

# SAMPLE TEST, FORM B

## PART 1 — VERBAL

*Suggested Time — 75 Minutes*

45 QUESTIONS

### SCRAMBLED PARAGRAPHS

PARAGRAPHS 1-5

**DIRECTIONS:** In this section, arrange each group of sentences to create the best paragraph. The first sentence for each paragraph is given; the remaining five sentences are listed in random order. Choose the order for these five sentences that will create the **best** paragraph, one that is well-organized, logical, and grammatically correct. Each correctly ordered paragraph is worth **double** the value of a question in any other section of the test. No credit will be given for responses that are only partially correct.

To keep track of your sentence order, use the blanks to the left of the sentences. For example, write “2” next to the sentence you think follows the first sentence, write “3” next to the sentence you think follows “2,” and so on. You may change these numbers if you decide on a different order. When you are satisfied with your sentence order, mark your choices on your answer sheet.

#### Paragraph 1

The Codex Mendoza is a fascinating document describing the culture and traditions of the Aztec Indians before the Spanish conquest.

- \_\_\_\_\_ **Q.** A boy was often named for the date of his birth or for an animal or ancestor, or even for some event at the time of his birth.
- \_\_\_\_\_ **R.** The parents would also place in the child’s hands the implements that he or she would use in adult life, gently guiding them in the motions of use.
- \_\_\_\_\_ **S.** Instruments used to weave and spin were given to the girls, while tools and weapons were given to the boys.
- \_\_\_\_\_ **T.** One tradition it describes is the feast hosted by the parents of a newborn child to give that child a name.
- \_\_\_\_\_ **U.** Girls’ names, on the other hand, were frequently created to include the Aztec word for flower, *xóchitl*.

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## Paragraph 2

Stephen Crane was 24 years old when his classic Civil War novel *The Red Badge of Courage* was published in 1895.

- \_\_\_\_\_ **Q.** Unfortunately, his first novel, *Maggie: A Girl of the Streets*, which chronicled life among the poor in New York City's Bowery slums, was not as successful.
- \_\_\_\_\_ **R.** That novel, his second, brought him almost overnight international celebrity status.
- \_\_\_\_\_ **S.** One story says that, in an attempt to recoup his losses, Crane paid people to ride the Manhattan El train carrying copies of the book.
- \_\_\_\_\_ **T.** *Maggie* was self-published by Crane when he was only 21, using money borrowed from his brother.
- \_\_\_\_\_ **U.** The loan became a loss—the gritty social realism of *Maggie* earned Crane praise from critics, but he probably gave away more copies than he sold.

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## Paragraph 3

It might be assumed that a nature preserve would be located in a pristine wilderness, far from the noise and pollution of the city.

- \_\_\_\_\_ **Q.** A pair of bird watchers had followed one of them heading toward the island and found a thriving colony with nearly 100 nests.
- \_\_\_\_\_ **R.** During World War I, the 45-acre island was home to a petroleum refinery and two shipbuilding companies, but later Shooter's Island became a dumping ground.
- \_\_\_\_\_ **S.** But Shooter's Island, a nature preserve just north of Staten Island, is an exception to the rule.
- \_\_\_\_\_ **T.** Nowadays, although there is no public access to the bird colonies on Shooter's Island, its winged inhabitants daily bring enjoyment to city dwellers who see them "commuting" into city parks.
- \_\_\_\_\_ **U.** In 1974, however, it was discovered that the abandoned dry docks there had become home to many water birds.

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**Paragraph 4**

Ancient people of the Mediterranean thought that volcanoes were caused by Vulcan, the Roman blacksmith god.

- \_\_\_\_\_ **Q.** In the same park, Mauna Loa, at 28,000 feet above the ocean's floor, is the largest active volcano in the world.
- \_\_\_\_\_ **R.** There are dozens of active and potentially active volcanoes within the United States, including Kilauea, the most active volcano in the world.
- \_\_\_\_\_ **S.** Both of these are shield volcanoes, which means that they were formed as lava flowed in all directions from a central vent to form low, gently sloping mountains.
- \_\_\_\_\_ **T.** Volcanoes, which were named for Vulcan, are vents in the crust of the earth from which molten lava and ash erupt.
- \_\_\_\_\_ **U.** That volcano, located in Hawaii Volcanoes National Park, has been spewing lava since 1983.

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**Paragraph 5**

A Canadian astronomer, Dr. Philip Stooke, is known for his detailed maps of the earth's moon.

- \_\_\_\_\_ **Q.** Certain that people must have observed and drawn images of the moon before that date, Stooke examined old manuscripts, history books, and records of archaeological excavations.
- \_\_\_\_\_ **R.** When a drawing of the tomb carving was placed over a picture of the full moon, the markings lined up.
- \_\_\_\_\_ **S.** He found a photograph of a carving of dots and lines from a prehistoric tomb in County Meath, Ireland, estimated to be 5,000 years old.
- \_\_\_\_\_ **T.** "It is without doubt a map of the moon, the most ancient one ever found," Stooke concluded.
- \_\_\_\_\_ **U.** He had long been puzzled by the lack of moon maps older than the one created in 1505 by Leonardo da Vinci.

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# LOGICAL REASONING

## QUESTIONS 11-20

**DIRECTIONS:** Read the information given and choose the **best** answer to each question. Base your answer **only on the information given**.

In a logical reasoning test, certain words must be read with caution. For example, “The red house is **between** the yellow and blue houses” does not necessarily mean “The red house is **between and next to** the yellow and blue houses”; one or more other houses may separate the red house from the yellow house or from the blue house. This precaution also applies to words such as **above, below, before, after, ahead of, and behind**.

11. A star named Quil is the center of four orbiting planets, which are named Dorb, Needer, Sly, and Tyne. Each planet travels in a separate orbit, and each orbit is a circle. All four orbits lie in one plane. The farther a planet is from Quil, the faster it travels.

- 1) Planet Needer is closest to Quil.
- 2) The orbit of planet Dorb is next to the orbit of Sly.
- 3) The orbit of Sly is farthest from the orbit of Needer.

Which planet travels fastest?

- A. Needer
- B. Dorb
- C. Sly
- D. Tyne
- E. Cannot be determined from the information given.

12. Sidney was in a contest with Alice, Huang, and Mariah to see whose airplane could fly highest.

- 1) Alice’s airplane flew higher than Huang’s airplane.
- 2) Mariah’s airplane did not fly as high as Alice’s airplane.

Based only on the information above, which of the following is a valid conclusion?

- F. Alice won the contest.
- G. Sidney’s airplane flew higher than Mariah’s.
- H. Mariah’s airplane flew higher than Huang’s.
- J. If Sidney finished second, Alice won.
- K. If Sidney finished second, Huang finished third.

13. In high school and college, Sequina played volleyball for 2 years, soccer for 3 years, and basketball for 2 years. She never played more than 2 sports during the same year.

What is the **least** number of years Sequina could have played high school and college sports?

- A. 2
- B. 3
- C. 4
- D. 5
- E. 6

# TAP TO GET FULL SHSAT MATERIALS & PREP

14. There are four towns in Jefferson County: Elmont, Richland, Landis, and Maple. Highway 14 is closed from Elmont to Richland because of flooding.

- 1) Landis is between Elmont and Richland on Highway 14.
- 2) Maple can be reached from Landis, without going through Elmont or Richland.

Which of the following statements is a valid conclusion from the statements above?

- F. Maple is not flooded.
- G. Either Elmont or Richland is flooded.
- H. Both Elmont and Richland are flooded.
- J. No one can drive to Landis on Highway 14.
- K. Maple cannot be reached directly from Elmont.

15. One prize was awarded each week in a three-

week contest. The prizes were a television, a computer, and a trip to Hawaii.

1) Luis, Michael, and Nadia each won a prize.

2) The television was awarded the first week, the computer the second week, and the trip to Hawaii the third week. It is possible to determine who won each prize?

- F. Michael won the first trip.
- G. Luis won the television.
- H. Luis won the computer.
- J. Nadia won the computer.
- K. Michael won the television.

16. In the town of Hestia, the millworkers are all over six feet tall. Every Hestia millworker is good at math.

Based only on the information above, which of the following **must** be true?

- F. At least some people in Hestia who are over six feet tall are good at math.
- G. At least some people in Hestia who are good at math are not millworkers.
- H. Anyone in Hestia who is over six feet tall works at the mill.
- J. Anyone in Hestia who is good at math is over six feet tall.
- K. Anyone in Hestia who is good at math works at the mill.

Questions 17 and 18 refer to the following information.

In the code below, (1) each letter always represents the same word, (2) each word is represented by only one letter, and (3) in any given sentence, the position of a letter is **never** the same as that of the word it represents.

L W Q P R means  
"Marie ate grass and chocolate."

U X H V N means  
"Sam likes wings and milk."

L V P T R means  
"Jackson ate wings and grass."

N Y H X W means  
"Tom likes chocolate and juice."

17. Which word represents the word "chocolate"?

18. Which word is represented by the letter U?

- F. Sam
- G. like
- H. wings
- J. milk
- K. milk

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**19.** If a snobble is heavy and slow, then it is silver.

Based only on the information above, which of the following is a valid conclusion?

- A.** All snobbles are silver.
  - B.** All snobbles are heavy and slow.
  - C.** All slow snobbles are silver.
  - D.** No silver snobble is both heavy and fast.
  - E.** No gold snobble is both heavy and slow.
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**20.** In a cartoon, four trolls stood in a line. Their names were Banto, Gretchen, Snowflake, and Holly. One had green eyes, another had purple ears, another had red teeth, and another had white hair.

- 1) The troll with red teeth was directly in front of Snowflake, who had white hair.
- 2) Banto, who did not have green eyes, was behind Gretchen.
- 3) Gretchen had purple ears.
- 4) Snowflake was behind Holly.

If the troll with green eyes stood behind Gretchen, then what was Gretchen's position?

- F.** first
- G.** second
- H.** third
- J.** fourth
- K.** Cannot be determined from the information given.

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# READING

## QUESTIONS 21-50

**DIRECTIONS:** Read each passage below and answer the questions following it. Base your answers **only on information contained in the passage**. You may reread a passage if you need to. Mark the **best** answer for each question.

The beaver, the state animal of New York, has long played a role in the history of the state. Before European colonists arrived, Native Americans hunted this large rodent for fur pelts and meat. The colonists nearly exterminated beavers through overtrapping and destruction of forest habitat. During the twentieth century, however, careful management increased the beaver population of upstate New York from only about a dozen in 1895 to tens of thousands a century later.

This remarkable comeback has had significant effects on the environment. Most people know that beavers build dams, but few realize that these industrious rodents actually shape the character of the streams and forests in which they live. An average adult beaver cuts down more than a ton of wood per year. Beavers cut down only mature trees, and several beavers at work can soon open up the forest area around a pond to sunlight.

Once a dam is built across a stream, the water behind the dam forms a pond, which is warmer and more slow-moving than the stream it replaced. The pond tends to retain sediments and organic material, causing a shift in its mix of nutrients. In response, the plant and insect species that live in the pond change as well. These changes provide more food and habitat for fish and birds, which in turn attract larger animals. Thus, the beaver helps to determine the plant and animal population of its neighborhood.

As the beavers selectively cut deciduous trees such as aspen and birch from the stream banks, conifers such as spruce gradually take over the area. Eventually, when the area no longer has trees desirable for food or building supplies, the beaver colony moves on. However, the effects of beavers on their environment are noticeable to the knowledgeable observer long after the beavers have left. Their dams eventually fall apart, and the beds of their former ponds, rich in nutrients, may become farmland, grassy meadows, or lush new forests. New streambeds may develop in these former pond areas, and the meadows and farmlands that occupied them may begin to erode, continuing the cycle of stream–beaver pond–meadow–stream.

In Wyoming, wildlife scientists at the Bureau of Land Management have captured beavers and moved them to rapidly flowing streams in an attempt to halt soil erosion. The reported success of this effort suggests that beavers can be valuable allies in protecting natural resources for future generations.

21. Which of the following best tells what this passage is about?
- A. Beavers have a significant effect on the environment.
  - B. Beaver activity encourages wildlife in New York forests.
  - C. Beavers can help prevent soil erosion.
  - D. Beavers are large, industrious rodents.
  - E. Beavers have long been important to farmers.

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- 22.** The changes in insect and plant life in a beaver pond result from changes in the
- F.** size of the trees used to build dams.
  - G.** temperature and flow of water in the pond.
  - H.** kinds of larger animals attracted to the area.
  - J.** number of beavers living in the pond.
  - K.** grassy meadows created by the abandoned dam.
- 23.** What is the purpose of the beaver trapping that was carried on in Wyoming?
- A.** to save beavers from becoming extinct
  - B.** to stop beavers from eroding stream banks
  - C.** to allow new forests to develop
  - D.** to study their industrious habits
  - E.** to encourage beavers to build dams in certain streams
- 24.** Near a recently abandoned beaver pond, which of the following would most likely be seen?
- F.** the effects of years of severe erosion
  - G.** untouched stands of evergreen trees
  - H.** mature birch and other deciduous trees
  - J.** dark, dimly lit forest land
  - K.** a new beaver dam being built
- 25.** The term “remarkable comeback” (line 13) refers to
- A.** the ways in which beaver dams change their environment.
  - B.** the changes that occur after a beaver colony has left an area.
  - C.** the choice of the beaver as the state animal of New York.
  - D.** the industrious work habits of the beaver.
  - E.** the increase in the beaver population during the twentieth century.
- 26.** What is the most likely reason that the author mentioned the amount of wood that a beaver can cut down in a year?
- F.** to explain how pond areas become forest land
  - G.** to suggest why beavers selectively cut down deciduous trees
  - H.** to emphasize that beavers have a major effect on their environment
  - J.** to argue that only large beaver colonies can change the environment
  - K.** to contrast beavers with other animals in their impact on the environment

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For centuries, a stone-faced old man looked across the White Mountains of northern New Hampshire. The Old Man of the Mountain was not a person, but rather a distinctive natural rock formation. From most viewpoints, it looked like a random heap of stones. Seen from the north, however, it resembled the profile of a stern, elderly man looking east. Until its collapse in 2003, it was one of the most photographed sights in New England.

According to geologists, the Old Man was formed during the last Ice Age some 10,000 years ago. Perched near the top of Cannon Mountain, 365 meters above Profile Lake, the face was about 12 meters tall and 8 meters across. When European-Americans settled in the area in the early 1600s, they heard Native American legends of a mountain with a great stone face. In 1805, two surveyors were the first European-Americans known to have seen the Old Man.

In 1905, a local climber discovered that the face's forehead had begun to slip from the cliffside. The slide was stopped when turnbuckles were installed. This system of screws and cables pulled the cracks tightly together, stabilizing the rock formation. Over the years, more turnbuckles were added to close other cracks. The Old Man received several "face-lifts" as well, using glue, wire, and fiberglass.

The Old Man's profile became the symbol of New Hampshire, which is known as the "Granite State." Its people have always taken pride in their state's rocky geography and their own strength and independence. Images of the Old Man appeared on license plates, the shoulder patches on police uniforms, and the New Hampshire quarter issued in 2000.

During the 1970s, an engineering company determined that the Old Man consisted of five granite layers, balanced atop one another. Behind the lowest slab, the Old Man's "chin," was a cave, hidden from view.

Only about two feet of the chin was anchored to the cliff. Surprisingly, the Old Man had balanced on its chin for many years.

During the night of May 3, 2003, the Old Man slid from its rocky perch into the valley below, the result of centuries of weathering and temperature extremes. The harsh New Hampshire winters had driven rain and snow into cracks in the granite. Water that freezes in a crack will expand, enlarging the crack and eventually splitting the rock. All that remained was a nondescript rocky slope and a few broken turnbuckles. The collapse prompted an outpouring of articles, poems, and statements from people all over the country. Some laid flowers at the viewpoint on Profile Lake, as though for a funeral.

After the collapse, a task force began working to memorialize the Old Man. It received thousands of suggestions, including construction of a plastic replica of the face on the mountainside. While that particular idea was not implemented, a museum was built at the base of Cannon Mountain, and plans have been made for a memorial. All over the state, schoolchildren still study the history and symbolism of the Old Man. He may be gone, but he is not forgotten.

27. Which of the following best tells what this passage is about?

- A. how the Old Man of the Mountain was formed
- B. the history of the state of New Hampshire
- C. attempts to halt the deterioration of the Old Man of the Mountain
- D. the future of the Old Man of the Mountain
- E. the history and significance of the Old Man of the Mountain

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If Han van Meegeren had kept to his career as an artist, he would have been forgotten years ago. In his native Holland, he was considered a mediocre painter and the critics' reviews of his work were uncomplimentary. Angered by their rejection, van Meegeren set out in the 1920s to fool these critics into accepting his work as the work of one of the great master painters. The hoax was carefully planned. Van Meegeren decided to create a series of religious paintings, then claim to have "discovered" the lost paintings of Jan Vermeer, the great seventeenth-century Dutch painter.

Other forgers have succeeded in their deception by borrowing elements of style and imagery from several similar works by a painter. Instead of copying any one particular painting, they combine slightly altered details from these related works, such as a pose, face, or piece of furniture, to create a new work. Van Meegeren outdid these forgers. He created not just one, but an entire series of paintings that mimicked Vermeer's style without duplicating specific details. He also collected works by little-known seventeenth-century painters and stripped the paint from these paintings so that he could use the canvas. When working on his forgeries, he applied paints made in the old ways from old materials. He also used clever techniques to lend the works authenticity. For example, he gave his paintings an aged appearance by exposing them to heat until the surface cracked in the manner of old oil paint.

Next, van Meegeren pretended to have discovered and purchased these "Vermeer" paintings. The art world rejoiced and Vermeer scholars accepted the works without question. Van Meegeren became a wealthy man, selling the pictures to museums and private collectors. He felt that he had been avenged in his bitter quarrels with art critics. It almost worked.

In the end, however, van Meegeren was forced to unmask his own forgeries. Shortly

before World War II, one of the fake Vermeers had been sold to Hermann Göring, a high-ranking German official. Van Meegeren was arrested after the war as a Nazi collaborator for selling a national treasure to the enemy, a far more serious crime than art forgery. When critics were asked to testify to the authenticity of the painting, they insisted it was a genuine Vermeer. Finally, to prove his innocence by demonstrating that he could forge a Vermeer, van Meegeren painted yet another fake Vermeer while under guard. Chemical tests and x-rays of other "Vermeers" confirmed van Meegeren's guilt. He was acquitted of collaboration—only to be convicted of fraud.

Sentenced to one year in prison, van Meegeren died in 1947, before the sentence could be carried out. Recently, during a new period of intense interest in Vermeer, there were two major exhibits of the faker's handiwork. Perhaps van Meegeren would feel he was having the last laugh.

33. Which of the following best tells what this passage is about?
- A. how to produce art forgeries
  - B. how art forgers differ from other criminals
  - C. how a skilled art forger nearly got away with fraud
  - D. forgeries of Dutch paintings
  - E. the difficulties of detecting art forgeries
34. Which of the following best describes van Meegeren's beliefs about art critics?
- F. They exaggerated the artistic merit of Vermeer's paintings.
  - G. They were overly worried about art forgery.
  - H. They did not recognize true talent when they saw it.
  - J. They believed his fakes were better than real Vermeers.
  - K. They did not appreciate Dutch art.

- 35.** Which of the following statements about Jan Vermeer is supported by the passage?
- A.** He did not become well-known until van Meegeren forged his paintings.
  - B.** He was van Meegeren's invention and had never existed.
  - C.** He became wealthy by selling his works to museums and private collectors.
  - D.** He was considered a mediocre artist by art critics.
  - E.** Some of his paintings may have been lost.
- 36.** Van Meegeren differed from other art forgers in his ability to
- F.** copy Vermeer paintings.
  - G.** combine features from similar paintings by different artists.
  - H.** avoid prosecution for forgery.
  - J.** profit from his forgeries.
  - K.** paint forgeries without copying particular features.
- 37.** Why did van Meegeren admit that he was a forger?
- A.** The Germans had conducted chemical tests and x-rays that unmasked his forgeries.
  - B.** He wanted critics to appreciate his talents.
  - C.** Art critics had long suspected the forgeries.
  - D.** Forgery was a lesser crime than collaboration with the enemy.
  - E.** Vermeer himself was a forger, so van Meegeren had committed no crime.
- 38.** In line 12, why did the author put the word "discovered" in quotation marks?
- F.** Van Meegeren had created the paintings and only pretended to discover them.
  - G.** Van Meegeren was the first to realize that Vermeer was a great artist.
  - H.** Van Meegeren pretended that he had purchased the paintings from Vermeer himself.
  - J.** Van Meegeren had invented the painter Vermeer, so there were no real Vermeer paintings to discover.
  - K.** Van Meegeren deceived the critics into believing that the paints and canvases were from the seventeenth century.

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Archaeologists first succeeded in using tree-ring dating while excavating ancient Pueblo Indian villages in the southwestern United States during the 1920s. At that time, no one knew when the villages had been occupied, or for how long, but the logs used in the buildings provided a clue. Scientists had long known that trees add a new growth ring to their circumferences during each growing season. Drought or early frost results in little growth and narrow rings. Good growing years result in wide rings. Archaeologists knew that by matching identical patterns of wide and narrow rings in sections of two different logs, they could determine which log was older. For example, a log with a certain pattern of rings near its outside edge would indicate a specific series of good and bad growing seasons. This log would have been cut down before a log of comparable size that shows the identical pattern near its center.

But how could these ring patterns help determine the actual dates for the abandoned Pueblo villages? Archaeologists had already used the ring patterns of trees with overlapping lifetimes to establish a tree-ring chronology for the southwestern United States that went back to A.D. 1260. That work had been done in a Hopi village called Oraibi. Oraibi had been continuously inhabited since before the arrival of the first Spanish explorers in 1540.

That same team of archaeologists also developed a relative, or “floating,” chronology for the abandoned Pueblo villages by matching up the ring patterns of the various logs used in the buildings. With this “floating” chronology, the archaeologists could tell which logs were older and which were more recent. None could be precisely dated, since no log had a pattern of tree rings that matched any part of the established chronology. It was clear from this evidence, however, that the buildings must have been constructed before A.D. 1260.

Finally, continued excavations turned up a “key” beam. The outer ring pattern of the

key beam overlapped the earliest rings in the established chronology. Furthermore, its inner ring pattern matched the pattern formed by the most recent rings of the “floating” chronology. Thus, the chronology for the abandoned Pueblo villages could be known with certainty. Counting backward from the present, the archaeologists estimated that the villages had been occupied between A.D. 900 and A.D. 1300.

The tree rings also suggested **why** the villages had been abandoned. The rings for the years A.D. 1276 to 1299 were very thin, indicating a severe drought that lasted for 23 years. Most likely the villagers had left their homes to search for a more hospitable climate.

39. Which of the following best tells what this passage is about?
- A. how variations in weather conditions affect tree growth
  - B. recent breakthroughs in understanding Indian cultures
  - C. why the Pueblo villages were abandoned
  - D. how tree-ring dating can establish the age of archaeological findings
  - E. why tree-ring dating is the best method for determining dates
40. What was the importance of the “key” beam described in the fourth paragraph?
- F. It proved that trees of the same age would have identical tree-ring patterns.
  - G. It helped to disprove earlier theories regarding the abandonment of the villages.
  - H. It helped archaeologists to determine why the villages had been built at that time.
  - J. It explained why the Pueblo buildings had been constructed at that location.
  - K. It connected the “floating” chronology to the established chronology.



In the diagrams above, an identical ring pattern on logs from two trees has been shaded. Which of the following conclusions about these logs is best supported by the information in the passage?

- A. Log 1 was cut before log 2.
- B. Log 2 was cut before log 1.
- C. The two trees responded differently to the same growing season.
- D. The two logs were cut from the same tree.
- E. The tree from which Log 2 was cut was the same size as the tree from which Log 1 was cut.

43. For which of the following would tree-ring data be most useful?
- A. identifying the kinds of trees used to build the ancient Pueblo buildings
  - B. tracking the historical sequence of weather cycles in a region
  - C. investigating the reasons that Indians lived in specific areas
  - D. determining the length of the growing season in different areas of the world
  - E. determining how people built their villages

44. Why did the archaeologists conclude that the buildings in the abandoned Pueblo villages "must have been constructed before A.D. 1200" (lines 45-46)?

- A. The logs in these buildings did not share any ring patterns with the established chronology, which went back to that year.
- B. The logs in these buildings had ring patterns in common with the logs used in Oraibi.
- C. The villages were still inhabited when the Spanish explorers found them.
- D. The villages were already abandoned when the Spanish explorers found them.
- E. The people in these villages had moved to Oraibi.

45. According to the passage, what is the most likely reason that the two villages had logs with identical ring patterns?
- A. The villages were destroyed by the same drought.
  - B. The villages were built by the same people.
  - C. There were no more trees to build with.
  - D. A long drought prompted people to leave the area.
  - E. The villages had grown too large for their locations.
46. The villagers fled to escape the Spanish explorers.

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Most people—if they think about bubbles, suds, and lather at all—consider them to be fairly ordinary physical occurrences. But scientists have been studying foams, particularly aqueous (watery) foams, for more than 300 years. The phenomenon of foam creation is quite complex, and only recently have scientists begun to understand how foams are formed.

Aqueous foam is produced when a gas—air, for example—is dispersed within a liquid, such as water. However, a pure liquid produces an unstable froth, so a third ingredient must be added to stabilize the froth into foam. The most common stabilizers, or foaming agents, are soaps and proteins. These stabilizers are also called surfactants, or surface-active agents. Surfactant molecules chemically disturb the surface of the liquid, lowering its surface tension and creating a foam of bubbles, each encased in a watery film. The dispersing gas continues to build bubbles until the liquid is partially or completely converted to foam, with a surface area far greater than that of the original volume of liquid.

Foams have a characteristic life cycle. During the first stage, the liquid content is high and the foam is characterized by spherical bubbles of nearly uniform size, each with a relatively thick outer film of liquid. As the foam ages, the liquid drains away, and the foam “dries.” The bubbles are no longer spherical; they have become polyhedrons with multiple flat surfaces. Eventually, outside forces—usually evaporation or vibration—cause the film walls of the bubbles to collapse, and the foam disappears.

The soap foams of shampoo, bubble bath, and dishpan suds were developed largely to satisfy consumer expectations. Protein foaming agents create whipped cream and marshmallows. Still other foams have important practical applications. Perhaps best known of these is the foam used in fire extinguishers. It puts out oil or gasoline

fires by smothering them in a blanket of foam made of carbon dioxide bubbles stabilized by a protein-based surfactant. In general, these extinguishers have the advantage of minimizing the extensive water damage caused by more traditional fire-fighting methods.

Less well-known are the applications of foam technology to the recovery of oil from deep wells. Water is often present along with this energy-producing resource, and the water must be removed before the well can become productive. Drillers introduce a gas, along with an appropriate surfactant, into the well, and then pump out the resulting foam. Thus the water is removed, leaving a more productive oil well.

45. Which of the following best tells what this passage is about?
- A. the life cycle of an aqueous foam
  - B. how foam was discovered
  - C. industrial uses of aqueous foams
  - D. differences between surfactants and foaming agents
  - E. how aqueous foams are formed, and some of their uses
46. In which of the following locations would an aqueous foam be expected to disappear most rapidly?
- F. on the shelf of a working refrigerator with its door closed
  - G. aboard an airtight satellite filled with humid air
  - H. on a moving railroad train on a hot day
  - J. on a table in a research laboratory
  - K. in the darkened vault of a bank

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47. How does a surfactant contribute to the formation of an aqueous foam?
- A. It dissolves the gas in the liquid.
  - B. It changes the surface tension of the liquid.
  - C. It delays the formation of polyhedron bubbles.
  - D. It causes the bubbles to disappear.
  - E. It converts soap into foam.
48. Which of the following is characteristic of a “young” aqueous foam?
- F. spherical bubbles
  - G. polyhedral bubbles
  - H. bubbles with thin walls
  - J. “dry” foam, with liquid draining away
  - K. increased surface tension of the liquid
49. Why is foam better than plain water in fighting oil fires?
- A. It results in less water damage.
  - B. It is not flammable.
  - C. It does not evaporate.
  - D. Its bubbles form a film.
  - E. It promotes oil recovery.
50. Which of the following is **not** mentioned in the passage as an ingredient of dishpan suds?
- F. protein
  - G. water
  - H. soap
  - J. air
  - K. a surfactant

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# PART 2 — MATHEMATICS

*Suggested Time — 75 Minutes*

50 QUESTIONS

## GENERAL INSTRUCTIONS

Solve each problem. Select the **best** answer from the choices given. Mark the letter of your answer on the answer sheet. You can do your figuring in the test booklet or on paper provided by the proctor. **DO NOT MAKE ANY MARKS ON YOUR ANSWER SHEET OTHER THAN FILLING IN YOUR ANSWER CHOICES.**

### IMPORTANT NOTES:

- (1) Formulas and definitions of mathematical terms and symbols are **not** provided.
- (2) Diagrams other than graphs are **not** necessarily drawn to scale. Do not assume any relationship in a diagram unless it is specifically stated or can be figured out from the information given.
- (3) Assume that a diagram is in one plane unless the problem specifically states that it is not.
- (4) Graphs are drawn to scale. Unless stated otherwise, you can assume relationships according to appearance. For example, (on a graph) lines that appear to be parallel can be assumed to be parallel; likewise for concurrent lines, straight lines, collinear points, right angles, etc.
- (5) Reduce all fractions to lowest terms.

51.  $3.6 \div \frac{2}{3} =$

- A. 2.4
- B. 5.4
- C. 6
- D. 9
- E. 54

52.  $-2x(3y - 4z) =$

- F.  $-6xy - 8xz$
- G.  $-6xy + 8xz$
- H.  $-6xy - 4z$
- J.  $2xyz$
- K.  $24xyz$

53. Maria is now 16 years old. In 6 years, she will be twice as old as her brother is then. How old is her brother now?

- A. 5
- B. 6
- C. 8
- D. 11
- E. 12

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54.  $6.44 + 6.46$

Consider the following two methods to estimate the sum above:

Method I: Round each number to the nearest tenth, then add.

Method II: Round each number to the nearest whole number, then add.

By how much would the result of Method I be **greater** than the result of Method II?

- F. 0
- G. 0.1
- H. 0.9
- J. 1
- K. 12.9

55. If M and T are odd numbers, and M is a multiple of T, which of the following **must** be true?

- A.  $M + T$  is odd.
- B.  $MT$  is even.
- C.  $M - T$  is odd.
- D.  $M \div T$  is even.
- E.  $M \div T$  is odd.

56. The scale on a map is 1 inch = 10 miles. What is the distance, in inches, on the map between two towns that are  $m$  miles apart?

- F.  $\frac{m}{10}$
- G.  $\frac{m}{5}$
- H.  $5m$
- J.  $10m$
- K.  $m + 10$

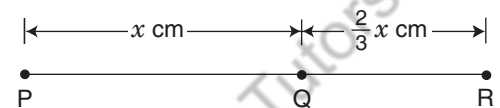
57. There are 1,650 registered voters in Centerville. Of these,  $\frac{1}{3}$  were born between 1950 and 1979, inclusive. How many of the registered voters were born either **before** 1950 or **after** 1979?

- A. 550
- B. 660
- C. 825
- D. 990
- E. 1,100

58. Tien is making 5-letter security codes using only the letters M, N, P, Q, and R. She arranges the letters in a different order for each code, using every letter exactly once within each code. How many different codes can she make?

- F. 1
- G. 5
- H. 15
- J. 120
- K. 3,125

- 59.



Point Q is on line segment  $\overline{PR}$ . If  $PQ = 9$  centimeters, how long is  $\overline{PR}$ ?

- A. 6 cm
- B. 12 cm
- C.  $13\frac{1}{2}$  cm
- D. 15 cm
- E. 18 cm

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88. 2004 SCHOOL DATA

	Average Number of Students per Teacher	Number of Classrooms per Teacher	Spending per Student
Alaska	12.2	100	\$12,000
Colorado	16.2	45,000	\$7,000
Dist. of Columbia	12.2	5,000	\$12,000
Florida	16.2	7,000	\$8,000
Illinois	16.2	45,000	\$8,000
Minnesota	16.2	15,000	\$7,000

Of the six locations listed above, what is the median spending per student?

- F. \$7,000  
G. \$8,000  
H. \$9,000  
J. \$10,000  
K. \$11,000

89. How much greater is 1,000 in the value of the digit 1 in 1,000 than the value of the digit 1 in 100?

- A. 1,000  
B. 1,100  
C. 1,900  
D. 900  
E. 999

MEAN ELEVATION OF CONTINENTS

Continent	Mean Elevation
North America	2,000 ft
South America	1,000 ft
Europe	900 ft
Asia	3,000 ft
Africa	1,000 ft
Oceania	1,000 ft
Antarctica	9,000 ft

After each elevation above is converted to the nearest thousand feet, what is the mode elevation?

- F. 1,000 ft  
G. 2,000 ft  
H. 3,000 ft  
J. 4,000 ft  
K. 17,000 ft

90. A 20-foot long pole is cut in half. One of these pieces is cut in half again. Finally, one of the shortest pieces is cut into thirds. Of these 3 cut pieces, what is the difference in length between the longest piece and one of the 3 shortest pieces?

- A. 2 ft  
B. 4 ft  
C. 10 ft  
D. 12 ft  
E. 20 ft

91. 12, 18, 24, 30, 36, \_\_\_\_\_

In the sequence above, each number except the first two is the difference between the two previous numbers. What is the seventh number in this sequence?

- F. 42  
G. 48  
H. 54  
J. 60  
K. 66

92. What is the value of  $\frac{1}{2}$  of  $\frac{1}{3}$  of 12?

- A. 1  
B. 2  
C.  $\frac{1}{2}$   
D.  $\frac{1}{3}$   
E. 100

93. The ratio of Bettina's height to her sister's height is 7:6. If Bettina is 140 centimeters tall, how much taller is Bettina than her sister?

- F. 6 cm  
G. 10 cm  
H. 12 cm  
J. 20 cm  
K. 120 cm

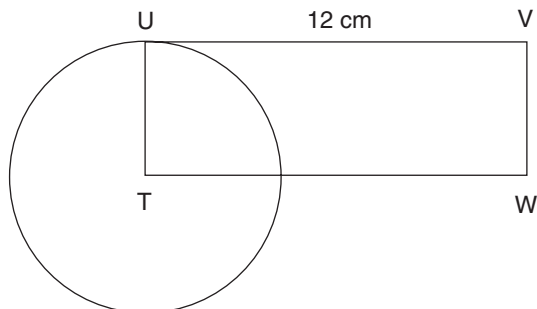
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67. What is the greatest prime factor of 210?

- A. 5
- B. 7
- C. 10
- D. 21
- E. 105

M89-709D

68.



In the diagram above, T is the center of the circle, the circumference of which is  $8\pi$  centimeters. Point U is on the circle. What is the area of rectangle TUVW?

- F. 24 sq cm
- G. 36 sq cm
- H. 40 sq cm
- J. 48 sq cm
- K. 96 sq cm

69. What is the greatest common factor of 459 and 567?

- A. 3
- B. 9
- C. 17
- D. 27
- E. 51

70. Which statement is true?

- F. All equilateral triangles are congruent.
- G. All equilateral triangles are similar.
- H. All rectangles are congruent.
- J. All rectangles are similar.
- K. All squares are congruent.

71. The sales of hot drinks are roughly a linear function of outdoor temperature. If a vendor sells 200 cups when the outdoor temperature is  $70^\circ$ , and 440 cups when the outdoor temperature is  $50^\circ$ , how many cups can the vendor expect to sell if the outdoor temperature is  $55^\circ$ ?

- A. 260
- B. 380
- C. 435
- D. 500
- E. 520

72. A certain type of bamboo blooms for 1 week once every 17 years. This type of bamboo bloomed in 1807. How many times did it bloom between 1820 and 2011, inclusive?

- F. 5
- G. 6
- H. 10
- J. 11
- K. 12

73. 
$$\frac{(-1)^2 + (-2)^3 + (-3)^4}{(-1)^4 + (-2)^3 + (-3)^2} =$$

- A. 0
- B. 1
- C. 5
- D. 9
- E. 37

74. Survey results indicate that between 70% and 80% of high school students have their own cell phones. If these results apply to a high school of 900 students, what is the maximum number of students who do **not** own cell phones?

- F. 180
- G. 270
- H. 370
- J. 720
- K. 828

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75. If Seung is now  $y$  years old and Jackson is 3 years older than Seung, what was Jackson's age 8 years ago?

A.  $y - 11$   
B.  $y - 3$   
C.  $y - 5$   
D.  $y + 11$   
E.  $3y - 8$

76. On a number line, what is the midpoint of a line segment beginning at  $-2$  and ending at  $\frac{2}{5}$ ?

F.  $-\frac{7}{10}$

G.  $-\frac{4}{5}$

H.  $-\frac{1}{5}$

J. 0

K.  $1\frac{1}{5}$

77. Yan has 48 coins, consisting of a mix of nickels and dimes. The total value of these 48 coins is \$3.90. How many more dimes than nickels does Yan have?

A. 10  
B. 12  
C. 18  
D. 22  
E. 30

78. If the side of a square and the diameter of a circle are equal in length, what is the ratio of the perimeter of the square to the circumference of the circle?

F.  $\frac{1}{1}$

G.  $\frac{\pi}{2}$

H.  $\frac{2}{\pi}$

J.  $\frac{\pi}{4}$

K.  $\frac{4}{\pi}$

79. A used car is sold for \$5,000. The buyer pays \$400 for the down payment. What fraction of the sale price is the down payment?

A. 0.0125  
B. 0.08  
C. 0.125  
D. 0.4  
E. 0.8

80. A particular type of plastic weighs 0.035 ounces per cubic inch. What is the weight of a stack of 50 rectangular sheets of this plastic if the stack measures 5 inches by 10 inches by 20 inches?

F. 0.000035 oz  
G. 0.7 oz  
H. 3.5 oz  
J. 35 oz  
K. 1,750 oz

81. A painter needs to paint a circular region with a radius of 3 feet. The painter has only enough paint to cover 25 square feet. About how many square feet of the region **cannot** be painted?

A. 2.7 sq ft  
B. 3.3 sq ft  
C. 6.2 sq ft  
D. 18.8 sq ft  
E. 28.3 sq ft

82. Gloria receives a 15% commission on her sales. For the last three-month period, Gloria received a commission of \$12,000. What were her sales for this period?

F. \$13,800  
G. \$68,000  
H. \$80,000  
J. \$92,000  
K. \$800,000

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83.

$x$	$y$
1	$-a - \frac{b}{2}$
2	$-\frac{b}{3}$
3	$a - \frac{b}{4}$
4	$2a - \frac{b}{5}$

Based on the table above, which of the following best represents the value of  $y$  when  $x = 0$ ?

- A.  $-2a - b$
- B.  $-b$
- C.  $-\frac{a}{2}$
- D.  $-2a$
- E.  $-\frac{a}{2} - b$

84. Daquan sold  $x$  hot dogs. Caitlyn and Daquan together sold  $5x - 2$  hot dogs. In terms of  $x$ , how many hot dogs did Caitlyn sell?

- F.  $\frac{x}{5} - 2$
- G.  $5x - 1$
- H.  $6x - 2$
- J.  $4x + 2$
- K.  $4x - 2$

85. For house sales, a certain real estate agent charges a commission of 3% of the house price for prices less than \$200,000, and 2.5% of the house price for prices of \$200,000 or more. How many more dollars does the agent earn on a price of \$199,000 than on a price of \$201,000?

- A. \$94.50
- B. \$945
- C. \$1,000
- D. \$1,055
- E. \$2,000

86.

$$r = 3m = 4n = 10p$$

If  $m$ ,  $n$ , and  $p$  are positive integers, what is the **least** possible value of  $r$ ?

- F. 1
- G. 10
- H. 17
- J. 60
- K. 120

87. In the set of all integers from 4 to 81, inclusive, how many are multiples of 2 or 7 or both?

- A. 34
- B. 39
- C. 45
- D. 50
- E. 55

88. If  $\frac{3t - s}{4} = 8s$ , what is the value of  $s$  in terms of  $t$ ?

- F.  $\frac{t}{2}$
- G.  $\frac{t}{3}$
- H.  $\frac{t}{4}$
- J.  $\frac{t}{7}$
- K.  $\frac{t}{11}$

89. Simplify the expression

$$r \left[ s \left( \frac{r+s}{r-s} \right) \left( \frac{r-s}{r+s} \right) \right], \text{ where}$$

$$r \neq s \text{ and } r \neq -s.$$

- A.  $rs$
- B.  $s$
- C.  $rs(r+s)(r-s)$
- D.  $(r+s)(r-s)$
- E. 1

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# TAP TO GET FULL SHSAT MATERIALS & PREP

# TAP TO GET FULL SHSAT MATERIALS & PREP

