CollegeBoard

SAT® Practice Test #3

IMPORTANT REMINDERS

1

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2

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Test begins on the next page.

Reading Test

65 MINUTES, 52 QUESTIONS

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

DIRECTIONS

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

Questions 1-10 are based on the following passage.

This passage is adapted from Saki, "The Schartz-Metterklume Method." Originally published in 1911.

Lady Carlotta stepped out on to the platform of the small wayside station and took a turn or two up and down its uninteresting length, to kill time till the train should be pleased to proceed on its way. Then, in the roadway beyond, she saw a horse struggling with a more than ample load, and a carter of the sort that seems to bear a sullen hatred against the animal that helps him to earn a living. Lady Carlotta promptly betook her to the roadway, and put rather a different complexion on the struggle. Certain of her acquaintances were wont to give her plentiful admonition as to the undesirability of interfering on behalf of a distressed animal, such interference being "none of her business." Only once had she put the doctrine of non-interference into practice, when one of its most eloquent exponents had been besieged for nearly three hours in a small and extremely uncomfortable may-tree by an angry boar-pig, while Lady Carlotta, on the other side of the fence, had proceeded with the water-colour sketch she was engaged on, and refused to interfere between the boar and his prisoner. It is to be feared that she lost the friendship of the ultimately rescued lady. On this occasion she merely lost the train, which gave way to the first sign of impatience it had shown throughout the journey, and steamed off without her. She bore the desertion with philosophical indifference; her friends and relations were thoroughly well used to the fact of her luggage arriving without her.

She wired a vague non-committal message to her destination to say that she was coming on "by another train." Before she had time to think what her next move might be she was confronted by an imposingly attired lady, who seemed to be taking a prolonged mental inventory of her clothes and looks.

"You must be Miss Hope, the governess I've come to meet," said the apparition, in a tone that admitted of very little argument.

"Very well, if I must I must," said Lady Carlotta to herself with dangerous meekness.

"I am Mrs. Quabarl," continued the lady; "and where, pray, is your luggage?"

"It's gone astray," said the alleged governess, falling in with the excellent rule of life that the absent are always to blame; the luggage had, in point of fact, behaved with perfect correctitude. "I've just telegraphed about it," she added, with a nearer approach to truth.

"How provoking," said Mrs. Quabarl; "these railway companies are so careless. However, my maid can lend you things for the night," and she led the way to her car.

During the drive to the Quabarl mansion Lady Carlotta was impressively introduced to the nature of the charge that had been thrust upon her; she learned that Claude and Wilfrid were delicate, sensitive young people, that Irene had the artistic temperament highly developed, and that Viola was

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CONTINUE

something or other else of a mould equally commonplace among children of that class and type in the twentieth century.

"I wish them not only to be TAUGHT," said Mrs. Quabarl, "but INTERESTED in what they learn. In their history lessons, for instance, you must try to make them feel that they are being introduced to the life-stories of men and women who really lived, not merely committing a mass of names and dates to memory. French, of course, I shall expect you to talk at meal-times several days in the week."

"I shall talk French four days of the week and Russian in the remaining three."

"Russian? My dear Miss Hope, no one in the house speaks or understands Russian."

"That will not embarrass me in the least," said Lady Carlotta coldly.

Mrs. Quabarl, to use a colloquial expression, was knocked off her perch. She was one of those imperfectly self-assured individuals who are magnificent and autocratic as long as they are not seriously opposed. The least show of unexpected resistance goes a long way towards rendering them cowed and apologetic. When the new governess failed to express wondering admiration of the large newly-purchased and expensive car, and lightly alluded to the superior advantages of one or two makes which had just been put on the market, the discomfiture of her patroness became almost abject. Her feelings were those which might have animated a general of ancient warfaring days, on beholding his heaviest battle-elephant ignominiously driven off the field by slingers and javelin throwers.

1

Which choice best summarizes the passage?

A) A woman weighs the positive and negative aspects of accepting a new job.

B) A woman does not correct a stranger who mistakes her for someone else.

C) A woman impersonates someone else to seek revenge on an acquaintance.

D) A woman takes an immediate dislike to her new employer.

2

In line 2, "turn" most nearly means

A) slight movement.

B) change in rotation.

C) short walk.

D) course correction.

3

The passage most clearly implies that other people regarded Lady Carlotta as

A) outspoken.

B) tactful.

C) ambitious.

D) unfriendly.

4

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

A) Lines 10-14 ("Certain . . . business")

B) Lines 22-23 ("It is . . . lady")

C) Lines 23-26 ("On this . . . her")

D) Lines 30-32 ("She . . . train")

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5

The description of how Lady Carlotta "put the doctrine of non-interference into practice" (lines 14-15) mainly serves to

A) foreshadow her capacity for deception.

B) illustrate the subtle cruelty in her nature.

C) provide a humorous insight into her character.

D) explain a surprising change in her behavior.

6

In line 55, "charge" most nearly means

A) responsibility.

B) attack.

C) fee.

D) expense.

7

The narrator indicates that Claude, Wilfrid, Irene, and Viola are

A) similar to many of their peers.

B) unusually creative and intelligent.

C) hostile to the idea of a governess.

D) more educated than others of their age.

8

The narrator implies that Mrs. Quabarl favors a form of education that emphasizes

A) traditional values.

B) active engagement.

C) artistic experimentation.

D) factual retention.

9

As presented in the passage, Mrs. Quabarl is best described as

A) superficially kind but actually selfish.

B) outwardly imposing but easily defied.

C) socially successful but irrationally bitter.

D) naturally generous but frequently imprudent.

10

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

A) Lines 49-50 ("How . . . careless")

B) Lines 62-68 ("I wish . . . memory")

C) Lines 70-73 ("I shall . . . Russian")

D) Lines 77-82 ("She was . . . apologetic")

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Questions 11-20 are based on the following passage and supplementary material.

This passage is adapted from Taras Grescoe, *Straphanger: Saving Our Cities and Ourselves from the Automobile*. ©2012 by Taras Grescoe.

Though there are 600 million cars on the planet, and counting, there are also seven billion people, which means that for the vast majority of us getting around involves taking buses, ferryboats, commuter trains, streetcars, and subways. In other words, traveling to work, school, or the market means being a straphanger: somebody who, by choice or necessity, relies on public transport, rather than a privately owned automobile.

Half the population of New York, Toronto, and London do not own cars. Public transport is how most of the people of Asia and Africa, the world's most populous continents, travel. Every day, subway systems carry 155 million passengers, thirty-four times the number carried by all the world's airplanes, and the global public transport market is now valued at $428 billion annually. A century and a half after the invention of the internal combustion engine, private car ownership is still an anomaly.

And yet public transportation, in many minds, is the opposite of glamour—a squalid last resort for those with one too many impaired driving charges, too poor to afford insurance, or too decrepit to get behind the wheel of a car. In much of North America, they are right: taking transit is a depressing experience. Anybody who has waited far too long on a street corner for the privilege of boarding a lurching, overcrowded bus, or wrestled luggage onto subways and shuttles to get to a big city airport, knows that transit on this continent tends to be underfunded, ill-maintained, and ill-planned. Given the opportunity, who wouldn't drive? Hopping in a car almost always gets you to your destination more quickly.

It doesn't have to be like this. Done right, public transport can be faster, more comfortable, and cheaper than the private automobile. In Shanghai, German-made magnetic levitation trains skim over elevated tracks at 266 miles an hour, whisking people to the airport at a third of the speed of sound. In provincial French towns, electric-powered streetcars run silently on rubber tires, sliding through narrow streets along a single guide rail set into cobblestones. From Spain to Sweden, Wi-Fi equipped high-speed trains seamlessly connect with highly ramified metro networks, allowing commuters to work on laptops as they prepare for same-day meetings in once distant capital cities. In Latin America, China, and India, working people board fast-loading buses that move like subway trains along dedicated busways, leaving the sedans and SUVs of the rich mired in dawn-to-dusk traffic jams. And some cities have transformed their streets into cycle-path freeways, making giant strides in public health and safety and the sheer livability of their neighborhoods—in the process turning the workaday bicycle into a viable form of mass transit.

If you credit the demographers, this transit trend has legs. The "Millenials," who reached adulthood around the turn of the century and now outnumber baby boomers, tend to favor cities over suburbs, and are far more willing than their parents to ride buses and subways. Part of the reason is their ease with iPads, MP3 players, Kindles, and smartphones: you can get some serious texting done when you're not driving, and earbuds offer effective insulation from all but the most extreme commuting annoyances. Even though there are more teenagers in the country than ever, only ten million have a driver's license (versus twelve million a generation ago). Baby boomers may have been raised in Leave It to Beaver suburbs, but as they retire, a significant contingent is favoring older cities and compact towns where they have the option of walking and riding bikes. Seniors, too, are more likely to use transit, and by 2025, there will be 64 million Americans over the age of sixty-five. Already, dwellings in older neighborhoods in Washington, D.C., Atlanta, and Denver, especially those near light-rail or subway stations, are commanding enormous price premiums over suburban homes. The experience of European and Asian cities shows that if you make buses, subways, and trains convenient, comfortable, fast, and safe, a surprisingly large percentage of citizens will opt to ride rather than drive.

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Figure 1

Primary Occupation of Public Transportation Passengers in US Cities

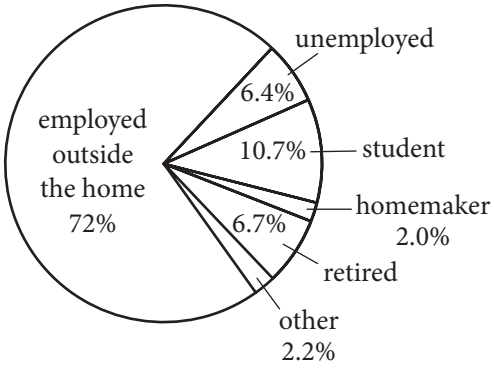

Figure 2

Purpose of Public Transportation Trips in US Cities

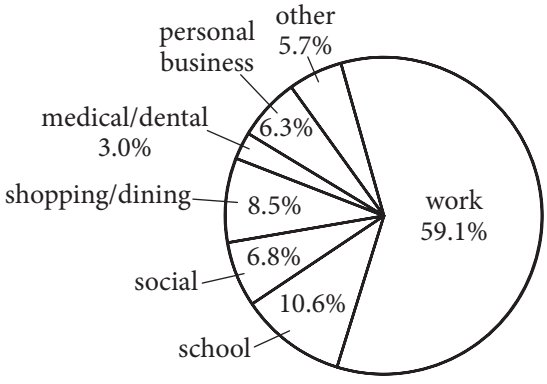

Figure 1 and figure 2 are adapted from the American Public Transportation Association, "A·Profile of Public Transportation Passenger Demographics and Travel Characteristics Reported in On-Board Surveys." ©2007 by American Public Transportation Association.

11

What function does the third paragraph (lines 20-34) serve in the passage as a whole?

A) It acknowledges that a practice favored by the author of the passage has some limitations.

B) It illustrates with detail the arguments made in the first two paragraphs of the passage.

C) It gives an overview of a problem that has not been sufficiently addressed by the experts mentioned in the passage.

D) It advocates for abandoning a practice for which the passage as a whole provides mostly favorable data.

12

Which choice does the author explicitly cite as an advantage of automobile travel in North America?

A) Environmental impact

B) Convenience

C) Speed

D) Cost

13

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

A) Lines 5-9 ("In . . . automobile")

B) Lines 20-24 ("And . . . car")

C) Lines 24-26 ("In . . . experience")

D) Lines 32-34 ("Hopping . . . quickly")

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14

The central idea of the fourth paragraph (lines 35-57) is that

A) European countries excel at public transportation.

B) some public transportation systems are superior to travel by private automobile.

C) Americans should mimic foreign public transportation systems when possible.

D) much international public transportation is engineered for passengers to work while on board.

15

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

A) Line 35 ("It . . . this")

B) Lines 35-37 ("Done . . . automobile")

C) Lines 37-40 ("In . . . sound")

D) Lines 44-48 ("From . . . cities")

16

As used in line 58, "credit" most nearly means

A) endow.

B) attribute.

C) believe.

D) honor.

17

As used in line 61, "favor" most nearly means

A) indulge.

B) prefer.

C) resemble.

D) serve.

18

Which choice best supports the conclusion that public transportation is compatible with the use of personal electronic devices?

A) Lines 59-63 ("The . . . subways")

B) Lines 63-67 ("Part . . . annoyances")

C) Lines 68-70 ("Even . . . ago")

D) Lines 77-81 ("Already . . . homes")

19

Which choice is supported by the data in the first figure?

A) The number of students using public transportation is greater than the number of retirees using public transportation.

B) The number of employed people using public transportation and the number of unemployed people using public transportation is roughly the same.

C) People employed outside the home are less likely to use public transportation than are homemakers.

D) Unemployed people use public transportation less often than do people employed outside the home.

20

Taken together, the two figures suggest that most people who use public transportation

A) are employed outside the home and take public transportation to work.

B) are employed outside the home but take public transportation primarily in order to run errands.

C) use public transportation during the week but use their private cars on weekends.

D) use public transportation only until they are able to afford to buy a car.

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Questions 21-30 are based on the following passage.

This passage is adapted from Thor Hanson, *Feathers*. ©2011 by Thor Hanson. Scientists have long debated how the ancestors of birds evolved the ability to fly. The ground-up theory assumes they were fleet-footed ground dwellers that captured prey by leaping and flapping their upper limbs. The tree-down theory assumes they were tree climbers that leapt and glided among branches.

At field sites around the world, Ken Dial saw a pattern in how young pheasants, quail, tinamous, and other ground birds ran along behind their parents. "They jumped up like popcorn," he said, describing how they would flap their half-formed wings and take short hops into the air. So when a group of graduate students challenged him to come up with new data on the age-old ground-up-tree-down debate, he designed a project to see what clues might lie in how baby game birds learned to fly.

Ken settled on the Chukar Partridge as a model species, but he might not have made his discovery without a key piece of advice from the local rancher in Montana who was supplying him with birds. When the cowboy stopped by to see how things were going, Ken showed him his nice, tidy laboratory setup and explained how the birds' first hops and flights would be measured. The rancher was incredulous. "He took one look and said, in pretty colorful language, 'What are those birds doing on the ground? They hate to be on the ground! Give them something to climb on!' " At first it seemed unnatural—ground birds don't like the ground? But as he thought about it Ken realized that all the species he'd watched in the wild preferred to rest on ledges, low branches, or other elevated perches where they were safe from predators. They really only used the ground for feeding and traveling. So he brought in some hay bales for the Chukars to perch on and then left his son in charge of feeding and data collection while he went away on a short work trip.

Barely a teenager at the time, young Terry Dial was visibly upset when his father got back. "I asked him how it went," Ken recalled, "and he said, 'Terrible! The birds are cheating!' " Instead of flying up to their perches, the baby Chukars were using their legs. Time and again Terry had watched them run right up the side of a hay bale, flapping all the while. Ken dashed out to see for himself, and that was the "aha" moment. "The birds were using their wings and legs cooperatively," he told me, and that single observation opened up a world of possibilities.

Working together with Terry (who has since gone on to study animal locomotion), Ken came up with a series of ingenious experiments, filming the birds as they raced up textured ramps tilted at increasing angles. As the incline increased, the partridges began to flap, but they angled their wings differently from birds in flight. They aimed their flapping down and backward, using the force not for lift but to keep their feet firmly pressed against the ramp. "It's like the spoiler on the back of a race car," he explained, which is a very apt analogy. In Formula One racing, spoilers are the big aerodynamic fins that push the cars downward as they speed along, increasing traction and handling. The birds were doing the very same thing with their wings to help them scramble up otherwise impossible slopes.

Ken called the technique WAIR, for wing-assisted incline running, and went on to document it in a wide range of species. It not only allowed young birds to climb vertical surfaces within the first few weeks of life but also gave adults an energy-efficient alternative to flying. In the Chukar experiments, adults regularly used WAIR to ascend ramps steeper than 90 degrees, essentially running up the wall and onto the ceiling.

In an evolutionary context, WAIR takes on surprising explanatory powers. With one fell swoop, the Dials came up with a viable origin for the flapping flight stroke of birds (something gliding animals don't do and thus a shortcoming of the tree-down theory) and an aerodynamic function for half-formed wings (one of the main drawbacks to the ground-up hypothesis).

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21

Which choice best reflects the overall sequence of events in the passage?

A) An experiment is proposed but proves unworkable; a less ambitious experiment is attempted, and it yields data that give rise to a new set of questions.

B) A new discovery leads to reconsideration of a theory; a classic study is adapted, and the results are summarized.

C) An anomaly is observed and simulated experimentally; the results are compared with previous findings, and a novel hypothesis is proposed.

D) An unexpected finding arises during the early phase of a study; the study is modified in response to this finding, and the results are interpreted and evaluated.

22

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

A) dared.

B) required.

C) disputed with.

D) competed with.

23

Which statement best captures Ken Dial's central assumption in setting up his research?

A) The acquisition of flight in young birds sheds light on the acquisition of flight in their evolutionary ancestors.

B) The tendency of certain young birds to jump erratically is a somewhat recent evolved behavior.

C) Young birds in a controlled research setting are less likely than birds in the wild to require perches when at rest.

D) Ground-dwelling and tree-climbing predecessors to birds evolved in parallel.

24

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

A) Lines 1-4 ("At field . . . parents")

B) Lines 6-11 ("So when . . . fly")

C) Lines 16-19 ("When . . . measured")

D) Lines 23-24 ("At first . . . the ground")

25

In the second paragraph (lines 12-32), the incident involving the local rancher mainly serves to

A) reveal Ken Dial's motivation for undertaking his project.

B) underscore certain differences between laboratory and field research.

C) show how an unanticipated piece of information influenced Ken Dial's research.

D) introduce a key contributor to the tree-down theory.

26

After Ken Dial had his "'aha' moment" (line 41), he

A) tried to train the birds to fly to their perches.

B) studied videos to determine why the birds no longer hopped.

C) observed how the birds dealt with gradually steeper inclines.

D) consulted with other researchers who had studied Chukar Partridges.

27

The passage identifies which of the following as a factor that facilitated the baby Chukars' traction on steep ramps?

A) The speed with which they climbed

B) The position of their flapping wings

C) The alternation of wing and foot movement

D) Their continual hopping motions

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CONTINUE

28

As used in line 61, "document" most nearly means

A) portray.

B) record.

C) publish.

D) process.

29

What can reasonably be inferred about gliding animals from the passage?

A) Their young tend to hop along beside their parents instead of flying beside them.

B) Their method of locomotion is similar to that of ground birds.

C) They use the ground for feeding more often than for perching.

D) They do not use a flapping stroke to aid in climbing slopes.

30

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

A) Lines 4-6 ("They jumped . . . air")

B) Lines 28-29 ("They really . . . traveling")

C) Lines 57-59 ("The birds . . . slopes")

D) Lines 72-74 ("something . . . theory")

Questions 31-41 are based on the following passages.

Passage 1 is adapted from Talleyrand et al., *Report on Public Instruction*. Originally published in 1791. Passage 2 is adapted from Mary Wollstonecraft, *A Vindication of the Rights of Woman*. Originally published in 1792. Talleyrand was a French diplomat; the *Report* was a plan for national education. Wollstonecraft, a British novelist and political writer, wrote *Vindication* in response to Talleyrand.

Passage 1

That half the human race is excluded by the other half from any participation in government; that they are native by birth but foreign by law in the very land where they were born; and that they are property-owners yet have no direct influence or representation: are all political phenomena apparently impossible to explain on abstract principle. But on another level of ideas, the question changes and may be easily resolved. The purpose of all these institutions must be the happiness of the greatest number. Everything that leads us farther from this purpose is in error; everything that brings us closer is truth. If the exclusion from public employments decreed against women leads to a greater sum of mutual happiness for the two sexes, then this becomes a law that all Societies have been compelled to acknowledge and sanction.

Any other ambition would be a reversal of our primary destinies; and it will never be in women's interest to change the assignment they have received.

It seems to us incontestable that our common happiness, above all that of women, requires that they never aspire to the exercise of political rights and functions. Here we must seek their interests in the wishes of nature. Is it not apparent, that their delicate constitutions, their peaceful inclinations, and the many duties of motherhood, set them apart from strenuous habits and onerous duties, and summon them to gentle occupations and the cares of the home? And is it not evident that the great conserving principle of Societies, which makes the division of powers a source of harmony, has been expressed and revealed by nature itself, when it divided the functions of the two sexes in so obviously distinct a manner? This is sufficient; we need not invoke principles that are inapplicable to the question. Let us not make rivals of life's companions. You must, you truly must allow the persistence of a union that no interest, no rivalry, can possibly undo. Understand that the good of all demands this of you.

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CONTINUE

Passage 2

Contending for the rights of woman, my main argument is built on this simple principle, that if she be not prepared by education to become the companion of man, she will stop the progress of knowledge and virtue; for truth must be common to all, or it will be inefficacious with respect to its influence on general practice. And how can woman be expected to co-operate unless she know why she ought to be virtuous? unless freedom strengthen her reason till she comprehend her duty, and see in what manner it is connected with her real good? If children are to be educated to understand the true principle of patriotism, their mother must be a patriot; and the love of mankind, from which an orderly train of virtues spring, can only be produced by considering the moral and civil interest of mankind; but the education and situation of woman, at present, shuts her out from such investigations. . . .

Consider, sir, dispassionately, these observations—for a glimpse of this truth seemed to open before you when you observed, "that to see one half of the human race excluded by the other from all participation of government, was a political phenomenon that, according to abstract principles, it was impossible to explain." If so, on what does your constitution rest? If the abstract rights of man will bear discussion and explanation, those of woman, by a parity of reasoning, will not shrink from the same test: though a different opinion prevails in this country, built on the very arguments which you use to justify the oppression of woman—prescription.

Consider—I address you as a legislator—whether, when men contend for their freedom, and to be allowed to judge for themselves respecting their own happiness, it be not inconsistent and unjust to subjugate women, even though you firmly believe that you are acting in the manner best calculated to promote their happiness? Who made man the exclusive judge, if woman partake with him the gift of reason?

In this style, argue tyrants of every denomination, from the weak king to the weak father of a family; they are all eager to crush reason; yet always assert that they usurp its throne only to be useful. Do you not act a similar part, when you force all women, by denying them civil and political rights, to remain immured in their families groping in the dark?

31

As used in line 21, "common" most nearly means

A) average.
B) shared.
C) coarse.
D) similar.

32

It can be inferred that the authors of Passage 1 believe that running a household and raising children

A) are rewarding for men as well as for women.
B) yield less value for society than do the roles performed by men.
C) entail very few activities that are difficult or unpleasant.
D) require skills similar to those needed to run a country or a business.

33

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

A) Lines 4-6 ("they are . . . representation")
B) Lines 13-17 ("If the . . . sanction")
C) Lines 25-30 ("Is it . . . home")
D) Lines 30-35 ("And . . . manner")

34

According to the author of Passage 2, in order for society to progress, women must

A) enjoy personal happiness and financial security.
B) follow all currently prescribed social rules.
C) replace men as figures of power and authority.
D) receive an education comparable to that of men.

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CONTINUE

35

As used in line 50, "reason" most nearly means

A) motive.

B) sanity.

C) intellect.

D) explanation.

36

In Passage 2, the author claims that freedoms granted by society's leaders have

A) privileged one gender over the other.

B) resulted in a general reduction in individual virtue.

C) caused arguments about the nature of happiness.

D) ensured equality for all people.

37

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

A) Lines 41-45 ("Contending . . . virtue")

B) Lines 45-47 ("truth . . . practice")

C) Lines 65-66 ("If so . . . rest")

D) Lines 72-75 ("Consider . . . happiness")

38

In lines 61-65, the author of Passage 2 refers to a statement made in Passage 1 in order to

A) call into question the qualifications of the authors of Passage 1 regarding gender issues.

B) dispute the assertion made about women in the first sentence of Passage 1.

C) develop her argument by highlighting what she sees as flawed reasoning in Passage 1.

D) validate the concluding declarations made by the authors of Passage 1 about gender roles.

39

Which best describes the overall relationship between Passage 1 and Passage 2?

A) Passage 2 strongly challenges the point of view in Passage 1.

B) Passage 2 draws alternative conclusions from the evidence presented in Passage 1.

C) Passage 2 elaborates on the proposal presented in Passage 1.

D) Passage 2 restates in different terms the argument presented in Passage 1.

40

The authors of both passages would most likely agree with which of the following statements about women in the eighteenth century?

A) Their natural preferences were the same as those of men.

B) They needed a good education to be successful in society.

C) They were just as happy in life as men were.

D) They generally enjoyed fewer rights than men did.

41

How would the authors of Passage 1 most likely respond to the points made in the final paragraph of Passage 2?

A) Women are not naturally suited for the exercise of civil and political rights.

B) Men and women possess similar degrees of reasoning ability.

C) Women do not need to remain confined to their traditional family duties.

D) The principles of natural law should not be invoked when considering gender roles.

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

This passage is adapted from Richard J. Sharpe and Lisa Heyden, "Honey Bee Colony Collapse Disorder is Possibly Caused by a Dietary Pyrethrum Deficiency." ©2009 by Elsevier Ltd. Colony collapse disorder is characterized by the disappearance of adult worker bees from hives.

Honey bees are hosts to the pathogenic large ectoparasitic mite *Varroa destructor* (Varroa mites). These mites feed on bee hemolymph (blood) and can kill bees directly or by increasing their susceptibility to secondary infection with fungi, bacteria or viruses. Little is known about the natural defenses that keep the mite infections under control.

Pyrethrums are a group of flowering plants which include *Chrysanthemum coccineum*, *Chrysanthemum cinerariifolium*, *Chrysanthemum marschalli*, and related species. These plants produce potent insecticides with anti-mite activity. The naturally occurring insecticides are known as pyrethrums. A synonym for the naturally occurring pyrethrums is pyrethrin and synthetic analogues of pyrethrums are known as pyrethroids. In fact, the human mite infestation known as scabies (*Sarcoptes scabiei*) is treated with a topical pyrethrum cream.

We suspect that the bees of commercial bee colonies which are fed mono-crops are nutritionally deficient. In particular, we postulate that the problem is a diet deficient in anti-mite toxins: pyrethrums, and possibly other nutrients which are inherent in such plants. Without, at least, intermittent feeding on the pyrethrum producing plants, bee colonies are susceptible to mite infestations which can become fatal either directly or due to a secondary infection of immunocompromised or nutritionally deficient bees. This secondary infection can be viral, bacterial or fungal and may be due to one or more pathogens. In addition, immunocompromised or nutritionally deficient bees may be further weakened when commercially produced insecticides are introduced into their hives by bee keepers in an effort to fight mite infestation. We further postulate that the proper dosage necessary to prevent mite infestation may be better left to the bees, who may seek out or avoid pyrethrum containing plants depending on the amount necessary to defend against mites and the amount already consumed by the bees, which in higher doses could be potentially toxic to them.

This hypothesis can best be tested by a trial wherein a small number of commercial honey bee colonies are offered a number of pyrethrum producing plants, as well as a typical bee food source such as clover, while controls are offered only the clover. Mites could then be introduced to each hive with note made as to the choice of the bees, and the effects of the mite parasites on the experimental colonies versus control colonies.

It might be beneficial to test wild-type honey bee colonies in this manner as well, in case there could be some genetic difference between them that affects the bees' preferences for pyrethrum producing flowers.

Pathogen Occurence in Honey Bee Colonies With and Without Colony Collapse Disorder

	Percent of colonies affected by pathogen	
Pathogen	Colonies with colony collapse disorder (%)	Colonies without colony collapse disorder (%)
Viruses		
IAPV	83	5
KBV	100	76
Fungi		
Nosema apis	90	48
Nosema ceranae	100	81
All four pathogens	77	0

Adapted from Diana L. Cox-Foster et al., "A Metagenomic Survey of Microbes in Honey Bee Colony Collapse Disorder." ©2007 by American Association for the Advancement of Science.

The table above shows, for colonies with colony collapse disorder and for colonies without colony collapse disorder, the percent of colonies having honey bees infected by each of four pathogens and by all four pathogens together.

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CONTINUE

42

How do the words "can," "may," and "could" in the third paragraph (lines 19-41) help establish the tone of the paragraph?

A) They create an optimistic tone that makes clear the authors are hopeful about the effects of their research on colony collapse disorder.

B) They create a dubious tone that makes clear the authors do not have confidence in the usefulness of the research described.

C) They create a tentative tone that makes clear the authors suspect but do not know that their hypothesis is correct.

D) They create a critical tone that makes clear the authors are skeptical of claims that pyrethrums are inherent in mono-crops.

43

In line 42, the authors state that a certain hypothesis "can best be tested by a trial." Based on the passage, which of the following is a hypothesis the authors suggest be tested in a trial?

A) Honeybees that are exposed to both pyrethrums and mites are likely to develop a secondary infection by a virus, a bacterium, or a fungus.

B) Beekeepers who feed their honeybee colonies a diet of a single crop need to increase the use of insecticides to prevent mite infestations.

C) A honeybee diet that includes pyrethrums results in honeybee colonies that are more resistant to mite infestations.

D) Humans are more susceptible to varroa mites as a result of consuming nutritionally deficient food crops.

44

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

A) Lines 3-5 ("These mites . . . viruses")

B) Lines 16-18 ("In fact . . . cream")

C) Lines 19-21 ("We suspect . . . deficient")

D) Lines 24-28 ("Without . . . bees")

45

The passage most strongly suggests that beekeepers' attempts to fight mite infestations with commercially produced insecticides have what unintentional effect?

A) They increase certain mite populations.

B) They kill some beneficial forms of bacteria.

C) They destroy bees' primary food source.

D) They further harm the health of some bees.

46

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

A) Lines 1-2 ("Honey bees . . . mites")

B) Lines 6-7 ("Little . . . control")

C) Lines 31-35 ("In addition . . . infestation")

D) Lines 47-50 ("Mites . . . control colonies")

47

As used in line 35, "postulate" most nearly means to

A) make an unfounded assumption.

B) put forth an idea or claim.

C) question a belief or theory.

D) conclude based on firm evidence.

48

The main purpose of the fourth paragraph (lines 42-50) is to

A) summarize the results of an experiment that confirmed the authors' hypothesis about the role of clover in the diets of wild-type honeybees.

B) propose an experiment to investigate how different diets affect commercial honeybee colonies' susceptibility to mite infestations.

C) provide a comparative nutritional analysis of the honey produced by the experimental colonies and by the control colonies.

D) predict the most likely outcome of an unfinished experiment summarized in the third paragraph (lines 19-41).

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CONTINUE

49

An unstated assumption made by the authors about clover is that the plants

A) do not produce pyrethrums.

B) are members of the *Chrysanthemum* genus.

C) are usually located near wild-type honeybee colonies.

D) will not be a good food source for honeybees in the control colonies.

50

Based on data in the table, in what percent of colonies with colony collapse disorder were the honeybees infected by all four pathogens?

A) 0 percent

B) 77 percent

C) 83 percent

D) 100 percent

51

Based on data in the table, which of the four pathogens infected the highest percentage of honeybee colonies without colony collapse disorder?

A) IAPV

B) KBV

C) *Nosema apis*

D) *Nosema ceranae*

52

Do the data in the table provide support for the authors' claim that infection with varroa mites increases a honeybee's susceptibility to secondary infections?

A) Yes, because the data provide evidence that infection with a pathogen caused the colonies to undergo colony collapse disorder.

B) Yes, because for each pathogen, the percent of colonies infected is greater for colonies with colony collapse disorder than for colonies without colony collapse disorder.

C) No, because the data do not provide evidence about bacteria as a cause of colony collapse disorder.

D) No, because the data do not indicate whether the honeybees had been infected with mites.

STOP

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

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Writing and Language Test

35 MINUTES, 44 QUESTIONS

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

DIRECTIONS

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

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

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

Questions 1-11 are based on the following passage.

Shed Some Light on the Workplace

Studies have shown that employees are happier, 1 healthier, and more productive when they work in an environment 2 in which temperatures are carefully controlled. New buildings may be designed with these studies in mind, but many older buildings were not, resulting in spaces that often depend primarily on artificial lighting. While employers may balk at the expense of reconfiguring such buildings to increase the amount of natural light, the investment has been shown to be well worth it in the long run—for both employees and employers.

1

A) NO CHANGE
B) healthy, and more
C) healthier, and they are
D) healthier, being more

2

Which choice provides the most appropriate introduction to the passage?

A) NO CHANGE
B) that affords them adequate amounts of natural light.
C) that is thoroughly sealed to prevent energy loss.
D) in which they feel comfortable asking managers for special accommodations.

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CONTINUE

For one thing, lack of exposure to natural light has a significant impact on employees' health. A study conducted in 2013 by Northwestern University in Chicago showed that inadequate natural light could result in eye strain, headaches, and fatigue, as well as interference with the body's circadian rhythms. 3 Circadian rhythms, which are controlled by the 4 bodies biological clocks, influence body temperature, hormone release, cycles of sleep and wakefulness, and other bodily functions. Disruptions of circadian rhythms have been linked to sleep disorders, diabetes, depression, and bipolar disorder. Like any other health problems, these ailments can increase employee absenteeism, which, in turn, 5 is costly for employers. Employees who feel less than 100 percent and are sleep deprived are also less prone to work at their maximal productivity. One company in California 6 gained a huge boost in its employees' morale when it moved from an artificially lit distribution facility to one with natural illumination.

3

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

> Workers in offices with windows sleep an average of 46 minutes more per night than workers in offices without windows.

Should the writer make this addition here?

A) Yes, because it supplies quantitative data that will be examined in the rest of the paragraph.
B) Yes, because it explains the nature of the bodily functions referred to in the next sentence.
C) No, because it interrupts the discussion of circadian rhythms.
D) No, because it does not take into account whether workers were exposed to sunlight outside the office.

4

A) NO CHANGE
B) bodies' biological clocks',
C) body's biological clocks,
D) body's biological clock's,

5

A) NO CHANGE
B) are
C) is being
D) have been

6

Which choice best supports the statement made in the previous sentence?

A) NO CHANGE
B) saw a 5 percent increase in productivity
C) saved a great deal on its operational costs
D) invested large amounts of time and capital

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CONTINUE

7 Artificial light sources are also costly aside from lowering worker productivity. They typically constitute anywhere from 25 to 50 percent of a building's energy use. When a plant in Seattle, Washington, was redesigned for more natural light, the company was able to enjoy annual electricity cost reductions of $500,000 8 each year.

7

In context, which choice best combines the underlined sentences?

A) Aside from lowering worker productivity, artificial light sources are also costly, typically constituting anywhere from 25 to 50 percent of a building's energy use.

B) The cost of artificial light sources, aside from lowering worker productivity, typically constitutes anywhere from 25 to 50 percent of a building's energy use.

C) Typically constituting 25 to 50 percent of a building's energy use, artificial light sources lower worker productivity and are costly.

D) Artificial lights, which lower worker productivity and are costly, typically constitute anywhere from 25 to 50 percent of a building's energy use.

8

A) NO CHANGE

B) every year.

C) per year.

D) DELETE the underlined portion and end the sentence with a period.

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CONTINUE

Among the possibilities to reconfigure a building's lighting is the installation of full-pane windows to allow the greatest degree of sunlight to reach office interiors. **9** Thus, businesses can install light tubes, **10** these are pipes placed in workplace roofs to capture and funnel sunlight down into a building's interior. Glass walls and dividers can also be used to replace solid walls as a means **11** through distributing natural light more freely. Considering the enormous costs of artificial lighting, both in terms of money and productivity, investment in such improvements should be a natural choice for businesses.

9

A) NO CHANGE
B) Nevertheless,
C) Alternatively,
D) Finally,

10

A) NO CHANGE
B) they are
C) which are
D) those being

11

A) NO CHANGE
B) of
C) from
D) DELETE the underlined portion.

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CONTINUE

Questions 12-22 are based on the following passage.

Transforming the American West Through Food and Hospitality

Just as travelers taking road trips today may need to take a break for food at a rest area along the highway, settlers traversing the American West by train in the mid-1800s often found **12** themselves in need of refreshment. However, food available on rail lines was generally of terrible quality. **13** Despite having worked for railroad companies, Fred Harvey, an English-born **14** entrepreneur. He decided to open his own restaurant business to serve rail customers. Beginning in the 1870s, he opened dozens of restaurants in rail stations and dining cars. These Harvey Houses, which constituted the first restaurant chain in the United States, **15** was unique for its high standards of service and quality. The menu was modeled after those of fine restaurants, so the food was leagues beyond the **16** sinister fare travelers were accustomed to receiving in transit.

12

A) NO CHANGE
B) himself or herself
C) their selves
D) oneself

13

Which choice provides the most logical introduction to the sentence?

A) NO CHANGE
B) He had lived in New York and New Orleans, so
C) To capitalize on the demand for good food,
D) DELETE the underlined portion.

14

A) NO CHANGE
B) entrepreneur:
C) entrepreneur; he
D) entrepreneur,

15

A) NO CHANGE
B) were unique for their
C) was unique for their
D) were unique for its

16

Which choice best maintains the tone established in the passage?

A) NO CHANGE
B) surly
C) abysmal
D) icky

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CONTINUE

His restaurants were immediately successful, but Harvey was not content to follow conventional business practices. **17** Although women did not traditionally work in restaurants in the nineteenth century, Harvey decided to try employing women as waitstaff. In 1883, he placed an advertisement seeking educated, well-mannered, articulate young women between the ages of 18 and 30. **18** Response to the advertisement was overwhelming, even tremendous, and Harvey soon replaced the male servers at his restaurants with women. Those who were hired as "Harvey Girls" joined an elite group of workers, who were expected to complete a 30-day training program and follow a strict code of rules for conduct and curfews. In the workplace, the women donned identical black-and-white uniforms and carried out their duties with precision. Not only were such regulations meant to ensure the efficiency of the business and the safety of the workers, **19** but also helped to raise people's generally low opinion of the restaurant industry.

17

The writer is considering deleting the previous sentence. Should the writer make this change?

A) Yes, because it introduces information that is irrelevant at this point in the passage.

B) Yes, because it does not logically follow from the previous paragraph.

C) No, because it provides a logical introduction to the paragraph.

D) No, because it provides a specific example in support of arguments made elsewhere in the passage.

18

A) NO CHANGE

B) Response to the advertisement was overwhelming,

C) Overwhelming, even tremendous, was the response to the advertisement,

D) There was an overwhelming, even tremendous, response to the advertisement,

19

A) NO CHANGE

B) but also helping

C) also helping

D) but they also helped

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CONTINUE

In return for the servers' work, the position paid quite well for the time: $17.50 a month, plus tips, meals, room and board, laundry service, and travel expenses. 20

For as long as Harvey Houses served rail travelers through the mid-twentieth century, working there was a steady and lucrative position for women. Living independently and demonstrating an intense work 21 ethic; the Harvey Girls became known as a transformative force in the American 22 West. Advancing the roles of women in the restaurant industry and the American workforce as a whole, the Harvey Girls raised the standards for restaurants and blazed a trail in the fast-changing landscape of the western territories.

20

Which choice most logically follows the previous sentence?

A) The growth of Harvey's business coincided with the expansion of the Santa Fe Railway, which served large sections of the American West.

B) Harvey would end up opening dozens of restaurants and dining cars, plus 15 hotels, over his lucrative career.

C) These benefits enabled the Harvey Girls to save money and build new and exciting lives for themselves in the so-called Wild West.

D) The compensation was considered excellent at the time, though it may not seem like much money by today's standards.

21

A) NO CHANGE

B) ethic:

C) ethic, and

D) ethic,

22

The writer is considering revising the underlined portion of the sentence to read:

> West, inspiring books, documentaries, and even a musical.

Should the writer add this information here?

A) Yes, because it provides examples of the Harvey Girls' influence.

B) Yes, because it serves as a transitional point in the paragraph.

C) No, because it should be placed earlier in the passage.

D) No, because it contradicts the main claim of the passage.

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CONTINUE

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

How Do You Like Those Apples?

Marketed as SmartFresh, the chemical 1-MCP (1-methylcyclopropene) has been used by fruit growers since 2002 in the United States and elsewhere to preserve the crispness and lengthen the storage life of apples and other fruit, which often must travel long distances before being eaten by consumers. 23 1-MCP lengthens storage life by three to four times when applied to apples. This extended life allows producers to sell their apples in the off-season, months after the apples have been harvested. And at a cost of about one cent per pound of apples, 1-MCP is a highly cost-effective treatment. However, 1-MCP is not a panacea for fruit producers or sellers: there are problems and limitations associated with its use.

23

Which choice most effectively combines the underlined sentences?

A) When applied to apples, 1-MCP lengthens storage life by three to four times, allowing producers to sell their apples in the off-season, months after the apples have been harvested.

B) Producers are allowed to sell their apples months after they have been harvested—in the off-season—because 1-MCP, when applied to apples, lengthens their storage life by three to four times.

C) 1-MCP lengthens storage life, when applied to apples, by three to four times, allowing producers to sell their apples months after the apples have been harvested in the off-season.

D) Months after apples have been harvested, producers are allowed to sell their apples, in the off-season, because 1-MCP lengthens storage life when applied to apples by three to four times.

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CONTINUE

[1] 1-MCP works by limiting a fruit's production of ethylene, **24** it is a chemical that causes fruit to ripen and eventually rot. [2] While 1-MCP keeps apples **25** tight and crisp for months, it also limits **26** their scent production. [3] This may not be much of a problem with certain kinds of apples that are not naturally very fragrant, such as Granny Smith, but for apples that are prized for their fruity fragrance, such as McIntosh, this can be a problem with consumers, **27** that will reject apples lacking the expected aroma. [4] But some fruits do not respond as well to 1-MCP as others **28** did, and some even respond adversely. [5] Furthermore, some fruits, particularly those that naturally produce a large

24

A) NO CHANGE
B) being
C) that is
D) DELETE the underlined portion.

25

A) NO CHANGE
B) firm
C) stiff
D) taut

26

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

27

A) NO CHANGE
B) they
C) which
D) who

28

A) NO CHANGE
B) do,
C) have,
D) will,

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CONTINUE

amount of ethylene, do not respond as well to 1-MCP treatment. [6] Take Bartlett **29** pears, for instance, unless they are treated with exactly the right amount of 1-MCP at exactly the right time, they will remain hard and green until they rot, and consumers who experience this will be unlikely to purchase them again. **30**

29

A) NO CHANGE
B) pears, for instance:
C) pears for instance,
D) pears. For instance,

30

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

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

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CONTINUE

Finally, researchers have found that 1-MCP actually increases susceptibility to some pathologies in certain apple varieties. For example, Empire apples are prone to a condition that causes the flesh of the apple to turn brown. Traditionally, apple producers have dealt with this problem by leaving the apples in the open air for three weeks before storing them in a controlled atmosphere with tightly regulated temperature, humidity, and carbon dioxide levels. As the graph shows, the flesh of untreated Empire apples that are first stored in the open air undergoes **31** roughly five percent less browning than the flesh of untreated Empire apples that are immediately put into storage in a controlled environment. However, when Empire apples are treated with 1-MCP, **32** their flesh turns brown when the apples are first stored in the open air, though not under other conditions. Although

31

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

A) NO CHANGE
B) slightly more browning than
C) twice as much browning as
D) substantially less browning than

32

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

A) NO CHANGE
B) roughly half of their flesh turns brown, regardless of whether the apples are first stored in the open air.
C) their flesh browns when they are put directly into a controlled atmosphere but not when they are first stored in the open air.
D) their flesh turns brown when they are first stored in the open air, though not as quickly as the apple flesh in an untreated group does.

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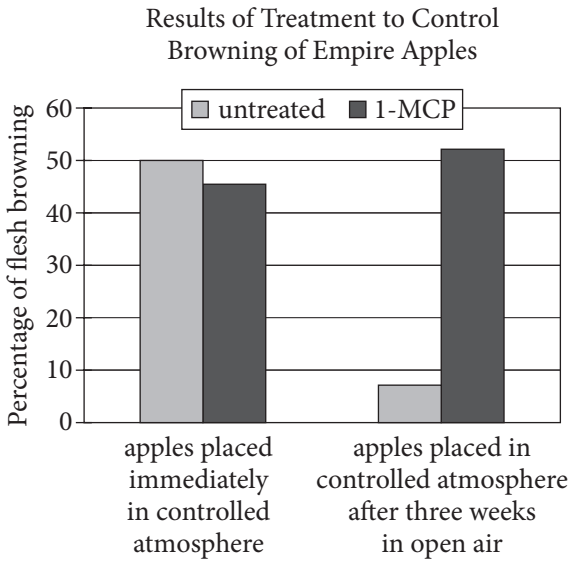
CONTINUE

researchers continue to search for the right combination of factors that will keep fruits fresh and attractive, **33** the problem may be that consumers are overly concerned with superficial qualities rather than the actual freshness of the fruit.



Adapted from Hannah J. James, Jacqueline F. Nock, and Chris B. Watkins, "The Failure of Postharvest Treatments to Control Firm Flesh Browning in Empire Apples." ©2010 by The New York State Horticultural Society.

33

The writer wants a conclusion that conveys how the shortcomings of 1-MCP presented in the passage affect the actions of people in the fruit industry. Which choice best accomplishes this goal?

A) NO CHANGE

B) many of the improvements to fruit quality they have discovered so far have required trade-offs in other properties of the fruit.

C) for now many fruit sellers must weigh the relative values of aroma, color, and freshness when deciding whether to use 1-MCP.

D) it must be acknowledged that 1-MCP, despite some inadequacies, has enabled the fruit industry to ship and store fruit in ways that were impossible before.

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CONTINUE

Questions 34-44 are based on the following passage.

More than One Way to Dress a Cat

From Michelangelo's *David* to Vincent van Gogh's series of self-portraits to Grant Wood's iconic image of a farming couple in *American* **34** *Gothic*. These works by human artists have favored representations of members of their own species to those of other species. Indeed, when we think about animals depicted in well-known works of art, the image of dogs playing poker—popularized in a series of paintings by American artist C. M. **35** Coolidge, may be the first and only one that comes to mind. Yet some of the earliest known works of art, including paintings and drawings tens of thousands of years old found on cave walls in Spain and France, **36** portrays animals. Nor has artistic homage to our fellow creatures entirely died out in the millennia since, **37** despite the many years that have passed between then and now.

34

A) NO CHANGE
B) *Gothic*. Works
C) *Gothic*; these works
D) *Gothic*, works

35

A) NO CHANGE
B) Coolidge—
C) Coolidge;
D) Coolidge

36

A) NO CHANGE
B) portraying
C) portray
D) has portrayed

37

The writer wants to link the first paragraph with the ideas that follow. Which choice best accomplishes this goal?

A) NO CHANGE
B) with special attention being paid to domestic animals such as cats.
C) even though most paintings in museums are of people, not animals.
D) as the example of one museum in Russia shows.

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CONTINUE

[1] The State Hermitage Museum in St. Petersburg, one of Russia's greatest art museums, has long had a productive partnership with a much loved animal: the cat. [2] For centuries, cats have guarded this famous museum, ridding it of mice, rats, and other rodents that could damage the art, not to mention **38** scared off visitors. [3] Peter the Great introduced the first cat to the Hermitage in the early eighteenth century. [4] Later Catherine the Great declared the cats to be official guardians of the galleries. [5] Continuing the tradition, Peter's daughter Elizaveta introduced the best and strongest cats in Russia to the Hermitage. [6] Today, the museum holds a yearly festival honoring these faithful workers. **39**

38

A) NO CHANGE
B) scaring
C) scare
D) have scared

39

To make this paragraph most logical, sentence 5 should be placed

A) where it is now.
B) after sentence 1.
C) after sentence 3.
D) after sentence 6.

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CONTINUE

These cats are so cherished by the museum that officials recently **40** decreed original paintings to be made of six of them. In each, a cat is depicted upright in a humanlike pose and clothed in imperial-era Russian attire. The person chosen for this **41** task, digital artist, Eldar Zakirov painted the cats in the style traditionally used by portrait artists, in so doing **42** presenting the cats as noble individuals worthy of respect. One portrait, *The Hermitage Court Chamber Herald Cat*, includes an

40

A) NO CHANGE
B) commissioned
C) forced
D) licensed

41

A) NO CHANGE
B) task, digital artist, Eldar Zakirov,
C) task digital artist Eldar Zakirov,
D) task, digital artist Eldar Zakirov,

42

Which choice most effectively sets up the examples that follow?

A) NO CHANGE
B) managing to capture unique characteristics of each cat.
C) commenting on the absurdity of dressing up cats in royal robes.
D) indicating that the cats were very talented mouse catchers.

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CONTINUE

aristocratic tilt of feline ears as well as a stately sweep of tail emerging from the stiff scarlet and gold of royal court dress. The wise, thoughtful green eyes of the subject of *The Hermitage Court Outrunner Cat* mimic those of a trusted royal advisor. 43 Some may find it peculiar to observe cats portrayed in formal court poses, but these felines, by 44 mastering the art of killing mice and rats, are benefactors of the museum as important as any human.

43

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

> The museum occupies six historic buildings, including the Winter Palace, a former residence of Russian emperors.

Should the writer make this addition here?

A) Yes, because it shows the link between Peter the Great and the cat paintings.

B) Yes, because it helps explain why Russian art celebrates animals.

C) No, because it fails to indicate why the Winter Palace became an art museum.

D) No, because it provides background information that is irrelevant to the paragraph.

44

A) NO CHANGE

B) acting as the lead predator in the museum's ecosystem,

C) hunting down and killing all the mice and rats one by one,

D) protecting the museum's priceless artworks from destructive rodents,

STOP

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

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Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

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

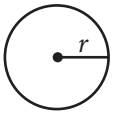
DIRECTIONS

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

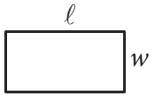
NOTES

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

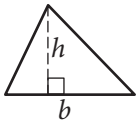
REFERENCE



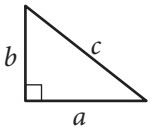
$A = \pi r^2$
$C = 2\pi r$



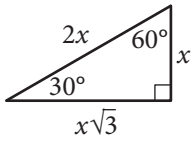
$A = \ell w$

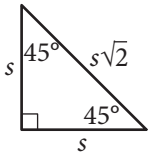


$A = \frac{1}{2}bh$

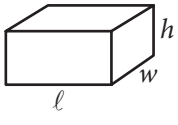


$c^2 = a^2 + b^2$

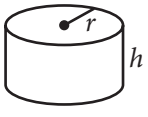




Special Right Triangles

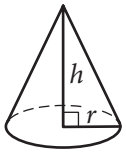


$V = \ell wh$

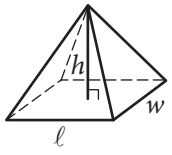


$V = \pi r^2 h$

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



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



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

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

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CONTINUE

1

A painter will paint n walls with the same size and shape in a building using a specific brand of paint. The painter's fee can be calculated by the expression $nK\ell h$, where n is the number of walls, K is a constant with units of dollars per square foot, ℓ is the length of each wall in feet, and h is the height of each wall in feet. If the customer asks the painter to use a more expensive brand of paint, which of the factors in the expression would change?

A) h

B) ℓ

C) K

D) n

2

If $3r = 18$, what is the value of $6r + 3$?

A) 6

B) 27

C) 36

D) 39

3

Which of the following is equal to $a^{\frac{2}{3}}$, for all values of a ?

A) $\sqrt{a^{\frac{1}{3}}}$

B) $\sqrt{a^3}$

C) $\sqrt[3]{a^{\frac{1}{2}}}$

D) $\sqrt[3]{a^2}$

4

The number of states that joined the United States between 1776 and 1849 is twice the number of states that joined between 1850 and 1900. If 30 states joined the United States between 1776 and 1849 and x states joined between 1850 and 1900, which of the following equations is true?

A) $30x = 2$

B) $2x = 30$

C) $\frac{x}{2} = 30$

D) $x + 30 = 2$

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CONTINUE

5

If $\frac{5}{x} = \frac{15}{x+20}$, what is the value of $\frac{x}{5}$?

A) 10

B) 5

C) 2

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

6

$$2x - 3y = -14$$
$$3x - 2y = -6$$

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

A) -20

B) -8

C) -4

D) 8

7

x	$f(x)$
0	3
2	1
4	0
5	-2

The function f is defined by a polynomial. Some values of x and $f(x)$ are shown in the table above. Which of the following must be a factor of $f(x)$?

A) $x - 2$

B) $x - 3$

C) $x - 4$

D) $x - 5$

8

The line $y = kx + 4$, where k is a constant, is graphed in the xy-plane. If the line contains the point (c, d), where $c \neq 0$ and $d \neq 0$, what is the slope of the line in terms of c and d ?

A) $\frac{d-4}{c}$

B) $\frac{c-4}{d}$

C) $\frac{4-d}{c}$

D) $\frac{4-c}{d}$

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CONTINUE

9

$$kx - 3y = 4$$

$$4x - 5y = 7$$

In the system of equations above, k is a constant and x and y are variables. For what value of k will the system of equations have no solution?

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

B) $\frac{16}{7}$

C) $-\frac{16}{7}$

D) $-\frac{12}{5}$

10

In the xy-plane, the parabola with equation $y = (x - 11)^2$ intersects the line with equation $y = 25$ at two points, A and B. What is the length of $\overline{AB}$?

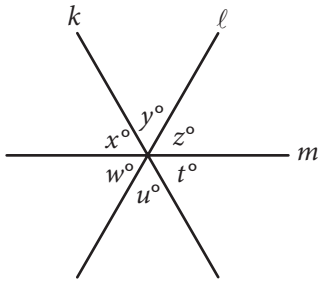
A) 10

B) 12

C) 14

D) 16

11



Note: Figure not drawn to scale.

In the figure above, lines k, ℓ, and m intersect at a point. If $x + y = u + w$, which of the following must be true?

I. $x = z$

II. $y = w$

III. $z = t$

A) I and II only

B) I and III only

C) II and III only

D) I, II, and III

12

$$y = a(x - 2)(x + 4)$$

In the quadratic equation above, a is a nonzero constant. The graph of the equation in the xy-plane is a parabola with vertex (c, d). Which of the following is equal to d ?

A) $-9a$

B) $-8a$

C) $-5a$

D) $-2a$

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CONTINUE

13

The equation $\frac{24x^2 + 25x - 47}{ax - 2} = -8x - 3 - \frac{53}{ax - 2}$ is true for all values of $x \neq \frac{2}{a}$, where a is a constant.

What is the value of a ?

A) -16

B) -3

C) 3

D) 16

14

What are the solutions to $3x^2 + 12x + 6 = 0$?

A) $x = -2 \pm \sqrt{2}$

B) $x = -2 \pm \frac{\sqrt{30}}{3}$

C) $x = -6 \pm \sqrt{2}$

D) $x = -6 \pm 6\sqrt{2}$

15

$$C = \frac{5}{9}(F - 32)$$

The equation above shows how a temperature F, measured in degrees Fahrenheit, relates to a temperature C, measured in degrees Celsius. Based on the equation, which of the following must be true?

I. A temperature increase of 1 degree Fahrenheit is equivalent to a temperature increase of $\frac{5}{9}$ degree Celsius.

II. A temperature increase of 1 degree Celsius is equivalent to a temperature increase of 1.8 degrees Fahrenheit.

III. A temperature increase of $\frac{5}{9}$ degree Fahrenheit is equivalent to a temperature increase of 1 degree Celsius.

A) I only

B) II only

C) III only

D) I and II only

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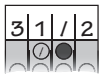
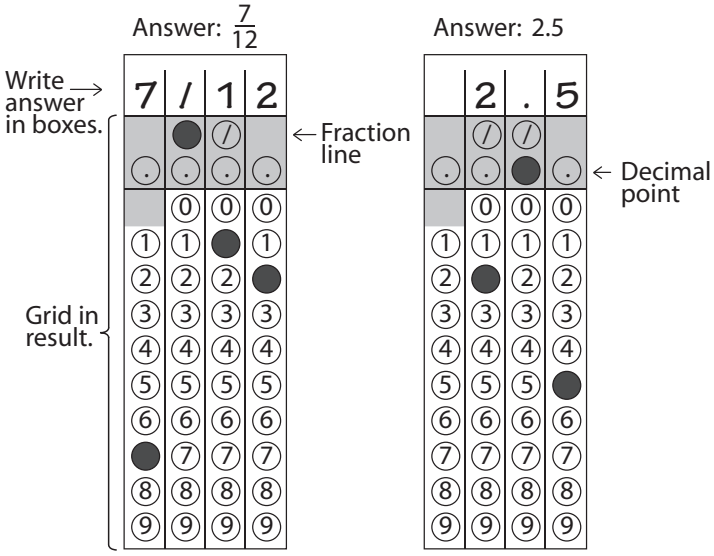
CONTINUE

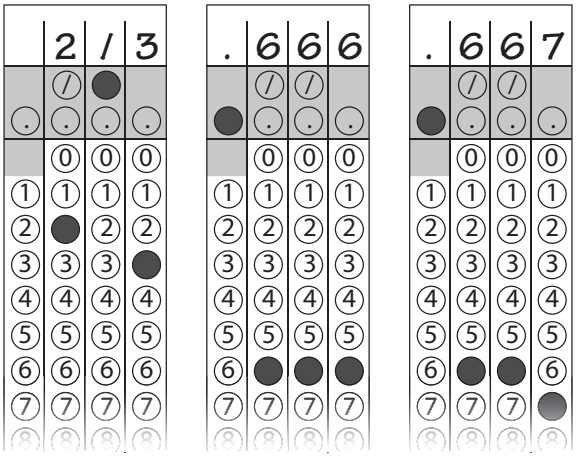
DIRECTIONS

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

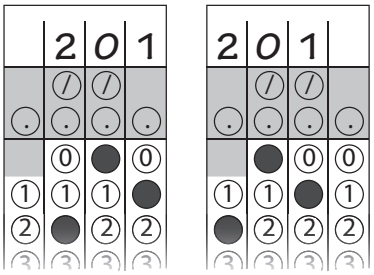
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one correct answer. In such cases, grid only one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.



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



Answer: 201 – either position is correct



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

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CONTINUE

16

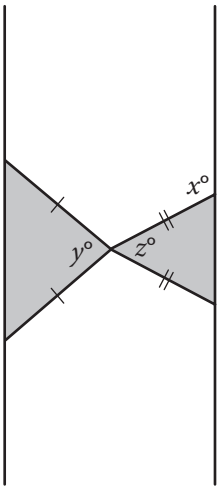
$$x^3(x^2 - 5) = -4x$$

If $x > 0$, what is one possible solution to the equation above?

17

If $\frac{7}{9}x - \frac{4}{9}x = \frac{1}{4} + \frac{5}{12}$, what is the value of x ?

18



Note: Figure not drawn to scale.

Two isosceles triangles are shown above. If $180 - z = 2y$ and $y = 75$, what is the value of x ?

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CONTINUE

19

At a lunch stand, each hamburger has 50 more calories than each order of fries. If 2 hamburgers and 3 orders of fries have a total of 1700 calories, how many calories does a hamburger have?

20

In triangle ABC, the measure of $\angle B$ is $90°$, $BC = 16$, and $AC = 20$. Triangle DEF is similar to triangle ABC, where vertices D, E, and F correspond to vertices A, B, and C, respectively, and each side of triangle DEF is $\frac{1}{3}$ the length of the corresponding side of triangle ABC. What is the value of $\sin F$?

STOP

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

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Math Test – Calculator

55 MINUTES, 38 QUESTIONS

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

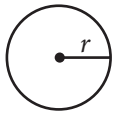
DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

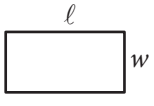
NOTES

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

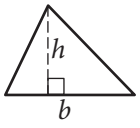
REFERENCE



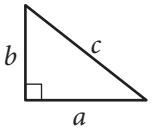
$A = \pi r^2$
$C = 2\pi r$



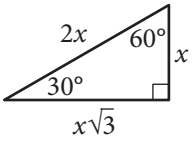
$A = \ell w$

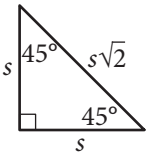


$A = \frac{1}{2}bh$

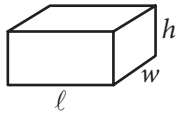


$c^2 = a^2 + b^2$

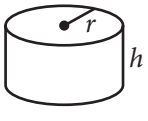




Special Right Triangles

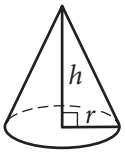


$V = \ell wh$

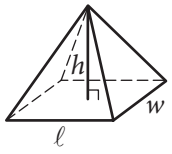


$V = \pi r^2 h$

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



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



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

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

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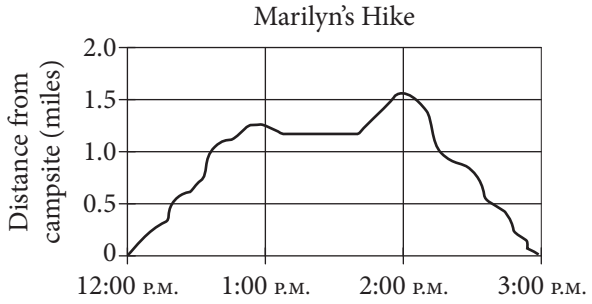
CONTINUE

1



The graph above shows Marilyn's distance from her campsite during a 3-hour hike. She stopped for 30 minutes during her hike to have lunch. Based on the graph, which of the following is closest to the time she finished lunch and continued her hike?

A) 12:40 P.M.

B) 1:10 P.M.

C) 1:40 P.M.

D) 2:00 P.M.

2

	Age		Total
Gender	Under 40	40 or older	
Male	12	2	14
Female	8	3	11
Total	20	5	25

The table above shows the distribution of age and gender for 25 people who entered a contest. If the contest winner will be selected at random, what is the probability that the winner will be either a female under age 40 or a male age 40 or older?

A) $\frac{4}{25}$

B) $\frac{10}{25}$

C) $\frac{11}{25}$

D) $\frac{16}{25}$

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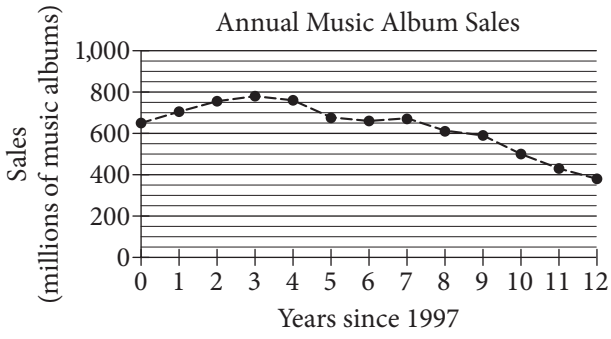
CONTINUE

3

The graph below shows the total number of music album sales, in millions, each year from 1997 through 2009.



Based on the graph, which of the following best describes the general trend in music album sales from 1997 through 2009 ?

A) Sales generally increased each year since 1997.

B) Sales generally decreased each year since 1997.

C) Sales increased until 2000 and then generally decreased.

D) Sales generally remained steady from 1997 through 2009.

4

n	1	2	3	4
$f(n)$	–2	1	4	7

The table above shows some values of the linear function f. Which of the following defines f ?

A) $f(n) = n - 3$

B) $f(n) = 2n - 4$

C) $f(n) = 3n - 5$

D) $f(n) = 4n - 6$

5

At Lincoln High School, approximately 7 percent of enrolled juniors and 5 percent of enrolled seniors were inducted into the National Honor Society last year. If there were 562 juniors and 602 seniors enrolled at Lincoln High School last year, which of the following is closest to the total number of juniors and seniors at Lincoln High School last year who were inducted into the National Honor Society?

A) 140

B) 69

C) 39

D) 30

6

$$3x^2 - 5x + 2$$
$$5x^2 - 2x - 6$$

Which of the following is the sum of the two polynomials shown above?

A) $8x^2 - 7x - 4$

B) $8x^2 + 7x - 4$

C) $8x^4 - 7x^2 - 4$

D) $8x^4 + 7x^2 - 4$

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CONTINUE

7

If $\frac{3}{5}w = \frac{4}{3}$, what is the value of w ?

A) $\frac{9}{20}$

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

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

D) $\frac{20}{9}$

8

The average number of students per classroom at Central High School from 2000 to 2010 can be modeled by the equation $y = 0.56x + 27.2$, where x represents the number of years since 2000, and y represents the average number of students per classroom. Which of the following best describes the meaning of the number 0.56 in the equation?

A) The total number of students at the school in 2000

B) The average number of students per classroom in 2000

C) The estimated increase in the average number of students per classroom each year

D) The estimated difference between the average number of students per classroom in 2010 and in 2000

9

Nate walks 25 meters in 13.7 seconds. If he walks at this same rate, which of the following is closest to the distance he will walk in 4 minutes?

A) 150 meters

B) 450 meters

C) 700 meters

D) 1,400 meters

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CONTINUE

Questions 10 and 11 refer to the following information.

Planet	Acceleration due to gravity $\left(\frac{m}{sec^2}\right)$
Mercury	3.6
Venus	8.9
Earth	9.8
Mars	3.8
Jupiter	26.0
Saturn	11.1
Uranus	10.7
Neptune	14.1

The chart above shows approximations of the acceleration due to gravity in meters per second squared $\left(\frac{m}{sec^2}\right)$ for the eight planets in our solar system. The weight of an object on a given planet can be found by using the formula $W = mg$, where W is the weight of the object measured in newtons, m is the mass of the object measured in kilograms, and g is the acceleration due to gravity on the planet measured in $\frac{m}{sec^2}$.

10

What is the weight, in newtons, of an object on Mercury with a mass of 90 kilograms?

A) 25
B) 86
C) 101
D) 324

11

An object on Earth has a weight of 150 newtons. On which planet would the same object have an approximate weight of 170 newtons?

A) Venus
B) Saturn
C) Uranus
D) Neptune

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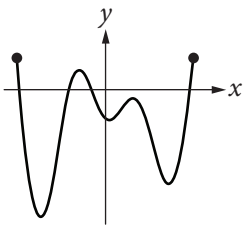
CONTINUE

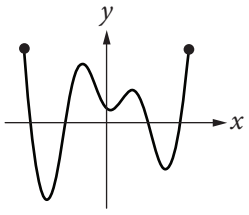
12

If the function f has five distinct zeros, which of the following could represent the complete graph of f in the xy-plane?

A)



B)



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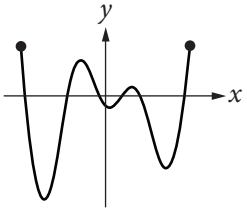

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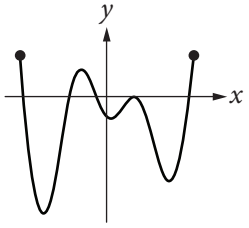

13

$$h = -16t^2 + vt + k$$

The equation above gives the height h, in feet, of a ball t seconds after it is thrown straight up with an initial speed of v feet per second from a height of k feet. Which of the following gives v in terms of h, t, and k ?

A) $v = h + k - 16t$

B) $v = \dfrac{h - k + 16}{t}$

C) $v = \dfrac{h + k}{t} - 16t$

D) $v = \dfrac{h - k}{t} + 16t$

14

The cost of using a telephone in a hotel meeting room is \$0.20 per minute. Which of the following equations represents the total cost c, in dollars, for h hours of phone use?

A) $c = 0.20(60h)$

B) $c = 0.20h + 60$

C) $c = \dfrac{60h}{0.20}$

D) $c = \dfrac{0.20h}{60}$

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CONTINUE

15

In order to determine if treatment X is successful in improving eyesight, a research study was conducted. From a large population of people with poor eyesight, 300 participants were selected at random. Half of the participants were randomly assigned to receive treatment X, and the other half did not receive treatment X. The resulting data showed that participants who received treatment X had significantly improved eyesight as compared to those who did not receive treatment X. Based on the design and results of the study, which of the following is an appropriate conclusion?

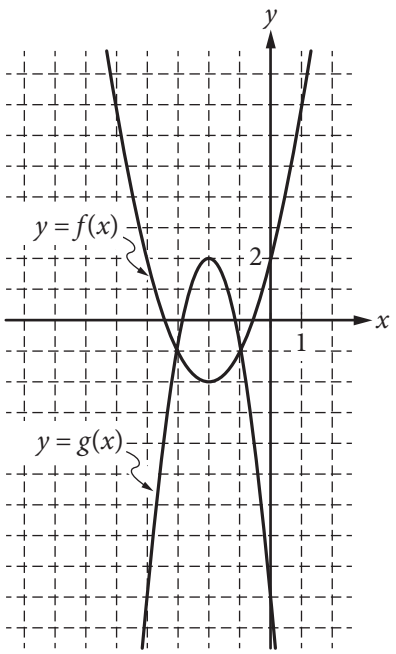
A) Treatment X is likely to improve the eyesight of people who have poor eyesight.

B) Treatment X improves eyesight better than all other available treatments.

C) Treatment X will improve the eyesight of anyone who takes it.

D) Treatment X will cause a substantial improvement in eyesight.

16



Graphs of the functions f and g are shown in the xy-plane above. For which of the following values of x does $f(x) + g(x) = 0$?

A) -3

B) -2

C) -1

D) 0

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CONTINUE

Questions 17 and 18 refer to the following information.

$$S(P) = \frac{1}{2}P + 40$$
$$D(P) = 220 - P$$

The quantity of a product supplied and the quantity of the product demanded in an economic market are functions of the price of the product. The functions above are the estimated supply and demand functions for a certain product. The function $S(P)$ gives the quantity of the product supplied to the market when the price is P dollars, and the function $D(P)$ gives the quantity of the product demanded by the market when the price is P dollars.

17

How will the quantity of the product supplied to the market change if the price of the product is increased by $10 ?

A) The quantity supplied will decrease by 5 units.
B) The quantity supplied will increase by 5 units.
C) The quantity supplied will increase by 10 units.
D) The quantity supplied will increase by 50 units.

18

At what price will the quantity of the product supplied to the market equal the quantity of the product demanded by the market?

A) $90
B) $120
C) $133
D) $155

19

Graphene, which is used in the manufacture of integrated circuits, is so thin that a sheet weighing one ounce can cover up to 7 football fields. If a football field has an area of approximately $1\frac{1}{3}$ acres, about how many acres could 48 ounces of graphene cover?

A) 250
B) 350
C) 450
D) 1,350

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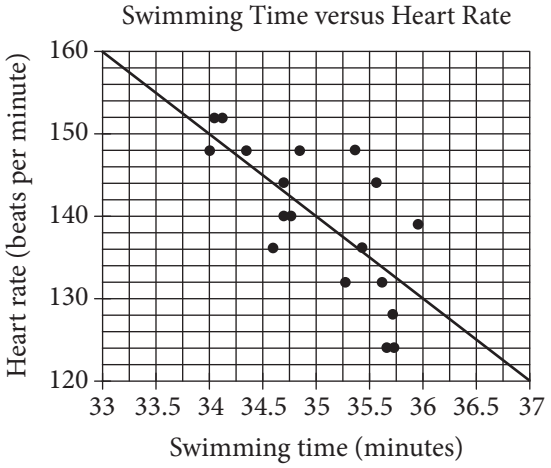
20



Michael swam 2,000 yards on each of eighteen days. The scatterplot above shows his swim time for and corresponding heart rate after each swim. The line of best fit for the data is also shown. For the swim that took 34 minutes, Michael's actual heart rate was about how many beats per minutes less than the rate predicted by the line of best fit?

A) 1

B) 2

C) 3

D) 4

21

Of the following four types of savings account plans, which option would yield exponential growth of the money in the account?

A) Each successive year, 2% of the initial savings is added to the value of the account.

B) Each successive year, 1.5% of the initial savings and $100 is added to the value of the account.

C) Each successive year, 1% of the current value is added to the value of the account.

D) Each successive year, $100 is added to the value of the account.

22

The sum of three numbers is 855. One of the numbers, x, is 50% more than the sum of the other two numbers. What is the value of x ?

A) 570

B) 513

C) 214

D) 155

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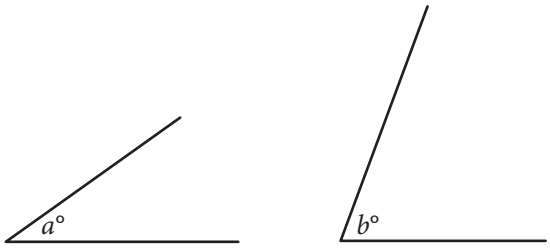
CONTINUE

23



Note: Figures not drawn to scale.

The angles shown above are acute and $\sin(a°) = \cos(b°)$. If $a = 4k - 22$ and $b = 6k - 13$, what is the value of k ?

A) 4.5

B) 5.5

C) 12.5

D) 21.5

24

Mr. Kohl has a beaker containing n milliliters of solution to distribute to the students in his chemistry class. If he gives each student 3 milliliters of solution, he will have 5 milliliters left over. In order to give each student 4 milliliters of solution, he will need an additional 21 milliliters. How many students are in the class?

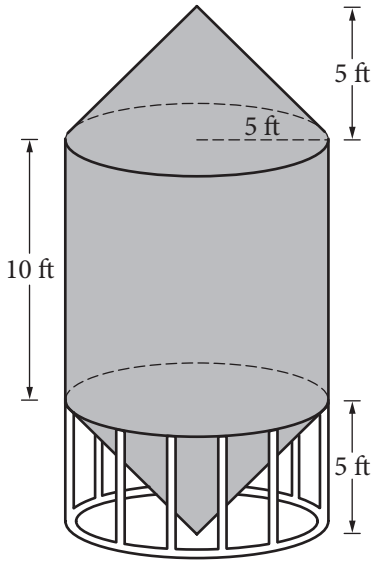
A) 16

B) 21

C) 23

D) 26

25



A grain silo is built from two right circular cones and a right circular cylinder with internal measurements represented by the figure above. Of the following, which is closest to the volume of the grain silo, in cubic feet?

A) 261.8

B) 785.4

C) 916.3

D) 1,047.2

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CONTINUE

26

In the xy-plane, the line determined by the points $(2, k)$ and $(k, 32)$ passes through the origin. Which of the following could be the value of k ?

A) 0

B) 4

C) 8

D) 16

27

A rectangle was altered by increasing its length by 10 percent and decreasing its width by p percent. If these alterations decreased the area of the rectangle by 12 percent, what is the value of p ?

A) 12

B) 15

C) 20

D) 22

28

In planning maintenance for a city's infrastructure, a civil engineer estimates that, starting from the present, the population of the city will decrease by 10 percent every 20 years. If the present population of the city is 50,000, which of the following expressions represents the engineer's estimate of the population of the city t years from now?

A) $50{,}000(0.1)^{20t}$

B) $50{,}000(0.1)^{\frac{t}{20}}$

C) $50{,}000(0.9)^{20t}$

D) $50{,}000(0.9)^{\frac{t}{20}}$

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CONTINUE

29

	Handedness	
Gender	Left	Right
Female		
Male		
Total	18	122

The incomplete table above summarizes the number of left-handed students and right-handed students by gender for the eighth-grade students at Keisel Middle School. There are 5 times as many right-handed female students as there are left-handed female students, and there are 9 times as many right-handed male students as there are left-handed male students. If there is a total of 18 left-handed students and 122 right-handed students in the school, which of the following is closest to the probability that a right-handed student selected at random is female? (Note: Assume that none of the eighth-grade students are both right-handed and left-handed.)

A) 0.410

B) 0.357

C) 0.333

D) 0.250

30

$$3x + b = 5x - 7$$
$$3y + c = 5y - 7$$

In the equations above, b and c are constants.

If b is c minus $\frac{1}{2}$, which of the following is true?

A) x is y minus $\frac{1}{4}$.

B) x is y minus $\frac{1}{2}$.

C) x is y minus 1.

D) x is y plus $\frac{1}{2}$.

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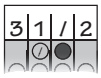
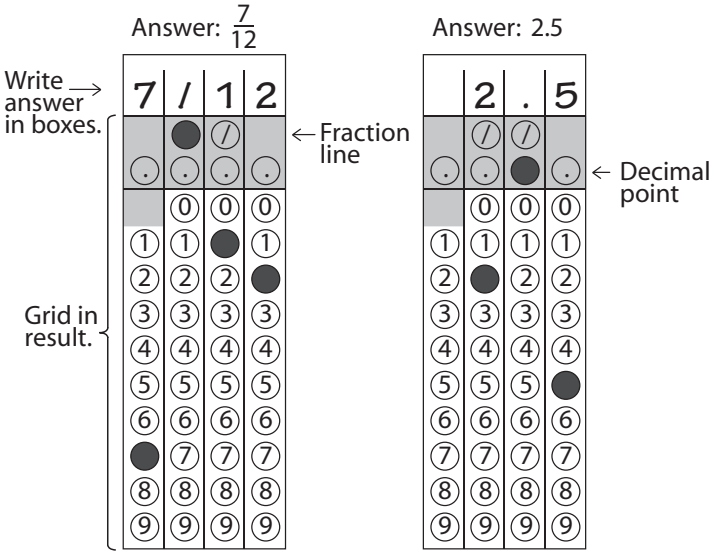
CONTINUE

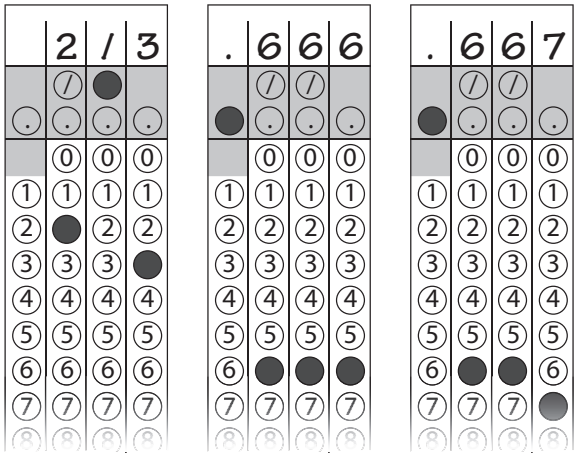
DIRECTIONS

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

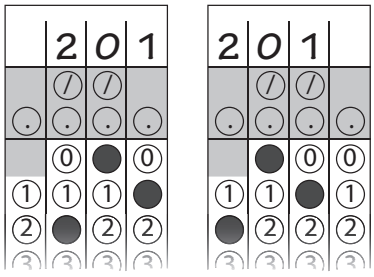
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one correct answer. In such cases, grid only one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.



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



Answer: 201 – either position is correct



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

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CONTINUE

31

Tickets for a school talent show cost \$2 for students and \$3 for adults. If Chris spends at least \$11 but no more than \$14 on x student tickets and 1 adult ticket, what is one possible value of x ?

32

Ages of the First 12 United States Presidents at the Beginning of Their Terms in Office

President	Age (years)	President	Age (years)
Washington	57	Jackson	62
Adams	62	Van Buren	55
Jefferson	58	Harrison	68
Madison	58	Tyler	51
Monroe	59	Polk	50
Adams	58	Taylor	65

The table above lists the ages of the first 12 United States presidents when they began their terms in office. According to the table, what was the mean age, in years, of these presidents at the beginning of their terms? (Round your answer to the nearest tenth.)

33

$$(-3x^2 + 5x - 2) - 2(x^2 - 2x - 1)$$

If the expression above is rewritten in the form $ax^2 + bx + c$, where a, b, and c are constants, what is the value of b ?

34

In a circle with center O, central angle AOB has a measure of $\frac{5\pi}{4}$ radians. The area of the sector formed by central angle AOB is what fraction of the area of the circle?

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CONTINUE

35

An online store receives customer satisfaction ratings between 0 and 100, inclusive. In the first 10 ratings the store received, the average (arithmetic mean) of the ratings was 75. What is the least value the store can receive for the 11th rating and still be able to have an average of at least 85 for the first 20 ratings?

36

$$y \leq -15x + 3000$$
$$y \leq 5x$$

In the xy-plane, if a point with coordinates (a, b) lies in the solution set of the system of inequalities above, what is the maximum possible value of b ?

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CONTINUE

Questions 37 and 38 refer to the following information.

If shoppers enter a store at an average rate of r shoppers per minute and each stays in the store for an average time of T minutes, the average number of shoppers in the store, N, at any one time is given by the formula $N = rT$. This relationship is known as Little's law.

The owner of the Good Deals Store estimates that during business hours, an average of 3 shoppers per minute enter the store and that each of them stays an average of 15 minutes. The store owner uses Little's law to estimate that there are 45 shoppers in the store at any time.

37

Little's law can be applied to any part of the store, such as a particular department or the checkout lines. The store owner determines that, during business hours, approximately 84 shoppers per hour make a purchase and each of these shoppers spend an average of 5 minutes in the checkout line. At any time during business hours, about how many shoppers, on average, are waiting in the checkout line to make a purchase at the Good Deals Store?

38

The owner of the Good Deals Store opens a new store across town. For the new store, the owner estimates that, during business hours, an average of 90 shoppers per hour enter the store and each of them stays an average of 12 minutes. The average number of shoppers in the new store at any time is what percent less than the average number of shoppers in the original store at any time? (Note: Ignore the percent symbol when entering your answer. For example, if the answer is 42.1%, enter 42.1)

STOP

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

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The SAT

GENERAL DIRECTIONS

- You may work on only one section at a time.
- If you finish a section before time is called, check your work on that section. You may NOT turn to any other section.

MARKING ANSWERS

- Be sure to mark your answer sheet properly.

COMPLETE MARK ● **EXAMPLES OF INCOMPLETE MARKS**

- You must use a No. 2 pencil.
- Carefully mark only one answer for each question.
- Make sure you fill the entire circle darkly and completely.
- Do not make any stray marks on your answer sheet.
- If you erase, do so completely. Incomplete erasures may be scored as intended answers.
- Use only the answer spaces that correspond to the question numbers.

USING YOUR TEST BOOK

- You may use the test book for scratch work, but you will not receive credit for anything that you write in your test book.
- After time has been called, you may not transfer answers from your test book to your answer sheet or fill in circles.
- You may not fold or remove pages or portions of a page from this book, or take the book or answer sheet from the testing room.

SCORING

- For each correct answer, you receive one point.
- You do not lose points for wrong answers; therefore, you should try to answer every question even if you are not sure of the correct answer.

IMPORTANT

The codes below are unique to your test book.
Copy them on your answer sheet in boxes 8 and 9 and fill in the corresponding circles exactly as shown.

9 TEST ID
(Copy from back of test book.)

8 FORM CODE
(Copy and grid as on back of test book.)

A	A	A	A	0	0	0
B	B	B	B	1	1	1
C	C	C	C	2	2	2
D	D	D	D	3	3	3
E	E	E	E	4	4	4
F	F	F	F	5	5	5
G	G	G	G	6	6	6
H	H	H	H	7	7	7
I	I	I	I	8	8	8
J	J	J	J	9	9	9
K	K	K	K			
L	L	L	L			
M	M	M	M			
N	N	N	N			
O	O	O	O			
P	P	P	P			
Q	Q	Q	Q			
R	R	R	R			
S	S	S	S			
T	T	T	T			
U	U	U	U			
V	V	V	V			
W	W	W	W			
X	X	X	X			
Y	Y	Y	Y			
Z	Z	Z	Z			

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www.sat.org/scoring

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