

Saturday
October 15, 2016

PSAT/NMSQT[®]

Preliminary SAT/National Merit Scholarship Qualifying Test

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1

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Preliminary SAT/National Merit Scholarship Qualifying Test
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Reading Test

60 MINUTES, 47 QUESTIONS

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

DIRECTIONS

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

Questions 1-9 are based on the following passage.

This passage is adapted from Stephen L. Carter, *The Emperor of Ocean Park*. ©2002 by Stephen L. Carter. The narrator, a law professor, is visiting the home of his father, the Judge, who has just died. His wife is Kimmer; his sister is Mariah; his brother is Addison.

You should understand that in many ways I love and respect my sister. When we were younger, Mariah was, by common agreement, the most intellectually able of my parents' four children, and the one most earnestly and touchingly devoted to the impossible work of gaining their approval. Her successes in high school and college warmed my father's heart. To warm my mother's, Mariah married once and happily, an earlier fiancé who would have been a disaster having conveniently absconded with her best friend, and she produced grandchildren with a regularity and enthusiasm that delighted my parents. Her husband is white and boring, an investment banker ten years her senior whom she met, she told the family, on a blind date, although sweet Kimmer always insists that it could only have been the personals.

At Shepard Street, Mariah is greeting callers in the foyer, formal and sober in a midnight blue dress and a single strand of pearls, very much the lady of the house, as my mother might have said. From somewhere in the house wafts my father's terrible taste in classical music: Puccini with an English-language libretto.¹ The foyer is small and murky and crowded with mismatched pieces of heavy wooden furniture. It opens on the left to the

living room, on the right to the dining room, and in the back to a hallway leading to family room and kitchen. A broad but undistinguished staircase strides upward next to the dining-room door, and along the upstairs hall is a gallery where I used to crouch in order to spy on my parents' dinner parties and poker games, and where Addison once made me hide in a successful effort to prove to me that there is no Santa Claus. Beyond the gallery is the cavernous study where my father died. To my surprise, I see two or three people up there now, leaning on the banister as though it belongs to them. In fact, there are more people in the house than I expect. The entire first floor seems filled with somber suits, a larger slice of financially comfortable African America than most white Americans probably think exists outside the sports and entertainment worlds, and I wonder how many of the guests are happier about my father's death than their faces attest.

When I step through the front door, my sister offers me not a hug but a distant kiss, one cheek, other cheek, and murmurs, "I'm so glad you're here," the way she might say it to one of my father's law partners or poker buddies. Then, holding my shoulders in something still short of a hug, she looks past me down the walk, eyes tired but bright and mischievous: "Where's Kimberly?" (Mariah refuses to say Kimmer, which reeks, she once told me, of faux preppiness, although my wife attended Miss Porter's School and is thus fully qualified as a preppie.)

"On her way back from San Francisco," I say.
"She's been out there for a few days on business."
60 Bentley, I add, much too fast, is with our neighbors: I
picked him up early from his preschool yesterday
and then left him again this morning to make this
trip, assuming I would be too busy today to spend
much time with him. Kimmer will retrieve him
65 tonight, and they will be down tomorrow on the
train. Explaining all these logistical details, knowing
already that I am talking too much, I experience a
yawning emptiness that I hope my face does not
show, for I am missing my wife in ways I am not yet
70 prepared to review for the family.

But I need not have bothered to mask my
emotions, for Mariah has plenty of her own to cope
with, and makes no effort to hide her pain or her
confusion. She has already forgotten asking for my
75 wife. "I don't understand it," she says softly, shaking
her head, her fingers digging into my upper arms.
Actually, I am sure Mariah understands perfectly.
Just last year the Judge was in the hospital to repair
the imprecise results of his bypass operation of two
80 years before, a fact my sister knows as well as I do;
our father's death, if not precisely awaited, was
hardly unexpected.

¹ The words or lyrics of an opera

1

The primary purpose of the first paragraph is to

- A) summarize the narrator's past relationships.
- B) recall a significant event from the past.
- C) provide background information about a character.
- D) explain the reasons for a hostile relationship.

2

The narrator indicates that his parents' relationship with their children was

- A) marred by unrealistically high expectations.
- B) unhappy because of the daughter's first marriage.
- C) mutually supportive and loving.
- D) more rewarding for the parents than for the children.

3

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

- A) Lines 1-2 (“You . . . sister”)
- B) Lines 2-6 (“When . . . approval”)
- C) Lines 7-8 (“Her successes . . . heart”)
- D) Lines 13-17 (“Her husband . . . personals”)

4

The last sentence of the first paragraph (“Her husband . . . personals”) suggests that the narrator believes that his wife possesses which quality?

- A) Perceptiveness
- B) Forgetfulness
- C) Jealousy
- D) Independence

5

As used in line 19, “sober” most nearly means

- A) temperate.
- B) plain.
- C) solemn.
- D) boring.

6

According to the passage, in his youth the narrator used the gallery for

- A) hiding forbidden objects.
- B) entertaining friends.
- C) studying and reading.
- D) hiding and spying.

7

As used in line 47, “distant” most nearly means

- A) separate.
- B) aloof.
- C) removed.
- D) unusual.

8

Which choice provides the best evidence that the narrator believes he is insightful about his sister?

- A) Lines 64-66 (“Kimmer . . . train”)
- B) Lines 66-69 (“Explaining . . . show”)
- C) Lines 69-70 (“for . . . family”)
- D) Line 77 (“Actually . . . perfectly”)

9

The primary purpose of the last paragraph is to

- A) foreshadow what will happen after the guests leave.
- B) describe the narrator’s response to Mariah’s emotional state.
- C) provide insight into the narrator’s relationship with his wife.
- D) discuss the course of the father’s illness.

Questions 10-19 are based on the following passage and supplementary material.

This passage is adapted from John Bohannon, "Does Money Inspire Us to Cooperate?" ©2014 by American Association for the Advancement of Science.

Ask most economists what money is good for and they may throw out the word "fungibility," which means the quality of being exchangeable. Unlike traditional barter systems, where people trade one useful thing for another, a monetary system uses symbolic tokens that can be traded for anything. That opens the possibility of exchanging goods—say, a cow for a year's supply of bread—for which a fair swap would otherwise be too complex to figure out. But beyond its basic utility, money could have other benefits to society. One theory holds that money makes cooperation possible in large groups of strangers, where trust is in short supply. For example, if you give your cow to a stranger in exchange for money, you don't have to trust that person to keep your bread supply coming all year; you can use the money to buy bread from anyone. For this reason, monetary systems may have been crucial for human urbanization.

To test this idea experimentally, a team led by economist Gabriele Camera of Chapman University in Orange, California, brought 200 people into a room full of computers and asked them to play two different games, both based on the goal of earning points called "units." Everyone started out with eight of these units, and players were divided into groups of two, four, eight, or 32 people for a series of rounds. In each round, the computer made random pairs within the group. Players knew how many people were in their group, but they didn't know which of those people was their current partner.

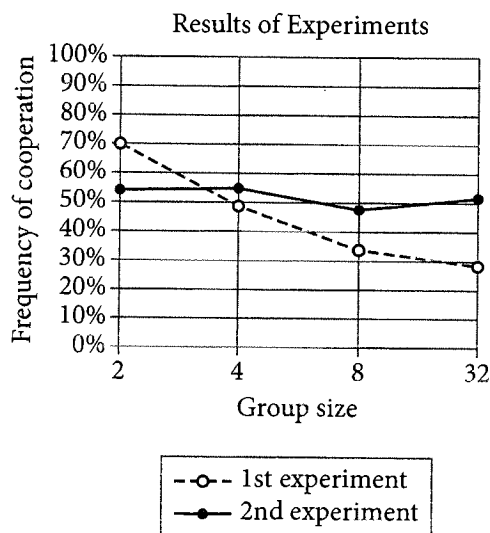
In the first game, one of the players in the pair had the option of spending 6 units to help the other get 12 units. That's an expensive choice, but if someone returned the favor in a future round, it would double the investment. Of course, if no one pitched in 6 units to help out later on, this player was out of luck. The computer stopped the game after a random number of rounds. At the end, everyone's scores were tallied up and converted into real cash that the participants took home.

As Camera and his colleagues expected, trust broke down as the group size increased. When just two people played the game, they could count on their gifts being returned when their roles were reversed. And indeed, the pairs of people helped each other out 71% of the time. But in larger groups, the chances of being paired with the same person plummeted—below 5% in the case of groups of 32. And that translated to a breakdown of trust. The frequency of cooperation in the 32-person groups fell to 28%.

The second experiment was exactly like the first but included a virtual form of money called "tokens." Each player started out with two of them. Players had the additional option to use a token to "buy" help from their partner, instead of just receiving assistance as a unilateral gift. Unlike units, tokens had no intrinsic value and could not be redeemed for anything at the end of the game. Using them was voluntary; the game could be played exactly as before without them.

Nonetheless, the participants adopted this monetary system immediately instead of helping each other through gift-giving. In the two-person groups, using tokens eroded trust, and cooperation dropped by 19%. But with more players, tokens had the opposite effect. In the largest groups, people cooperated nearly twice as often when using the symbolic monetary system, and everyone reaped larger rewards, the team reported.

Camera theorizes that money makes cooperation possible when people cannot rely on reputation or kinship. He speculates that money drives cultures toward money-based economies by helping to support larger populations.



Adapted from Gabriele Camera, Marco Casari, and Maria Bigoni, "Money and Trust among Strangers." ©2013 by Gabriele Camera, Marco Casari, and Maria Bigoni.

10

What is the main purpose of the passage?

- A) To illustrate which people tend to offer monetary help to others
- B) To explain why money systems are beneficial in an urbanized society
- C) To analyze where trust can fall apart when people use money
- D) To demonstrate how well money can be managed by individuals

11

With which statement would the author most likely agree?

- A) Monetary systems are especially useful among large groups of people.
- B) Barter systems are old and outdated methods of trading goods.
- C) Money should mainly be used to obtain practical and necessary items.
- D) Monetary systems are easier for people to use than barter systems.

12

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

- A) restrains.
- B) carries.
- C) claims.
- D) reserves.

13

What is the main idea of the second paragraph (lines 10-19)?

- A) Bartering is a beneficial exchange system in society.
- B) Bartering helps only a small percentage of the population.
- C) People who exhibit trust can earn the most rewards.
- D) Money makes cooperation possible where trust is lacking.

14

Based on the passage, why did trust break down in the first experiment?

- A) Participants were initially given differing amounts of units.
- B) Participants were members of larger groups.
- C) Participants were able to select their own partner.
- D) Participants were unwilling to give up their units.

15

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

- A) Lines 20-25 ("To test . . . units")
- B) Lines 29-31 ("Players . . . partner")
- C) Lines 42-43 ("As Camera . . . increased")
- D) Lines 46-47 ("And indeed . . . time")

16

The author uses the terms "breakdown" and "fell" in lines 50-52 in order to

- A) emphasize the negative outcomes of the unit system in the large groups.
- B) illustrate the hesitation participants felt when they were using only units.
- C) describe the effects of various investments that were made using units.
- D) highlight the anxiety the group felt when help was sought but not provided.

17

Which choice best supports the idea that people rely more on money than on personal relations and trustworthiness?

- A) Lines 3-6 ("Unlike . . . anything")
- B) Lines 11-13 ("One . . . supply")
- C) Lines 58-60 ("Unlike . . . game")
- D) Lines 63-65 ("Nonetheless . . . gift-giving")

18

The main purpose of the information in the graph is to show

- A) how the participants' scores were converted to cash.
- B) the number of times each group used a barter system.
- C) the number of times each participant exchanged a gift.
- D) how often the participants cooperated in the experiments.

19

According to the graph, a decrease in cooperation happened during the second experiment when the

- A) frequency of cooperation was at 52%.
- B) size of the group increased from 2 to 4 people.
- C) size of the group increased from 4 to 8 people.
- D) size of the group increased from 8 to 32 people.

Questions 20-28 are based on the following passages.

Passage 1 is adapted from a lecture delivered by Richard P. Feynman to the American Physical Society in 1959. Passage 2 is adapted from Emily Sohn, "Atom Hauler." ©2005 by Society for Science & the Public. Passage 1 is about the potential to manipulate things on a very small scale.

Passage 1

As we go down in size, there are a number of interesting problems that arise. All things do not simply scale down in proportion. There is the problem that materials stick together by the molecular (Van der Waals) attractions. It would be like this: After you have made a part and you unscrew the nut from a bolt, it isn't going to fall down because the gravity isn't appreciable; it would even be hard to get it off the bolt. It would be like those old movies of a man with his hands full of molasses, trying to get rid of a glass of water. There will be several problems of this nature that we will have to be ready to design for.

But I am not afraid to consider the final question as to whether, ultimately—in the great future—we can arrange the atoms the way we want; the very atoms, all the way down! What would happen if we could arrange the atoms one by one the way we want them (within reason, of course; you can't put them so that they are chemically unstable, for example).

Up to now, we have been content to dig in the ground to find minerals. We heat them and we do things on a large scale with them, and we hope to get a pure substance with just so much impurity, and so on. But we must always accept some atomic arrangement that nature gives us. We haven't got anything, say, with a "checkerboard" arrangement, with the impurity atoms exactly arranged 1,000 angstroms apart, or in some other particular pattern.

What could we do with layered structures with just the right layers? What would the properties of materials be if we could really arrange the atoms the way we want them? They would be very interesting to investigate theoretically. I can't see exactly what would happen, but I can hardly doubt that when we have some control of the arrangement of things on a small scale we will get an enormously greater range of possible properties that substances can have, and of different things that we can do.

Passage 2

Atoms are everywhere, but you'd never know it. Even though these tiny building blocks of matter make up everything—from chairs to air—they're far too tiny to see with your own eyes.

When scientists want to study atoms one at a time, however, they can use special, highly sensitive microscopes to see them. Using these tools, called scanning tunneling microscopes (STMs), researchers can also move individual atoms around.

Now, researchers in France and Germany have taken the technology one step further. They have found a way to gather up and move around atoms in bunches. Their work may help them eventually make and operate tiny, nanoscale machines.

The key part of a scanning tunneling microscope is an extremely sharp needle that rides over the surface being examined. This sharp tip can even nudge a single atom from one place to another. But maneuvering more than one atom at a time is a difficult juggling act.

To make the task easier, the researchers created a new, six-legged molecule. They called it hexa-t-butyl-hexaphenylbenzene (HB-HBP). The molecule is shaped like a hexagon (having six sides) and contains rings of carbon atoms. Six tripod-like feet support the structure. Like a minuscule vacuum cleaner, it can easily slide over a copper surface, sucking up loose copper atoms.

Experiments performed at very low temperatures and in practically airless conditions showed that an STM tip can move an HB-HBP molecule that holds as many as five copper atoms that the molecule has picked up. Scientists can then use the STM tip to lift the carrier molecule, leaving the clump of atoms behind.

The development is a major step toward making molecule-sized machines, scientists say. Someday, tiny sweepers might gather atoms together to form wires. Or they might pile atoms into regularly spaced mounds that, together, affect light or magnetic fields in useful ways.

20

According to the author of Passage 1, which of the following is a difficulty associated with working at a very small scale?

- A) The strength of molecular attractions
- B) The unpredictability of the benefits
- C) The proportion of impurities in substances
- D) The great range of possible substance properties

21

Which choice best supports the claim made in Passage 1 that some arrangements of atoms will be impossible to build?

- A) Lines 3-5 (“There . . . attractions”)
- B) Lines 19-20 (“you . . . example”)
- C) Lines 46-48 (“Using . . . around”)
- D) Lines 52-53 (“Their . . . machines”)

22

As used in line 12, “nature” most nearly means

- A) disposition.
- B) environment.
- C) origin.
- D) type.

23

The author of Passage 2 implies that building nanoscale machines will first require

- A) improving existing microscopes.
- B) sharpening STM tips.
- C) creating molecular tools.
- D) developing new uses for magnetic fields.

24

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

- A) Lines 41-43 (“Even . . . eyes”)
- B) Lines 50-52 (“They . . . bunches”)
- C) Lines 54-56 (“The key . . . examined”)
- D) Lines 60-61 (“To make . . . molecule”)

25

The main purpose of the discussion of the size of atoms in the first paragraph of Passage 2 (lines 40-43) is to

- A) point out that the number of atoms comprising everyday objects is large.
- B) emphasize the need for improved methods of observing atoms.
- C) demonstrate that many different arrangements of atoms are possible.
- D) introduce a fact underlying the challenges of working at the atomic level.

26

As used in line 78, “regularly” most nearly means

- A) acceptably.
- B) evenly.
- C) frequently.
- D) normally.

27

Which accomplishment described in Passage 2 is predicted in Passage 1?

- A) Microscopes seeing single atoms
- B) Researchers moving individual atoms
- C) Scientists producing molecules that perform tasks
- D) Experiments being performed at very low temperatures

28

The authors of both passages do which of the following to motivate the reader's interest in manipulating atoms?

- A) Specify methods by which individual atoms can be moved
- B) Stress the limitations of large-scale materials design
- C) Appeal to the possibility of making new and useful substances
- D) Describe the intrinsic intellectual challenge of the endeavor

Questions 29-37 are based on the following passage.

This passage is adapted from a commencement address delivered by President Lyndon B. Johnson on May 22, 1964, for the graduation ceremony at the University of Michigan in Ann Arbor.

I have come today from the turmoil of your Capital to the tranquility of your campus to speak about the future of your country.

Line The purpose of protecting the life of our Nation
5 and preserving the liberty of our citizens is to pursue the happiness of our people. Our success in that pursuit is the test of our success as a Nation.

For a century we labored to settle and to subdue a continent. For half a century we called upon
10 unbounded invention and untiring industry to create an order of plenty for all of our people.

The challenge of the next half century is whether we have the wisdom to use that wealth to enrich and elevate our national life, and to advance the quality of
15 our American civilization.

Your imagination, your initiative, and your indignation will determine whether we build a society where progress is the servant of our needs, or a society where old values and new visions are buried
20 under unbridled growth. For in your time we have the opportunity to move not only toward the rich society and the powerful society, but upward to the Great Society.

The Great Society rests on abundance and liberty
25 for all. It demands an end to poverty and racial injustice, to which we are totally committed in our time. But that is just the beginning.

The Great Society is a place where every child can find knowledge to enrich his mind and to enlarge his
30 talents. It is a place where leisure is a welcome chance to build and reflect, not a feared cause of boredom and restlessness. It is a place where the city of man serves not only the needs of the body and the demands of commerce but the desire for beauty and
35 the hunger for community.

It is a place where man can renew contact with nature. It is a place which honors creation for its own sake and for what it adds to the understanding of the race. It is a place where men are more concerned
40 with the quality of their goals than the quantity of their goods.

But most of all, the Great Society is not a safe harbor, a resting place, a final objective, a finished work. It is a challenge constantly renewed, beckoning
45 us toward a destiny where the meaning of our lives matches the marvelous products of our labor. . . .

So, will you join in the battle to give every citizen the full equality which God enjoins and the law requires, whatever his belief, or race, or the color of
50 his skin?

Will you join in the battle to give every citizen an escape from the crushing weight of poverty?

Will you join in the battle to make it possible for all nations to live in enduring peace—as neighbors
55 and not as mortal enemies?

Will you join in the battle to build the Great Society, to prove that our material progress is only the foundation on which we will build a richer life of mind and spirit?

60 There are those timid souls who say this battle cannot be won; that we are condemned to a soulless wealth. I do not agree. We have the power to shape the civilization that we want. But we need your will, your labor, your hearts, if we are to build that kind of
65 society.

Those who came to this land sought to build more than just a new country. They sought a new world. So I have come here today to your campus to say that you can make their vision our reality. So let us from
70 this moment begin our work so that in the future men will look back and say: It was then, after a long and weary way, that man turned the exploits of his genius to the full enrichment of his life.

29

As used in line 8, “labored” most nearly means

- A) burdened.
- B) endeavored.
- C) forced.
- D) trudged.

30

The main purpose of lines 8-15 (“For a century . . . civilization”) is to

- A) show that the country has moved beyond its struggles from the past.
- B) outline the nation’s problems and suggest how to fix them.
- C) emphasize that the country’s past will not negatively affect its future.
- D) reference the country’s past in order to illustrate the possibilities for its future.

31

Which choice best supports the idea that Johnson believed there would be strong opposition to many of the goals he outlined in his speech?

- A) Lines 12-15 (“The challenge . . . civilization”)
- B) Lines 60-62 (“There . . . wealth”)
- C) Lines 63-65 (“But we . . . society”)
- D) Lines 71-73 (“It was . . . life”)

32

As used in line 19, “values” most nearly means

- A) amounts.
- B) habits.
- C) principles.
- D) costs.

1
33

Based on the passage, it can reasonably be concluded that Johnson believed people of the United States had a responsibility to be

- A) more productive.
- B) more respectable.
- C) less fearful.
- D) less materialistic.

34

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

- A) Lines 20-23 ("For . . . Society")
- B) Lines 30-32 ("It is a place where leisure . . . restlessness")
- C) Lines 56-59 ("Will . . . spirit")
- D) Lines 62-63 ("We have . . . want")

35

Johnson repeats the words "Will you join . . ." several times near the end of his speech most likely to

- A) convince the audience to take action on his plan.
- B) persuade the audience to continue their studies.
- C) show the audience that change must occur immediately.
- D) help the audience understand the necessity for strong leadership.

36

Based on the passage, what objection to his ideas about building a Great Society did Johnson mainly foresee?

- A) That people want change but do not believe it is possible
- B) That people will not agree that it is a worthy goal
- C) That people do not have time to devote to the goal
- D) That people will be uninterested in working together

37

Johnson claims that the vision of the people who founded the United States included the

- A) hope for a wealthy nation.
- B) expectation of old cultural values.
- C) wish for all nations to live in peace.
- D) dream of building a whole new world.

Questions 38-47 are based on the following passage and supplementary material.

This passage is adapted from Veronique Greenwood, "Sleep: When Brain Cells Shrink & Neuro Trash is Flushed Away." ©2013 by Nautilus.

For humans, sleep is an absolute requirement for survival, almost on par with food and water.

When we don't get it, we not only feel terrible, but our cognitive abilities go downhill, and in extreme cases sleeplessness can lead to seizures and contribute to death. And while we share with many other animals this intense commitment to spending much of our lives unconscious, we don't really know why we do it. Recent research suggests that the answer may lie in part with a recently discovered plumbing system that drains waste from the brain. Scientists essentially found that the brain likes to wait till sleep comes before taking out the garbage.

The study follows up on a discovery by the same team, based at University of Rochester, that the brain's waste is removed by a network of channels that run alongside blood vessels. The channels work like the lymphatic system that operates in the rest of the body, collecting and draining what isn't needed, but they are made of brain cells called glia, instead of the membrane cells that form lymphatic vessels. The channels were effectively invisible to biologists until the development of methods to watch a living brain under the microscope—mouse brains, in these experiments. The discovery of these channels suggested that diseases like Alzheimer's, in which waste products build up in the brain, might be linked to problems with drainage.

The team wondered whether this system of channels, whose constant pumping action requires a lot of energy, might be responsible for the observation that the sleeping brain uses as much energy as a wakeful one. To see how the volume of cleaning fluid circulating in the brain changed during sleep, they injected fluorescent molecules into the brains of mice and watched them circulate through waking, sleeping, and anesthetized animals. They even got to see how the flow changed in real time, as mice emerged from sleep, by gently touching their tails to wake them up.

Remarkably, unconsciousness had a dramatic effect on how much fluid swept through the brain. The sleeping and the anesthetized mice had a 60% increase in the volume of fluid, apparently because brain cells actually shrink to allow more

space in the channels. When the researchers woke the mice up, the flow of fluid into the brain abruptly slowed. Further, when the group watched for the removal of beta-amyloid, the waste product that gums up the brains of Alzheimer's patients, they found it left twice as fast in the brains of sleeping mice. The results indicate that the drainage system is particularly active during sleep. (See figure 1 and figure 2.)

Though things might work differently in human brains, and this waste-management system is not yet well studied, these findings give a tantalizing glimpse of one possible explanation for why sleep is so restorative. Maybe the fresh, new feeling we have when we awake really is a kind of cleanliness, as the by-products of the previous day's cogitations have been washed away.

Figure 1

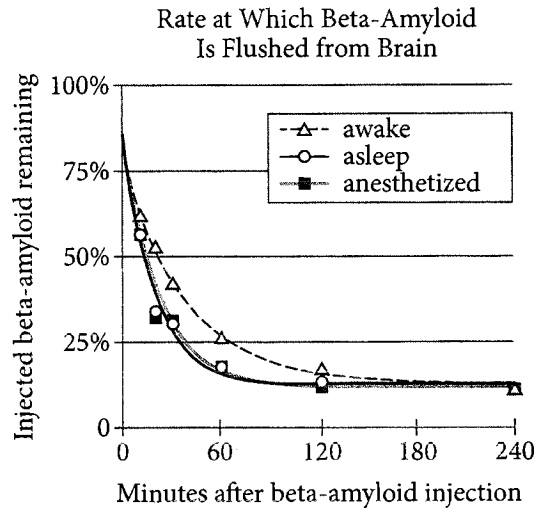
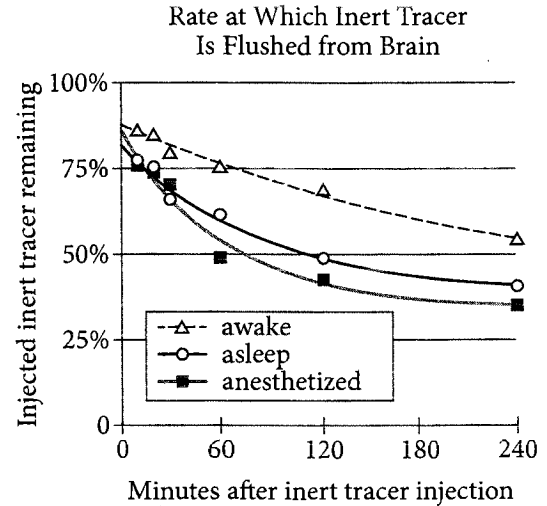


Figure 2



Adapted from Lulu Xie et al., "Sleep Drives Metabolite Clearance from the Adult Brain." ©2013 by American Association for the Advancement of Science.

38

Which choice best states the main conclusion drawn from the experiments discussed in the passage?

- A) The primary reason humans need sleep is to drain waste products from the brain.
- B) Some neurological diseases result from an excess of waste products in the brain.
- C) Waste products are removed from the brain through channels adjacent to blood vessels.
- D) Sleep assists in the elimination of waste products from the brains of mice.

39

As used in line 1, "absolute" most nearly means

- A) fundamental.
- B) perfect.
- C) independent.
- D) uniform.

40

Based on the passage, which inference can most reasonably be made about the researchers' evidence?

- A) It came from multiple studies conducted on unrelated species.
- B) It showed a different pattern than did evidence gathered in similar studies.
- C) It supports mutually exclusive hypotheses equally well.
- D) It could be collected because of technological advancements.

41

It can most reasonably be inferred from the passage that the detection of the network of channels in the brain raised the possibility that

- A) the brain can use a significant amount of energy during sleep.
- B) an inability to dispose of waste products may contribute to the development of harmful conditions of the brain.
- C) sleep may restore the glia that have been flushed from the brain with waste products.
- D) lymphatic vessels may function differently in the brain than elsewhere in the body.

42

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

- A) Lines 14-17 ("The study . . . vessels")
- B) Lines 17-21 ("The channels . . . vessels")
- C) Lines 25-28 ("The discovery . . . drainage")
- D) Lines 29-33 ("The team . . . wakeful one")

43

As used in line 32, "observation" most nearly means

- A) supervision.
- B) study.
- C) finding.
- D) pronouncement.

44

Based on the passage, which choice best describes a change that a mouse undergoes when it wakes up?

- A) The channels that remove beta-amyloid from its brain close completely.
- B) The flow of cleaning fluid reverses, forcing beta-amyloid into its brain.
- C) It experiences a rapid increase in fluid circulation in its brain and throughout its body.
- D) Its brain cells expand to the size they were before the mouse was asleep.

45

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

- A) Lines 38-40 ("They . . . them up")
- B) Lines 41-43 ("Remarkably . . . brain")
- C) Lines 43-48 ("The sleeping . . . slowed")
- D) Lines 48-53 ("Further . . . sleep")

46

The data presented in figure 1 best support which statement about the mice that were awake in the experiment?

- A) They flushed a smaller total amount of injected beta-amyloid than did either the sleeping mice or anesthetized mice.
- B) They had nearly the same amount of injected beta-amyloid remaining after 240 minutes as did the sleeping mice and anesthetized mice.
- C) They had more than 25% of the injected beta-amyloid still remaining at the conclusion of the experiment.
- D) They flushed 50% of the injected beta-amyloid in less time than it took the sleeping mice and anesthetized mice to do the same.

47

Figure 1 and figure 2 most strongly suggest that which event occurred immediately following the injection of the beta-amyloid and the inert tracer?

- A) Mice that were awake flushed some of the beta-amyloid and the inert tracer, but sleeping mice and anesthetized mice did not.
- B) Anesthetized mice flushed most of the beta-amyloid, but mice that were awake and sleeping mice did not.
- C) Mice that were awake, sleeping mice, and anesthetized mice all flushed some of the beta-amyloid and the inert tracer.
- D) Mice that were awake, sleeping mice, and anesthetized mice all flushed the same portion of the inert tracer but different portions of the beta-amyloid.

STOP

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

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.

Physical Therapy: A Profession on the Move

[1] Students who are looking for a personally and financially rewarding career would be wise to consider physical therapy. [2] They develop individual plans of care by assessing each client's balance, coordination, strength, and overall health. [3] These plans can include exercise, massage, ultrasound therapy, wellness education, and other techniques for improving mobility. [4] As a slogan of the American Physical Therapy Association puts it, "Physical therapy brings motion to life."

1

The writer plans to add the following sentence to the paragraph.

Physical therapists are health professionals whose primary mission is to help improve and restore people's ability to move.

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

- A) before sentence 1.
- B) after sentence 1.
- C) after sentence 2.
- D) after sentence 3.

Physical therapists practice this important work in many different 2 settings. They assist a diverse population of clients. Hospitals, clinics, assisted-living centers, 3 and gyms among many other facilities, employ physical therapists. Fitness enthusiasts may enter the profession with the ambition of working for a sports team. People who enjoy working with children may aspire to work in a school or children's hospital. The variety of opportunities ensures that physical therapy 4 will continue to grow.

There are many other reasons a career in physical therapy merits serious consideration. Demand for physical therapists is high in many areas of the United States. The current state of the profession is strong, and its future looks even stronger. 5 However, according to the US Bureau of Labor Statistics, in 2018 there will be 30 percent more jobs in the field than there were in 2008. Furthermore, physical therapists earn a median average 6 salary that is. Well above that of the US average for all occupations.

2

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

- A) settings, assisting
- B) settings—assistants to
- C) settings, but they assist
- D) settings: assistance for

3

- A) NO CHANGE
- B) and gyms, among many other facilities
- C) and gyms, among many other facilities,
- D) and, gyms among many other, facilities

4

Which choice most effectively advances the main argument of the passage?

- A) NO CHANGE
- B) provides needed relief to clients from all walks of life.
- C) will appeal to students with a range of interests and backgrounds.
- D) is here to stay.

5

- A) NO CHANGE
- B) At present,
- C) Nevertheless,
- D) In fact,

6

- A) NO CHANGE
- B) salary and that is well
- C) salary that is well
- D) salary, that is well

Of course, becoming a physical therapist requires a lot of effort. Physical therapists must earn a graduate degree from one of **7** more than 200 accredited programs. They complete rigorous course work in anatomy, kinesiology, physiology, and **8** courses in physics. Most states also require physical therapists to pass a licensure examination. Many physical therapists choose to continue their education by pursuing certification in one of eight areas of specialization, **9** including—pediatrics, geriatrics, sports and women's health. Most physical therapists consider this training to be well worth the effort: a 2007 survey revealed that more than three-quarters of physical therapists reported being "very satisfied" with their jobs.

7

- A) NO CHANGE
- B) the 200 accredited programs, at minimum, that are accredited and award the graduate degree necessary to practice physical therapy.
- C) the programs, of which there are more than 200, that are accredited to award physical therapy degrees.
- D) many accredited educational programs that offer a physical therapy graduate degree.

8

- A) NO CHANGE
- B) the study of physics.
- C) they take physics courses.
- D) physics.

9

- A) NO CHANGE
- B) including pediatrics, geriatrics, sports, and women's
- C) including pediatrics, geriatrics, sports and women's,
- D) including: pediatrics, geriatrics sports and women's

Given the many benefits physical therapy offers clients and practitioners, students should research whether this growing field could be one to which they would like to contribute. **10** They just may find that helping others move forward is the best way to advance **11** his or her careers.

10

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

They should also consider whether becoming a physical therapist assistant, rather than a physical therapist, would be a more appropriate career choice.

Should the writer add this sentence here?

- A) Yes, because it strengthens the writer's argument by providing another example of the flexibility offered by a career in physical therapy.
- B) Yes, because it adds a detail about how students might be able to contribute to the field of physical therapy.
- C) No, because it contradicts the writer's claim that physical therapy jobs are personally and financially rewarding.
- D) No, because it adds new information that is not adequately explained in the passage.

11

- A) NO CHANGE
- B) their
- C) they're
- D) your

Questions 12-22 are based on the following passage.

Eat Nuts, Live Longer?

Numerous studies have confirmed that for people not allergic to nuts, a daily diet incorporating them provides various health benefits. Packed with proteins and vitamins and filled with antioxidants and unsaturated fats, nuts are every bit the superfood that wild salmon or wild blueberries are.

12 These foods don't have to be wild to be nutritious, though. A 2005 Harvard University study, for example, showed that consuming cashews, walnuts, pecans, or almonds (among other nuts) reduces the risk of heart disease. A 2009 study conducted at Texas Woman's University revealed that **13** eating pistachios every day reduces the risk of lung cancer. Brazil nuts, full of the mineral selenium, have been shown to aid in the battle against advanced prostate cancer. Replacing red

12

Which choice most effectively establishes the main idea of the paragraph?

- A) NO CHANGE
- B) Many people already include such foods in their diet.
- C) Nuts should be eaten more often than other superfoods to reap maximum benefits.
- D) The health gains from nut consumption are becoming readily apparent.

13

- A) NO CHANGE
- B) if you eat
- C) when eating
- D) their eating

meat with nuts one day a week has been shown to reduce mortality. **14** Stress levels, immune system strength, male fertility, and weight and cholesterol—**15** which all appear to benefit from the regular consumption of nuts.

14

Are the data in the following table consistent with the statement the writer makes regarding reducing consumption of red meat?

Percent Reduction of Mortality When Substituting
Other Protein Sources for Red Meat
One Day a Week

Starting servings of red meat per day	Replace with legumes	Replace with whole grains	Replace with nuts
1	1.5%	2.1%	3.0%
2	3.0%	4.2%	5.8%
3	4.4%	6.3%	8.6%
4	5.8%	8.3%	11.3%

Adapted from Allison Righter, "Ditching Meat One Day a Week: What, Exactly, Is the Reduced Risk of Mortality?" ©2010 by Center for a Livable Future.

- A) Yes, because the data indicate that nuts contain more vitamins than do whole grains.
- B) Yes, because the data show that replacing red meat with nuts in one's diet reduces mortality.
- C) No, because the data fail to provide any relevant information about nut consumption.
- D) No, because the data suggest that eating legumes reduces mortality more so than does eating nuts.

15

- A) NO CHANGE
- B) that all appear
- C) all appearing
- D) all appear

16 In an attempt to disprove these assertions, a 2013 study touting the health benefits of daily nut consumption didn't exactly break new ground. It was **17** awesome anyhow. The study, the largest ever done on nuts and health, confirmed a clear—if still **18** unexplained, link between eating nuts and living a longer, healthier life. Researchers at Brigham and Women's Hospital and Harvard Medical School looked at the survey results of some 120,000 people. Among other questions, participants were asked what kinds of nuts they ate and how often they ate them. **19** The researchers found an obvious correlation between eating nuts and not developing certain illnesses. These illnesses include heart disease, cancer, and various respiratory conditions. In fact, the study revealed that those who had

16

- A) NO CHANGE
- B) As if this weren't enough,
- C) Despite previous findings,
- D) Given the evidence that already existed,

17

- A) NO CHANGE
- B) noteworthy nonetheless.
- C) amazing any way you look at it.
- D) mind-boggling no matter what.

18

- A) NO CHANGE
- B) unexplained—
- C) unexplained;
- D) unexplained

19

Which choice most effectively combines the underlined sentences?

- A) The researchers found an obvious correlation between eating nuts and not developing certain illnesses, including heart disease, cancer, and various respiratory conditions.
- B) A correlation between eating nuts and not developing certain illnesses, including heart disease, cancer, and various respiratory conditions, is what the researchers found, and it was obvious.
- C) Between eating nuts and not developing certain illnesses, including heart disease, cancer, and various respiratory conditions, researchers found an obvious correlation.
- D) Not developing certain illnesses, including heart disease, cancer, and various respiratory conditions, was found by researchers to be obviously correlated with eating nuts.

said they ate nuts at least seven times a week were 20 percent less likely to die after four years than **20** not eating nuts.

The study wasn't conclusive, however. **21** For instance, it wasn't able to identify exactly how many nuts one should eat per day to extend life span. Neither **22** were they able to establish a cause-and-effect relationship between eating nuts and living longer and better. The survey found that regular nut eaters were more likely to have leaner physiques, be more active, and not smoke; however, its methodology couldn't ascertain whether regular nut consumption helped those people live healthier, longer lives or already generally healthy people simply ate nuts more frequently. People lacking allergies to nuts may not want to bother waiting for the answer, though, given that there's at least a chance that including nuts in a daily diet may improve health and longevity.

20

- A) NO CHANGE
- B) if saying they ate no
- C) when people were not eating
- D) those who had said they ate no

21

- A) NO CHANGE
- B) Even so,
- C) Nevertheless,
- D) Regardless,

22

- A) NO CHANGE
- B) are they
- C) had they been
- D) was it

Questions 23-33 are based on the following passage.

A Linguistic Fingerprint

Because individuals speak and write in **23** his or her own unique ways, or “idiolects,” studying a writer’s language patterns can reveal who is, or isn’t, **24** reasonable for writing a given document. This process is called forensic linguistics. According to Peter Millican, a professor at the University of Oxford, an individual’s writing style can actually be seen as “a kind of signature or DNA or fingerprint.”

23

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

24

- A) NO CHANGE
- B) reliable
- C) dependable
- D) responsible

[1] In 1963, for instance, researchers examined the linguistic tendencies of James Madison and Alexander Hamilton in an attempt to determine which of the two had written particular papers in the *Federalist Papers* series. [2] The author of the papers in question favored the word “whilst” over “while” and “on” over “upon.” [3] Analysis of other documents written by the men revealed that Madison frequently used the word “whilst”; 25 nevertheless, Hamilton never incorporated this word into his prose. [4] The same held for “on” versus “upon”: 26 these words were used as clues to determine the author’s identity. [5] These specific word choices suggested that Madison, not Hamilton, 27 to be the true author of the papers. 28

25

- A) NO CHANGE
- B) in addition,
- C) conversely,
- D) ironically,

26

Which choice develops the sentence’s supporting example in a way that makes it most consistent with the example preceding it?

- A) NO CHANGE
- B) some writers show a tendency to use one word instead of the other.
- C) Hamilton had one linguistic preference, but Madison had another.
- D) Madison regularly used the first word, while Hamilton rarely did.

27

- A) NO CHANGE
- B) was
- C) being
- D) DELETE the underlined portion.

28

The writer wants to add the following sentence.

Scholars have used forensic linguistics to ascertain authorship of historical documents.

To make the paragraph most logical, the sentence should be placed

- A) before sentence 1.
- B) after sentence 1.
- C) after sentence 2.
- D) after sentence 4.

Advances in forensic linguistics have made it possible to pinpoint features of **29** author's idiolects with a degree of specificity that can make it difficult, if not impossible, to **30** maintain anonymity as a writer. In 2013, a British crime novel called *The Cuckoo's Calling* was published, purportedly written by first-time author Robert Galbraith. When a rumor surfaced that the book had actually been penned by J. K. Rowling (creator of the best-selling Harry Potter series), two forensic linguists investigated. Patrick Juola, a computer scientist at Duquesne University, examined patterns of adjacent words and characters, frequency of common words, and **31** how long the words were in *The Cuckoo's Calling* and compared them to **32** previous works by Rowling and other British crime writers. Meanwhile, Peter Millican of the University of Oxford independently analyzed the same books, focusing on word, sentence, and paragraph length, the frequency of certain words and punctuation, and rare word usage. After complex statistical analyses, Juola and Millican came to the same **33** conclusion. Galbraith was surely Rowling. Shortly thereafter, Rowling admitted to writing *The Cuckoo's Calling*.

The ability of forensic linguists to determine authorship has applications beyond historical research and literary analysis. Forensic linguists can be so accurate that even the criminal justice system sometimes makes use of their expert testimony. In this context, Millican's likening of one's writing style to a fingerprint is a particularly apt comparison.

29

- A) NO CHANGE
- B) authors' idiolects
- C) authors idiolects
- D) author's idiolect's

30

Which choice most effectively sets up the information that follows in the paragraph while logically completing the sentence?

- A) NO CHANGE
- B) determine whether a particular book was written by a famous author.
- C) distinguish the books of first-time authors from those of more experienced authors.
- D) know which books have been written under an assumed name.

31

- A) NO CHANGE
- B) word lengths
- C) measured the lengths of words
- D) word lengths were also examined

32

- A) NO CHANGE
- B) previous works'
- C) those in previous works
- D) that of previous works

33

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

- A) conclusion; they also believed that Galbraith
- B) conclusion: Galbraith
- C) conclusion and agreed that Galbraith
- D) conclusion, for Galbraith

Questions 34–44 are based on the following passage.

Letters from Vesuvius

Today's newsworthy events are instantly documented and shared with the world via video, photography, texts, and email, and new communications options become available every year. **34** If they are compared with these methods, the handwritten letter is an extremely inefficient means of communication. **35** Meanwhile, letters once played an important role in recording history; indeed, for some events, **36** letters celebrate the heroic actions of the participants.

One such event was the famous eruption of Mount Vesuvius, which occurred in August of the year 79 CE. This devastating natural disaster buried the ancient city of **37** Pompeii near Naples, Italy, under millions of tons of hot ash and rocks. A student named Pliny witnessed the spectacle. Twenty-five years later, he captured his memories of those frightening days in two letters he wrote to historian Cornelius Tacitus.

34

- A) NO CHANGE
- B) If you compare them
- C) When comparing it
- D) Compared

35

- A) NO CHANGE
- B) For example,
- C) However,
- D) In addition,

36

The writer wants to support the preceding claim with a detail that also signals the main subject of the passage. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) the only eyewitness accounts are handwritten letters.
- C) letters supplement other historical documents from the period.
- D) people involved in the actions were too busy to write letters.

37

- A) NO CHANGE
- B) Pompeii, near Naples, Italy
- C) Pompeii, near Naples, Italy,
- D) Pompeii—near Naples, Italy,

38 In Pliny's first letter to Tacitus, it describes the attempt of Pliny's uncle to save a friend following the eruption. This uncle, known to history as Pliny the Elder, was a highly regarded writer, philosopher, and naval commander. Pliny believed that having information about his uncle included in Tacitus's historical account would help keep his uncle's memory alive. **39** "Thank you for asking me to send you a description of my uncle's death," he wrote in the letter. On the day of the eruption, Pliny the Elder was initially just curious **40** at first to see the strange cloud from the volcano, but upon receiving word that a friend was in **41** danger, he sailed toward Pompeii to try to rescue her. Sadly, Pliny the Elder perished in the attempt.

38

- A) NO CHANGE
- B) The first letter written from Pliny to Tacitus, he
- C) The first letter to Tacitus
- D) When writing the first letter to Tacitus, it

39

The writer wants to support the preceding claim with a quotation from Pliny's letter. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) "I know that immortal fame awaits him if his death is recorded by you,"
- C) "[H]e perished in a catastrophe which destroyed the loveliest regions of the earth, a fate shared by whole cities and their people,"
- D) "He changed his plans, and what he had begun in a spirit of inquiry he completed as a hero,"

40

- A) NO CHANGE
- B) in the beginning
- C) at the start
- D) DELETE the underlined portion.

41

- A) NO CHANGE
- B) danger, and sailing
- C) danger sailing
- D) danger, and sailed

[1] The second letter to Tacitus details Pliny's own experience of the eruption and its aftermath. [2] Pliny described the cloud as 42 parting; "to reveal great tongues of fire, like flashes of lightning magnified in size." [3] According to this letter, the days preceding the eruption gave no real warning of what was to come. [4] Then, on August 24, an immense and strangely shaped cloud appeared in the sky. [5] The next few hours were terrifying for Pliny, as the sky grew so black with ash that he could barely see. [6] Finally, sunlight began to reappear through the ash. 43

Pliny's letters have been essential in helping later generations understand what happened during those awful August days. The portion of Tacitus's book that 'covered the Pompeii tragedy has been lost to history, as have all other eyewitness accounts of the event. But Pliny's two letters are still 44 here. They offer a powerful and lasting testament to all the horror and heroism associated with the eruption of Mount Vesuvius.

42

- A) NO CHANGE
- B) parting,
- C) parting—
- D) parting

43

To make this paragraph most logical, sentence 2 should be placed

- A) where it is now.
- B) after sentence 3.
- C) after sentence 4.
- D) after sentence 6.

44

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

- A) here, offering
- B) here in order to offer
- C) here because they offer
- D) here as a result of offering

STOP

If you finish before time is called, you may check your work on this section only.

Do not turn to any other section.



Math Test – No Calculator

25 MINUTES, 17 QUESTIONS

PSAT
SATURDAY
2016

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

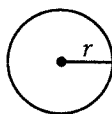
DIRECTIONS

For questions 1-13, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 14-17, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 14 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTES

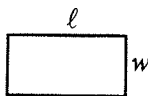
1. The use of a calculator is **not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated,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

REFERENCE

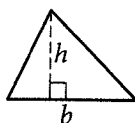


$$A = \pi r^2$$

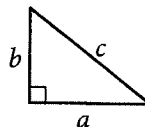
$$C = 2\pi r$$



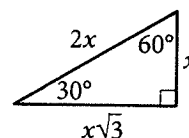
$$A = \ell w$$



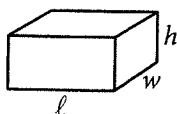
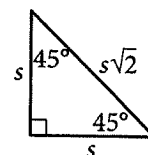
$$A = \frac{1}{2}bh$$



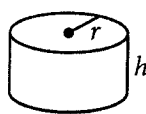
$$c^2 = a^2 + b^2$$



Special Right Triangles



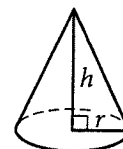
$$V = \ell wh$$



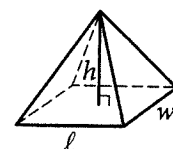
$$V = \pi r^2 h$$



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



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



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

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.



1

In the xy -plane, what is the slope of the line with equation $y - 2 = 7x$?

- A) -7
- B) -3.5
- C) 2
- D) 7

2

A group of n friends attending a concert decided to equally share the cost of a car rental and n concert tickets. If each friend's share of the cost was $\frac{a + nb}{n}$ dollars, what does $a + nb$ represent?

- A) The cost, in dollars, of the car rental
- B) The cost, in dollars, of each concert ticket
- C) The total cost, in dollars, of n concert tickets
- D) The total cost, in dollars, of the car rental and n concert tickets

3

The equation $d = 50 - 173t$ is used to estimate the horizontal distance d , in feet, of an arrow from an archery target t seconds after an archer shoots it. What is the meaning of the number 50 in the equation?

- A) The number of feet the arrow moves horizontally in one second
- B) The number of seconds it takes for the arrow to move one foot horizontally
- C) The number of feet from the archer to the target
- D) The number of seconds it takes for the arrow to hit the target

4

$$3x^2 - 10x - 8$$

Which of the following is an equivalent form of the expression above?

- A) $(3x - 2)(x - 4)$
- B) $(3x + 2)(x - 4)$
- C) $(3x - 4)(x - 2)$
- D) $(3x - 4)(x + 2)$



5

Terrence is selling tulip bulbs for \$0.35 per bulb and daffodil bulbs for \$0.64 per bulb. He makes a 40% profit on the sales of tulip bulbs and a 45% profit on the sales of daffodil bulbs. He is trying to determine the number of tulip bulbs, x , and the number of daffodil bulbs, y , he will need to sell in a week to earn a profit of \$1,200 for the week. Which of the following equations can Terrence use to make this determination?

- A) $0.35x + 0.64y = 1,200(0.40 + 0.45)$
- B) $(0.40 + 0.45)(0.35x + 0.64y) = 1,200$
- C) $(0.40)(0.35)x + (0.45)(0.64)y = 1,200$
- D) $(0.35 + 0.64)(x + y) = 1,200(0.40 + 0.45)$

6

The volume, V , of a cone is given by the formula

$$V = \frac{1}{3}\pi r^2 h, \text{ where } r \text{ is the radius of the circular base}$$

and h is the height of the cone. Which of the

following gives r in terms of V and h ?

- A) $r = \sqrt{\frac{3V}{\pi h}}$
- B) $r = \sqrt{\frac{V}{3\pi h}}$
- C) $r = \sqrt{\frac{3h}{\pi V}}$
- D) $r = \sqrt{\frac{\pi h}{3V}}$

7

$$y^2 - 6y - 2 = 0$$

Which of the following pairs of values are the solutions for the equation above?

- A) $-3 + \sqrt{11}, -3 - \sqrt{11}$
- B) $-3 + 2\sqrt{11}, -3 - 2\sqrt{11}$
- C) $3 + \sqrt{11}, 3 - \sqrt{11}$
- D) $3 + 2\sqrt{11}, 3 - 2\sqrt{11}$

8

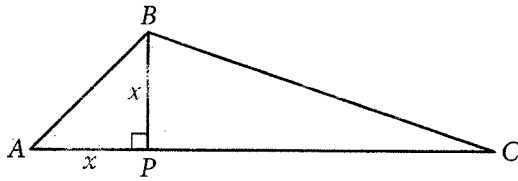
The expression $(x + j)(x - j)(x - k)$ can be rewritten as $x^3 - 5x^2 - 4x + t$, where j , k , and t are constants.

Which of the following is the value of t ?

- A) 20
- B) 10
- C) -10
- D) -20



9



In the figure above, the area of triangle ABC is equal to $2x^2$. What is the cosine of $\angle BCP$?

- A) $\frac{1}{\sqrt{10}}$
- B) $\frac{3}{\sqrt{10}}$
- C) $\frac{1}{3}$
- D) 3

10

An airline has a restriction on the dimensions of any piece of checked luggage shaped like a right rectangular prism. The restriction states that the sum of the length, width, and height of one piece of checked luggage must be less than 62 inches. Which inequality shows the restriction for the height h , in inches, of a piece of checked luggage with a width that is 0.3 times the height, and a length that is 1.8 times the height?

- A) $h < 20$
- B) $h < 21$
- C) $h < 30$
- D) $h < 33$

11

One equation in a system of equations is $y = 9x^2$.

The second equation, when graphed in the xy -plane,

is a horizontal line that passes through the point

$\left(-\frac{1}{3}, 4\right)$. What is the value of x^2 for both of the

solutions to the system of equations?

- A) $\frac{1}{9}$
- B) $\frac{16}{81}$
- C) $\frac{4}{9}$
- D) $\frac{2}{3}$



12

The time interval I , in minutes, between any two successive eruptions of a certain geyser can be modeled by the equation $I = 36.3 + 9.71d$, where the duration of the first of the two eruptions is d minutes. Which of the following is predicted by this model?

- A) The duration of the first of the two eruptions is 9.71 minutes.
- B) The time interval between the two eruptions is 9.71 minutes.
- C) An increase of 1 minute in the time interval between the two eruptions corresponds to an additional 9.71 minutes in the duration of the first eruption.
- D) An increase of 1 minute in the duration of the first eruption corresponds to an additional 9.71 minutes in the time interval between the eruptions.

13

If $h(x) = x^a$ for some positive constant a , and $h(27x) = 3h(x)$ for all positive values of x , what is the value of a ?

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

**DIRECTIONS**

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

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

Write answer in boxes. →

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

	7	/	1	2
	☐	☒	☐	☐
	0	0	0	0
1	1	☒	1	
2	2	2	☒	
3	3	3	3	
4	4	4	4	
5	5	5	5	
6	6	6	6	
☒	7	7	7	
8	8	8	8	
9	9	9	9	

Grid in result.

Answer: 2.5

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

← Fraction line

← Decimal point

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

	2	/	3
	☐	☒	☐
	0	0	0
1	1	1	1
2	☒	2	2
3	3	3	☒
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7

.	6	6	6
☒	☐	☐	☐
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	☒	☒	☒
7	7	7	7

.	6	6	7
☒	☐	☐	☐
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	☒	☒	☒
7	7	7	☒

Answer: 201 – either position is correct

	2	0	1
	☐	☐	☐
	0	☒	0
1	1	1	☒
2	☒	2	2

	2	0	1
	☐	☐	☐
	☒	0	0
1	1	☒	1
☒	2	2	2

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



14

$$12x - ax + 3 = 3 + 5x$$

In the equation above, a is a constant. If the equation has infinitely many solutions, what is the value of a ?

15

A snack bar sells scoops of strawberry, chocolate, and vanilla ice cream. On Monday, the snack bar sold 100 scoops in total of these flavors of ice cream. The snack bar sold 3 times as many scoops of chocolate as it did strawberry and 2 times as many scoops of vanilla as it did chocolate. How many scoops of chocolate ice cream did the snack bar sell on Monday?

16

If $\sqrt{ab - 2} = 3$, what is the value of a^2b^2 ?

17

$$x + 2y = 33$$

$$x - y = 11$$

The system of equations above has solution (x, y) . What is the value of $x + y$?

STOP

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



Math Test – Calculator

45 MINUTES, 31 QUESTIONS

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

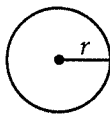
DIRECTIONS

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

NOTES

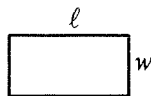
1. The use of a calculator **is permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated,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

REFERENCE

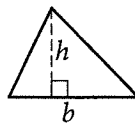


$$A = \pi r^2$$

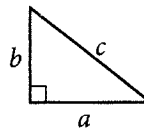
$$C = 2\pi r$$



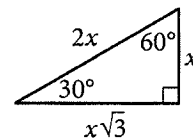
$$A = \ell w$$



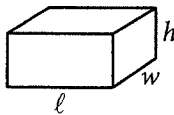
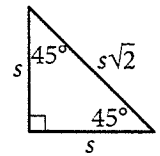
$$A = \frac{1}{2}bh$$



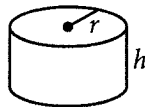
$$c^2 = a^2 + b^2$$



Special Right Triangles



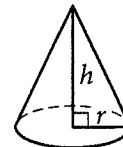
$$V = \ell wh$$



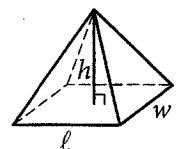
$$V = \pi r^2 h$$



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



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



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

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.

PSAT SATURDAY
2016

1

A scale model of a building is created such that 1 inch of the model corresponds to 3 feet of the actual building. The height of a window on the model is 2.3 inches. What is the height of the actual window?

- A) 0.575 inches
- B) 0.575 feet
- C) 6.9 inches
- D) 6.9 feet

2

Ms. Keaton wants to invest her money in an account that will double the amount of money in the account every eight years. Which type of function best models the relationship between the amount of money in the account and the number of eight-year time periods?

- A) Exponential growth
- B) Exponential decay
- C) Increasing linear
- D) Decreasing linear

3

A city's parks department currently offers a ceramics program and a basketball program. The parks department director is considering offering a soccer program and wants to determine how many city residents would sign up if the soccer program was offered. Which of the following groups would be the best sample for the survey?

- A) 100 residents of the city who are currently enrolled in the ceramics program
- B) 100 members of a park district soccer program in a neighboring state
- C) 100 randomly selected residents of the city
- D) 100 randomly selected residents of the state

4

A company is hiring an interior designer to decorate the reception area of a new office building. The designer charges a one-time fee of \$250 plus \$175 per hour of work. Which of the following represents the amount, in dollars, the company will be charged if the designer works on the reception area 4 hours each day for x days?

- A) $175 + 250(4)x$
- B) $250 + 175x$
- C) $250 + 175(4)x$
- D) $250(4) + 175x$

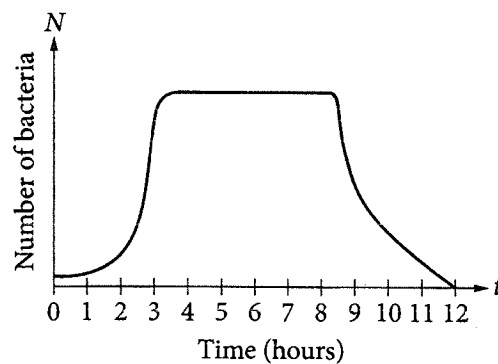


5

Juan spent 15 percent of a 4-hour drive waiting at traffic lights. How many minutes did he spend waiting at traffic lights on the drive?

- A) 36
- B) 45
- C) 60
- D) 75

6



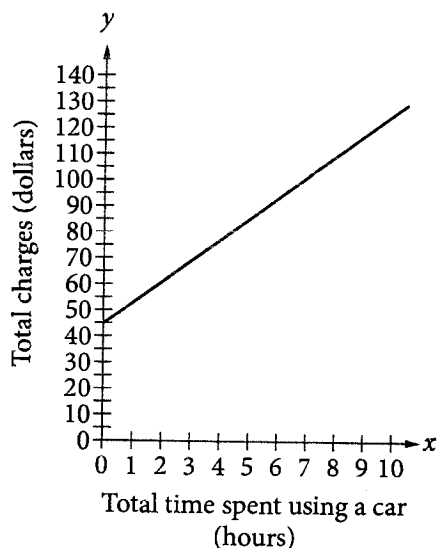
The graph above shows the number of bacteria N present in a colony t hours after the start of an experiment. During which of the following time intervals is the population always decreasing?

- A) $1 < t < 3$
- B) $2 < t < 6$
- C) $2.5 < t < 9$
- D) $9.5 < t < 12$



Questions 7 and 8 refer to the following information.

A car-sharing service near a university offers short-term car rentals to students. The graph below represents the current pricing for the car-sharing service, which includes a one-time membership fee and a charge based on the amount of time spent using a car.



7

Which of the following equations best represents the total charge for the car-sharing service, y , in dollars, in terms of the time spent using a car, x , in hours?

- A) $y = 8 - 45x$
- B) $y = 8x + 45$
- C) $y = 45 - 8x$
- D) $y = 45 + \frac{1}{8}x$

8

Next year, the membership fee will increase by a fixed amount of dollars, A . How will this affect the graph shown above?

- A) The slope will increase by A and the y -intercept will not change.
- B) The slope will decrease by A and the y -intercept will not change.
- C) The y -intercept will increase by A and the slope will not change.
- D) The y -intercept will decrease by A and the slope will not change.



9

The capacity of a fish tank to support a group of fish depends on x , the surface area of water (in square inches) that comes in contact with air. A fish tank can support a group of fish as long as the sum of the lengths of the fish is no more than M inches, where the value of M depends on x . The table below shows several pairs of values of x and M .

x	M
75	6
325	26
450	36

Which of the following could represent the relationship between x and M ?

- A) $M = 8x$
- B) $M = 8x + 6$
- C) $M = 0.08x$
- D) $M = 12.5x + 26$

10

A sales representative for a bread manufacturer surveyed grocery store customers at random. The representative asked each customer which of three types of bread the customer preferred. The results of the survey are summarized in the table below.

Bread Preference Survey

Type of Bread	Male	Female
Rye bread	5	12
Wheat bread	11	10
Sourdough bread	5	8
No preference	4	2

To the nearest percent, what percent of the customers surveyed preferred sourdough bread?

- A) 12%
- B) 20%
- C) 23%
- D) 30%

11

$$y = x$$

$$y = 0.5x + 3$$

The system of equations above has solution (x, y) . What is the value of x ?

- A) 1.5
- B) 2.5
- C) 3.0
- D) 6.0



12

n	$t(n)$
2	18
4	162
8	13,122

Some values of function t are shown in the table above. Which of the following could define t ?

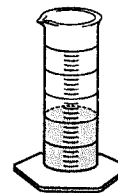
- A) $t(n) = \frac{1}{3}(2)^n$
- B) $t(n) = 2(3)^n$
- C) $t(n) = 2(9)^n$
- D) $t(n) = 3(2)^n$

13

A botanist measures the height of a two-year-old spruce tree each week. The tree is growing by a constant amount each week. If h is the height of the tree in inches, w is the number of weeks the botanist has been measuring the height of the tree, and g and t are constants, which of the following is the best model of the relationship between h and w ?

- A) $h = gw$
- B) $h = gw + t$
- C) $h = g^w$
- D) $h = t(g)^w$

14



The graduated cylinder above contains p milliliters of water. More water begins flowing into the cylinder at a constant rate. Which of the following graphs best models the height h of the water in the cylinder as a function of time t after the additional water began flowing into the cylinder?

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



15

The kinetic energy T , in joules, of a car with mass m , in kilograms, that travels at a velocity v , in meters per second, can be calculated by the formula below.

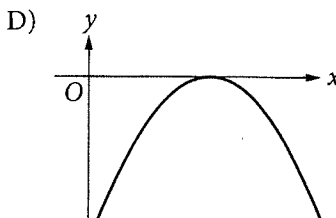
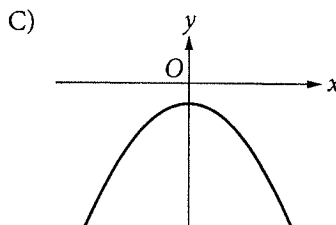
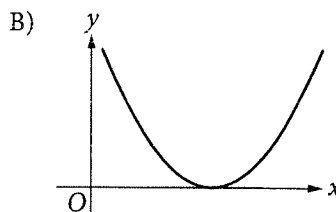
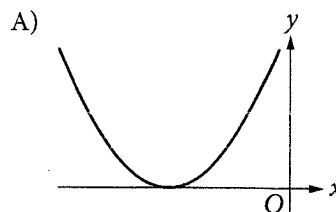
$$T = \frac{1}{2}mv^2$$

Assuming the mass remains the same, the car's kinetic energy is multiplied by a factor of 4 if the velocity is multiplied by which of the following factors?

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

16

The function h is defined by the equation $h(x) = (x - k)^2$, where k is a positive constant. Which of the following could be the graph of $y = h(x)$ in the xy -plane?





Questions 17-19 refer to the following information.

The tables below show the distribution, by size, of four types of cases that can be ordered by a retail shoe store. There are two types of cases for one style of women's sandals and two other types of cases for one style of men's sandals. The cost per case includes all fees and shipping charges.

Women's sandals													
Size	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	Total
Case A	1	2	2	2	3	3	2	2	0	1	0	0	18
Case B	0	0	0	2	2	3	3	3	0	3	0	2	18

Men's sandals							
Size	8	9	10	11	12	13	Total
Case C	1	2	3	3	2	1	12
Case D	3	6	9	9	6	3	36

17

What is the difference between the cost per pair of sandals in Case C and the cost per pair of sandals in Case D?

- A) \$0.50
- B) \$1.50
- C) \$3.00
- D) \$3.88

19

The median shoe size of sandals in Case B is how much greater than the median shoe size of sandals in Case A?

- A) 0.5
- B) 1.0
- C) 1.5
- D) 2.0

18

If the Eli Shoe Store orders one Case A and one Case B, what is the range of the shoe sizes in the order?

- A) 4.5
- B) 5.5
- C) 6.5
- D) 8.0

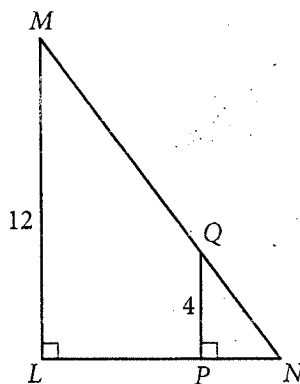


20

If $y = x - 2$ and $z = x + 2$, what is y^2z in terms of x ?

- A) $x^3 - 2x^2 - 4x + 8$
- B) $x^3 - 2x^2 - 4x - 8$
- C) $x^2 + x - 2$
- D) $x^2 - 4$

21

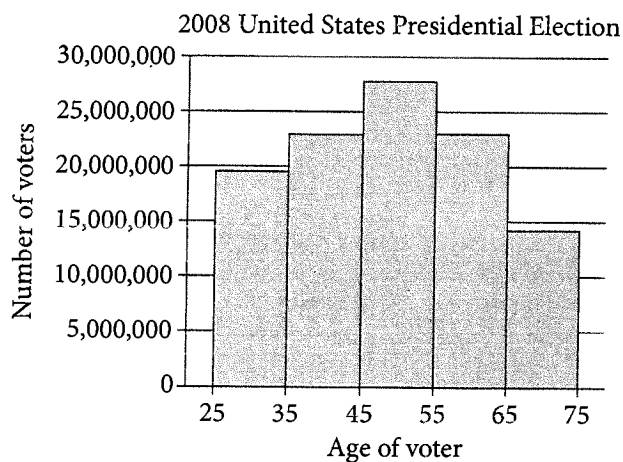


In the figure above, $MN = 15$. What is the area of triangle PQN ?

- A) 3
- B) 6
- C) 9
- D) 12



Questions 22 and 23 refer to the following information.



The histogram above shows the distribution of the ages of US citizens who voted in the 2008 presidential election from the age of 25 up to but not including the age of 75. The first bar represents voters from age 25 up to but not including 35. The second bar represents voters from age 35 up to but not including 45, and so on.

22

Approximately 107,500,000 voters are represented in the histogram. Which of the following is closest to the percentage of voters represented in the histogram who were ages 45 up to but not including 55?

- A) 25%
- B) 30%
- C) 44%
- D) 50%

23

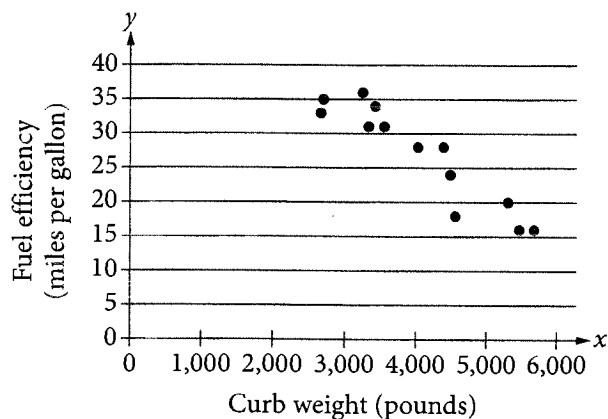
Looking at these data, Janice wants to estimate the percentage of all voters in 2008 who were at least 25 but less than 35 years old. Which of the following is information that would allow Janice to make this estimation?

- A) The number of voters who are exactly 25
- B) The number of voters who are younger than 25
- C) The number of voters who are 75 or older
- D) The number of voters who are younger than 25 and the number of voters who are 75 or older



24

The curb weight of a vehicle describes the total weight of the vehicle with all standard operating equipment and consumables such as gasoline, coolant, and oil. The graph below shows the average fuel consumption, in miles per gallon, and the curb weight, in pounds, for several vehicles.



Which of the following equations is the best approximation of the line of best fit for the data?

- A) $y = -\frac{2}{1,000}x + 27$
- B) $y = -\frac{4}{1,000}x + 41$
- C) $y = -\frac{7}{1,000}x + 55$
- D) $y = -\frac{20}{1,000}x + 86$

25

Lusio exercises each day by jogging at 5 miles per hour and then running at 8 miles per hour. The total time he jogs and runs is at least 1 hour. If j is the distance, in miles, Lusio jogs, and r is the distance, in miles, he runs, which of the following inequalities represents this situation?

- A) $5j + 8r \leq 1$
- B) $5j + 8r \geq 1$
- C) $\frac{1}{5}j + \frac{1}{8}r \leq 1$
- D) $\frac{1}{5}j + \frac{1}{8}r \geq 1$



26

$$\begin{aligned}x - y &= -1 \\ x^2 &= 1 + y\end{aligned}$$

A system consisting of a linear equation and a quadratic equation is shown above. If $(x, y) = (a, b)$ is a solution to the system, which of the following could be the value of a ?

- A) 1
- B) 0
- C) -1
- D) -2

27

$$y = 10x^2 - 25x - 60$$

The graph of the equation above is a parabola in the xy -plane. In which of the following equivalent forms of the equation does the minimum value of y appear as a term?

- A) $y = 5(2x + 3)(x - 4)$
- B) $5(4x - 5)^2 - 8y = 605$
- C) $\left(x - \frac{5}{4}\right)^2 = \frac{y}{10} + \frac{121}{16}$
- D) $y = 10\left(x - \frac{5}{4}\right)^2 - \frac{605}{8}$

**DIRECTIONS**

For questions 28-31, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

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

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

Write answer in boxes. →

← Fraction line

Grid in result.

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

Answer: 2.5

← Decimal point

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

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

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

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

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

Answer: 201 – either position is correct

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

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

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



28

A meteorologist releases a weather balloon from a rooftop. The balloon is released 100 feet above the ground. If the balloon rises at a constant rate of 2 feet per second, how many seconds will it take the balloon to reach a height of 2000 feet above the ground?

29

$$7 < 0.04x - 2y < 8$$

In the inequality above, if $x = 320$, what is one possible value for y ?



Questions 30 and 31 refer to the following information.

Gender of Animal Owner and
Type of Animal Licensed, in 2012

Type of animal	York, PA		Eugene, OR		Total
	Male resident	Female resident	Male resident	Female resident	
Dogs	7,228	5,900	9,197	6,132	28,457
Cats	5,873	5,072	6,684	6,184	23,813
Birds	568	548	712	608	2,436
Horses	190	360	410	132	1,092
Other	204	120	234	144	702
Total	14,063	12,000	17,237	13,200	56,500

The table above shows the number and type of animals licensed by male and female residents of York, Pennsylvania, and Eugene, Oregon, in 2012.

30

If the combined number of male and female residents of York, Pennsylvania, was 43,760 in 2012, what was the ratio of the number of licensed dogs in York to the number of male and female residents of York? (Express your answer as a fraction or a decimal.)

31

One licensed animal with a female owner is to be selected at random from York, and one licensed animal with a female owner is to be selected at random from Eugene. The probability that the animal selected from York will be a horse is how many times the probability that the animal selected from Eugene will be a horse?

STOP

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

Answer Key

Saturday, Oct. 15, Test Form

Reading Test		Writing and Language Test		Math Test – No Calculator	
SECTION 1		SECTION 2		SECTION 3	
1	C	1	B	1	D
2	A	2	A	2	D
3	B	3	C	3	C
4	A	4	C	4	B
5	C	5	D	5	C
6	D	6	C	6	A
7	B	7	A	7	C
8	D	8	D	8	A
9	B	9	B	9	B
10	B	10	D	10	A
11	A	11	B	11	C
12	C	12	D	12	D
13	D	13	A	13	C
14	B	14	B	14	7
15	C	15	D	15	30
16	A	16	D	16	121
17	D	17	B	17	77/3, 25.6, 25.7
18	D	18	B		
19	C	19	A		
20	A	20	D		
21	B	21	A		
22	D	22	D		
23	C	23	C		
24	D	24	D		
25	D	25	C		
26	B	26	D		
27	B	27	B		
28	C	28	A		
29	B	29	B		
30	D	30	A		
31	B	31	B		
32	C	32	C		
33	D	33	B		
34	C	34	D		
35	A	35	C		
36	A	36	B		
37	D	37	C		
38	D	38	C		
39	A	39	B		
40	D	40	D		
41	B	41	A		
42	C	42	D		
43	C	43	C		
44	D	44	A		
45	C				
46	B				
47	C				

Math Test – Calculator	
SECTION 4	
1	D
2	A
3	C
4	C
5	A
6	D
7	B
8	C
9	C
10	C
11	D
12	B
13	B
14	B
15	C
16	B
17	A
18	B
19	B
20	A
21	B
22	A
23	D
24	C
25	D
26	C
27	D
28	950
29	$12/5 < x < 29/10$, $2.4 < x < 2.9$
30	$3/10$, .3
31	3

Wednesday, Oct. 19, Test Form

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

Math Test – Calculator	
SECTION 4	
1	B
2	B
3	A
4	B
5	C
6	D
7	B
8	D
9	B
10	C
11	A
12	B
13	A
14	B
15	C
16	D
17	C
18	B
19	A
20	D
21	C
22	A
23	B
24	C
25	B
26	C
27	D
28	6
29	1
30	60
31	33.3

U = This question
will not be scored.

(Continued on next page)

Wednesday, Nov. 2, Test Form

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

U = This question
will not be scored.

Math Test – Calculator	
SECTION 4	
1	D
2	C
3	A
4	D
5	B
6	A
7	B
8	B
9	A
10	C
11	C
12	B
13	A
14	A
15	B
16	D
17	A
18	D
19	C
20	C
21	B
22	A
23	D
24	B
25	D
26	A
27	D
28	180
29	5
30	25.3
31	94

Score Conversion

Shows how raw scores are converted into test scores, cross-test scores, and subscores.

Important to note

- The section score for the Evidence-Based Reading and Writing section is calculated by adding the Reading Test score to the Writing and Language Test score and multiplying that figure by 10.
- The section score for the Math section is calculated by multiplying the Math Test score by 20.
- There is no advantage or disadvantage in taking either the Saturday, Oct. 15, Wednesday, Oct. 19, or Wednesday, Nov. 2, test form.

Saturday, Oct. 15, Test Form

Raw Score (# of correct answers)	Reading Test Score	Writing and Language Test Score	Math Test Score
48			38
47	38		38
46	38		37.5
45	37		37.5
44	37	38	37
43	36	37	36.5
42	35	37	36
41	35	36	35.5
40	34	35	34.5
39	33	34	34
38	32	33	33
37	31	33	32.5
36	31	32	31.5
35	30	31	31
34	29	31	30.5
33	29	30	30
32	28	30	29.5
31	28	29	29
30	27	29	28.5
29	26	28	28
28	26	28	27.5
27	25	27	27
26	25	27	26.5
25	24	26	26
24	24	26	25.5
23	23	25	25
22	23	25	24.5
21	22	24	24
20	22	24	23.5
19	21	23	23
18	21	22	22.5
17	20	22	22
16	19	21	21.5
15	19	20	20.5
14	18	19	20
13	18	18	19.5
12	17	18	19
11	17	17	18
10	16	16	17.5
9	16	15	16.5
8	15	15	16
7	15	14	15
6	14	13	14
5	13	13	13
4	12	12	12
3	11	11	10.5
2	10	10	9.5
1	9	9	8.5
0	8	8	8

Wednesday, Oct. 19, Test Form

Raw Score (# of correct answers)	Reading Test Score	Writing and Language Test Score	Math Test Score
47	38		
46*	37		38
45	37		37.5
44	36	38	37.5
43	35	38	37
42	35	37	36.5
41	34	36	35.5
40	34	36	34.5
39	33	35	34
38	32	34	33
37	32	33	32.5
36	31	33	31.5
35	30	32	31
34	30	31	30.5
33	29	31	30
32	29	30	29.5
31	28	30	29
30	28	29	28.5
29	27	29	28
28	27	28	28
27	26	28	27.5
26	26	27	27
25	25	27	26.5
24	25	26	26
23	24	26	25.5
22	23	25	25
21	23	25	24.5
20	22	24	24
19	22	23	23.5
18	21	22	23
17	20	22	22.5
16	20	21	22
15	19	20	21
14	19	19	20.5
13	18	18	20
12	17	18	19.5
11	17	17	19
10	16	16	18
9	16	15	17.5
8	16	15	16.5
7	15	14	15.5
6	14	13	14.5
5	13	13	13.5
4	12	12	12.5
3	11	11	11.5
2	10	10	10
1	9	9	9
0	8	8	8

*Due to the unscored questions (see page 11) on the Oct. 19 Test Form, the highest possible Raw Score for Math is 46.

(Continued on next page)

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Wednesday, Nov. 2 Test Form

Raw Score (# of correct answers)	Reading Test Score	Writing and Language Test Score	Math Test Score
47*	38		38
46	38		38
45	37		37.5
44	37	38	37
43	36	38	36.5
42	36	37	36
41	36	37	35.5
40	35	36	34.5
39	35	35	33.5
38	34	34	32.5
37	33	33	32
36	33	33	31.5
35	32	32	31
34	31	31	30.5
33	30	31	30
32	30	30	29.5
31	29	30	29
30	28	29	28.5
29	28	29	28
28	27	28	27.5
27	27	28	27.5
26	26	27	27
25	26	27	26.5
24	25	26	26
23	25	26	25.5
22	24	25	25
21	23	25	24.5
20	23	24	24
19	22	23	23.5
18	22	22	23
17	21	22	22.5
16	20	21	22
15	20	20	21.5
14	19	19	21
13	18	18	20.5
12	18	17	20
11	17	17	19
10	17	16	18.5
9	16	15	18
8	16	15	17
7	15	14	16
6	14	13	15
5	13	13	14
4	12	12	13
3	11	11	11.5
2	10	10	10.5
1	9	9	9.5
0	8	8	8

*Due to the unscored question (see page 12) on the Nov. 2 Test Form, the highest possible Raw Score for Math is 47.