NEW YORK CITY PUBLIC SCHOOLS

USE A PENCIL ONLY

SIDE 2

2014 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
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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
67	A	B	C	D	E
68	F	G	H	J	K
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 **only on information contained in the passage.** You may reread a passage if you need to. Mark the **best** answer for each question.

When you eat an orange, your perception of its flavor comes from the combination of its aroma and its taste. Taste buds, the sensory receptors on the tongue, convey information to the brain about chemicals in food while the food dissolves in saliva. The sense of smell comes into play when the olfactory nerve in the nasal passages senses even very low concentrations of food chemicals in gaseous form. The sense of smell has a larger role in tasting flavors than most people realize—that is, until they have a stuffy nose and nothing tastes good.

If taste and smell depend on our detection of food chemicals, one might expect that chemists would be able to duplicate the flavors of foods. In fact, a surprising number of popular food flavors can now be reproduced in the laboratory, and even more are on the way. Orange, perhaps the most popular flavor worldwide, has been reproduced successfully. So have some national favorites, including cashew (Latin America), paprika (Hungary), and fruit-flavored "Jamaica" (Mexico). Synthetic flavors are not limited to flavoring food; they are also added to mouthwashes, toothpaste, beverages, and other consumer products.

Only a small proportion of the chemical components occurring naturally in foods actually contribute to their flavor. To identify these critical components, scientists use a gas chromatograph to separate a food into its basic chemical constituents. Flavor experts, called flavorists, then attempt to isolate those chemicals that are essential to the distinctive flavor of a food. Mechanical techniques have been developed to capture the aromas of food as it is being prepared—such as bread while it bakes—and distill the essential chemicals from these essences. If successful, flavorists use their highly developed senses of taste and smell to attempt to produce acceptable flavorings that are chemically identical to, but purer than, flavors that are naturally present in unprocessed food.

Although American consumers claim to want "natural" flavors in their food, taste tests demonstrate that they often prefer their synthetically produced counterparts. Artificial flavors tend to be stronger and less subtle than natural flavors. For example, many Americans prefer a soft drink created with artificial flavors, such as orange soda, over an "all-natural" soda flavored with real oranges, which may taste weak in comparison. In fact, some flavorists worry that consumers will develop such a strong taste for artificial flavors that natural flavorings, usually more expensive than their artificial counterparts, will become scarce.

Researchers have not always been successful in their efforts to duplicate natural flavors. Some popular flavors, such as coffee, strawberry, and chocolate, have proven virtually impossible to reproduce. The difficulty in creating a flavor like chocolate, experts say, is its complexity—a mysterious combination of sweet and bitter that excites the taste buds in an unusual and satisfying way.

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

- **A.** how the sense of smell affects taste
- **B.** the science of how taste buds work
- **C.** the analysis and creation of flavors
- **D.** why some flavors cannot be reproduced
- **E.** the search for the perfect aroma

22. What is the principal goal of the scientific research described in the third paragraph?

- **F.** to predict consumer taste preferences
- **G.** to develop artificial foods with strong flavors
- **H.** to monitor the use of artificial food additives
- **J.** to produce synthetic equivalents to natural food flavors
- **K.** to invent entirely new flavors

23. Which of the following is the most likely reason that no good artificial strawberry flavoring exists?

- **A.** People prefer the taste of oranges to strawberries.
- **B.** The taste of strawberries is more complicated than most other flavors.
- **C.** The gas chromatograph has not yet been used to analyze strawberries.
- **D.** Most people prefer artificial strawberry flavor to a natural flavor.
- **E.** Fruit flavors cannot be duplicated successfully.

24. Which of the following can be concluded about collecting aromas during food preparation?

- **F.** The flavors of odorless foods can now be duplicated.
- **G.** Artificial flavors do not make food taste better.
- **H.** Certain chemical components of a food's flavor are present in its odor.
- **J.** Uncooked food is more flavorful than cooked food.
- **K.** The flavor of a food is always improved by cooking it.

25. What is the most likely reason that the author mentioned orange soda in the fourth paragraph?

- **A.** to give an example of a well-liked flavor that has no natural counterpart
- **B.** to explain why artificial orange flavor has not yet been produced
- **C.** to describe how the aroma of oranges can be used to help reproduce its flavor
- **D.** to demonstrate that consumers sometimes prefer flavor substitutes to the natural flavors they mimic
- **E.** to give an example of a flavor you cannot taste without the sense of smell

26. According to the passage, some flavorists are concerned by the fact that

- **F.** artificial flavors are more expensive to produce than natural flavors.
- **G.** artificial flavors are not as healthy as natural flavors.
- **H.** many people prefer bland food to tasty food.
- **J.** artificial flavors are added to consumer products other than food.
- **K.** people may come to strongly prefer artificial flavors over natural flavors.

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In many cultures, the ugly physical appearance of the bat has given it an unearned reputation as an evil and vicious bearer of diseases. Many people, for example, believe that the American brown bat carries rabies. In fact, it is no more likely to transmit the disease than other animals, such as dogs. Brown bats actually help to prevent disease, not spread it. The basis of their diet is the mosquito, an insect that transmits more diseases than all the bats in the world combined.

A group of bat species known as flying foxes or fruit bats serve another important purpose, as a critical link in the reproduction of many tropical trees and shrubs. In the tropical rain forests of Africa, Asia, and Australia, plants such as avocadoes, date trees, cashews, and mangoes rely in part on flying foxes for pollination. One of Africa's most valuable hardwood trees, the iroko, is entirely dependent on this type of bat for pollination. Flying foxes feed on flowers, fruit, and nectar, flying from one plant to another and pollinating the plants as they go, much as bees do in other parts of the world. Because they are sloppy eaters, flying foxes drop fruit as they go, dispersing the seeds. They can travel great distances and convey pollen and seeds far from their origins, thereby maintaining the genetic biodiversity within a plant species.

Because of the importance of bats' role in pollination and seed distribution, scientists consider them a keystone in the ecosystems of tropical rain forests. Without bats, many bat-pollinated plants—and the animals that depend on them for food and shelter—would be threatened to the point of extinction. Areas outside the rain forests would be impacted as well, since the rain forests' lush vegetation replenishes the oxygen in the global atmosphere.

Unfortunately, many people are determined to get rid of bats. Flying foxes are at particular risk. In the wild, they feed on wild fruit, but when their rain forest habitat is reduced by conversion into farmland or residential areas, they occasionally raid cultivated fruit trees, spoiling the crops. Several flying fox species have been hunted to extinction, while others are seriously endangered.

Conservation groups and government agencies in many countries are attempting to change people's attitudes toward bats. When people learn that bats pollinate the trees and crops that provide their livelihood, they are more likely to appreciate and protect the bats in their area. There are also effective, non-harmful ways to deal with troublesome bats. Orchard owners can cover their trees with netting to discourage the bats, and there are humane methods for moving bats from places where they are not wanted. For the sake of the rain forests, and for life forms everywhere that depend on them, it is urgent that people apply a new twist to an old adage, and realize that ugliness is only skin deep.

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

- **A.** why plant species in the tropical rain forest are becoming endangered
- **B.** how the misunderstood bat benefits other life forms
- **C.** why rain forests are an important world resource
- **D.** how bats spread rabies and other diseases
- **E.** how bats pollinate tropical plants

28. What does the author intend to convey by the statement "ugliness is only skin deep" (line 70)?

- **F.** Some ugly animals eventually become beautiful.
- **G.** Bats are not really ugly.
- **H.** People shouldn't think that bats are harmful simply because they are ugly.
- **J.** People who find bats ugly do not believe that bats have an important environmental role.
- **K.** Beneficial animals are often considered ugly.

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29. Which of the following best describes animal species that function as a "keystone" (line 35)?

A. They are a major factor in disease prevention.
B. They are a food source for other animals.
C. They pollinate every plant species.
D. They are crucial in maintaining the balance of their ecosystem.
E. They generate the oxygen in the atmosphere.

30. What would be the most immediate result if flying foxes became extinct?

F. Other animal species would take their place.
G. Tropical rain forests would become free of disease.
H. Many animals would lose a food source.
J. Many tropical plants would have difficulty in reproduction.
K. The oxygen in the atmosphere would be quickly used up.

31. Why do flying foxes sometimes eat fruit from cultivated fruit trees?

A. They prefer eating cultivated fruit to wild fruit.
B. They are better able to spread pollen from cultivated fruit trees.
C. The number of wild fruit trees has decreased.
D. Cultivated fruit trees are completely dependent on bats for pollination.
E. Declining mosquito populations can no longer feed the bats.

32. What is the most likely reason that the author mentioned the iroko tree?

F. to provide an example of a useful plant that would die out without flying foxes
G. to demonstrate that there are alternate ways to pollinate tropical plants
H. to illustrate how rain forests supply oxygen to the atmosphere
J. to show what flying foxes will do when wild fruit trees are unavailable
K. to encourage farmers to cover their trees with netting

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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."

33. 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*

34. 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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35. 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.

36. 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 painful for him to confront 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.

37. 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 blamed her for quarreling with his boss.

38. 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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Anyone who has watched TV news coverage of a hurricane has seen how destructive wind energy can be. But the power of the wind can also be put to constructive use. From sailboats to old-fashioned windmills to the high-tech, modern wind machines called turbines, people have devised ways to harness wind energy for thousands of years.

The first known attempt to use wind power was the sailboat. Ancient shipbuilders understood how to use forces like lift and momentum, even if they could not explain those forces scientifically. The principles behind sailing led to the development of the windmill. The first known windmills originated in Persia, an area that is now Iran, as early as A.D. 500. They were created to help with the demanding chores of grinding grain and pumping water. By the tenth century, windmills were used throughout central Asia; they were used in China as early as the thirteenth century.

In Europe, windmills came into widespread use during the twelfth century. As in other parts of the world, they were used for milling grain and pumping water. Windmills replaced the water wheel, which was turned by the movement of running water over paddles mounted around a wheel. The windmill was more adaptable and efficient than the water wheel and quickly became popular. For example, Holland, famous for its windmills, used the machines to pump seawater away from low-lying coastal bogs. This allowed the Dutch to reclaim large areas of land from the sea. Windmills eventually became sophisticated enough for use in a broad range of work, from sawmills and drainage pumping to processing goods such as dyes, tobacco, cocoa, and spices.

In the 1700s, as steam engines gained in popularity, the use of wind machines for many types of work declined. However, windmills still played an essential role in pumping water on farms throughout the American West and Midwest. Between 1850 and 1970, over six million small windmills were installed on American farms for watering livestock and meeting other water needs. In many remote areas even today, livestock production would be impossible without the use of windmills to provide water.

Beginning in the late nineteenth century, windmills were adapted to generate electricity. During the 1930s and '40s, thin-bladed windmills provided electricity for hundreds of thousands of farms across the United States. By the 1950s, however, power lines connected almost every household in America to a central power source, such as a utility company. After that, there was little need for wind turbines until the energy crisis of the 1970s. At that time, interest in wind turbines was renewed due to rising energy costs and concern about the future availability of fossil fuels such as oil, coal, and natural gas. The last several decades have seen the development of "wind farms," clusters of wind turbines that generate electricity. Efficient, clean, and fairly inexpensive to operate, wind farms may prove to be as important in the future as earlier windmills were in the past.

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

A. the destructive power of wind energy
B. the ways people have harnessed wind power throughout history
C. reasons for developing wind farms to generate electricity
D. how windmills are used in the United States
E. the use of the windmill in the present day

40. Where were the first known windmills built?

F. Persia
G. North America
H. Europe
J. China
K. Holland

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41. Which of the following best expresses the author's opinion regarding the future use of wind energy?

A. Wind farms will someday be the only source of electricity in the United States.
B. Wind farms will not be successful in providing large amounts of electricity.
C. Wind farming will eventually be replaced by new energy sources.
D. Wind farms will become an important source of electricity in the United States.
E. Wind farming will become more expensive as more consumers switch to using it.

42. The adaptation of old-fashioned water-pumping windmills into wind turbines that generate electricity illustrates

F. that modern technology is no improvement over ancient technology.
G. the inability of people to generate a better idea.
H. how wind power has helped to reclaim land from the sea.
J. that water cannot be used to generate electricity.
K. the ability of people to think creatively.

43. Why were fewer American farms dependent on windmills for electrical power after the 1950s?

A. Windmills were not used for any purpose after that time.
B. The energy crisis had prompted interest in other fuel sources.
C. The energy crisis had stopped the development of wind turbines.
D. A centralized power system had connected almost all American homes.
E. Wind farms had replaced the need for individual windmills.

44. According to the passage, how did windmills aid the growth of the country of Holland?

F. Windmills helped Dutch shipbuilders use the forces of lift and momentum.
G. By pumping seawater out, the Dutch turned bogs into usable land.
H. Windmills made the country of Holland famous.
J. By pumping seawater, the Dutch flooded coastal bogs in order to improve ship travel.
K. In Holland, windmills led to the use of water wheels.

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Almost one hundred fifty years ago, Charles Darwin, the famous British naturalist, proposed a startling new theory about the cause of human emotions. Facial expressions, he argued, are more than the visible signs of an emotion; to some extent they actually cause the emotion. For example, a person's smile reflects a feeling of happiness, but it also helps to produce that feeling. The theory that facial expressions contributed to emotions was controversial and, at the time, impossible to prove. Eventually it lost favor, and for more than a century people's facial expressions were assumed to be the result, not the cause, of their feelings.

Theories change, however. Within the last few decades, psychologists have been investigating the notion that we can put smiles in our hearts by first putting them on our faces. In a research study, volunteers were asked to say words that placed their facial muscles into either smiles or frowns. The purpose of the task was not explained. After the experiment, the volunteers who said words like "cheese" were measurably happier than those who said words like "few."

To explain these results, the researchers theorized that there is a relationship between facial expressions and the temperature of the blood entering the brain. According to their theory, the muscle contractions produced by a facial expression raise or lower the temperature of the blood that flows through the person's face. The change in temperature is slight—less than one degree Celsius. The blood vessels in the face connect to the carotid artery, which leads to the hypothalamus, an area of the brain believed to regulate emotions. The researchers theorized that warmer blood, which is associated with frowning or scowling, leads to feelings of unhappiness. A smile, which is created by a different set of muscles, lowers the blood temperature and tends to produce a feeling of happiness.

In another study, volunteers were told exactly which facial muscles to contract. For example, volunteers were told, "Raise your eyebrows, open your eyes wide, tuck in your chin, and let your mouth relax" (the facial expression associated with fear). The volunteers were not told which emotion they were mimicking. As they produced the muscular movements of a particular emotional expression, they tended to experience that emotion. For example, while making a fearful expression, they reported feeling more fear than anger, sadness, or disgust.

Acceptance of the research relating emotions to facial expressions, especially the blood temperature theory, is far from universal. However, some psychologists hope that the phenomenon may be useful in treating mild depression. They do agree, though, that facial expressions are not the most important causes of emotion. Encouraging people to smile while they are mourning, for example, would do little to lessen their grief.

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

- **A.** the theory that facial expressions may contribute to emotions
- **B.** the role of the hypothalamus in experiencing emotions
- **C.** the use of facial expressions in a variety of scientific research
- **D.** the range of emotions felt by volunteers in experiments
- **E.** the potential uses of facial expressions in treating mild depression

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46. In the research study described in the second paragraph, after volunteers said words that placed their facial muscles into smiles, what did the researchers do?

- **F.** cooled down the blood entering the volunteers' brains
- **G.** asked the volunteers to say words like "few"
- **H.** explained the purpose of the study to the volunteers
- **J.** placed the volunteers' facial muscles into frowns
- **K.** determined how happy the volunteers felt

47. Why was Darwin's theory not accepted during his lifetime?

- **A.** Scientists could not think of a way to test his theory.
- **B.** Most scientists mistakenly believed that emotions were caused by thoughts.
- **C.** Scientists did not understand the function of the hypothalamus.
- **D.** Scientists did not study emotions until the twentieth century.
- **E.** Accurate measurement of blood temperature was not possible.

48. According to the theory described in lines 33-36, what effect might saying a word such as "cheese" have on a person?

- **F.** It makes a person's face appear to frown.
- **G.** It relaxes the blood vessels leading to the carotid artery.
- **H.** It may cool the blood flowing to the hypothalamus.
- **J.** It produces the facial expression associated with fear.
- **K.** It does not affect the speaker's mood.

49. What is the notion referred to in line 19?

- **A.** Smiling can make people feel happy.
- **B.** People who feel happy tend to smile.
- **C.** Psychologists can conduct research on emotions.
- **D.** Theories change over time.
- **E.** Certain words cause the speaker to smile or frown.

50. What do researchers believe about the hypothalamus?

- **F.** It prevents mild depression.
- **G.** It manages emotions.
- **H.** It regulates the temperature of blood.
- **J.** It causes negative emotions, such as fear, rather than positive emotions.
- **K.** It regulates the flow of blood to the brain.

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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. $8 \times 3\frac{1}{4} =$

A. $11\frac{1}{4}$

B. $24\frac{1}{4}$

C. $24\frac{1}{2}$

D. 25

E. 26

52. $100(2 + 0.1)^2 - 100 =$

F. 101
G. 141
H. 200
J. 301
K. 341

53. Carlos is picking colored pencils from a large bin that contains only 480 red pencils, 240 green pencils, and 160 blue pencils. Without looking, Carlos pulls out 22 pencils. If the pencils were distributed randomly in the bin, how many pencils of each color is it most likely that he picked?

A. 8 red, 7 green, 7 blue
B. 10 red, 7 green, 5 blue
C. 10 red, 8 green, 4 blue
D. 11 red, 6 green, 5 blue
E. 12 red, 6 green, 4 blue

CONTINUE ON TO THE NEXT PAGE ▶

54. If $\frac{a}{b} = 2$ and $a = 8$, what is the value of $3b + a^2$?

F. 28
G. 70
H. 76
J. 88
K. 112

55. $3.99 \div 1.5 =$

A. 0.266
B. 0.267
C. 2.0
D. 2.66
E. 2.67

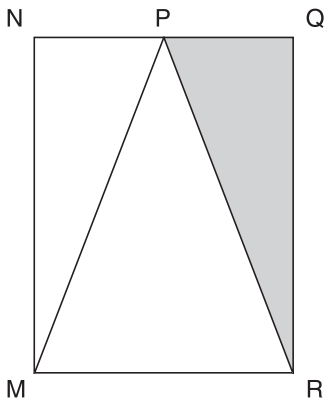
56. What time will it be 46 hours after 9:30 p.m. on Friday?

F. 7:30 p.m. Saturday
G. 7:30 a.m. Sunday
H. 6:30 p.m. Sunday
J. 7:30 p.m. Sunday
K. 9:30 p.m. Sunday

57. How many positive integers satisfy the inequality $x + 7 < 23$?

A. 15
B. 16
C. 17
D. 29
E. 30

58.



In the figure above, the base of $\triangle$MPR is a side of rectangle MNQR, and point P is the midpoint of $\overline{NQ}$. If the area of the shaded region is 24 square centimeters, what is the area of the region that is **not** shaded?

F. 24 sq cm
G. 48 sq cm
H. 64 sq cm
J. 72 sq cm
K. 96 sq cm

59. 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.)

A. 6
B. 7
C. 8
D. 9
E. 12

60. If x and y are positive integers such that $0.75 = \frac{x}{y}$, what is the **least** possible value for x?

F. 1
G. 3
H. 4
J. 25
K. 75

61.

SONGS PLAYED DURING ONE HOUR

Number of Songs	Number of Radio Stations
14	8
15	4
16	4
17	5
18	9

The table above shows the number of songs played during a specific hour by 30 different radio stations. What is the mean number of songs played during that hour by these stations?

A. 6
B. 8
C. 16.1
D. 16.5
E. 18

62.

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.)

F. \$28
G. \$52
H. \$182
J. \$282
K. \$988

63.

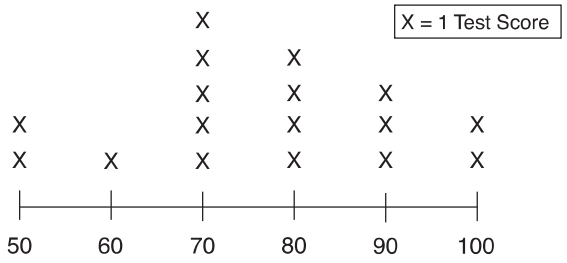
$$\begin{array}{r} -2 \\ 4 \\ -6 \\ 8 \\ . \\ . \\ -22 \\ +\ 24 \\ \hline \end{array}$$

If the missing terms in the problem above were filled in according to the pattern, what would be the sum of all the terms?

A. -6
B. 2
C. 6
D. 10
E. 12

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. Ms. Grant's car gets between 20 and 22 miles per gallon, inclusive. The gasoline she uses costs between \$4.20 and \$4.50 per gallon, inclusive. What is the **greatest** amount Ms. Grant will spend on gasoline to drive her car 200 miles?

A. \$37.27
B. \$40.90
C. \$42.00
D. \$45.00
E. \$99.00

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. $\frac{11}{3}, \frac{18}{5}, \frac{25}{7}$

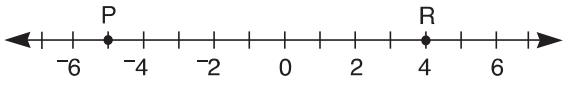
67.

Item	Quantity Puchased	Price Per Item
Rain Coat	1	$102.00
Slacks	2	$60.00
Shirt	2	$35.00

One state has a 6% sales tax on clothing items priced at $75 or higher, and no sales tax on clothing items priced under $75. What is the total tax on the items in the table above?

A. $6.12
B. $6.72
C. $13.32
D. $17.00
E. $203.12

68.



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 $\overline{PQ}$?

F. 2
G. 1
H. 0
J. -1
K. -2

69. 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

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. $4\frac{1}{2}$ ft, $5\frac{3}{4}$ ft, $4\frac{3}{4}$ ft, $6\frac{1}{4}$ ft, $5\frac{5}{8}$ ft

Jordan has 5 trees with the heights shown above. He plans to plant the trees in a row with the tallest tree in the middle, the next 2 shorter trees on either side, and the 2 shortest trees on either end of the row. How many different ways of ordering the 5 trees follow Jordan's plan?

A. 1
B. 2
C. 4
D. 6
E. 30

72. 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

73.

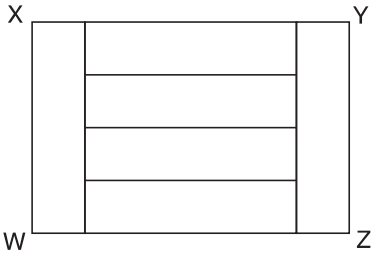


Figure WXYZ above is composed of 6 congruent rectangular panels. The area of figure WXYZ is 54 square centimeters. What is the perimeter of figure WXYZ in centimeters?

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

74. In the set of consecutive integers from 12 to 30, inclusive, there are 4 integers that are multiples of both 2 and 3. How many integers in the set are multiples of **neither** 2 nor 3?

F. 2
G. 5
H. 6
J. 13
K. 15

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. PEOPLE PER VEHICLE AT CHECKPOINT

Number of People in the Vehicle	Percent of Vehicles
1	40%
2	35%
3	15%
4	7%
5 or more	3%

A researcher recorded the number of people in each vehicle that passed through a checkpoint. The table above shows the percent distribution for the 420 vehicles that passed the checkpoint yesterday morning. How many of the 420 vehicles contained **at least** 3 people?

F. 42
G. 63
H. 105
J. 315
K. 378

77. For what value of z is $z - \frac{1}{3}z = 12$?

A. -18
B. 4
C. 8
D. 12
E. 18

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

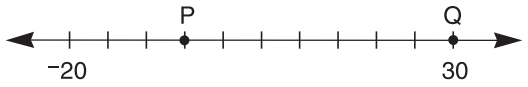
79. If Crystal multiplies her age by 3 and then adds 2, she will get a number equal to her mother's age. If m is her mother's age, what is Crystal's age in terms of m?

A. $-\frac{2}{3}m$
B. $\frac{m-2}{3}$
C. $3m + 2$
D. $\frac{m}{3} - 2$
E. $\frac{3}{m} - 2$

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

F. 0.075 g
G. 0.75 g
H. 7.5 g
J. 75 g
K. 7,500 g

81.



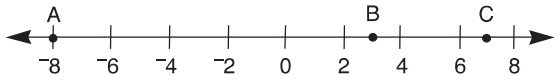
Points P and Q are points on the number line above, which is divided into equal sections. What is the value of PQ?

A. −5
B. 7
C. 30
D. 35
E. 50

82. If $r = 3q + 2$ and $q = \frac{1}{3^n}$ for $n = 1, 2$, or 3, what is the **least** possible value of ?

F. 1
G. $2\frac{1}{9}$
H. $2\frac{1}{3}$
J. 3
K. 5

83.



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 $\overline{DE}$?

A. −1.5
B. 1.25
C. 1.75
D. 2.25
E. 7.5

84. Let $N = -(|-3| - |-8| + |-4|)$. What is the value of $-|N|$?

F. −9
G. −4
H. −1
J. 1
K. 9

85. A video game originally priced at $44.50 was on sale for 10% off. Julian received a 20% employee discount applied to the sale price. How much did Julian pay for the video game? (Assume that there is no tax.)

A. $31.15
B. $32.04
C. $35.60
D. $40.05
E. $43.61

86. A radio station plays Samantha's favorite song 6 times each day at random times between 8:00 a.m. and 5:00 p.m. The song is 5 minutes long. If Samantha turns on the radio at a random time between 8:00 a.m. and 5:00 p.m., what is the probability that her favorite song will be playing at that time?

F. $\frac{1}{30}$
G. $\frac{1}{18}$
H. $\frac{1}{6}$
J. $\frac{1}{5}$
K. $\frac{1}{3}$

87. 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?

A. 55
B. 56
C. 57
D. 59
E. 66

CONTINUE ON TO THE NEXT PAGE ▶

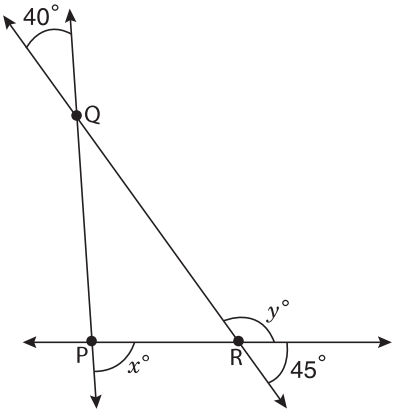
88. A cylindrical oil drum can hold 4,320 liters when it is completely full. Currently, the drum is $\frac{1}{3}$ full of oil. How many **kiloliters** (kL) of oil need to be added to fill the drum completely?

F. 1.44 kL
G. 2.88 kL
H. 4.32 kL
J. 14.40 kL
K. 28.80 kL

89. If x, y, and z are numbers such that $xy + xz = 100$, what is the value of $\frac{x}{5}(3y + 3z) + 10$?

A. $60 + 2x$
B. 62
C. 70
D. 130
E. $130 + 2x$

90.



The figure above shows three intersecting straight lines. What is the value of $y - x$?

F. 40
G. 50
H. 85
J. 95
K. 135

91. $(2p + 8) - (5 + 3p) =$

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

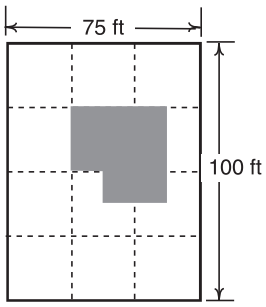
92. A recent survey asked students what pets they have. Based on the results, the following statements are all true:

23 students have dogs.
20 students have cats.
3 students have both dogs and cats.
5 students have no cats or dogs.

How many students were surveyed?

F. 40
G. 42
H. 45
J. 46
K. 51

93.



The drawing above represents a rectangular lot containing a building, indicated by the shaded region. The dashed lines divide the lot into twelve equal-sized squares. If the unshaded portion of the lot is to be paved, about how many square feet will be paved?

A. 4,000 sq ft
B. 5,000 sq ft
C. 6,000 sq ft
D. 7,000 sq ft
E. 8,000 sq ft

CONTINUE ON TO THE NEXT PAGE ▶

94. 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

95. Marta and Kim are sisters. Five years ago, Kim's age was twice as great as Marta's age. If Marta is now m years old, which expression represents Kim's age now?

A. $2m + 5$
B. $2m$
C. $2(m - 5)$
D. $2(m + 5) - 5$
E. $2(m - 5) + 5$

96. 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

97. One week the price of gasoline dropped by \$0.05 per gallon. Madison's car travels 27 miles each way to work, and her car travels 30 miles on each gallon of gasoline. What were her total savings, to the nearest cent, over the 5-day work week?

A. \$0.23
B. \$0.25
C. \$0.30
D. \$0.45
E. \$0.50

98. Nam worked on a job for 10 days. On each of the last 2 days, he worked 2 hours more than the mean number of hours he worked per day during the first 8 days. If he worked 69 hours in all, how many hours did he work during the last 2 days together?

F. 8.5
G. 10.5
H. 13.0
J. 15.0
K. 17.0

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

A. 17
B. 51
C. 119
D. 131
E. 153

100. {1, 2, 3, 4, 5, 6}

Company X wants to assign each employee a 3-digit ID number formed from digits in the set shown above. No digit may appear more than once in an ID number, and no two employees may be assigned the same ID number. What is the greatest total number of possible different ID numbers?

F. 20
G. 120
H. 180
J. 216
K. 720

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. ■

97. (**D**) Madison's car travels 27 miles one way to work, so it travels a total of 54 miles per day. In 5 days, it travels $5 \times 54 = 270$ miles. Her car travels 30 miles on each gallon of gas, so it uses $\frac{270}{30} = 9$ gallons of gas per week. To find the total savings, multiply the number of gallons by the savings per gallon: 9 gallons • \$0.05 = \$0.45

---

98. (**K**) Let x = the mean number of hours Nam worked per day during the first 8 days.

Then, $x + 2$ is the number of hours he worked on each of the last 2 days. Since he worked 69 total hours, set up the equation and solve for x:

$8x + 2(x + 2) = 69$
$10x + 4 = 69$
$10x = 65$
$x = 6.5$

Remember that x is the mean hours worked the first 8 days. The question asked for the number of hours Nam worked the **last** two days:

$2(x + 2) = 2(6.5 + 2) = 2(8.5) = 17.0$ hours

99. (**A**) First, find the prime factorization of 5,355:

$5{,}355 = 5 \bullet 1{,}071 = 5 \bullet 9 \bullet 119 = 3^2 \bullet 5 \bullet 7 \bullet 17$

The greatest prime factor is 17.

---

100. (**G**) Using the counting principle, the first digit has 6 possible values (1 through 6). The second digit then has 5 possible values, and the third digit has 4 possible values. So the total number of possible different ID numbers is $6 \times 5 \times 4 = 120$.

Answer Key for Sample Form B

Paragraph 1
S R T U Q

Paragraph 2
T S U R Q

Paragraph 3
R U Q T S

Paragraph 4
Q S R U T

Paragraph 5
Q U T S R

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