NEW YORK CITY PUBLIC SCHOOLS

USE A PENCIL ONLY

SIDE 2

2016 SPECIALIZED HIGH SCHOOLS ADMISSIONS TEST

GRADE 8

Test Booklet Letter Test Booklet Number

Student's First Name (please print) Student's Last Name (please print)

PART 1 VERBAL

SCRAMBLED PARAGRAPHS

Paragraph 1

The second sentence is	Q	R	S	T	U
The third sentence is	Q	R	S	T	U
The fourth sentence is	Q	R	S	T	U
The fifth sentence is	Q	R	S	T	U
The sixth sentence is	Q	R	S	T	U

Paragraph 2

The second sentence is	Q	R	S	T	U
The third sentence is	Q	R	S	T	U
The fourth sentence is	Q	R	S	T	U
The fifth sentence is	Q	R	S	T	U
The sixth sentence is	Q	R	S	T	U

Paragraph 3

The second sentence is	Q	R	S	T	U
The third sentence is	Q	R	S	T	U
The fourth sentence is	Q	R	S	T	U
The fifth sentence is	Q	R	S	T	U
The sixth sentence is	Q	R	S	T	U

Paragraph 4

The second sentence is	Q	R	S	T	U
The third sentence is	Q	R	S	T	U
The fourth sentence is	Q	R	S	T	U
The fifth sentence is	Q	R	S	T	U
The sixth sentence is	Q	R	S	T	U

Paragraph 5

The second sentence is	Q	R	S	T	U
The third sentence is	Q	R	S	T	U
The fourth sentence is	Q	R	S	T	U
The fifth sentence is	Q	R	S	T	U
The sixth sentence is	Q	R	S	T	U

LOGICAL REASONING

11	A	B	C	D	E
12	F	G	H	J	K
13	A	B	C	D	E
14	F	G	H	J	K
15	A	B	C	D	E
16	F	G	H	J	K
17	A	B	C	D	E
18	F	G	H	J	K
19	A	B	C	D	E
20	F	G	H	J	K

READING

21	A	B	C	D	E
22	F	G	H	J	K
23	A	B	C	D	E
24	F	G	H	J	K
25	A	B	C	D	E
26	F	G	H	J	K
27	A	B	C	D	E
28	F	G	H	J	K
29	A	B	C	D	E
30	F	G	H	J	K
31	A	B	C	D	E
32	F	G	H	J	K
33	A	B	C	D	E
34	F	G	H	J	K
35	A	B	C	D	E
36	F	G	H	J	K
37	A	B	C	D	E
38	F	G	H	J	K
39	A	B	C	D	E
40	F	G	H	J	K
41	A	B	C	D	E
42	F	G	H	J	K
43	A	B	C	D	E
44	F	G	H	J	K
45	A	B	C	D	E
46	F	G	H	J	K
47	A	B	C	D	E
48	F	G	H	J	K
49	A	B	C	D	E
50	F	G	H	J	K

PART 2 MATHEMATICS

MATHEMATICS PROBLEMS

51	A	B	C	D	E
52	F	G	H	J	K
53	A	B	C	D	E
54	F	G	H	J	K
55	A	B	C	D	E
56	F	G	H	J	K
57	A	B	C	D	E
58	F	G	H	J	K
59	A	B	C	D	E
60	F	G	H	J	K
61	A	B	C	D	E
62	F	G	H	J	K
63	A	B	C	D	E
64	F	G	H	J	K
65	A	B	C	D	E
66	F	G	H	J	K
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69	A	B	C	D	E
70	F	G	H	J	K
71	A	B	C	D	E
72	F	G	H	J	K
73	A	B	C	D	E
74	F	G	H	J	K
75	A	B	C	D	E
76	F	G	H	J	K
77	A	B	C	D	E
78	F	G	H	J	K
79	A	B	C	D	E
80	F	G	H	J	K
81	A	B	C	D	E
82	F	G	H	J	K
83	A	B	C	D	E
84	F	G	H	J	K
85	A	B	C	D	E
86	F	G	H	J	K
87	A	B	C	D	E
88	F	G	H	J	K
89	A	B	C	D	E
90	F	G	H	J	K
91	A	B	C	D	E
92	F	G	H	J	K
93	A	B	C	D	E
94	F	G	H	J	K
95	A	B	C	D	E
96	F	G	H	J	K
97	A	B	C	D	E
98	F	G	H	J	K
99	A	B	C	D	E
100	F	G	H	J	K

READING

QUESTIONS 21-50

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

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.

Aqueous 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 aqueous 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.

21. 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. the formation and uses of aqueous foams

22. Which of the following occurs only later in the life cycle of foam?

F. addition of a surfactant
G. an increase in surface area
H. bubbles covered in watery film
J. bubbles with many flat sides
K. a decrease in surface tension of the liquid

23. 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.

24. 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

25. According to the passage, foam is better than water in fighting oil fires because foam

A. results in less damage.
B. is not flammable.
C. does not evaporate.
D. has bubbles that form a film.
E. promotes oil recovery.

26. 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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Most movies about spies and undercover agents feature fascinating special equipment. Many of these gadgets exist only in the imaginations of script writers, but others are actually used in espionage activities. One device with a surprisingly long and colorful history, both in and out of the cloak-and-dagger world, is the concealed camera.

In the late nineteenth century, "detective cameras" were popular with amateur photographers who wanted to take snapshots of unsuspecting people on the street. The camera was usually carried in plain view. Its disguise was simple: it was a plain box resembling a large and rather heavy parcel or a piece of luggage, with no external lens or controls. When people caught on to the deception, though, designers began hiding cameras in other objects, ranging from hats and books to purses and pocket watches. One concealed camera even looked like an ordinary camera, but had mirrors that allowed users to take photographs at a right angle to the direction of whatever the photographer seemed to be viewing.

Although most early spy cameras were meant to be used on the ground, cameras have been hidden in the sky almost from the beginning of photography. In World War I, both sides realized the strategic value of taking aerial photographs of enemy territory from the newly invented airplane. To spy more discreetly, without the use of airplanes, the Germans attached cameras to homing pigeons and sent them over French army positions. Timers were set to trigger the cameras when the pigeons were expected to be flying over their targets. That particular attempt proved impractical, but the idea behind it did not: aerial photography became a staple of World War II.

In the mid-twentieth century, a new era of spying with cameras began under the Cold War. This was a period of worldwide tension and competition between the Communist world, led by the Soviet Union, and the Western world, represented by the United States and its allies. The conflict was expressed through propaganda, arms races, and especially espionage. During the Cold War, both sides competed to develop new technologies to use photography in spying. Sophisticated concealed cameras were put in matchboxes, pens, rings, cigarette lighters, makeup cases, guns, and even hidden in clothing, with the lens concealed in a button. Almost any object that could be carried without attracting attention was probably made into a camera and carried by an undercover agent. Cameras were also hidden in furniture and office machines such as copiers, which took photos of every document that was copied. The development of the long-range telephoto lens even allowed spies to take clear photos from a distance, such as across the street from an embassy.

Today, space has proven to be the ultimate location for hidden cameras, as satellite-mounted cameras can produce highly detailed photographs of objects anywhere on earth.

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

- **A.** the role of hidden cameras in national security
- **B.** the problems associated with hidden cameras
- **C.** the mechanics of the "detective camera"
- **D.** historical information about the concealed camera
- **E.** how cameras are mounted in satellites

28. According to the passage, "detective cameras" were popular with

- **F.** spies.
- **G.** detectives.
- **H.** the German army.
- **J.** professional photographers.
- **K.** amateur photographers.

CONTINUE ON TO THE NEXT PAGE ►

29. What was the original purpose of the early detective cameras?

- **A.** to resemble an ordinary object such as a box
- **B.** to deceive people into thinking that the box contained a camera
- **C.** to use in espionage activites by secret agents
- **D.** to take pictures without the subjects' knowledge
- **E.** to be carried by homing pigeons for surveillance

30. The camera with mirrors (lines 21-25) allowed the photographer to

- **F.** conceal the camera in a hat or pocket watch.
- **G.** take a picture with no external lens or controls.
- **H.** disguise the camera as a simple box.
- **J.** take a picture of one scene while appearing to take a picture of another.
- **K.** determine whether other photographers were using detective cameras.

31. Photographers stopped using the box-type "detective camera" because

- **A.** people were no longer deceived by them.
- **B.** the cameras could not be used with external lenses.
- **C.** they wanted to avoid being mistaken for secret agents.
- **D.** professional photographers refused to use them.
- **E.** espionage was conducted during the war.

32. What was the "idea" referred to in line 40?

- **F.** taking photographs without permission
- **G.** taking photographs from above
- **H.** disguising a camera as something else
- **J.** using cameras in wartime
- **K.** attaching cameras to homing pigeons

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One of the books that has done the most to alert the world to the dangers of environmental degradation was George Perkins Marsh's *Man and Nature*. Its message—that Western society was in the process of causing irreparable harm to the environment—greatly influenced ecologists during the beginning of the modern environmentalist movement in the 1960s. Marsh was not, however, part of this movement. Surprisingly, *Man and Nature* was first published in 1864.

Marsh first observed the environmentally destructive effects of human activities while growing up in Vermont in the early nineteenth century. The heavy demand for firewood had depleted the forests, and extensive sheep grazing had stripped the land. The result was flooding and soil erosion. Furthermore, streams were fouled by wastes dumped from numerous mills and dye houses.

Much later in his life, after careers in law, business, farming, and politics, Marsh served as ambassador to Italy. There he noticed land abuse similar to what he had seen in Vermont. Overgrazing and forest mismanagement had rendered desolate areas that had been productive farmland since the days of the Roman Empire. Marsh attributed this to what he called ". . . man's ignorant disregard for the laws of nature."

In Italy, Marsh began to organize his observations and theories. He wrote in a way intended to educate readers about the impact of industrial and agricultural practices on the environment. In *Man and Nature*, he evaluated the important relationships between animals and plants, discussed forestry practices in great detail, and analyzed the ways natural water supplies are affected by human use.

Man and Nature challenged the popular belief that nature can heal any damage that people inflicted upon it. Marsh argued that human beings may use and enjoy, but not destroy, the riches of the earth.

Furthermore, he asserted that everything in nature is significant, and that even the tiniest organism affects the fragile environmental balance. His belief that drastic alteration of this balance would be dangerous is now accepted as a fundamental principle of modern environmental science.

Although he pointed out environmental damage caused by irresponsible human activities, Marsh did not oppose every human alteration to the environment. To him, the goal was proper management, not a return to wilderness conditions. People should consider the consequences of their actions, he wrote, and become "co-worker[s] with nature." Marsh praised the Suez Canal, the human-made waterway between the Mediterranean Sea and the Gulf of Aden, as "the greatest and most truly cosmopolite physical improvement ever undertaken by man." He believed that the advantages of the canal—improved transportation and commerce—would outweigh any environmental damage. Yet he also warned of possible unintended consequences, such as destructive plants and animals spreading from one body of water to the other.

Marsh was considered a radical thinker during his lifetime. By the late nineteenth century, however, his writings, along with those of John Muir, Henry David Thoreau, and others, had inspired what became known as the conservation movement. The conservationists of that time sought to educate the public that wilderness areas were worth preserving, and they were responsible for creating the National Park Service and the National Forest Service.

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33. What prompted Marsh to write *Man and Nature*?

- **A.** his belief that nature can heal itself
- **B.** his interest in the modern environmentalist movement
- **C.** his own mismanagement of farmland
- **D.** his belief that the Roman Empire was responsible for land abuse in Italy
- **E.** his observations of land mismanagement in Vermont and Italy

34. Marsh attributed people's irresponsible environmental practices to

- **F.** their failure to reclaim land desolated by erosion.
- **G.** their desire to keep the earth unspoiled for future generations.
- **H.** land management practices during the Roman Empire.
- **J.** their lack of understanding of nature.
- **K.** the influence of the modern environmentalist movement.

35. What is the most likely reason the author uses the word "surprisingly" in line 11?

- **A.** to point out that Marsh's theories have been overturned by modern environmentalists
- **B.** to argue that Marsh's ideas, while valid in their time, do not apply to the present
- **C.** to show that Marsh introduced ideas a century before they became well-accepted
- **D.** to suggest that Marsh's ideas were actually taken from other environmentalists
- **E.** to suggest that environmental pollution was not a problem in 1864

36. Which of the following best describes how modern environmentalists view George Perkins Marsh?

- **F.** overly optimistic about nature's ability to renew itself
- **G.** outdated but interesting
- **H.** a man whose ideas were ahead of his time
- **J.** a politician who should not have tried to write a scientific book
- **K.** unrealistic about his desire to return to wilderness conditions

37. Which of the following provides support for the author's statement in lines 55-58?

- **A.** Marsh's concern about dangerous plants and animals
- **B.** Marsh's reputation as a radical thinker
- **C.** Marsh's contribution to the conservation movement
- **D.** Marsh's desire for the earth to become wild again
- **E.** Marsh's approval of an intervention that benefited human life

38. Marsh's main contribution to the environmental movement of the 1960s was the

- **F.** realization that environmental damage began in the twentieth century.
- **G.** importance of preserving natural areas.
- **H.** idea that human activities could damage the environment.
- **J.** growth of the conservation movement.
- **K.** knowledge that environmental degradation was chiefly an American problem.

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The British novelist Charles Dickens is well known for the colorful and eccentric characters he created in his many novels. But one of his books, *David Copperfield*, seems to have a great deal to do with fact as well as fiction. After attempting to write his autobiography, Dickens abandoned the project and began to work on a novel, the plot of which was loosely based on his own boyhood experiences. Apparently, it was easier for him to weave the events of his own life into the fiction of *David Copperfield* than to write about them in nonfiction.

Some of Dickens' most troubling memories involved a job he held in 1824 as a 12-year-old child. Because his family was deeply in debt, he was forced to quit school and go to work in a London factory, pasting labels on pots of shoe polish. Young Charles lived in a boardinghouse, using his meager wages to support himself and to help pay his family's debts. He worked in the dreary, run-down factory six days a week from 8:00 a.m. to 8:00 p.m. Such long hours were not unusual at the time, for children or adults, but Dickens was miserable during the entire four months he spent working at the factory.

Even when the family finances improved, the boy continued to work at the factory until his father quarreled with Dickens' boss, who promptly dismissed the son. Charles was upset at being fired, but relieved to be out of the factory. Thus he felt betrayed when his mother, anxious for the boy's weekly wage, succeeded in making peace and getting Dickens' job back for him. The father, however, now sided with his son and the boy was sent back to school. "I know how these things have worked together to make me what I am," Dickens later wrote, but he never forgot that his mother was eager for him to return to work.

As an adult, Dickens always remembered the shame and humiliation he felt during those months at the factory. For years afterward, whenever in London, he could not go near the sites of the factory and boardinghouse, going out of his way to avoid those painful reminders of his past. In fact, Dickens never told his wife and children about his childhood work experience. It was only after his death that they heard of it from a family friend whom Dickens had confided in.

Instead, Dickens expressed his feelings by giving his fictional "other self," David Copperfield, a job similar to the one he had so hated. In the novel, ten-year-old David is forced by his harsh stepfather to work as a bottle washer in a factory. Young David, who "suffered exquisitely" as a child manual laborer, was apparently Dickens' way of dealing with his own past. *David Copperfield* was to become Dickens' most popular novel, and Dickens himself called it his "favorite child."

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

- **A.** Dickens' childhood dreams and desires
- **B.** Dickens' autobiography written while he was a child
- **C.** Dickens' childhood relationship with his parents
- **D.** the autobiographical basis for Dickens' *David Copperfield*
- **E.** the many characters created by Dickens for *David Copperfield*

40. When did Dickens begin writing *David Copperfield*?

- **F.** after giving up work on his own life story
- **G.** shortly after he worked at the shoe polish factory
- **H.** when he decided to resume his long-delayed schooling
- **J.** after revisiting the shoe polish factory as an adult
- **K.** when he no longer felt ashamed about his childhood

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41. Which of the following is the most reasonable inference about Dickens as a child?

A. He believed that children should learn to work and support themselves.
B. He was dreamy and imaginative.
C. He planned to be a factory owner when he grew up.
D. He thought that all work was worthwhile if done well.
E. He preferred attending school to working in a factory.

42. Which of the following is the primary reason that Dickens wrote *David Copperfield*?

F. He needed money from the novel to help pay his debts.
G. It was too difficult for him to write about his memories directly in an autobiography.
H. He wanted his own children to know of his work in the factory.
J. His autobiography had not been well accepted by the public.
K. He wanted to demonstrate that his childhood job had helped him succeed in later life.

43. What can be concluded about the relationship between Dickens and his mother as described in the third paragraph?

A. He never saw her again after he left to work in the shoe polish factory.
B. He was grateful that she got his job back for him.
C. He resented her for putting the need for his wages above his own happiness.
D. He never included her in any of his novels.
E. He had trouble remembering her role in the unpleasant events of his childhood.

44. What most directly enabled Charles Dickens to return to school?

F. a downturn in the family's finances
G. his father's quarrel with the factory owner
H. getting fired from the factory
J. his mother's desire for his weekly wage
K. his father's intervention

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The African country of Zimbabwe took its name from the Shona word meaning "stone enclosures" or "venerated houses." In fact, dozens of stone ruins are today scattered throughout Zimbabwe and other areas in southeastern Africa. One of these ruins, known as "Great Zimbabwe," was once a fabled city that inspired tales that circulated throughout Europe. Where was this remarkable city, and who had built it? For centuries the mystery occupied the minds of explorers and treasure-seekers.

The first reports to Europeans of Great Zimbabwe were spread a thousand years ago by Arab traders sailing between the Middle East and the east coast of Africa. They told of the fabulous wealth of a mysterious stone city in the African interior. In their tales, that city became associated with their understanding of Middle Eastern history—with the Queen of Sheba, King Solomon, and his legendary gold mines, long since lost to the world. By the sixteenth century, Portuguese explorers regularly visited East Africa, searching for "King Solomon's gold," but they never found Great Zimbabwe. In 1552, a Portuguese historian, João de Barros, recorded a story told by the Arabs about a city with a "square fortress of masonry within and without, built of stones of marvelous size, and there appears to be no mortar joining them."

In fact, Great Zimbabwe **was** a marvel. In one area, a massive wall, over thirty feet high and twenty feet thick, created a great enclosure. Another area contained a fortress-like series of walls, corridors, and steps built into the bluff above. Throughout the city, each stone was precisely fitted to the others without the use of mortar.

In the 1870s, a German geologist, Karl Mauch, was the first European to see Great Zimbabwe, by then in ruins. Mauch realized that he had "rediscovered" the fabled city from de Barros's story. He jumped to the conclusion that Great Zimbabwe had been built by the Queen of Sheba. British authorities sent a British journalist, Richard Hall, to Great Zimbabwe to investigate Mauch's report. Archaeology was still in its infancy, and Hall, convinced that the structures had been built by ancient people from the Middle East, dug up and discarded archaeological deposits that would have revealed much about the true history of Great Zimbabwe. Later European excavations destroyed even more valuable evidence.

In the twentieth century, after excavating areas that had not been disturbed, David Randall-MacIver, a Scottish Egyptologist, and Gertrude Caton-Thompson, an English archaeologist, concluded that the ruins were unmistakably African in origin. Great Zimbabwe was most likely built during the fourteenth or fifteenth century by the ancestors of the present-day Shona people. Recent carbon-14 dating supports their conclusion. Great Zimbabwe was once home to an estimated 20,000 people, the center of a great Shona kingdom. Wealthy Shona kings traded their ivory and gold in coastal towns for other goods, thus accounting for the discovery of beads and other foreign wares in the ruins.

One mystery of Great Zimbabwe had been solved. Another mystery remains: why was the settlement at Great Zimbabwe abandoned, leaving the magnificent stone architecture to fall into ruins?

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

- **A.** a brief history of the nation of Zimbabwe
- **B.** inaccuracies in the recording of African history
- **C.** a comparison of Great Zimbabwe with other African archaeological sites
- **D.** the true story of the Great Zimbabwe ruins
- **E.** how Karl Mauch discovered Great Zimbabwe

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46. Which of the following statements about Richard Hall's opinion on Great Zimbabwe would the author most likely support?

F. First impressions are generally accurate.
G. Preconceptions can cloud a person's judgment.
H. The history of a people can best be judged by looking at its present culture.
J. Advanced cultures developed first in the Middle East, then spread to the rest of the world.
K. Much of Middle Eastern culture was derived from the culture of the Shona people.

47. What was "one mystery of Great Zimbabwe" (line 77) that had been solved?

A. why foreign wares were found in the ruins
B. why the settlement was abandoned
C. the source of the ivory and gold
D. why it was not discovered by Europeans until the 1870s
E. who had built it and when

48. Which of the following statements about the Shona people is best supported by the passage?

F. They no longer exist as a distinct group.
G. They live along Africa's East Coast.
H. They are descendents of the people who built Great Zimbabwe.
J. They lived in the Middle East before settling in Africa.
K. They were once ruled by King Solomon and the Queen of Sheba.

49. Which of the following best illustrates the statement that "Archaeology was still in its infancy" (lines 51-52)?

A. the stone buildings built without mortar
B. the abandonment of Great Zimbabwe
C. the conclusions of David Randall-MacIver and Gertrude Caton-Thompson
D. the discovery of beads and other foreign materials at Great Zimbabwe
E. the excavations conducted by Richard Hall

50. Which of the following best describes the relationship of Portuguese explorers to Great Zimbabwe?

F. They searched for it but never found it.
G. They told Arab traders where to find it.
H. They found King Solomon's mines but didn't realize it.
J. They destroyed archaeological evidence about its history.
K. They were responsible for its abandonment.

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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.

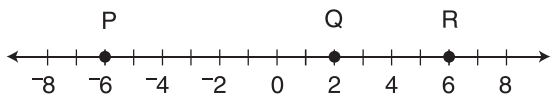
51. $100(2 + 0.1)^2 - 100 =$

A. 101
B. 141
C. 200
D. 301
E. 341

52. Jack scored a mean of 15 points per game in his first 3 basketball games. In his 4th game, he scored 27 points. What was Jack's mean score for the 4 games?

F. 15
G. 16
H. 17
J. 18
K. 21

53.



How many units is it from the midpoint of $\overline{PQ}$ to the midpoint of $\overline{QR}$?

A. 2
B. 4
C. 6
D. 8
E. 10

54. Each child in a certain class is required to have school supplies of 1 notebook and 2 pencils. One notebook costs \$1.09 and one pencil costs \$0.59. With \$15, what is the maximum number of children that can be provided with the required supplies? (Assume no tax.)

F. 6
G. 7
H. 8
J. 9
K. 12

55. What time will it be 46 hours after 9:30 p.m. on Friday?

A. 7:30 p.m. Saturday
B. 7:30 a.m. Sunday
C. 6:30 p.m. Sunday
D. 7:30 p.m. Sunday
E. 9:30 p.m. Sunday

56. Judy is n years older than Carmen and twice as old as Frances. If Frances is 15, how old is Carmen?

F. 30
G. $15 + n$
H. $15 + 2n$
J. $15 - n$
K. $30 - n$

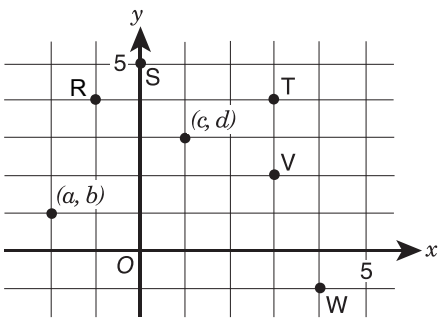
57. If $0.00102 = \frac{102}{N}$, what is the value of N?

A. 10,000
B. 100,000
C. 1,000,000
D. 100,000,000
E. 1,000,000,000

58. On a scale drawing, a distance of 1 foot is represented by a segment 0.25 inch in length. How long must a segment on the scale drawing be to represent a 36-inch distance?

F. 0.25 in.
G. 0.75 in.
H. 3 in.
J. 9 in.
K. 144 in.

59.



The figure above is drawn to scale. Which point best shows the location of $(c + a, d + b)$?

A. R
B. S
C. T
D. V
E. W

60. $\frac{(-51)^2}{17^3} =$

F. -2

G. $-\frac{1}{17}$

H. $\frac{9}{17}$

J. $\frac{16}{17}$

K. 2

61. 1 dollar = 7 lorgs
1 dollar = 0.5 dalts

Kwamme has 140 lorgs and 16 dalts. If he exchanges the lorgs and dalts for dollars according to the rates above, how many dollars will he receive? (Assume there are no exchange fees.)

A. \$28
B. \$52
C. \$182
D. \$282
E. \$988

CONTINUE ON TO THE NEXT PAGE ▶

62. DISTRIBUTION OF EYE AND HAIR COLOR FOR 64 CHILDREN

		Eye Color		
		Brown	Blue	Total
Hair Color	Blond	11	18	29
	Black	15	20	35

The table above shows the distribution of eye color and hair color for 64 children. How many of these children have blond hair or brown eyes, but **not both**?

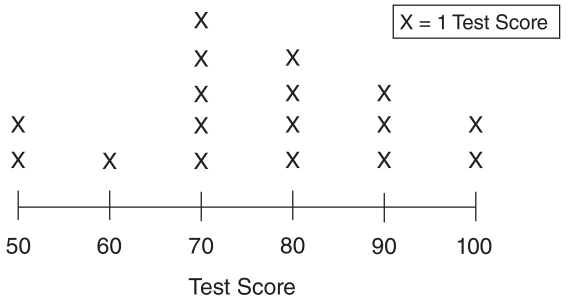
F. 22
G. 33
H. 44
J. 53
K. 55

63. 1 sind = 5.6 ricks
1 sind = 12.88 dalts

Using the conversions above, how many dalts are equivalent to 1 rick?

A. 0.43 dalts
B. 2.3 dalts
C. 7.28 dalts
D. 18.48 dalts
E. 72.128 dalts

64. TEST SCORES FOR 17 STUDENTS



According to the figure above, what was the median score for the test?

F. 70
G. 75
H. $76\frac{8}{17}$
J. 80
K. 90

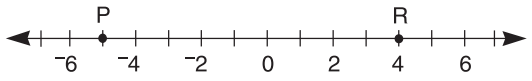
65. What is the solution to $\frac{0.21}{0.33} = \frac{x}{1.10}$?

A. 0.07
B. 0.67
C. 0.70
D. 6.70
E. 7.00

66. Which of the following shows the fractions $\frac{11}{3}$, $\frac{25}{7}$, and $\frac{18}{5}$ in order from least to greatest?

F. $\frac{25}{7}, \frac{18}{5}, \frac{11}{3}$
G. $\frac{25}{7}, \frac{11}{3}, \frac{18}{5}$
H. $\frac{18}{5}, \frac{11}{3}, \frac{25}{7}$
J. $\frac{18}{5}, \frac{25}{7}, \frac{11}{3}$
K. $\frac{11}{3}, \frac{18}{5}, \frac{25}{7}$

67.



Point Q is to be placed on the number line one-third of the way from point R to point P. What number will be at the midpoint of segment $\overline{PQ}$?

A. 2
B. 1
C. 0
D. −1
E. −2

CONTINUE ON TO THE NEXT PAGE ▶

68. A prom dress originally priced at $450 is on sale for $\frac{1}{3}$ off the original price. In addition, Alia has a coupon for 10% off the discounted price. If there is a 6% sales tax on the final price of the dress, what would Alia's total cost be?

F. $111.30
G. $143.10
H. $270.30
J. $286.20
K. $297.00

69. How many different two-digit numbers can be formed from the digits 7, 8, 9 if the numbers must be even and no digit can be repeated?

A. 0
B. 1
C. 2
D. 3
E. 6

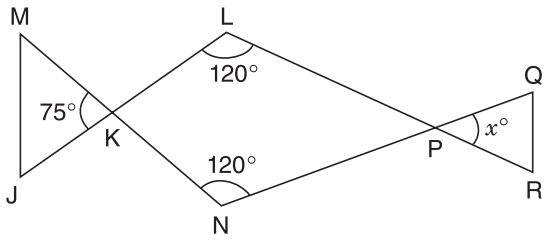
70. A group of mountain climbers started the day at an elevation of 125 feet below sea level. At the end of the day, they camped at 5,348 feet above sea level. What was the climbers' elevation gain for the day?

F. 5,223 ft
G. 5,373 ft
H. 5,377 ft
J. 5,463 ft
K. 5,473 ft

71. How many integers are between $\frac{5}{2}$ and $\frac{20}{3}$?

A. 3
B. 4
C. 5
D. 10
E. 15

72.



In the figure above, $\overline{JKL}$, $\overline{MKN}$, $\overline{NPQ}$, and $\overline{LPR}$ are straight line segments. What is the value of x?

F. 25
G. 45
H. 50
J. 60
K. 75

73.

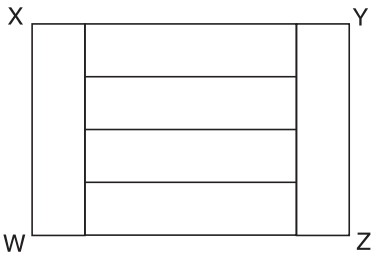


Figure WXYZ above is composed of 6 congruent rectangular panels. The area of figure WXYZ is 54 square centimeters. What is the perimeter of figure WXYZ in centimeters?

A. 24 cm
B. 30 cm
C. 36 cm
D. 45 cm
E. 50 cm

74. What is the prime factorization of 714?

F. $2 \cdot 357$
G. $2 \cdot 3 \cdot 119$
H. $2 \cdot 7 \cdot 51$
J. $6 \cdot 7 \cdot 17$
K. $2 \cdot 3 \cdot 7 \cdot 17$

CONTINUE ON TO THE NEXT PAGE ▶

75. Three gallons of gasoline are needed to drive 65 miles. At this rate, how many gallons are needed to drive m miles?

A. $\frac{3}{65}$ gal.

B. $\frac{3m}{65}$ gal.

C. $3m$ gal.

D. $\frac{65}{3}$ gal.

E. $\frac{65m}{3}$ gal.

76. If Crystal multiplies her age by 3 and then adds 2, she will get a number equal to her mother's age. If m is her mother's age, what is Crystal's age in terms of m?

F. $-\frac{2}{3}m$

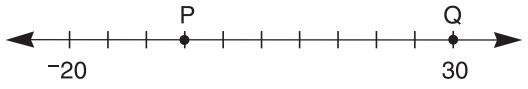
G. $\frac{m-2}{3}$

H. $3m + 2$

J. $\frac{m}{3} - 2$

K. $\frac{3}{m} - 2$

77.



Points P and Q are points on the number line above, which is divided into equal sections. What is the value of PQ?

A. −5
B. 7
C. 30
D. 35
E. 50

78.

8:54 a.m.
9:12 a.m.
9:24 a.m.
10:24 a.m.
11:18 a.m.

Light A flashes every 12 minutes, and light B flashes every 18 minutes. The two lights flash at the same time at 8:00 a.m. At how many of the times listed above will they again both flash at the same time?

F. 1
G. 2
H. 3
J. 4
K. 5

79. Which sum below can be expressed as a non-repeating decimal?

A. $\frac{1}{2} + \frac{1}{6}$

B. $\frac{1}{3} + \frac{1}{4}$

C. $\frac{1}{3} + \frac{1}{5}$

D. $\frac{1}{4} + \frac{1}{5}$

E. $\frac{1}{4} + \frac{1}{6}$

80. To paint a room, Suzanne uses blue and white paint in the ratio of blue:white = 8:3. What was the **total** number of gallons of paint used if she used 6 gallons of blue paint?

F. $2\frac{1}{4}$ gal.

G. $8\frac{1}{4}$ gal.

H. 9 gal.

J. 16 gal.

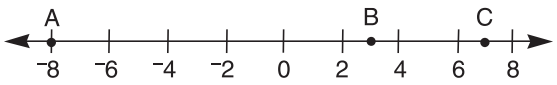
K. 22 gal.

CONTINUE ON TO THE NEXT PAGE ▶

81. A cylindrical oil drum can hold 4,320 liters when it is completely full. Currently, the drum is $\frac{1}{3}$ full of oil. How many kiloliters of oil need to be added to fill the drum completely?

A. 1.44 kL
B. 2.88 kL
C. 4.32 kL
D. 14.40 kL
E. 28.80 kL

82.



On the number line above, A is located at −8, B is located at 3, and C is located at 7. D (not shown) is the midpoint of $\overline{AB}$, and E (not shown) is the midpoint of $\overline{BC}$. What is the midpoint of $\overline{DE}$?

F. −1.5
G. 1.25
H. 1.75
J. 2.25
K. 7.5

83. A certain insect has a mass of 75 milligrams. What is the insect's mass in grams?

A. 0.075 g
B. 0.75 g
C. 7.5 g
D. 75 g
E. 7,500 g

84. A box contains 11 marbles—7 red and 4 green. Five of these marbles are removed at random. If the probability of drawing a green marble is now 0.5, how many red marbles were removed from the box?

F. 1
G. 2
H. 3
J. 4
K. 5

85. A water tank is $\frac{1}{3}$ full; then, 21 gallons of water are added to the tank, making it $\frac{4}{5}$ full. How many gallons of water could the tank hold if it were completely full?

A. 35 gal.
B. 45 gal.
C. 56 gal.
D. 84 gal.
E. 105 gal.

86. RELATIONSHIP BETWEEN ROW A AND ROW B

Row A	1	2	3	4	5	6	7	8	9	10	11
Row B	1	1	2	2	3	3	4	4	5	5	6

The table above shows two rows of integers, Row A and Row B, and the relationship between them. Assume each row continues in the pattern shown. When the number 111 appears in Row A, what is the corresponding number that will appear in Row B?

F. 55
G. 56
H. 57
J. 59
K. 66

87. In a restaurant, the mean annual salary of the 4 chefs is $68,000, and the mean annual salary of the 8 waiters is $47,000. What is the mean annual salary of all 12 employees?

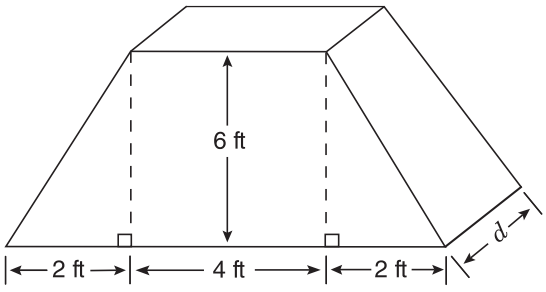
A. $47,000
B. $54,000
C. $55,500
D. $57,500
E. $61,000

CONTINUE ON TO THE NEXT PAGE ▶

88. On the first leg of its trip, a plane flew the 900 miles from New York City to Atlanta in 2 hours. On the second leg, it flew the 1,400 miles from Atlanta to Albuquerque in $2\frac{1}{2}$ hours. How much greater was the plane's mean speed, in miles per hour, on the second leg than on the first?

F. 110 mph
G. 150 mph
H. 200 mph
J. 250 mph
K. 500 mph

89.



The end of a tent has a trapezoidal cross-section as shown above. What is the depth (d) of the tent if its volume is 216 cubic feet?

A. $4\frac{1}{2}$ ft
B. 6 ft
C. $6\frac{1}{2}$ ft
D. 7 ft
E. 8 ft

90. Today, Tom is $\frac{1}{4}$ of Jordan's age. In 2 years, Tom will be $\frac{1}{3}$ of Jordan's age. How old is Jordan today?

F. 4 yr
G. 6 yr
H. 12 yr
J. 16 yr
K. 22 yr

91. How many positive two-digit numbers are evenly divisible by 4?

A. 22
B. 23
C. 24
D. 25
E. 26

92. A steel container is shaped like a cube 10 feet on each side. This container is being filled with water at a rate of 7 cubic feet per minute. At the same time, water is leaking from the bottom of the container at a rate of 2 cubic feet per minute. If the container is exactly half-filled at 9:00 a.m., at what time will the container begin to overflow?

F. 9:55 a.m.
G. 10:00 a.m.
H. 10:11 a.m.
J. 10:40 a.m.
K. 12:20 p.m.

93. Each week, Arnold has fixed expenses of $1,250 at his furniture shop. It costs Arnold $150 to make a chair in his shop, and he sells each chair for $275. What is Arnold's **profit** if he makes and sells 25 chairs in 1 week?

A. $1,875
B. $2,500
C. $3,125
D. $3,750
E. $4,375

94. In how many different ways can you make exactly $0.75 using only nickels, dimes, and quarters, if you must have at least one of each coin?

F. 2
G. 4
H. 6
J. 7
K. 12

CONTINUE ON TO THE NEXT PAGE ▶

95. $(2p + 8) - (5 + 3p) =$

A. $3 - p$
B. $p + 3$
C. $5p - 3$
D. $5p + 3$
E. $5p + 13$

96. A 90-gram mixture contains three items, X, Y, and Z. The ratio of the weights of X and Y is 4:9, and the ratio of the weights of Y and Z is 9:5. If all of item Z were removed, what would be the new weight of the mixture?

F. 60 g
G. 65 g
H. 70 g
J. 72 g
K. 75 g

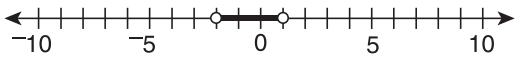
97. Maria is now 16 years old. In 6 years, she will be twice as old as her brother is then. How old is her brother now?

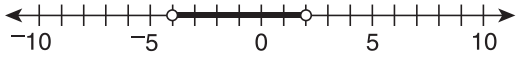
A. 5
B. 6
C. 8
D. 11
E. 12

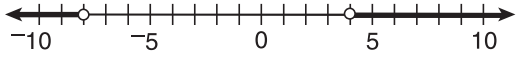
98. A car travels at 4,400 feet per minute. If the radius of each tire on the car is one foot, how many revolutions does one of these tires make in a single minute? (Use the approximation $\frac{22}{7}$ for π.)

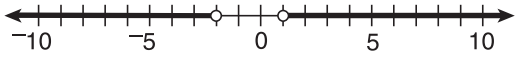
F. 700
G. 1,925
H. 13,828
J. 15,400
K. 27,657

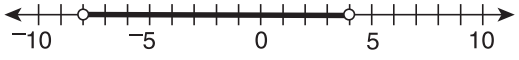
99. Which number line below shows the solution to the inequality $-4 < \frac{x}{2} < 2$?

A.


B.


C.


D.


E.


100. What is the greatest prime factor of 5,355?

F. 17
G. 51
H. 119
J. 131
K. 153

THIS IS THE END OF THE TEST. IF TIME REMAINS, YOU MAY CHECK YOUR ANSWERS TO PART 2 AND PART 1. BE SURE THAT THERE ARE NO STRAY MARKS, PARTIALLY FILLED ANSWER CIRCLES, OR INCOMPLETE ERASURES ON YOUR ANSWER SHEET. ■

94. (**H**) The question asks for the number of different ways to create \$0.75 using at least one of each coin. One of each coin (one quarter, one dime, one nickel) is \$0.25 + \$0.10 + \$0.05 = \$0.40. Thus, the first \$0.40 of any solution is already determined. Subtract \$0.40 from \$0.75 (\$0.75 – \$0.40 = \$0.35), so the question becomes "how many different ways can you make \$0.35 using nickels, dimes, and quarters?" There are 6 ways to create \$0.35 using nickels, dimes and quarters:

7 nickels
5 nickels + 1 dime
3 nickels + 2 dimes
1 nickel + 3 dimes
1 quarter + 1 dime
1 quarter + 2 nickels

---

95. (**A**) $(2p + 8) - (5 + 3p) = 2p + 8 - 5 - 3p = 3 - p$

---

96. (**G**) The ratios of X:Y and Y:Z can be combined because Y has the same value in both ratios. So, X:Y:Z = 4:9:5. The proportion of X and Y in the mixture is $\frac{4+9}{4+9+5} = \frac{13}{18}$. Multiply the total weight of the mixture by the proportion to find the weight of the mixture after Z has been removed: $90 \times \frac{13}{18} = 65$ g

---

97. (**A**) If Maria is 16 now, in 6 years she will be 22. Since she will then (in 6 years) be twice as old as her brother, he will be 11 (in 6 years). To find his present age, subtract 6 from 11. Thus, he is now 5 years old.

---

98. (**F**) One revolution is equal to the circumference of the tire:

$C = 2r\pi = 2(1)(\frac{22}{7}) = \frac{44}{7}$ feet

The car travels at 4,400 feet per minute. To calculate the number of revolutions, divide the speed by the circumference:

$4{,}400 \div \frac{44}{7} = 4{,}400 \bullet \frac{7}{44} = 700$ revolutions

---

99. (**E**) First, multiply each term by 2 to eliminate the fraction:

$-4(2) < (\frac{x}{2})(2) < 2(2)$

$-8 < x < 4$

Therefore, x must be between -8 and 4, which is Option E.

---

100. (**F**) First, find the prime factorization of 5,355:

$5{,}355 = 5 \bullet 1{,}071 = 5 \bullet 9 \bullet 119 =$
$3 \bullet 3 \bullet 5 \bullet 7 \bullet 17$

The greatest prime factor is 17.

Answer Key for Sample Form B

Paragraph 1 S R T U Q	11. C	20. J	29. D	38. H	47. E	56. K	65. C	74. K	83. A	92. J
	12. G	21. E	30. J	39. D	48. H	57. B	66. F	75. B	84. J	93. A
Paragraph 2 R Q T U S	13. C	22. J	31. A	40. F	49. E	58. G	67. E	76. G	85. B	94. H
	14. K	23. B	32. G	41. E	50. F	59. A	68. J	77. D	86. G	95. A
Paragraph 3 S U R Q T	15. A	24. F	33. E	42. G	51. E	60. H	69. C	78. G	87. B	96. G
	16. F	25. A	34. J	43. C	52. J	61. B	70. K	79. D	88. F	97. A
Paragraph 4 Q S R U T	17. E	26. F	35. C	44. K	53. C	62. G	71. B	80. G	89. B	98. F
	18. K	27. D	36. H	45. D	54. F	63. B	72. G	81. B	90. J	99. E
Paragraph 5 S U T Q R	19. C	28. K	37. E	46. G	55. D	64. J	73. B	82. G	91. A	100. F