been firmly established that fetus cells can migrate to the brain of the mother, as well as to several other organs.
- D) It is due to the lack of cells produced and transferred from mother to fetus that children can be born with immune disorders.

**STOP**

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



# 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.

### An Official, Certified... Criminal?

[1] The image is as old as computers themselves. [2] These are the hackers, immortalized in the 1995 cult classic film *Hackers*. [3] Of late, these “cybercriminals” have become the scourge of the American public **1** in recent years because of huge security breaches at major businesses. [4] “Hackers” are the reason we password-protect our WiFi networks and feel a twinge of skepticism every time we pay for something with a credit card. [5] A ponytailed group of geeks, their computer monitors reflecting brightly off of their glasses, breaks into some “mainframe” from an evil corporation. **2**

1

- A) NO CHANGE
- B) in the present day
- C) presently
- D) DELETE the underlined portion.

2

The best placement for sentence 5 would be

- A) where it is now.
- B) after sentence 1.
- C) after sentence 2.
- D) after sentence 3.

3 While the popular image of the hacker might not have changed, it has, in some cases, been given a bit of a makeover. Schools like Hack Reactor in San Francisco teach aspiring software engineers and wear the name “Hack” proudly, as if it’s a sign of 4 authenticity. In this line, a “hacker” is now seen as one whose powers can be used for good as well as ill. There is a new crop of hackers, called Certified Ethical Hackers (CEH), who can help to protect against 5 our evil counterparts and make computers safer for us all.

3

Which of the following would best introduce this paragraph by linking it to ideas from the previous paragraph?

- A) NO CHANGE
- B) Because hacking is a federal crime with a range of punishments,
- C) As identity theft becomes a more public problem,
- D) Although hackers’ style is now more conventionally attractive,

4

Which of the following alternatives to the underlined portion would be LEAST acceptable?

- A) Realness
- B) Legitimacy
- C) Legality
- D) Genuineness

5

- A) NO CHANGE
- B) one’s
- C) the
- D) their

Certified Ethical Hackers follow a course of study either at an Accredited Training Center or by self-study. The final exam is a 125 multiple-choice exam: it takes four hours and requires 70% correct to receive a passing score. There is another **6** certification Certified Network Defense Architect which has the same basic course and test but is available only for certain U.S. Government agents.

**7****6**

- A) NO CHANGE
- B) certification, Certified Network Defense Architect,
- C) certification Certified Network Defense Architect,
- D) certification, Certified Network Defense Architect

**7**

The writer is considering deleting the phrase *but is available only for certain U.S. Government agents* from the preceding sentence, ending the sentence with a period after the word *test*. Should this phrase be kept or deleted?

- A) Kept, because it helps to differentiate the two certifications mentioned in this paragraph.
- B) Kept, because it shows that CEHs also have an important role to play in maintaining national security.
- C) Deleted, because it contains information already stated in an earlier part of the paragraph.
- D) Deleted, because it suggests that hacking is only a problem in the United States.

CEHs combine many facets of computer study into **8** one typically. A company will hire a CEH to ensure maximum security of that company’s network, whether that’s company secrets or customer payment information or anything in between. Essentially, an ethical hacker does everything that an unethical one does, but he or she does so at the request of a particular organization. “We want you to hack us,” says that organization, “so we **9** will have known how to avoid being hacked.” It’s kind of like the old saying, “It takes a crook to catch a thief,” except in this case the “crook” is not a crook at all. **10**

Some in the computing community disparage the term. They say that “hacker” is a criminal designation, so saying “ethical hacker” is like saying “ethical thief,” that is, a **11** contradiction of terms. This objection is of course overstated, and overwhelmingly, companies are happy to have “hackers” on staff. That designation can help to overcome the stodgy, impersonal image that corporations tend to have, and it can tap in to a kind of underground energy that many find irresistible.

8

- A) NO CHANGE
- B) one, typically, a company
- C) one. Typically, a company
- D) one typically; a company

9

- A) NO CHANGE
- B) knew
- C) know
- D) would of known

10

At this point, the writer is considering adding the following true sentence:

*To Catch a Thief* was directed by Alfred Hitchcock and released in 1955.

Should the writer make this addition here?

- A) Yes, because it helps to clarify the origin of the saying cited in the previous sentence.
- B) Yes, because it is as relevant to the passage as the movie *Hackers* cited in the first paragraph.
- C) No, because it does not maintain this paragraph’s focus on ethical hacking.
- D) No, because it mentions a movie that existed before computer hacking became widespread.

11

- A) NO CHANGE
- B) contradictory under terms.
- C) contradiction by terms.
- D) contradiction in terms.

Questions 12–22 are based on the following passage.

### Taking Stock of Modern Investing

Time is a funny thing. Often, we can feel that we've been studying for hours and hours only to realize that it's been, say, 40 minutes. Or, if we're watching a football game, we may have a sense of constant action, **12** and that's what sports fandom is all about. Each of these **13** is plausible when we sit and think about it: we know that "time flies when you're having fun" and that it drags when you're not, but some statistics about time may surprise us. If time flies when you're having fun, what about when there's no "you" at all, or any other human for that matter?

12

Which of the following true choices best matches the style and tone of this paragraph?

- A) NO CHANGE
- B) while the average NFL play lasts only 6 to 7 seconds.
- C) yet people continue to watch football every Sunday.
- D) but there are some who find football boring as all get-out.

13

- A) NO CHANGE
- B) are
- C) was
- D) were

Increasingly, computers are running the world, and these computers operate on a completely separate time scale **14** than us. They can process many millions of operations in seconds, operations that would take us multiple lifetimes to complete. That's all fine if the computers are doing the work of computers—making calculations, assimilating data, or accessing that data. **15** But what about when computers **16** start working in human fields and competing with the human mind?

14

- A) NO CHANGE
- B) from ours.
- C) from us.
- D) than we do.

15

If the writer were to delete the phrase *making calculations, assimilating data, or accessing that data* from the previous sentence (ending the sentence at the word *computers*), the essay would primarily lose

- A) a clarification of a term used earlier in the same sentence.
- B) a complete list of the tasks that computers perform well.
- C) a metaphor for the intrusion of technology into modern life.
- D) nothing at all, because the information is stated explicitly in the following paragraph.

16

- A) NO CHANGE
- B) take the human field and the mind in competition with its working?
- C) field the human mind and start working and competing with it?
- D) work starting and competing in human fields and the mind?

Broader questions of artificial intelligence **17** aside; the contemporary stock market offers an interesting test case. There's no question that the average holding period has gone down significantly since the 1950s, but a recent study has shown that the data no longer fits an obvious trend. In 2014, the average holding period for a stock in the U.S. was 22 seconds. **18** In 1920, it was even lower! Granted, the stock market has gone through some troubling permutations: many young people treat investing in the stock market like “investing” in the poker tables at Las Vegas, and people are less likely than ever to stay loyal to certain brands. **19**

Average holding period for a stock on the NYSE (years)

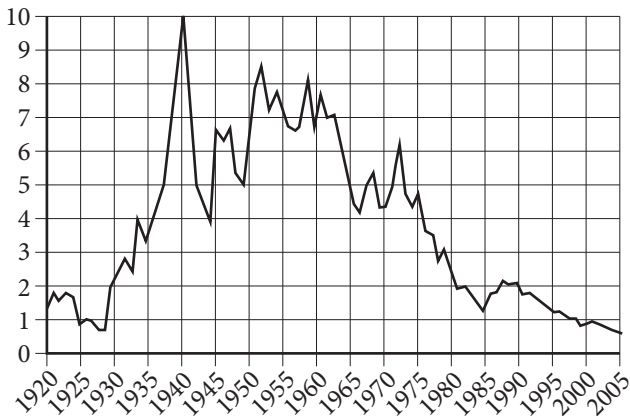


Image courtesy SG Global Strategy Research

17

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

18

Which of the following gives information consistent with the graph?

- A) NO CHANGE
- B) It peaked in 1975!
- C) What a change a decade makes!
- D) In 1940, it was 10 years!

19

If the author were to remove the quotation marks from the preceding sentence, the sentence would primarily lose

- A) nothing at all, because the punctuation does not influence the meaning of the word in quotations.
- B) a suggestion that the author wishes he could find a more precise word.
- C) an indication that the author is using the word *investing* ironically.
- D) a direct quotation from one of the investors discussed in the essay.

However, 22 seconds is simply not a human time.

That essentially means owning a stock for less time than it takes to complete the transaction online or with a broker. The number is so low because stock trading has come to be almost exclusively the **20** province of powerful trading computers, which can buy and sell stocks in milliseconds. After all, 22 seconds is the average, so if there are still some human traders keeping **21** your stocks for 10 years, that must make a stunning number of computer transactions.

In the end, **22** the trend toward mechanized training is probably irreversible, regardless of what governments try to do to intervene. The question remains, though, what are the purely human activities left to us? Is there anything they can do that we can do better?

20

Which of the following alternatives to the underlined portion would be LEAST acceptable?

- A) work
- B) responsibility
- C) realm
- D) state

21

- A) NO CHANGE
- B) their
- C) they're
- D) his or her

22

- A) NO CHANGE
- B) the trend, toward mechanized training, is probably irreversible,
- C) the trend toward mechanized training is, probably, irreversible,
- D) the trend, toward mechanized training, is, probably, irreversible,



Questions 23–33 are based on the following passage.

I Object!

Crime stories are as old as narrative itself. Some of the earliest texts we have center on questions of **23** murder, theft, and other transgressions. Still, while people often remember the crimes and criminals themselves, typically these stories will revolve around a separate **24** issue, guilt, and innocence. Courtroom dramas in our own day attest to this correlative fascination. **25**

23

- A) NO CHANGE
- B) murder, theft, and, other transgressions.
- C) murder theft and other transgressions.
- D) murder: theft and other transgressions.

24

- A) NO CHANGE
- B) issue; guilt and innocence.
- C) issue: guilt and innocence.
- D) issue: guilt, and innocence.

25

Which of the following choices would most effectively conclude this paragraph and provide an effective transition into the next?

- A) The most famous courtroom drama of all time is probably *To Kill a Mockingbird*.
- B) Errol Morris has made many interesting films throughout his career.
- C) We all have our fascinations in life, and there's usually some TV show that lines up with these fascinations.
- D) One of the great modern examples of such a fascination is Errol Morris's famous documentary *The Thin Blue Line* (1988).

Morris's story takes up the real-life case of Randall Dale Adams, **26** a Texas police officer was killed by this Ohio man allegedly. Although the evidence in the trial was thin, Adams was sentenced to life in prison. Morris's film in a sense reopens the case, interviewing many of those involved: **27** many more people than just the defendant are involved in a case. All of the interviewees raise notable objections to Adams's murder charge, and the film concludes with a sobering message from the prosecutor's closing statement: the police are the "thin blue line" separating society from **28** anarchy. At least they should be, the film wants us to see, but should this separation come at the expense of a man's legal rights?

26

- A) NO CHANGE
- B) a man from Ohio who would be convicted of the murder of Texas police officer.
- C) a Texas police officer being killed by this Ohio man allegedly.
- D) a verdict of guilty was this Ohio man's fate for the murder of a Texas police officer.

27

Which of the following choices gives the most detailed explanation of the words *those involved*, which appear before the colon?

- A) NO CHANGE
- B) witnesses, attorneys, detectives, and the judge who presided over the case.
- C) he couldn't interview the victim of the crime for obvious reasons.
- D) there is nothing that says those involved can't talk after the trial has concluded.

28

Which of the following alternatives to the underlined portion would be LEAST acceptable?

- A) lawlessness.
- B) chaos.
- C) tyranny.
- D) mayhem.

Within a year of the film's 1988 release, Adams's sentence was overturned. It's not hard to see that it was Morris's film that helped to build the appeals case. Such an event is remarkable, not only because of the relative rarity of a court overturning its verdict **29** (one that peaked in the year of Morris's film), but also because it was seemingly done outside of the courts.

The significance of *The Thin Blue Line* is again with us today with the podcast *Serial*, hosted by journalist Sarah Koenig. The podcast analyzes the records from the 1999 trial and conviction of Adnan Syed, a then-17-year-old high school student, who was convicted of killing his ex-girlfriend. **30** While Koenig's stated purpose is merely to understand the ins-and-outs of the trial, not necessarily to get Syed's sentence overturned, she does identify a degree of uncertainty about the trial's verdict. Unlike Morris, Koenig is not quite convinced of her subject's innocence as Morris was, but she is equally interested in how the legal system determines that guilt and innocence, often showing how decidedly extralegal matters can play a serious role.

**31**

Figure 2C: Direct Appeal Reversal Rate  
by Year of Review, 1973-1995

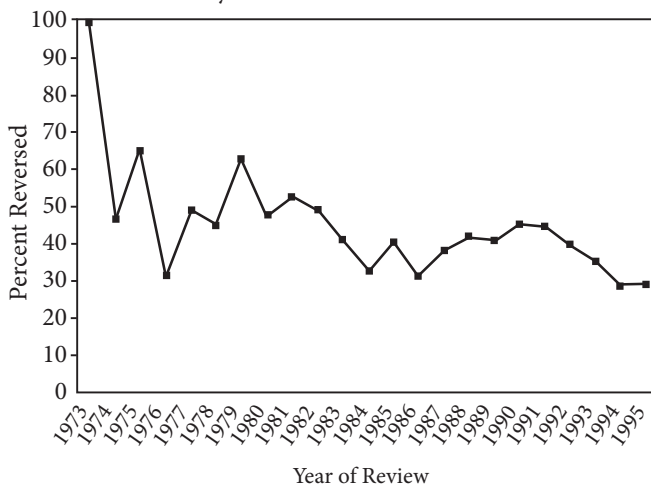


Image courtesy of Columbia Law School

**29**

Which of the following gives accurate information based on the graph?

- A) NO CHANGE
- B) (the data do not account for repeated attempts to overturn verdicts),
- C) (in 1989, the direct-appeal reversal rate was approximately 14%),
- D) (one that actually trended downward in the years after Morris's film),

**30**

- A) NO CHANGE
- B) Koenig's stated purpose
- C) Because Koenig's stated purpose
- D) However, Koenig's stated purpose

**31**

The author is considering deleting the phrase *as Morris was*, placing the comma after the word *innocence*. Should the phrase be kept or deleted?

- A) Kept, because the contrast with Errol Morris's project is not clear without it.
- B) Kept, because Koenig is clearly interested in duplicating Morris's work in the podcast format.
- C) Deleted, because the information is given elsewhere in the sentence.
- D) Deleted, because it is not reasonable to suppose that a film and a podcast could be usefully compared.

Morris's film and **32** Koenig's podcast both raise some serious questions about the legal system. For instance, how conclusive does the evidence have to be to prove someone's guilt? And how can questions of innocence or guilt ever be determined by so many imperfect human actors? **33** They both remind us that even though justice itself may be blind, and the U.S. court system prides itself on legal objectivity, such a thing may not be possible, especially as it promises that all of those on trial are innocent until proven guilty.

32

- A) NO CHANGE
- B) the podcast of Koenig's
- C) the podcast Koenig is making
- D) Koenig's

33

- A) NO CHANGE
- B) Koenig and Morris
- C) The two
- D) DELETE the underlined portion (beginning the sentence at the word *Both*).

Questions 34–44 are based on the following passage.

### Seeing Her Way to Space

[1]

On the strength of these achievements, Ochoa was selected for a NASA space mission in 1990. She became the first Hispanic female astronaut and the first in space in 1993. **34** Ochoa's career at NASA has been every bit as illustrious as one would expect **35** of Hispanic descent: in 2013, she became the first person and the second woman to become director of NASA's Johnson Space Center.

[2]

Her second patent came in 1989, for a device that identifies the positional coordinates of objects with a new kind of precision, the kind required in military operations. The device, which **36** is characterized by their almost exact precision, uses the light and movement data to compute a specific spatial coefficient. The images produced by this device allow a mathematical precision that digital photography simply cannot provide. This invention has had popular applications as well, **37** including advances in face-recognition technology and airport-security scanning devices.

34

- A) NO CHANGE
- B) Ochoas's
- C) Ochoas'
- D) Ochoas

35

If the punctuation were to be adjusted accordingly, the best placement for the underlined portion would be:

- A) where it is now.
- B) after the word *she*.
- C) after the word *person*.
- D) after the word *Center*.

36

- A) NO CHANGE
- B) are characterized by their
- C) are characterized by its
- D) is characterized by its

37

Which of the following true choices would best support the idea presented in the first part of this sentence?

- A) NO CHANGE
- B) though scientists can sometimes be less interested in popular applications than in scientific soundness.
- C) but popular is a relative term when you're talking about high-level, complex scientific discoveries.
- D) which is not to say that like people were sitting around reading the patent for fun or anything.

[3]

Ellen Ochoa was born in Los Angeles, CA, in 1958. She did her primary schooling in La Mesa, and went on to get a bachelor's degree in physics from San Diego State University. She earned a Ph.D. from Stanford in electrical engineering in 1981. **38** San Diego State University is a good school, but Stanford is a truly great research institution.

[4]

Ochoa was first **39** revere for her research. Her most notable contribution is an optical system that can detect defects in a repeating pattern. Her first patent came in 1987 for a special camera that could correct in real time. **40** Unlike digital technology, which can operate neither quickly nor accurately enough in space missions, Ochoa's optical analysis device uses laser light technology **41** instead of the traditional digital. The technology operates on electromagnetic wavelengths and produces instantaneous hologram images that are themselves incorporated into the final image output. This technology has enabled the further development of such optics technology as powerful telescopes that can see through electromagnetic aberrations to accurate images.

38

Which of the following true sentences would best conclude this paragraph and support the main idea of the passage?

- A) NO CHANGE
- B) Despite her fairly conventional beginnings, Ochoa has gone on to become one of the most revered Hispanic women in science.
- C) Ochoa is a fairly common surname for celebrities: Guillermo Ochoa is a soccer player, Amparo a singer, and Lorena a golfer.
- D) On average, it takes approximately five years to earn a doctorate in electrical engineering.

39

- A) NO CHANGE
- B) reverent
- C) referred
- D) revered

40

- A) NO CHANGE
- B) Rather than using digital technology,
- C) Using her knowledge of digital technology,
- D) A specialist in non-digital technology,

41

- A) NO CHANGE
- B) in the place of digital.
- C) not digital technology.
- D) DELETE the underlined portion (ending the sentence with a period).

[5]

Ochoa's third patent was issued in 1990. **42** This technology enables a user to filter **43** two-dimensional images to focus on particular parts of that image with equal precision. An electronic system ranks the components of image, removing the "noise" that is irrelevant to the desired part of the image. This technology gives a three-dimensional perspective to two-dimensional objects, essentially offering users the ability to search an image with the same range of motion and perspective that they could use when analyzing a real-life object. This patent has had an obvious role in high-definition cameras, but it has also led to innovations in other areas, such as fingerprint-recognition software.

**42**

At this point, the writer is considering adding the following true statement.

A design patent typically lasts for 14 years, but a utility patent lasts for 20.

Should the writer make this addition here?

- A) Yes, because it helps to clarify many parts of the passage that discuss patents.
- B) Yes, because the statement is true and advances the larger cause of education.
- C) No, because the statement removes the focus from Ellen Ochoa's career and accomplishments.
- D) No, because patents are a politically sensitive topic when there are competing claims to them.

**43**

- A) NO CHANGE
- B) a two-dimensional image
- C) one or two dimensional images
- D) a pair of dimensional images

**44**

The best sequence for the paragraphs would be

- A) 1, 2, 3, 4, 5
- B) 2, 4, 3, 5, 1
- C) 3, 4, 2, 5, 1
- D) 4, 2, 3, 1, 5

**STOP**

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



# Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

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

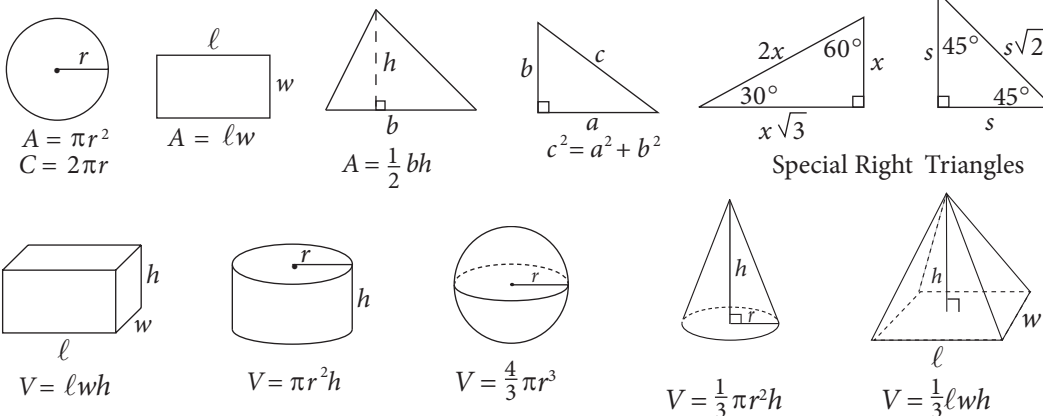
## DIRECTIONS

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



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

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

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





1

David is planning a dinner for his birthday. At one restaurant, the cost per person for dinner is \$15, with an additional one-time set-up charge of \$35. David has a maximum budget of \$150. If  $p$  represents the number of people (including David) who will attend the dinner, which of the following inequalities represents the number of people who can attend within budget?

- A)  $15p \leq 150 + 35$
- B)  $35 \leq 150 - 15p$
- C)  $15p \geq 150 - 35$
- D)  $35 \geq 150 - 15p$

2

When a virus breaks out, each infected person can infect multiple new people. In a particularly bad flu outbreak at an elementary school, the number of infected people triples each day in the first school week of January. If 5 people were sick with the flu on Monday, which of the following equations best predicts the number of infected people,  $I(d)$ ,  $d$  days after Monday?

- A)  $I(d) = 5 \times 3d^2$
- B)  $I(d) = 5d^3$
- C)  $I(d) = 5 \times 3^d$
- D)  $I(d) = 5 \times 9d$

3

During the month of July, the number of units,  $y$ , of a certain product sold per day can be modeled by the function  $y = -3.65x + 915$ , where  $x$  is the average daily temperature in degrees Fahrenheit. Which of the following statements must be true?

- A) As the temperature increases, the number of units sold decreases.
- B) As the temperature increases, the number of units sold remains constant.
- C) As the temperature increases, the number of units sold increases.
- D) There is no linear relationship between temperature and the number of units sold.

4

Newton's law of gravitation describes the strength of the force  $F$  between two objects with masses  $M$  and  $m$  separated by a distance of  $r$  units and is defined as  $F = \frac{GMm}{r^2}$ . Which of the following gives the value of Newton's gravitational constant  $G$ , in terms of  $F$ ,  $M$ ,  $m$ , and  $r$ ?

- A)  $G = Fr^2Mm$
- B)  $G = \frac{Fr^2}{Mm}$
- C)  $G = \frac{FMm}{r^2}$
- D)  $G = \frac{F}{r^2Mm}$



5

Which of the following expressions is equivalent to  $(4s)^{\frac{1}{3}}$ ?

- A)  $\frac{2}{\sqrt{s}}$
- B)  $\frac{1}{12s^3}$
- C)  $2\sqrt{s}$
- D)  $\sqrt[3]{4s}$

6

If  $A$  and  $B$  both lie on a circle with an area of  $16\pi$ , and the length of  $\widehat{AB}$  is  $2\pi$ , what is the radian measure of the central angle between  $A$  and  $B$ ?

- A)  $\frac{\pi}{8}$
- B)  $\frac{\pi}{4}$
- C)  $\frac{\pi}{2}$
- D)  $\frac{2\pi}{3}$

7

Oil is being drained from an oil tank at a constant linear rate. Four hours after draining of the tank began, the volume of oil in the tank was 740 gallons, and seven hours after draining of the tank began, the volume was 545 gallons. Which of the following functions best models  $v(t)$ , the volume of oil in the tank, in gallons,  $t$  hours after draining of the tank began?

- A)  $v(t) = 740 - t$
- B)  $v(t) = 740 - 65t$
- C)  $v(t) = 1000 - 195t$
- D)  $v(t) = 1000 - 65t$

8

What is the result of multiplying  $8s^2 - 6s + 2$  by  $4s - 1$ ?

- A)  $14s - 2$
- B)  $16s^2 + 2s + 2$
- C)  $32s^3 - 16s^2 + 2s + 2$
- D)  $32s^3 - 32s^2 + 14s - 2$



9

If the equation for a parabola is  $y = 5(x - 3)^2 - 3$ , which of the following points represents the parabola's vertex?

- A) (3, -3)
- B) (3, 0)
- C) (0, -3)
- D) (-3, 3)

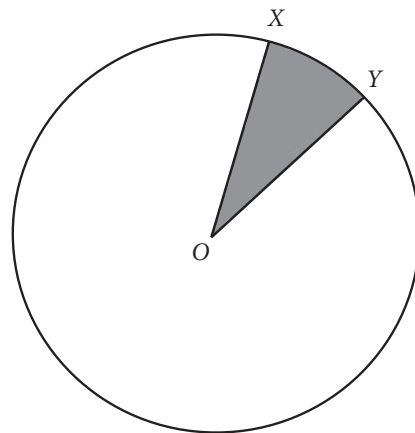
10

$$\left(\frac{3}{c+2}\right)(c+2) = \left(5 - \frac{c}{c+2}\right)(c+2)$$

In the equation above, what is the value of  $c$ ?

- A) -4
- B)  $-\frac{7}{4}$
- C)  $-\frac{7}{5}$
- D)  $\frac{1}{5}$

11



In the figure above,  $O$  is the center of the circle and the diameter is 10. If the area of the shaded region is  $\pi$ , what is the length of minor arc  $XY$ ?

- A)  $\frac{2\pi}{5}$
- B)  $\frac{4\pi}{5}$
- C)  $\frac{5\pi}{2}$
- D)  $5\pi$



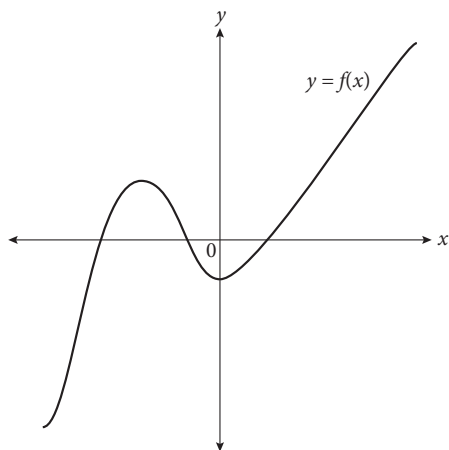
12

$$\begin{aligned}x + 3y &= 42 \\ 3x - y &= 8\end{aligned}$$

In the system of equations above, how many points of intersection do the equations share and what is their relationship, if any?

- A) Zero, and the lines are parallel.
- B) Infinitely many, and the lines are the same line.
- C) One, and the lines have no relationship.
- D) One, and the lines are perpendicular.

13



The figure above shows the graph in the  $xy$ -plane of the function  $f$ . If  $q$ ,  $r$ ,  $s$  and  $t$  are distinct real numbers, which of the following could be  $f(x)$ ?

- A)  $f(x) = (x - q)^2$
- B)  $f(x) = (x - r)(x + s)$
- C)  $f(x) = (x - r)(x + s)(x + t)$
- D)  $f(x) = (x - q)(x - r)(x + s)(x + t)$

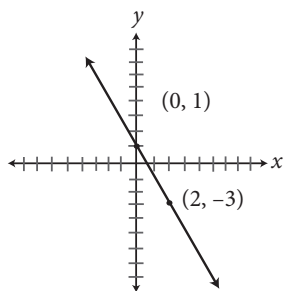
14

A 40-foot tall arch with a parabolic shape has a line drawn between the bases of the two legs of the arch. If the height above the ground,  $y$ , of the arch can be written as the function  $y(x) = a(x - 20)(x + 20)$ , where  $x$  represents the horizontal distance along the line between the bases from a point on the ground directly under the highest point of the arch, then what is the value of negative constant  $a$ ?

- A)  $-\frac{1}{40}$
- B)  $-\frac{1}{20}$
- C)  $-\frac{1}{10}$
- D)  $-20$

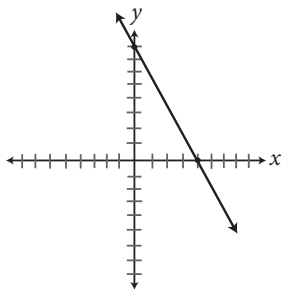


15

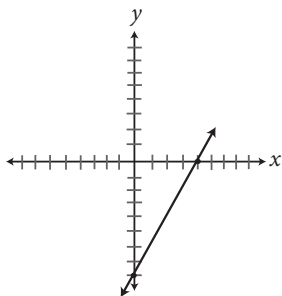


The graph of  $f(x)$  is shown in the  $xy$ -plane above. Which of the following could be the graph of  $-[f(x - 2) + 3]$ ?

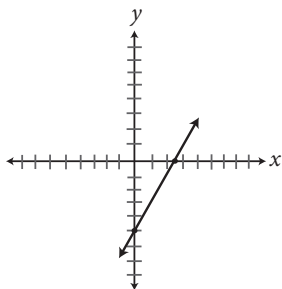
A)



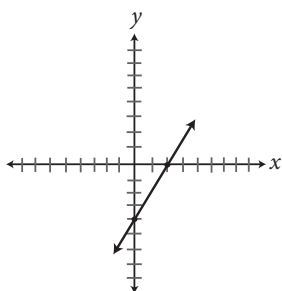
B)



C)



D)



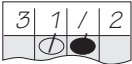


### DIRECTIONS

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

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

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

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

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

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

Write answer in boxes. →

	7	/	1	2
.	○	○	○	○
○	0	0	0	0
①	1	○	1	○
②	2	2	2	○
③	3	3	3	3
④	4	4	4	4
⑤	5	5	5	5
⑥	6	6	6	6
⑦	7	7	7	7
⑧	8	8	8	8
⑨	9	9	9	9

← Fraction line

Grid in result. →

Answer: 2.5

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

← Decimal point

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

		2	/	3
.	○	○	○	○
○	0	0	0	0
①	1	1	1	1
②	○	2	2	2
③	3	3	3	3
④	4	4	4	4
⑤	5	5	5	5
⑥	6	6	6	6
⑦	7	7	7	7
⑧	8	8	8	8
⑨	9	9	9	9

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

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

Answer: 201  
Either position is correct.

		2	0	1
.	○	○	○	○
○	0	0	0	0
①	1	1	1	1
②	○	2	2	2
③	3	3	3	3
④	4	4	4	4

	2	0	1	
.	○	○	○	○
○	0	0	0	0
①	1	1	1	1
②	○	2	2	2
③	3	3	3	3
④	4	4	4	4

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



16

$$h(t) = \frac{1}{2}at^2$$

As a space probe descends to the surface of Mars, its distance in meters above the surface can be modeled by the equation above. If  $t$  is the time in seconds it will take the probe to reach the surface, and it takes the probe 8 seconds to descend the final 120 meters to the surface, what is the value of the deceleration constant  $a$ ?

17

$$\begin{aligned}3h - j &= 7 \\2h + 3j &= 1\end{aligned}$$

Based on the system of equations above, what is the value of  $h$ ?

18

A rectangular box has a volume of 24. If the length is halved and the height is tripled, what will be the new volume of the box?

19

If  $6e(e + 3) = 3e(2e + 4) + 5$ , what is the value of  $e$ ?



20

Abeena is making punch for a winter party in a punch bowl that can hold at most 9 quarts. She wants to get as much vitamin C in her punch as possible, so she is using only orange juice and grape juice. She has 6 quarts of orange juice, which has 2 grams of vitamin C per quart, and 7 quarts of grape juice, which has 1 gram of vitamin C per quart. If there are 4 cups in a quart, what is the greatest possible amount of vitamin C, in grams, that Abeena can have in one cup of her punch?

**STOP**

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





# Math Test – Calculator

55 MINUTES, 38 QUESTIONS

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

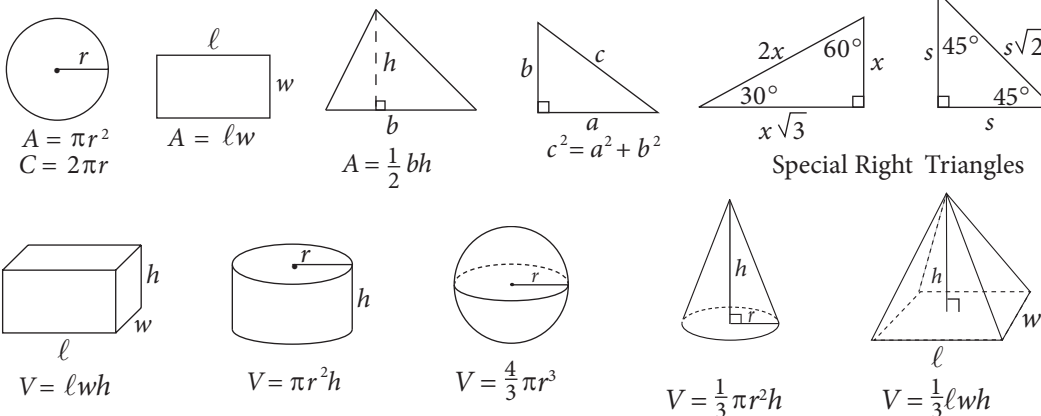
## DIRECTIONS

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

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

## REFERENCE



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

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

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



1

If  $16a^2 + 4a - 6 = 0$ , what is a possible value of  $a$ ?

- A)  $-0.75$
- B)  $-0.5$
- C)  $0$
- D)  $1$

2

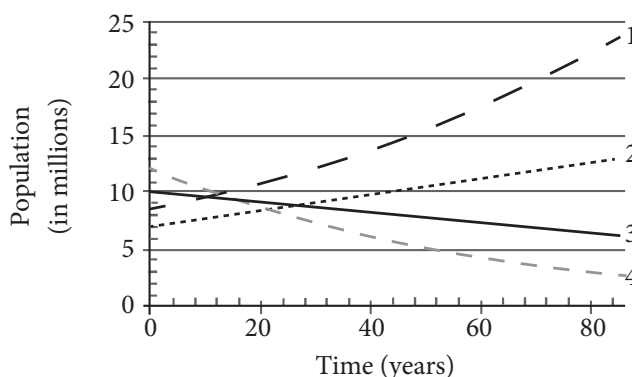
In order to make a profit, a zoo needs to sell at least 350 admission tickets each day. Four student groups, each of which includes 48 students, have purchased tickets for admission. If  $z$  represents the number of additional tickets sold today, and the zoo made its daily profit goal, which of the following inequalities could represent all possible values for  $z$ ?

- A)  $4(48) + z \leq 350$
- B)  $4(48) + z \geq 350$
- C)  $4(48) - z \leq 350$
- D)  $4(48) - z \geq 350$

3

A country's birth rate is the number of births per year per 1,000 people in the country, and a country's death rate is the number of deaths per year per 1,000 people. Immigration refers to the number of people who move into a country each year, and emigration refers to the number of people who move out of the country each year. A country's population growth is determined by these four variables. Table 1 gives birth, death, immigration, and emigration rates in four countries and lines 1-4 in Figure 1 model the population for the four countries shown over time.

	Birth	Death	Immigration	Emigration
East Zealand	20	$x$	1,000	1,000
West Zealand	21	21	12,100	$y$
South Zealand	36	24	$z$	500
North Zealand	13	13	82,000	9,600



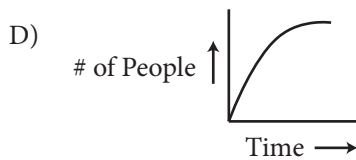
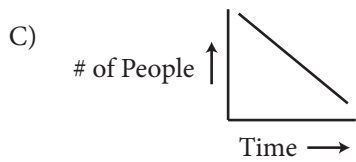
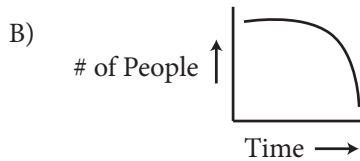
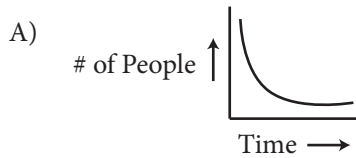
Line 1 represents which country's population?

- A) East Zealand
- B) West Zealand
- C) North Zealand
- D) South Zealand



4

At the start of a new movie at the Cineplex 16, there are 250 people in the theater. However, 10% of the people walk out of the theater within the first 15 minutes of the movie starting. If another 10% leave in the next 15 minutes and this rate continues for the duration of the movie, which of the following graphs correctly models the number of people in the theater during the movie?



5

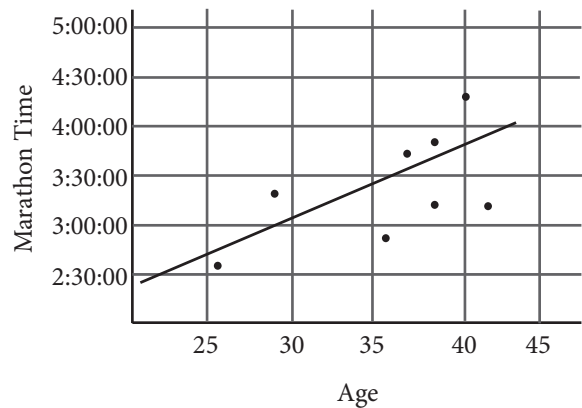
$$\frac{6}{2y} = \frac{y}{12}$$

Which of the following includes all possible values of  $y$  in the equation above?

- A)  $\{-6\}$
- B)  $\{-6, 6\}$
- C)  $\{6\}$
- D)  $\{6, 36\}$

6

Marathon Times for an All-Ages Running Club



The scatterplot above displays the marathon times of the eight members of a running club in relation to their ages and the line of best fit. How many people have times at least fifteen minutes faster than what would be expected based on the line of best fit?

- A) One
- B) Two
- C) Three
- D) Four



**Questions 7 and 8 refer to the following information.**

The table below shows the relative investment in alternative energy sources in the United States by type. One column shows the relative investment in 2007 of \$75 million total invested in alternative energy. The other column shows the projected relative investment in 2017 given current trends. The total projected investment in alternative energy in 2017 is \$254 million.

**United States Investment in  
Alternative Energy Sources**

	Actual 2007 Investment	Projected 2017 Investment
<b>Biofuels</b>	0.31	0.34
<b>Wind</b>	0.40	0.32
<b>Solar</b>	0.27	0.30
<b>Fuel Cells</b>	0.02	0.04
<b>Total</b>	1.00	1.00

7

Based on the information in the table, if an investment was made in alternative energy in 2007, what is the probability that the money was invested in wind resources?

- A)  $\frac{1}{25}$
- B)  $\frac{3}{10}$
- C)  $\frac{2}{5}$
- D)  $\frac{3}{5}$

8

Based on the information in the table, which of the following statements is the most accurate?

- A) The value of the 2007 investment in biofuels was approximately \$50 million.
- B) The portion of total alternative energy investment focused on wind sources is projected to decrease by 8% in 2017.
- C) The dollar amount invested in fuel cells in 2007 is projected to double in 2017.
- D) The top three types of alternative energy were invested in more equally in 2007 than they are projected to be in 2017.



9

Monster Truck Inc. leases a new truck for a down payment of \$3,200 plus monthly payments of \$380 per month for 36 months. Which of the following functions  $f$  represents the total amount paid, in dollars, after  $m$  months, where  $0 \leq m \leq 36$ ?

- A)  $f(m) = 380 + 3,200m$
- B)  $f(m) = 3,200 + 36m$
- C)  $f(m) = 3,200 + 380m$
- D)  $f(m) = 10,480 - 380m$

10

What is the equation of a line that contains the point  $(6, -5)$  and has an  $x$ -intercept of 3?

- A)  $y = -\frac{5}{3}x + 5$
- B)  $y = -\frac{4}{3}x + 3$
- C)  $y = -\frac{3}{5}x + 3$
- D)  $y = \frac{5}{3}x + 5$

11

A single frame of 35 mm film is about three-quarters of an inch long. A film reel holds up to 1,000 feet of film. How many reels are required for a two-hour, forty-seven minute film shot at 24 frames per second?

- A) 13
- B) 14
- C) 15
- D) 16

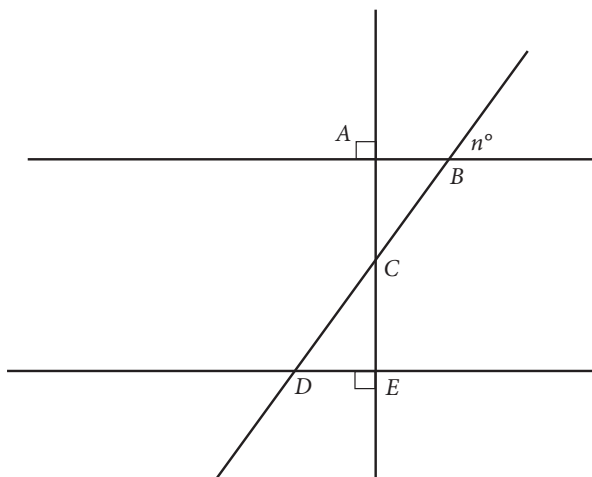
12

Hua needs to receive completed surveys from at least 3,800 potential voters in her city. She has noticed that for every 5 surveys she sends out, only 1 survey is completed. Last week she received 1,350 completed surveys, and this week she received 900 completed surveys. Hua plans to send out  $s$  additional surveys. Which of the following inequalities shows all possible values for  $s$  that would ensure that Hua receives 3,800 completed surveys?

- A)  $s \geq 1,550$
- B)  $s \geq 2,250$
- C)  $s \geq 7,750$
- D)  $s \geq 12,250$



13



In the figure above  $C$  is the midpoint of  $\overline{BD}$  and  $\overline{AC} = \overline{DE}$ . What is the value of  $n$ ?

- A) 30
- B) 45
- C) 60
- D) Cannot be determined from the information given

14

Allie is a caterer who is building 4 sandwich platters. Each sandwich platter contains turkey slices that weigh 2 ounces each and bread slices that weigh 1 ounce each. In each platter, she has a total of 100 slices of turkey and bread that weigh a total of 160 ounces. Solving which of the following system of equations yields the number of turkey slices,  $t$ , and the number of bread slices,  $b$ , that are in the 4 sandwich platters?

- A)  $t + b = 100$   
 $2t + b = 160$
- B)  $t + b = 160$   
 $2t + b = 100$
- C)  $t + b = 400$   
 $2t + b = 160$
- D)  $t + b = 400$   
 $2t + b = 640$

15

$$\begin{aligned} 4a + 2z &= 10 \\ -3a + z &= -10 \end{aligned}$$

Based on the system of equations above, what is the value of  $10a$ ?

- A) -10
- B) -1
- C) 3
- D) 30

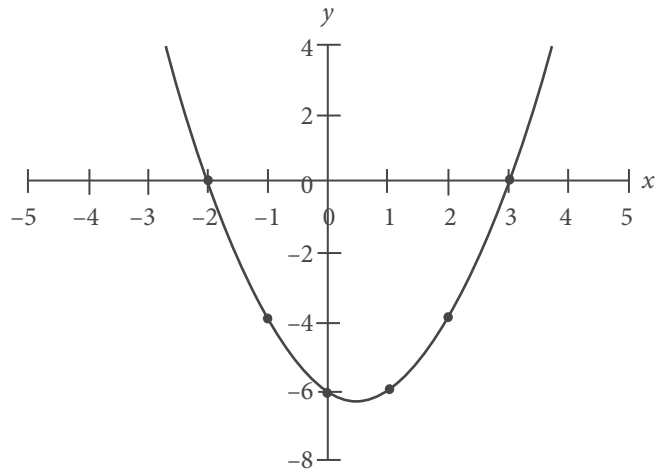


16

Isabella has \$1,000 to invest and explores a number of options at her local bank. After learning about her options, she decides to deposit her \$1,000 into a high-yield savings account that compounds at an annual rate of 4%, compounded quarterly. The banker tells Isabella that her projected earnings in dollars,  $P$ , as a function of time in years,  $t$ , can best be represented by the equation  $P(t) = 1000(1.01)^{4t}$ . Which of the following graphs best illustrates Isabella's projected earnings over time?

- A)
- B)
- C)
- D)

17



Which of the following quadratic equations is represented in the graph above?

- A)  $y = x^2 - x - 6$   
 B)  $y = x^2 + x - 12$   
 C)  $y = x^2 + 6x + 9$   
 D)  $y = x^2 + 5x + 6$



18

Dahlia is competing in a group stair-climbing relay challenge with two of her friends. They will take turns climbing the stairs of two of Metropolis's tallest buildings. The three of them each plan to climb an equal number of stairs, and Dahlia will go first. The first building has  $s$  stairs, and the second building has 3,639 stairs. During the race, Dahlia runs out of energy and is only able to complete 75% of her goal. What is the total number of stairs that Dahlia climbs?

- A)  $0.75\left(\frac{1}{3}s + 1,213\right)$   
 B)  $0.75\left(\frac{1}{3}s + 3,639\right)$   
 C)  $75\left(\frac{1}{3}s + 1,213\right)$   
 D)  $75\left(\frac{1}{3}s + 3,639\right)$

19

Thirty-six percent of the 315 million people residing in the United States currently hold a passport. Of these passport-holding individuals, 8% travel internationally every year. Of those who travel internationally every year, approximately 10% visit European countries. How many U.S. residents visit European countries every year?

- A) 9,072  
 B) 90,720  
 C) 907,200  
 D) 9,072,000

20

If the third degree polynomial  $x^3 - 10x^2 + 12x + 72$  can be factored to  $(x + 2) \cdot y^2$ , what is  $y$  in terms of  $x$ ?

- A)  $x - 6$   
 B)  $x - 3$   
 C)  $x - 1$   
 D)  $x + 1$

21

Year	North District	Central District	South District
2000	565	495	1023
2002	552	445	980
2004	503	376	924
2006	455	365	887
2008	406	278	842
2010	354	225	757
2012	343	201	624
2014	364	176	596

To better measure the effects of increases in poaching, the nation of Wakanda began a study in 2000 to track the number of elephants in each of the country's three administrative districts. Every two years, researchers performed a count of the number of elephants in each region; these counts were performed in January. The table above shows the results of the study.

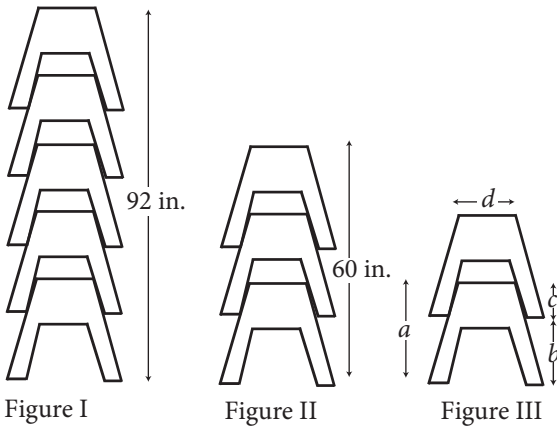
Researchers determine that at a 95% confidence level, their margin of error for the population of elephants in 2010 was 17.4. If the actual population in 2010 is within the confidence interval, what is the lowest possible population of elephants in Wakanda in 2010?

- A) 1,317  
 B) 1,318  
 C) 1,319  
 D) 1,320





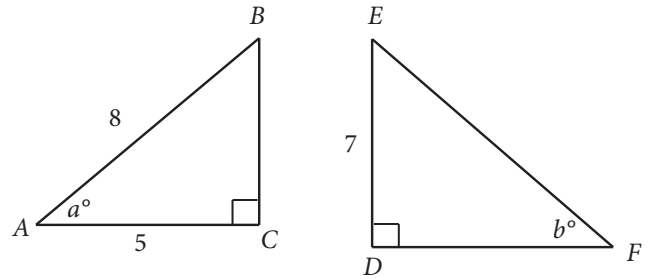
22



In figures I and II above, two stacks of identical carpenter's sawhorses are shown, with heights of 92 and 60 inches, respectively. The height, in inches, of a stack of  $k$  sawhorses is given by the function  $h(k) = 16k + 12$ , where  $k$  is a positive integer and  $k \geq 1$ . The number 12 in the function represents which of the dimensions shown in Figure III?

- A)  $a$ , the height of one sawhorse
- B)  $b$ , the distance from the bottom of one sawhorse to the bottom of the next highest sawhorse
- C)  $c$ , the distance from the top of one sawhorse to the bottom of the next highest sawhorse
- D)  $d$ , the width of a sawhorse at the top

23



In the figure above, if  $\sin a = \cos b$ , which of the following is closest to the length of  $\overline{DF}$ ?

- A) 5.6
- B) 8.7
- C) 11.2
- D) 12



24

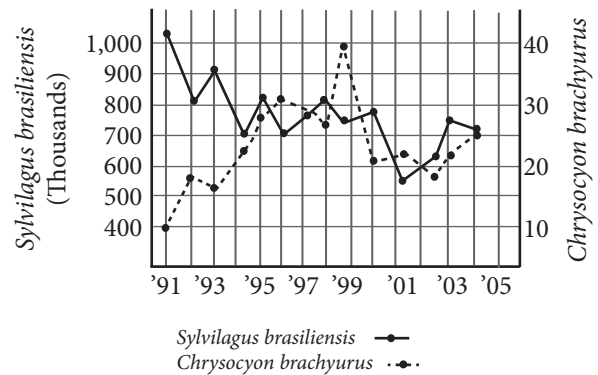
	Widgets	Hours	Breaks
Rick	28	4	2
Darryl	42	6	4
Shane	27	5	2

Rick, Shane, and Darryl work at a widget factory. The table above shows the number of hours they each spent at the factory on a given day, the number of widgets they produced, and the number of 15-minute breaks they took while they were at the factory. Each man works at a constant rate.

Rick and Shane are each assigned an equal number of widgets. Neither will take breaks in order to complete this assignment as quickly as possible. Rick offers to do a certain percentage of Shane's assignment so that they both finish at the same time. What percentage of Shane's original assignment does Rick do?

- A) 12.5%
- B) 14.3%
- C) 16.7%
- D) 25%

25



The graph above represents the effect of efforts to reintroduce *Chrysocyon brachyurus*, a wolf-like predator, to Uruguay. It tracks the population of both *Chrysocyon brachyurus* and *Sylvilagus brasiliensis*, the rabbit species that is a primary food-source.

For which of the following periods did the *Sylvilagus brasiliensis* population undergo the greatest percent decrease?

- A) '91-'92
- B) '93-'95
- C) '99-'00
- D) '00-'01



26

$$y = x^2 - 2x$$
$$y = 2x - 1$$

This system has two solutions for  $(x, y)$ . What is the larger value of  $x$ ?

- A)  $2 - \sqrt{3}$
- B)  $\sqrt{3}$
- C)  $2 + \sqrt{3}$
- D) 5

27

If  $\csc \theta = 1.66$ , then  $\tan \theta =$

- A) 0.60
- B) 0.76
- C) 1.32
- D) 1.76

28

184	176	181	157	168
154	148	165	190	162

A group of patients is recruited for a clinical trial. Their heights, recorded in centimeters, are listed in the table above. Two more patients are recruited to the study. After these patients join, the mean height is 169 cm. Which of the following could be the heights of the two new patients?

- A) 146 cm and 177 cm
- B) 150 cm and 188 cm
- C) 165 cm and 177 cm
- D) 157 cm and 186 cm



29

What is the equation of the line that passes through the point  $(2.75, 0.975)$  and has an  $x$ -intercept of 2?

- A)  $y + 5.9 = 2.5x$
- B)  $4y + 12x = 29.1$
- C)  $6y + 27.15 = 12x$
- D)  $10y - 13x = -26$

30

A bacteria population,  $P$ , can be modeled by the equation  $P = P_0 10^{kt}$ , where  $P_0$  is the bacteria population at the beginning of the experiment,  $t$  is the time in hours since the beginning of the experiment, and  $k$  is a positive constant. Which of the following gives the time,  $t$ , in terms of  $k$ ,  $P$ , and  $P_0$ ?

- A)  $t = \frac{\log\left(\frac{P_0}{P}\right)}{k}$
- B)  $t = \frac{\log\left(\frac{P}{P_0}\right)}{k}$
- C)  $t = \frac{\log(P \times P_0)}{k}$
- D)  $t = k \log\left(\frac{P}{P_0}\right)$


**DIRECTIONS**

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

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

3	1	/	2
---	---	---	---

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

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

Write answer in boxes. →

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

← Fraction line

Grid in result. →

Answer: 2.5

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

← Decimal point

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

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

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

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

Answer: 201  
Either position is correct.

	2	0	1
.			
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4

2	0	1	
.			
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4

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



31

Dan orders a soccer jersey online. If the jersey costs 40 euros and one euro is worth 1.2 dollars, how many dollars did Dan pay for the jersey?

32

An ice cream cart vendor sells 50 popsicles on an average fall day. During the summer, the ice cream cart vendor sells 7 less than twice as many popsicles per day than he does on the average fall day. How many popsicles does the ice cream cart vendor sell in 6 summer days?

33

$$\begin{aligned} 1.3g + 1.7h &= 5 \\ 3h &= 20 + 13g \end{aligned}$$

Based on the system of equations above, what is the value of  $h$  ?

34

	Candidate A	Candidate B	Undecided	Total
Democrat	24	56	70	150
Republican	117	70	50	237
Independent	15	18	80	113
Total	156	144	200	500

The table above illustrates the results of a political poll. Five hundred voters were first asked whether they were registered as Democrat, Republican, or Independent. The voters were then asked whether they planned to vote for Candidate A, for Candidate B, or were Undecided. What percent of the registered Democrats plan to vote for Candidate A ? (Disregard the percent symbol when gridding your answer.)



35

$$\begin{aligned}x &\geq 0 \\3y - 2x &\geq -12 \\2x + 5y &\leq 20\end{aligned}$$

What is the area of the triangle formed in the  $xy$ -plane by the system of inequalities above?

36

When  $(x^2 + 2x - 3)(2x + 5) - (x + 1)(x - 1)(x + 3)$  is expressed in the form  $ax^3 + bx^2 + cx + d$ , what is the value of  $a + b + c + d$ ?

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

Nile is a track & field athlete at North Sherahan High School. He hopes to qualify for the Olympic Games in his best field event, the javelin throw. He experiments with different javelin weights to build his arm strength and currently measures the results in feet.

37

The distance at which Nile can throw a javelin is inversely proportional to the weight of that javelin. Nile can throw a 1.5 pound javelin exactly 260 feet. How far would Nile be able to throw a two pound javelin, in feet, assuming all other factors remain constant? (Disregard units when inputting your answer.)

38

During his preparations, Nile realizes that the upcoming Olympic qualifying competition will be judged in meters, rather than feet or yards. Nile wants to make sure he can throw the javelin the minimum required distance so he can advance in the competition. If his current best throw is 60 yards, and one yard is approximately 0.9144 meters, how much further, to the nearest yard, must he throw in order to achieve the minimum required distance of 68.58 meters to qualify for the Olympics? (Disregard units when gridding your answer.)

**STOP**

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

# SAT Essay

## ESSAY BOOK

### 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 sheet 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 in print so that what you are writing is legible to those readers.

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

### REMINDER

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



As you read the passage below, consider how the author 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.

**Speech of Alexander the Great, from *The Campaigns of Alexander* by Arrian.**

- 1 I observe, gentlemen, that when I would lead you on a new venture you no longer follow me with your old spirit. I have asked you to meet me that we may come to a decision together: are we, upon my advice, to go forward, or, upon yours, to turn back?
- 2 If you have any complaint to make about the results of your efforts hitherto, or about myself as your commander, there is no more to say. But let me remind you: through your courage and endurance you have gained possession of Ionia, the Hellespont, both Phrygias, Cappadocia, Paphlagonia, Lydia, Caria, Lycia, Pamphylia, Phoenicia, and Egypt; the Greek part of Libya is now yours, together with much of Arabia, lowland Syria, Mesopotamia, Babylon, and Susia; Persia and Media with all the territories either formerly controlled by them or not are in your hands; you have made yourselves masters of the lands beyond the Caspian Gates, beyond the Caucasus, beyond the Tanais, of Bactria, Hyrcania, and the Hyrcanian sea; we have driven the Scythians back into the desert; and Indus and Hydaspes, Acesines and Hydraotes flow now through country which is ours. With all that accomplished, why do you hesitate to extend the power of Macedon—your power—to the Hyphasis and the tribes on the other side? Are you afraid that a few natives who may still be left will offer opposition? Come, come! These natives either surrender without a blow or are caught on the run—or leave their country undefended for your taking; and when we take it, we make a present of it to those who have joined us of their own free will and fight on our side.
- 3 For a man who is a man, work, in my belief, if it is directed to noble ends, has no object beyond itself; none the less, if any of you wish to know what limit may be set to this particular campaign, let me tell you that the area of country still ahead of us, from here to the Ganges and the Eastern ocean, is comparatively small... Our ships will sail round from the Persian Gulf to Libya as far as the Pillars of Hercules, whence all Libya to the eastward will soon be ours, and all Asia too, and to this empire there will be no boundaries but what God Himself has made for the whole world.

- 4 But if you turn back now, there will remain unconquered many warlike peoples between the Hyphasis and the Eastern Ocean, and many more to the northward and the Hyrcanian Sea, with the Scythians, too, not far away; so that if we withdraw now there is a danger that the territory which we do not yet securely hold may be stirred to revolt by some nation or other we have not yet forced into submission. Should that happen, all that we have done and suffered will have proved fruitless—or we shall be faced with the task of doing it over again from the beginning. Gentlemen of Macedon, and you, my friends and allies, this must not be. Stand firm; for well you know that hardship and danger are the price of glory, and that sweet is the savour of a life of courage and of deathless renown beyond the grave...
- 5 I could not have blamed you for being the first to lose heart if I, your commander, had not shared in your exhausting marches and your perilous campaigns; it would have been natural enough if you had done all the work merely for others to reap the reward. But it is not so. You and I, gentlemen, have shared the labour and shared the danger, and the rewards are for us all. The conquered territory belongs to you; from your ranks the governors of it are chosen; already the greater part of its treasure passes into your hands, and when all Asia is overrun, then indeed I will go further than the mere satisfaction of our ambitions: the utmost hopes of riches or power which each one of you cherishes will be far surpassed, and whoever wishes to return home will be allowed to go, either with me or without me. I will make those who stay the envy of those who return.

Write an essay in which you explain how Alexander the Great builds an argument to persuade his exhausted troops to continue their advances into India. In your essay, analyze how Alexander the Great uses one or more of the features listed 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 aspects of the passage.

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

**END OF TEST**

**DO NOT RETURN TO A PREVIOUS SECTION.**

Completely darken bubbles with a No. 2 pencil. If you make a mistake, be sure to erase mark completely. Erase all stray marks.

1. YOUR NAME: \_\_\_\_\_ Last \_\_\_\_\_ First \_\_\_\_\_ M.I. \_\_\_\_\_  
 (Print)

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_/\_\_\_\_/\_\_\_\_

HOME ADDRESS: \_\_\_\_\_  
 (Print) Number and Street \_\_\_\_\_  
 \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_

PHONE NO.: \_\_\_\_\_  
 (Print)

5. YOUR NAME

First 4 letters of last name				FIRST INT	MID INT
(A)	(A)	(A)	(A)	(A)	(A)
(B)	(B)	(B)	(B)	(B)	(B)
(C)	(C)	(C)	(C)	(C)	(C)
(D)	(D)	(D)	(D)	(D)	(D)
(E)	(E)	(E)	(E)	(E)	(E)
(F)	(F)	(F)	(F)	(F)	(F)
(G)	(G)	(G)	(G)	(G)	(G)
(H)	(H)	(H)	(H)	(H)	(H)
(I)	(I)	(I)	(I)	(I)	(I)
(J)	(J)	(J)	(J)	(J)	(J)
(K)	(K)	(K)	(K)	(K)	(K)
(L)	(L)	(L)	(L)	(L)	(L)
(M)	(M)	(M)	(M)	(M)	(M)
(N)	(N)	(N)	(N)	(N)	(N)
(O)	(O)	(O)	(O)	(O)	(O)
(P)	(P)	(P)	(P)	(P)	(P)
(Q)	(Q)	(Q)	(Q)	(Q)	(Q)
(R)	(R)	(R)	(R)	(R)	(R)
(S)	(S)	(S)	(S)	(S)	(S)
(T)	(T)	(T)	(T)	(T)	(T)
(U)	(U)	(U)	(U)	(U)	(U)
(V)	(V)	(V)	(V)	(V)	(V)
(W)	(W)	(W)	(W)	(W)	(W)
(X)	(X)	(X)	(X)	(X)	(X)
(Y)	(Y)	(Y)	(Y)	(Y)	(Y)
(Z)	(Z)	(Z)	(Z)	(Z)	(Z)

IMPORTANT: Please fill in these boxes exactly as shown on the back cover of your test book.

2. TEST FORM

3. TEST CODE				4. REGISTRATION NUMBER							
(0)	(A)	(J)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
(1)	(B)	(K)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
(2)	(C)	(L)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
(3)	(D)	(M)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
(4)	(E)	(N)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
(5)	(F)	(O)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
(6)	(G)	(P)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
(7)	(H)	(Q)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)
(8)	(I)	(R)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
(9)			(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)

6. DATE OF BIRTH

Month	Day	Year
( ) JAN		
( ) FEB	(0)	(0)
( ) MAR	(1)	(1)
( ) APR	(2)	(2)
( ) MAY	(3)	(3)
( ) JUN	(4)	(4)
( ) JUL	(5)	(5)
( ) AUG	(6)	(6)
( ) SEP	(7)	(7)
( ) OCT	(8)	(8)
( ) NOV	(9)	(9)
( ) DEC		

7. SEX

( ) MALE  
 ( ) FEMALE



Test 4

Start with number 1 for each new section. If a section has fewer questions than answer spaces, leave the extra answer spaces blank.

Section 1—Reading

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

Section 2—Writing and Language Skills

- 1. (A) (B) (C) (D)
- 2. (A) (B) (C) (D)
- 3. (A) (B) (C) (D)
- 4. (A) (B) (C) (D)
- 5. (A) (B) (C) (D)
- 6. (A) (B) (C) (D)
- 7. (A) (B) (C) (D)
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- 10. (A) (B) (C) (D)
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- 15. (A) (B) (C) (D)
- 16. (A) (B) (C) (D)
- 17. (A) (B) (C) (D)
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- 19. (A) (B) (C) (D)
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- 25. (A) (B) (C) (D)
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- 34. (A) (B) (C) (D)
- 35. (A) (B) (C) (D)
- 36. (A) (B) (C) (D)
- 37. (A) (B) (C) (D)
- 38. (A) (B) (C) (D)
- 39. (A) (B) (C) (D)
- 40. (A) (B) (C) (D)
- 41. (A) (B) (C) (D)
- 42. (A) (B) (C) (D)
- 43. (A) (B) (C) (D)
- 44. (A) (B) (C) (D)

**Test 4** Start with number 1 for each new section.  
If a section has fewer questions than answer spaces, leave the extra answer spaces blank.

**Section 3—Mathematics: No Calculator**

1. (A) (B) (C) (D)
  2. (A) (B) (C) (D)
  3. (A) (B) (C) (D)
  4. (A) (B) (C) (D)
  5. (A) (B) (C) (D)
  6. (A) (B) (C) (D)
  7. (A) (B) (C) (D)
  8. (A) (B) (C) (D)
  9. (A) (B) (C) (D)
  10. (A) (B) (C) (D)
  11. (A) (B) (C) (D)
  12. (A) (B) (C) (D)
  13. (A) (B) (C) (D)
  14. (A) (B) (C) (D)
  15. (A) (B) (C) (D)
16. 

.	/	/	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
  17. 

.	/	/	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
  18. 

.	/	/	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
  19. 

.	/	/	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
  20. 

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

**Section 4—Mathematics: Calculator**

1. (A) (B) (C) (D)
  2. (A) (B) (C) (D)
  3. (A) (B) (C) (D)
  4. (A) (B) (C) (D)
  5. (A) (B) (C) (D)
  6. (A) (B) (C) (D)
  7. (A) (B) (C) (D)
  8. (A) (B) (C) (D)
  9. (A) (B) (C) (D)
  10. (A) (B) (C) (D)
  11. (A) (B) (C) (D)
  12. (A) (B) (C) (D)
  13. (A) (B) (C) (D)
  14. (A) (B) (C) (D)
  15. (A) (B) (C) (D)
  16. (A) (B) (C) (D)
  17. (A) (B) (C) (D)
  18. (A) (B) (C) (D)
  19. (A) (B) (C) (D)
  20. (A) (B) (C) (D)
  21. (A) (B) (C) (D)
  22. (A) (B) (C) (D)
  23. (A) (B) (C) (D)
  24. (A) (B) (C) (D)
  25. (A) (B) (C) (D)
  26. (A) (B) (C) (D)
  27. (A) (B) (C) (D)
  28. (A) (B) (C) (D)
  29. (A) (B) (C) (D)
  30. (A) (B) (C) (D)
31. 

.	/	/	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
  32. 

.	/	/	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
  33. 

.	/	/	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
  34. 

.	/	/	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
  35. 

.	/	/	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
  36. 

.	/	/	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
  37. 

.	/	/	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
  38. 

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