Student Handbook

For the Admissions Test for Thomas Jefferson High School for Science and Technology

Fairfax County Public Schools

PEARSON

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Test Description

The *Thomas Jefferson Admissions Test* assesses the knowledge and skills needed for success in a high school program for high-achieving students. These skills consist of the ability to comprehend English prose and construct a well-ordered English paragraph, the ability to think through a verbal problem and reach a reasoned conclusion, and problem-solving skills in mathematics. The test has two sections, Verbal and Mathematics.

Verbal section (45 questions)

Verbal reasoning is measured by 5 questions on ordering sentences to form a paragraph and 15 questions on logical reasoning. Reading comprehension is measured by five reading selections, each of which is followed by five questions that tap your ability to understand, analyze, and interpret what you have read. You should not spend more than 60 minutes on this section.

Mathematics section (50 questions)

Mathematical reasoning is measured by both word problems and computation questions. The formulas needed are given in the test booklet. The time allotted for this section is 60 minutes.

If you have time remaining after finishing the Mathematics section, you can return to the Verbal section.

TEST MATERIALS

For each student, the school will provide the following for the *Thomas Jefferson Admissions Test*:

- a test booklet.
- an answer sheet.
- scratch paper for use in solving logical reasoning and mathematics problems.

Students must bring the following to the testing session for the *Thomas Jefferson Admissions Test*:

- three sharpened number 2 pencils with erasers. (Ballpoint pens or felt-tip markers cannot be used on the answer sheet for the *Thomas Jefferson Admissions Test*.)
- extra eraser (optional).
- a watch to keep track of your time (optional, but with no alarm, calculator, or memory features).
- the Test Information Newsletter containing your student I.D. number.

Do NOT bring:

- calculators, calculator watches, or other computation aids.
- dictionaries or other study aids.
- electronic devices of any kind.
- highlighters, correction fluid, correction tape, self-stick notes, or page flags.
- personal scratch paper.

Students are **NOT** allowed to have cell phones at test sites.

Use of electronic devices or any other unapproved materials may result in disqualification of the applicant.

SCORING

There is only one correct answer to each question. If your answer sheet shows more than one mark in response to a question, that question will be scored as incorrect. Your score will be based on the number of correct answers marked. There is no penalty for guessing. If you're not sure of an answer, mark your best guess.

The test scores will be reported to the Thomas Jefferson Admissions Office for use in the selection process. When the admissions process is complete, scores will be sent to each applicant.

If you are sick and cannot take the test at the scheduled time, follow the instructions in your Test Information Newsletter to receive make-up testing information.

Study Guide

The *Thomas Jefferson Admissions Test* is a difficult test and there are no tricks to attaining a high score. Keeping up with your schoolwork throughout the year is the best possible preparation. Because the test measures knowledge and skills that you have gained over the years, cramming usually is not very effective. In fact, cramming may be counterproductive if it increases your anxiety or keeps you from getting enough rest before the test.

The best way to improve your verbal skills is to read widely. This way, you will acquire a large vocabulary and improve your comprehension naturally. While reading a book or an article, ask yourself these questions: What is the main point? What can I deduce from this? Why does the author use certain words?

To improve your math skills, you must do a lot of mathematical problems over a period of time. A good approach is to choose a mathematics textbook and work your way through it. Do both routine and difficult problems. Routine problems teach you basic mathematical facts. More challenging problems will help you understand the concepts. Don't limit yourself to problems that test only what you have learned in class. Whenever possible, go beyond what you have learned and try new types of problems.

TEST PREP

- Commercial test preparation books that supposedly help students improve their scores are not going to help much, but knowing what to expect on the test may be beneficial. **This handbook describes each part of the test and includes a sample test (pp. 16-41), answer key (p. 55), and explanations of correct answers (pp. 42-54).**
- **The sample test shows you the types of questions** that will appear on the test. It will also give you an idea of the verbal and mathematical ability required for this test.
- When taking the sample test, it may be helpful to **simulate the actual testing situation**. Find a quiet place with a clear working area, adequate light, a piece of scratch paper, and a comfortable chair. Clear any books or papers from the table.
- When you have completed the sample test, **check your answers** against the correct answers on page 55. Then check the kinds of mistakes you may have made. Did you read too quickly and misunderstand the question? Did you make computational errors? Did you choose answers that were partially correct, but were not the **best** answers? Were many of your wrong answers guesses?

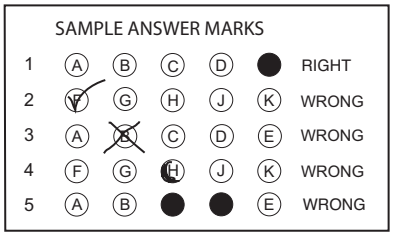
ON THE DAY OF THE TEST

Here are some common-sense suggestions for taking the *Thomas Jefferson Admissions Test*:

- **Rest well the night before** and eat a good breakfast on the day of the test. Plan to arrive when the test site opens to have time to get settled before the test begins. Dress appropriately in comfortable clothes. The environmental conditions at test sites can vary greatly. Bring only the testing supplies listed in your Applicant Newsletter to the test site. Make sure that you have several sharpened number 2 pencils and that your erasers erase cleanly without leaving smudges.
- It's normal to feel nervous, but **try not to be anxious** or allow yourself to "freeze." Taking deep breaths and closing your eyes may help you to relax and stay calm.
- **You have two hours to complete the test.** How you allot the time between the Verbal and Mathematics sections is up to you. You may start on either section. It is recommended that you do not spend more than 60 minutes on each section. You can return to one section if you have time remaining after finishing the other section.
- **Plan your time.** Be aware of the total number of questions and the amount of time you have to complete the test. Work carefully, but move along at a comfortable pace and keep track of the time. Don't spend all your time on either the math or verbal section.
- **Read the instructions carefully.** Be sure you understand what to do before marking your answer sheet. For each question, read all the choices before choosing one. Many questions ask for the **best** answer; it is important to compare all the choices to determine which answer is the **best**.

- **Mark your answers carefully**. On a multiple-choice test, it is possible to lose credit by marking the wrong answer circle, or marking the answers to two questions on the same line. When marking answers, make sure the number on the answer sheet matches the number of the question in the test booklet. The answer choices are coded A, B, C, D, E, or F, G, H, J, K in alternate questions to help you keep track of your place on the answer sheet.

- Mark your answers by **completely filling in the appropriate circle** (see example). Make your marks heavy and dark. Be careful not to make any stray marks on the answer sheet. If you change an answer, erase your first answer completely. Do not fold or tear the answer sheet.



- **Don't worry** if you can't answer every question or if you run out of time. No one is expected to know all the answers! In general, the easier questions are at the beginning of each section. When you reach a question that seems especially difficult, don't spend too much time on it, and don't be discouraged. You may go back to work on difficult questions if you have time after finishing the test. Remember, just do your best.

- If you finish before time is up, **review your work** to make sure that you followed instructions, did not skip any question by accident, and did not make any careless mistakes. If you have time, reread the questions and answers a second time. If you want to change answers that you considered carefully the first time, rethink the question and answer choices again before making any changes. Finally, go back to questions that you skipped and try to answer them.

- **Your score will be based on the number of correct answers that you marked.** There is no penalty for a wrong answer.

- Remember, there is **no penalty for guessing.** When the time limit is almost up, look at your answer sheet one more time. If you have left some answers blank, feel free to mark them at that time. If you decide to guess, do it only after marking all the answers you believe are correct.

- **Be considerate of others.** Don't make noises or movements that might be distracting to the students seated around you.

Answers must be recorded on the answer sheet to be counted. Answers left in the test booklet or on scratch paper will not be counted.

SCRAMBLED PARAGRAPHS

The scrambled paragraph portion of the test measures your ability to organize written material according to the sequence of ideas and/or cues provided by transitional words and phrases. There are five paragraphs, each consisting of six sentences. The first sentence is provided, with the remaining five presented in random order. You are to arrange the sentences in the author's original order using cues contained in the sentences. Only one arrangement of each set of sentences will form a well-organized, cohesive, grammatically correct paragraph. **Each correctly ordered paragraph is worth double the value of a question in any other section of the test.**

The sentences contain words and phrases that help to identify the flow of ideas from one sentence to the next, perhaps describing a procedure or tracing a historical event. The sentences may also provide grammatical cues as to how to construct the paragraph. For example, the pronoun "she" may refer to someone mentioned in a previous sentence. Transitional words such as "although" and "however" also provide cues about how the sentences relate to one another.

As you put the sentences in order, it may help to write the correct position of each sentence in the blank to the left. For example, write "2" next to the sentence that you think follows the first sentence, write "3" next to the sentence you think follows "2", and so on.

Read Example 1. After reading all the sentences, you should have an idea of what the paragraph is about. Now go back to the given sentence and determine which sentence should come next. The next sentence is S because it contains a transitional word ("however") and a substitute for "banjo" ("stringed instrument"). Write "2" in the blank before S. S also contains a reference to stringed instruments in Arab countries, and Arab traders are mentioned in T, so T follows S. Write "3" before T. U begins with "at any rate," a transition that moves the story along, and ends with the arrival of the banjo in North America, so U follows T. Write "4" before U. Q refers to "our continent," which is North America, so Q follows U. Write "5" before Q. The final sentence, R, describes the changes mentioned in Q, so it is a logical concluding sentence. Write "6" before R.

Now write out the letters of the sentences in order—STUQR—and then read the sentences in this order to see if they form a coherent, grammatically correct paragraph. If they do not, ask yourself why. For example, suppose you ordered the sentences SQRTU. When read in this order, the paragraph seems to hang in mid-air after the end of U, indicating that it may not be correct. Go back to see whether a sentence should come after U. Q is that sentence, for the reasons given above. Change the numbers to reflect your new order.

Five sentences are not very many with which to create a well-organized paragraph that can stand alone, without the context that a longer work provides. Thus, the position of each sentence within a relatively short paragraph is very important. When a paragraph is factual and explanatory in nature, as this one is, a good writer presents ideas, facts, definitions, and relationships in a precise and orderly way.

Note that the correct ordering depends on the logical sequence of ideas **and/or** the grammatical cues provided by transitional words or phrases. A strict chronological ordering is incorrect if the grammatical cues are ignored. Base your ordering **only** on the information provided. Assume that the paragraph stands alone and is not part of a larger work.

Some sentence orders may be partially correct, with two or more sentences in proper order. Unless all five sentences are ordered correctly, however, the ordering is incorrect. **No credit is given for partially correct responses.**

Example 1

No one knows when or where the first banjo was created.

5 **Q.** Once on our continent, it has undergone many changes and appeared in various forms.

6 **R.** For example, the number of banjo strings has varied between two and five, with five strings being standard today.

2 **S.** However, similar stringed instruments have been played in Indian and Arab countries for thousands of years.

3 **T.** Arab traders may have brought the instrument from Asia to the west coast of Africa.

4 **U.** At any rate, in the eighteenth century, the banjo arrived in North America, along with enslaved Africans.

Example 1

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

LOGICAL REASONING

This section, consisting of 15 questions, assesses your ability to reason logically, using the information given. You must guard against jumping to conclusions that are not warranted **from the information given.** There are different types of questions: figuring out codes, determining the relative positions of people or things, identifying correct assumptions, and drawing valid conclusions.

The most important strategy for answering logical reasoning questions is to read the information carefully. Certain words must be read with caution. For example, the phrase *between the cars* doesn't necessarily mean *between and right next to the cars*; something else may be between the cars as well. The same sort of caution should be applied to such words as *above, below, before,* and *after*.

Another good strategy is to look for information that is definitely stated, such as, "The red box is the largest," or "Jane is not standing next to Erik." This information makes it easier to determine the relationships between the boxes or the people.

Example 2

Maria was born in California. She went to schools in Massachusetts, Connecticut, and New York. After college, she married and moved to New Jersey.

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

A. Maria did not like her school in Massachusetts.
B. From Connecticut, Maria moved to New Jersey.
C. Maria went to college in New York.
D. Part of Maria's adult life was spent in New Jersey.
E. Maria moved to New Jersey because she was married.

What do we know for sure? We know that Maria was born in California, has lived in at least five states, was past college age when she married, and moved to New Jersey after she was married. We do not know why she moved, and we can't be sure of the exact order of the moves she made before moving to New Jersey, or whether she had lived somewhere other than the five states mentioned.

The only option that **must** be true from what we know is Option D, since Maria was married when she was past college age, which is a reasonable definition of "adult," and she lived in New Jersey after she married. Since we don't know anything about Maria's motives, Options A and E cannot be defended as valid. Options B and C are possible, but are not supported by the information given.

Example 3

In the code below, (1) each letter always represents the same word, (2) each word is represented by only one letter, and (3) in any given sentence, the letters may or may not be presented in the same order as the words.

R	J	K	B	L	means
"Tony	wants	to	meet	Shanika."	
M	R	C	B	K	means
"Bao-yu	wants	to	meet	Michael."	
B	R	D	K	Z	means
"Anjel	wants	to	meet	Kim."	
K	J	Y	R	B	means
"Imani	wants	to	meet	Tony."	

Which letter represents the word "Tony"?

F. R
G. J
H. Z
J. L
K. Cannot be determined from the information given.

When the question involves a code, don't try to solve for all parts of the code, because that is usually too time-consuming. Solve only the parts that relate to the question.

Start by ruling out the letters that mean "wants to meet," since they appear in all four sentences. After checking each sentence, we can determine that "wants to meet" is represented by the letters R, K, and B. (We don't know which word corresponds to each letter, but it doesn't matter. We're interested only in solving for the word "Tony.") Then we can go back to the first and fourth sentences, the only sentences that contain the word "Tony," and eliminate those three letters from consideration. The remaining letters are J, L, and Y. Only one letter, J, appears in both sentences, as does the word "Tony." Thus we can conclude that J means "Tony."

At times, drawing a chart may help you visualize how the parts of the problem are related. Here is an example in which this strategy will be helpful.

Examples 4 and 5

There are five bookshelves on the wall. The bottom shelf is Shelf 1; the top shelf is Shelf 5. Each shelf is filled with books of one color.

1) The red books are above the green books.
2) The yellow books are below the blue books.
3) The orange books are between the red books and the yellow books.
4) The yellow books are on Shelf 2.

4. What color are the books on Shelf 1?
- **A.** red
- **B.** green
- **C.** blue
- **D.** orange
- **E.** Cannot be determined from the information given.

5. What color are the books on Shelf 5?
- **F.** red
- **G.** green
- **H.** blue
- **J.** orange
- **K.** Cannot be determined from the information given.

First draw the five shelves and number them as described. Then look for information that is definite rather than relative. The only such information is in statement 4, that the yellow books are on Shelf 2. The other statements describe the relative positions of the various books.

To solve Example 4, note that the yellow books are below the blue books (statement 2). From statement 3, we know that (1) the red and orange books are both above the yellow books, or (2) both are below the yellow books. The yellow books are on Shelf 2, and there is only one shelf below them. So the red and orange books cannot be below the yellow books. That leaves only the green books for Shelf 1, so the correct answer is B.

To do Example 5, note that the orange, red, and blue books must occupy Shelves 3, 4, and 5. Statement 3 tells us that the orange books are below the red books. We do not have any further information that will allow us to determine the exact positions of the orange, red, and blue books. We know only that the red or blue books are on Shelf 5, so the correct answer is K.

When solving problems like these, it is important not to think that you have answered the question by coming up with an arrangement that satisfies the conditions. For example, the following arrangement satisfies all conditions in statements 1-4:

SHELF	COLOR OF BOOK
5	blue
4	red
3	orange
2	yellow
1	green

However, it is a mistake to pick "blue" as the answer to Example 5, because it is not the only arrangement that satisfies the conditions. Based on the information given, other arrangements are possible.

READING

The purpose of this section is to measure your ability to read and comprehend English prose. There are five reading passages with five questions each. Each passage is about 350 to 450 words long. The subjects include short biographies, discussions of historical events, descriptions of scientific phenomena, brief essays on art or music, and human interest stories.

One question will always assess your understanding of the main idea of the passage. Other questions will ask about factual details and inferences that can be drawn from the information given.

You may want to read the questions before the passage in order to focus your reading, **but do not attempt to answer the questions without reading the passage.** It is also unwise to skim the passage instead of reading it carefully; you are likely to make inaccurate assumptions if you base them on only a few words or a short phrase. Often the correct answer requires combining information from different parts of the passage.

Read each question and try to answer it before reading the choices. If none of the five choices seems to match your answer, read the question again to make certain you understood it. You may reread the passage if you wish. Since you know that there will always be a question asking what the passage is about, try to have the answer in mind by the time you have finished reading the passage.

Be wary of choices that are too broad or too narrow. Ask yourself whether the question requires you to draw a conclusion or inference, or simply to identify a restatement of the facts.

When answering a question, do not rely on information outside of that presented in the passage. You will be given enough information to arrive at the correct answer. As the directions say: "Base your answers only on what you have read in the passage."

A sample reading passage is on page 9.

Example 6

In selecting the best answer, look for a generalization about the passage that is broad yet inclusive, and incorporates most of the details. Options A and D are too specific; they are only a part of the general theme. On the other hand, Option E is too broad; the passage is only about kiwifruit. Option B is not discussed at all. Option C is best because the passage emphasizes the kiwifruit's tastiness and good nutrition.

Example 7

Although all the dates in the answer choices are mentioned in the passage, the correct answer, G, is found in lines 21-22.

Example 8

"Imply" in this question means that you must look for information in the passage to support an inference, or an idea not directly stated. Note that the question is limited to the earliest kiwifruit, which is discussed in the second paragraph. Option A might appear correct, but the "tastier" varieties (line 19) developed later suggest that the first fruits were at least edible. Option B can be eliminated, since nothing is said about improved nutritional value, and the kiwi always did have nutritional value. Option C is incorrect because the kiwifruit seeds came to New Zealand from China, and there is no mention of sales to China. Option E is incorrect because the passage states that kiwifruit is tastier today (lines 18-19). Option D is supported by the statement that New Zealanders valued the vine for its ornamental qualities as well as a source of food (lines 14-16).

Example 9

This question asks you to judge the author's viewpoint based on statements made in the passage. Option F may be eliminated since it contradicts the author's evidence of the growing popularity and positive attributes of the fruit.

The author might agree with Option G, but the passage contains no hint of such an extreme viewpoint. The passage says that the kiwifruit has gained popularity around the world (lines 5-6), but it never claims that it will become the most popular fruit in the world. Option H can be ruled out because the kiwifruit has been available outside of New Zealand for many years. Although advertising is mentioned in the passage, there is no suggestion that the success of the kiwifruit was created by advertising hype, as suggested by Option J. In fact, lines 4-7 give the fruit full credit for its own success. The viewpoint presented in Option K is supported by statements in the fourth paragraph.

Example 10

This question asks for a conclusion inferred from the facts in the passage. Option B is accurate regarding kiwifruit, but the passage gives no information about the breeding of the kiwi bird. Option C is incorrect because there is no evidence for it in the passage. Although kiwifruit came from China, no information about the origin of the kiwi bird is provided, eliminating Option D. The kiwi bird is not described as beautiful, nor is the kiwifruit (just the vines), so Option E may be eliminated. Option A is correct, based on lines 1 and 12-14.

Examples 6-10

What looks like a large, fuzzy brown egg, has more vitamins and minerals than an orange, and is named for a flightless bird? It is the kiwifruit, the leading commercial crop of New Zealand. The tough-skinned kiwifruit has gained popularity around the world because of its sweet taste and high nutritional value.

Kiwifruit seeds were brought to New Zealand from China in 1904. Originally called the Chinese gooseberry, the kiwifruit got its present name in an advertising campaign in the 1950s that compared the appearance of the fruit to the kiwi, a round-bodied, flightless New Zealand bird with short, hairlike feathers. The first kiwifruit vines in New Zealand were prized as much for their beauty as for their fruit. They produced small, hard berries quite different from the soft, plum-sized kiwifruit of today. New Zealand gardeners gradually developed bigger and tastier domestic varieties through careful breeding of their best plants, and kiwifruit became a commercial crop in the 1930s. New Zealand currently exports over one billion of them annually.

The kiwifruit is the only fruit in the world that, when ripe, has bright green flesh. Its flavor has been described as a combination of strawberry, banana, melon, and pineapple. Besides tasting good, it is an extremely healthful food. It contains more iron, magnesium, phosphorus, potassium, vitamin C, and riboflavin than an equal serving of apples, oranges, or peaches. The kiwifruit is high in fiber and contains neither sodium nor cholesterol. Its juice even makes an excellent meat tenderizer.

The kiwifruit has been grown in the United States for over fifty years, but it became well known here only in the early 1960s. Not until about 1980 could it be regularly found in grocery stores. Today, although New Zealand produces over two-thirds of the crop in the world, the United States, Italy, France, and Japan are all becoming major kiwifruit producers.

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

A. how the kiwifruit came to New Zealand
B. whether the kiwifruit will replace the orange
C. the tasty and nutritious kiwifruit
D. how the kiwifruit was developed
E. the fruits of New Zealand

7. When did the kiwifruit first become a commercial crop?

F. 1904
G. the 1930s
H. the 1950s
J. the early 1960s
K. about 1980

8. What does the passage imply about the earliest kiwifruit grown in New Zealand?

A. It was thought to be inedible.
B. It had almost no nutritional value.
C. Most of it was sold to the Chinese.
D. Most people did not realize its commercial potential.
E. Though smaller, it tasted better than the kiwifruit of today.

9. Which of the following statements about the popularity of the kiwifruit would the author most likely agree with?

F. The kiwifruit is just a fad and other fruits will probably replace it.
G. The kiwifruit will become the most popular fruit in the world.
H. The kiwifruit would become more popular if it were available outside of New Zealand.
J. The success of the kiwifruit is due primarily to clever advertising.
K. The popularity of the kiwifruit is likely to keep increasing.

10. What do the kiwifruit and the kiwi bird have in common?

A. Both are round with a fuzzy exterior.
B. Both were bred to grow larger.
C. Both are the same size.
D. Both originated in China.
E. Both are valued for their beauty.

MATHEMATICS

This portion of the test includes arithmetic, algebra, probability, statistics, and geometry. All mathematics problems are based on materials covered in a widely used Grade 7 curriculum, but the curriculum is just an outline. Knowing how to respond to novel situations creatively is an important indication of mathematical ability. Since one purpose of this test is to identify students who will benefit from a specialized high school, there will be many such questions on the test.

Some problems will require you to apply various formulas. Although many formulas (for example, the area of a triangle or the circumference of a circle) will be provided in the test booklet, you will not be told what the formulas mean or how to use them. Therefore, it is important that you be familiar with them. The test booklet also includes information about drawings and definitions of symbols and other mathematical abbreviations.

Here are some tips for taking the Mathematics section of the test:

- Read each problem carefully and work out the answer on the scratch paper provided or in your test booklet. Most problems should be solved by working out the answer. It is more efficient to do this than to try out the options to see which one seems to fit the question.
- **You may write in your test booklet, but be sure not to write on your answer sheet.**
- If the question is a word problem, it is often helpful to **express it as an equation**. When you get an answer, look at the answer choices. If your answer is included among the choices, mark it. If not, reread the question and try again. Remember, the incorrect choices are often answers you would get if you misread the question or made common computational errors. For this reason, it is unwise to solve a problem in your head while looking at the answer choices. It is too easy to choose a wrong answer before you do the computation required.
- You may draw figures or diagrams for questions that do not have them.
- Some questions ask you to combine a series of simple steps. **Take one step at a time**, using what you know and what the question tells you to do.

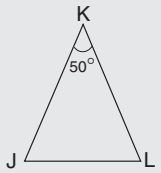
Example 11

Heather flew her plane at an average speed of 310 kilometers per hour for $4\frac{1}{2}$ hours. About how far did she travel?

A. 300 km
B. 500 km
C. 1,500 km
D. 3,000 km
E. 4,500 km

You can multiply 310 by $4\frac{1}{2}$ to arrive at an answer of 1,395 kilometers. However, since the problem asks for an estimate ("about how far"), you can round 310 to 300 and multiply 300 by 4.5 to get 1,350. Now look at the answer choices. We rounded 310 down to 300. So the correct answer should be slightly larger than 1,350. Option C is correct.

Example 12



In triangle JKL, JK = KL. What is the measure of angle J?

F. 45°
G. 50°
H. 65°
J. 75°
K. 130°

To answer this question, you must know that the sum of the interior angles of a triangle is 180°. Since JK = KL, triangle JKL is an isosceles triangle. Therefore the measures of angle J and angle L are equal. Let $x°$ be the measure of angle J and angle L. Then:

$$2x + 50 = 180$$
$$2x = 130$$
$$x = 65$$

Example 13

If $\frac{2m - 3}{9} = 7$, what is the value of m?

A. 2
B. 8
C. 10
D. 30
E. 33

$$\frac{2m - 3}{9} = 7$$
$$2m - 3 = 7 \bullet 9 = 63$$
$$2m = 66$$
$$m = 33$$

Example 14

What is the smallest positive odd integer that is **not** immediately adjacent to an integer power of 2?

F. 1
G. 3
H. 5
J. 11
K. There is no such number.

Start by listing the positive powers of 2:

$$2^1 = 2$$
$$2^2 = 4$$
$$2^3 = 8$$
$$2^4 = 16$$
$$2^5 = 32$$

The question asks for the smallest positive odd integer that is **not** immediately adjacent to one of the quantities on the right-hand side of the equations above. Start with 1. It cannot be the right answer, since it is immediately adjacent to 2. The next several positive odd integers—3, 5, 7, and 9—are ruled out because they are immediately adjacent to 2, 4, 8, and 8, respectively. The smallest positive odd integer that meets the requirements is 11. It is between 8 and 16, but not immediately adjacent to either.

Taking the Sample Test

Now you are ready to take the sample test. Begin by carefully reading the Directions on pages 12 and 13 and filling out side 1 of the answer sheet on page 14. Use side 2 of the answer sheet (page 15) to record your answers.

The Answer Key is provided on page 55.
Explanations of the correct answers begin on page 42.

Last Name_____ First Name_____ **A**

SPECIALIZED HIGH SCHOOL ADMISSIONS TEST

2012-2013 Edition

GENERAL DIRECTIONS

Identifying Information

Write your name, last name first, on the lines at the top of the test booklet.

Turn to side 1 of the answer sheet. **Line 1** says, "I am well enough to take this test and complete it." If you do not feel well enough to continue, notify the test administrator and do not sign the statement. Otherwise, sign your name in the space above the word "signature." Do not print your name.

On **Line 2,** print the name of the school you currently attend, followed by its city and state. On **Line 3,** print today's date.

In **Grid 4,** print your LAST NAME, or as much as will fit, in the boxes. Then print your FIRST NAME, or as much as will fit, in the boxes. (Do not use nicknames.) Print your middle initial in the box labeled M.I. Then, below each box, fill in the circle that contains the same letter as the box. If there is a space in your name, or a hyphen or apostrophe, fill in the circle under the space, hyphen, or apostrophe. It is not necessary to fill in the blank circles under empty boxes at the end of your first or last name.

Make dark marks that completely fill the circles. If you need to change a mark, be sure to erase the first mark completely.

In **Grid 5**, TEST BOOKLET LETTER AND NUMBER, copy the letter and numbers shown in the upper right corner of your test booklet. Below each box, fill in the circle containing the same letter or number as the box.

In **Grid 6**, print your I.D. number in the boxes marked STUDENT I.D. NUMBER. If your I.D. number has six digits, place a zero in the first box and write your I.D. number in the remaining six boxes. If your I.D. number has seven digits, write one digit in each box. If your I.D. number begins with an A, write A in the first box and write one digit in each of the remaining boxes. Copy the I.D. number from your newsletter or from the scratch paper where you wrote it. Then fill in the circle for each number (or the letter A) below each box. Check your work to make sure you copied your I.D. number correctly and that the circles are marked correctly.

Grid 7 is for your date of birth. Print the first three letters of the month in the first box, the number of the day in the next box, and the last two digits of the year in the last box. For example, a birth date of July 4, 1998, would be printed JUL 4 98. Fill in the corresponding circles.

In **Grid 8**, fill in the circle that identifies your gender.

Now check to make sure you have completed the entire side 1 of the answer sheet correctly. Inspect each column to see that the filled-in circles correspond to the letters or numbers in the boxes above them. Incorrect marks may delay the scoring of your answer sheet.

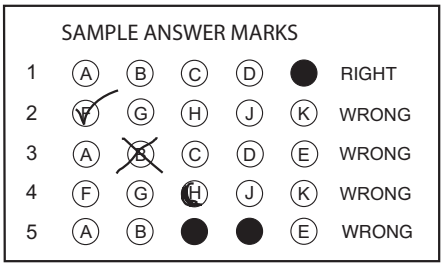
Next, **without breaking the seal on your test booklet,** check the bottom of each page within the booklet to make sure that the pages are numbered consecutively. The numbers are located in the middle of the bottom of each page. Page 1 is the front cover and is not numbered. The numbers begin with page 2 and end with page 30. The back cover is not numbered.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO ■

TURN YOUR BOOKLET OVER TO THE BACK COVER ■

Marking Your Answers

Be sure to mark your answer in the row of answer circles corresponding to the question number printed in the test booklet. Use a number 2 pencil. If you change an answer, erase it completely. See the example of correct and incorrect answer marks below.



Each question has only one correct answer. If you mark more than one circle in any answer row, that question will be scored as incorrect.

You may write in your test booklet or on your scratch paper to solve verbal and mathematical problems, **but your answers must be recorded on the answer sheet in order to be counted.** Be careful to avoid making any stray pencil marks on your answer sheet.

Select the **best** answer for each question. Your score will be the number of questions answered correctly. It is to your advantage to answer every question even though you may not be certain which choice is correct. There is no penalty for an incorrect answer.

Planning Your Time

You have two hours to complete the entire test. How you allot the time between the Verbal and Mathematics sections is up to you. If you begin with the Verbal section, you may go on to the Mathematics section as soon as you are ready. Likewise, if you begin with the Mathematics section, you may go on to the Verbal section as soon as you are ready. It is recommended that you do not spend more than 60 minutes on either section. An announcement will be made after 60 minutes so that you will know that half the testing time has elapsed. If you complete the test before two hours are over, you may go back to review questions in either section.

Work as rapidly as you can without making mistakes. Don't spend too much time on a difficult question. Come back to it later if you have time.

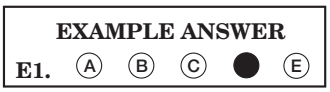
Remember to read all directions carefully. Now read the question below.

Example 1

DIRECTIONS: Solve the problem. Find the **best** answer among the answer choices given.

E1. If four ice cream cones cost $2.00, how much will three ice cream cones cost?

A. $0.50
B. $1.00
C. $1.25
D. $1.50
E. $1.75



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PEARSON

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SPECIALIZED HIGH SCHOOL ADMISSIONS TEST

SIDE 1

1. **STUDENT STATEMENT: I am well enough to take this test and complete it.** _____
   Signature

2. **SCHOOL NOW ATTENDING** _____
   Name City State

3. **DATE** ____ / ____ / ____
   Month Day Year

USE ONLY A NUMBER 2 PENCIL TO MARK YOUR ANSWER SHEET.

4. LAST NAME (PLEASE PRINT)

FIRST NAME (PLEASE PRINT)

M.I.

5. TEST BOOKLET LETTER AND NUMBER

6. STUDENT I.D. NUMBER

7. BIRTH DATE

MONTH	DAY	YEAR
JAN	1 11 21	96
FEB	2 12 22	97
MAR	3 13 23	98
APR	4 14 24	99
MAY	5 15 25	00
JUN	6 16 26	01
JUL	7 17 27	02
AUG	8 18 28	
SEP	9 19 29	
OCT	10 20 30	
NOV	31	
DEC		

8. GENDER

○ Female ○ Male

NOTE TO THE STUDENT:
Make sure that all information on this page is correctly marked. Incorrect marks or missing information may delay the scoring of your answer sheet.

Fill each circle completely with a dark, heavy mark. Use only a number 2 pencil.

SIDE 2

SPECIALIZED HIGH SCHOOL ADMISSIONS TEST

TOTAL TIME 2 HOURS

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
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

READING

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
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

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PART 1 — VERBAL

Suggested Time — 60 Minutes

45 QUESTIONS

SCRAMBLED PARAGRAPHS

PARAGRAPHS 1-5

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

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

Paragraph 1

Scientists have long known that chimpanzees have the ability to invent and use tools for the purpose of gathering and preparing food.

_____ **Q.** However, more recently researchers have observed a Tanzanian mountain chimpanzee demonstrate that chimps are also capable of inventing tools for other purposes.

_____ **R.** The afflicted Kalunde suffered from a hacking cough and severely congested nasal passages.

_____ **S.** This congestion forced Kalunde to breathe through his mouth, so he needed to clear his nasal passages in order to eat.

_____ **T.** On four separate occasions, researchers observed Kalunde accomplish this goal by inserting a twig or plant stem into his nose, thus stimulating his reflex to sneeze.

_____ **U.** These researchers were studying Kalunde, who, like many other chimps in his group, had a case of the dry-season flu.

CONTINUE ON TO THE NEXT PAGE ▶

Paragraph 2

The spirit of the American Revolutionary War is apparent in the songs that were sung during that war.

_____ **Q.** Tradition has it that the American army band even played "Yankee Doodle" to the surrendering British at Yorktown in 1781.

_____ **R.** Another American original, "Chester," written by William Billings during the Revolution, was sung around many campfires by American troops.

_____ **S.** The first American patriotic ballad, "The Liberty Song," was published in 1768, well before the Revolution began.

_____ **T.** The Americans liked the song, however, and later in the Revolutionary War, took it for their own.

_____ **U.** Unlike those two, the song "Yankee Doodle," also popular during the Revolution, had first been sung by the British in mockery of the colonial troops during the French and Indian War.

Paragraph 3

Jules Verne wrote about travel to the moon more than 100 years ago, but he was not the first writer to do so.

_____ **Q.** Three hundred years before Verne, Johannes Kepler, probably the first scientist to recognize that the atmosphere of the Earth gave out before reaching the moon, wrote about an imaginary trip there.

_____ **R.** Thus, while Jules Verne is credited with writing the first "realistic" science fiction, it is clear that space travel has haunted people's imaginations for centuries.

_____ **S.** Even earlier, in A.D. 1010, a Persian poet described a trip to the moon on a throne pulled by eagles.

_____ **T.** Perhaps credit for the first space flight description, however, should go to a second-century Greek whose fictional sailing ship was caught up in a whirlwind that blew it to the moon.

_____ **U.** A contemporary of Kepler's, Francis Godwin, wrote of men carried to the moon by geese.

CONTINUE ON TO THE NEXT PAGE ▶

Paragraph 4

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

_____ **Q.** In the same park, Mauna Loa, at 28,000 feet above the ocean's floor, is the largest active volcano in the world.

_____ **R.** There are dozens of active and potentially active volcanoes within the United States, including Kilauea, the most active volcano in the world.

_____ **S.** Both of these are shield volcanoes, which means that they were formed as lava flowed in all directions from a central vent to form low, gently sloping mountains.

_____ **T.** Volcanoes, which were named for Vulcan, are vents in the crust of the earth from which molten lava and ash erupt.

_____ **U.** That volcano, located in Hawaii Volcanoes National Park, has been spewing lava since 1983.

Paragraph 5

To the earliest European traders, Africa seemed to be loosely organized into tribal societies, without any great centers of wealth or learning.

_____ **Q.** He described a thriving metropolis with great universities and dozens of private libraries.

_____ **R.** Unfortunately, by the nineteenth century raids by neighboring tribes had made Timbuktu a shadow of its former self.

_____ **S.** This impression began to change in the fifteenth century, as Europeans traveled inland into western Africa.

_____ **T.** In 1470, an Italian merchant named Benedetto Dei traveled to Timbuktu and confirmed these stories.

_____ **U.** The travelers told tales of an enormous city known as Timbuktu on the southern edge of the Sahara Desert, where the markets were crowded with goods and gold was bought and sold.

CONTINUE ON TO THE NEXT PAGE ▶

LOGICAL REASONING

QUESTIONS 11-25

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

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

11. As you walk up a long hill, you pass five different trees.

1) The first tree is not an aspen.
2) The last tree is an elm.
3) The second tree is a sugar maple.
4) You pass the hickory tree after you have passed the sugar maple, but before you pass the aspen.
5) You pass the aspen after you have passed the red oak.

In which position is the aspen?

A. second
B. third
C. fourth
D. fifth
E. Cannot be determined from the information given.

12. In high school and college, Tessa played soccer for two years, lacrosse for three years, and basketball for two years. She never played more than two sports during the same year.

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

F. 2
G. 3
H. 4
J. 5
K. 6

13. When problem X occurs, Paul always follows the procedure below.

1) As soon as problem X occurs, Paul must apply procedure Q for five minutes.
2) If procedure Q fails to solve the problem, he must apply procedure M for ten minutes.
3) If Q or M solves problem X, Paul does not notify anyone.
4) If M fails to solve the problem, Paul must notify Sue immediately.

At noon on Monday, Paul notified Sue of problem X.

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

A. Before applying procedure M, Paul must notify Sue of the failure of procedure Q.
B. Paul applied procedure M on Monday, and it did not solve problem X.
C. Paul notified Sue immediately when problem X occurred.
D. Paul did not apply either procedure Q or M correctly.
E. Monday was the first time that both procedures failed to solve problem X.

CONTINUE ON TO THE NEXT PAGE ▶

14. If the moon is full, my dog will bark. If my dog sees a cat, my dog will bark.

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

F. If my dog barks, it has seen a cat and the moon is full.
G. If my dog barks, it has seen a cat.
H. If my dog doesn't bark, it has not seen a cat and the moon isn't full.
J. If the moon is not full, my dog won't bark.
K. If the moon is full, my dog will see a cat.

15. The smallest man on the Bruiser football team can eat six bowls of chicken soup in one sitting. Tyrone can eat only four bowls of chicken soup in one sitting.

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

A. Tyrone is not a member of the Bruiser football team.
B. Tyrone is not the smallest man on the Bruiser football team.
C. The ability to eat chicken soup is related to size.
D. Other men on the Bruiser football team can eat more than six bowls of chicken soup in one sitting.
E. The smallest man on the Bruiser football team can eat more than any other member of the team.

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

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

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

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

17. Sarah keeps five flashlights in her apartment. Only two flashlights use batteries of the same size. Sarah wants to keep one extra battery of each size. What is the minimum number of batteries she needs to keep as extras?

A. 1
B. 2
C. 4
D. 5
E. Cannot be determined from the information given.

18. The Bump Building is taller than the Tork Building. The Tork Building and the Stump Building are the same height. All buildings in Urbanville are taller than the Stump Building.

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

F. The Bump Building is in Urbanville.
G. The Tork Building is not in Urbanville.
H. At least one building in Urbanville is shorter than the Tork Building.
J. The Stump Building is in Urbanville.
K. All buildings in Urbanville are taller than the Bump Building.

19. At the end of an auto race, four cars crossed the finish line, one at a time. The four cars were blue, green, red, and yellow.

1) Jennifer finished directly behind Pierre.
2) The red car finished before the green car.
3) Charles was not in the blue car.
4) Pierre was in the red car.
5) Stephanie, who was in the yellow car, finished after Jennifer.

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

A. The blue car finished before the green car.
B. Charles finished third.
C. Jennifer drove the green car.
D. Stephanie finished third.
E. The green car finished second.

20. The Gobi Desert receives only 3 inches of rain each year. The Sawli Desert is the wettest desert in the world, with a yearly rainfall of 5 inches.

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

F. All deserts receive less than 6 inches of rainfall each year.
G. Most deserts receive between 3 inches and 5 inches of rainfall each year.
H. Deserts are the driest places on earth.
J. Deserts always have at least some rainfall each year.
K. Each month, the Sawli Desert receives more rainfall than the Gobi Desert.

---

21. Five students are seated at a round table, facing the table.

1) Howard is next to Tina and on her right.
2) Jamal is next to Beth and on her right.
3) Melinda is not sitting next to Beth.

What is the seating arrangement, starting with Melinda and going to her **left?**

A. Melinda-Tina-Howard-Beth-Jamal
B. Melinda-Howard-Tina-Beth-Jamal
C. Melinda-Tina-Howard-Jamal-Beth
D. Melinda-Jamal-Beth-Howard-Tina
E. Melinda-Jamal-Beth-Tina-Howard

---

22. At the horse show, four competitors stood in a line, each standing beside his or her horse.

1) Anita stood with the bay horse.
2) Pinh did not stand with the spotted horse.
3) Mia, who was behind Juan, stood with the white horse.
4) Juan stood directly behind Anita.
5) The chestnut horse was behind the bay horse.

Which competitor stood last in line?

F. Juan
G. Anita
H. Mia
J. Pinh
K. Cannot be determined from the information given.

---

23. Every member of club X is also a member of club Y. Some members of club Z are also members of club Y. Sonya is a member of exactly two of these clubs.

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

A. If Sonya is in club X, she is not in club Z.
B. If Sonya is in club Y, she is not in club Z.
C. If Sonya is in club Y, she must be in club X.
D. All members of club Y are in at least two clubs.
E. All members of club Z are in at least two clubs.

Questions 24 and 25 refer to the following information.

In the code below, (1) each letters always represents the same word, (2) each word is represented by only one letter, and (3) in any given sentence, the letters may or may not be presented in the same order as the words.

M O R T Y means "John walked home by himself."
X N M Q R means "Lien walked home with friends."
M Z R X N means "Manuel walked home with friends."
Q M X R P means "Ahmal walked home with Lien."

24. Which letter represents the word "Manuel"?

F. R
G. M
H. X
J. Z
K. Cannot be determined from the information given.

25. Which word is represented by the letter X?

A. friends
B. with
C. home
D. Lien
E. Cannot be determined from the information given.

READING

QUESTIONS 26-50

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

Wang Yani was born in 1975 in the small town of Gongcheng, China. From earliest childhood Yani watched her father paint and, when she was two years old, he gave her a brush to "play" at painting.

When Yani was four, several of her paintings were sent to a famous artist, who asked her to demonstrate her technique to a group of twenty important Shanghai artists. They decided that the child should have her own exhibition. By the age of eight, Yani was known throughout China for her paintings of mischievous monkeys, her favorite subject until she was six; and one work was reproduced on a Chinese postage stamp. She was soon recognized as a national treasure and acknowledged worldwide as a prodigy.

Yani was surrounded from birth by art and artists, but has never had formal instruction in painting. Her parents supported her and encouraged her to trust her own talent. Her father even stopped his own painting in order to avoid influencing her work.

The quality of Yani's early creations—paintings of animals inspired by trips to the zoo—was immediately recognized by critics. Painted in the highly expressive *xieyi* style rather than in the *gongbi* style of careful, delicate strokes, the paintings seemed to pour out of Yani as though she had invented the style herself. Observers are invariably amazed by the swiftness and certainty with which she chooses her colors and makes her bold, wet, overlapping strokes.

Yani's more recent subjects include landscapes and people as well as animals. She has had solo exhibitions in major museums around the world—at the Smithsonian Institution she was the youngest artist ever to have a one-person show.

What makes Yani paint? How did she learn her art? What does she see as her future? At sixteen, she gave these answers: "Don't think anyone can help you paint. Colors, paper, and paint are all you have to depend on. You must tell a story to yourself. Painting is a great pleasure to me," she said, "and I will just go on with it naturally."

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

- **F.** Yani's attitude toward art
- **G.** children's art on Chinese postage stamps
- **H.** the importance of children's art in China
- **J.** how Yani's parents taught her to paint
- **K.** the work of a child prodigy

27. How was Yani's talent first discovered?

- **A.** One of her paintings was used as a postage stamp.
- **B.** She had a one-person show at the Smithsonian.
- **C.** Her paintings were sent to an influential artist.
- **D.** Her parents decided that she should have her own exhibition.
- **E.** People saw her painting animals at the zoo.

28. What does the passage suggest was the reaction of the group of Shanghai artists to Yani's paintings?

F. She was overly influenced by her father's style.
G. She could paint only monkeys and other animals.
H. She was a talented artist.
J. Her paintings were superior to their own.
K. She needed more instruction in *xieyi* painting.

29. Which of the following best describes Yani's style of painting?

A. finely detailed
B. strongly influenced by her father
C. difficult to create
D. created with bold strokes
E. strongly influenced by European artists

30. What is the primary reason why Yani's paintings are so remarkable?

F. The subject matter of each is unique and unusual.
G. They were created by a very young child.
H. They showed a striking mastery of different styles.
J. The style is new and used only by Yani.
K. They have been largely unrecognized by critics.

CONTINUE ON TO THE NEXT PAGE ▶

1

A whale leaps from the ocean, twists in the air, and falls back into the water with a spectacular display of foam and a loud splash. This phenomenon, called breaching, is practiced by almost all whale species, but most frequently by humpback whales. Seldom observed until recently by anyone except whalers, breaching was thought to be motivated by hunger, playfulness, boredom, or even defiance (presumably toward pursuers).

Computer simulations of a whale breaching suggest that breaching requires the full use of the whale's power of movement. The breach begins when the whale, swimming horizontally, builds up speed. Then it raises its tail and tilts its head upward, gaining vertical momentum. In a true breach, the whale emerges from the water on its side, twists with flailing flippers, and lands on its back. Other times, possibly to maintain the ability to breathe, the whale will do a belly flop. In rare instances, a whale will propel its body completely clear of the water. Other breaches are more leisurely, in which only half of the body emerges. Breaches often occur in sequence, sometimes as often as every forty seconds for several minutes.

Close observation of breaching whales by marine biologists suggests that breaching is probably a means of communication. Humpbacks, for example, travel in social groups, called pods, of two to four whales. When a whale breaches, the sound travels through the water as far as several kilometers under good weather conditions. As soon as one whale breaches, others within the pod or nearby may breach in response.

Because a sequence of breaches requires such a great exertion, breaching may be a method of communicating physical prowess to other whales in ways that normal vocalizations cannot. The sound of the crashing impact on the water might communicate both the size of the whale and the magnitude of the breach (that is, the whale's full power). Thus, breaching might be useful in courtship as a general show of strength to other whales.

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

- **A.** the nature of and reason for whale breaching
- **B.** the power required for a whale to breach
- **C.** breaching as the basis for social groups among whales
- **D.** how breaching differentiates humpbacks from other whales
- **E.** how whales form social groups called pods

32. How often does a breaching whale entirely clear the water?

- **F.** almost every time
- **G.** about half the time
- **H.** every forty seconds
- **J.** only rarely
- **K.** whenever the whale sees other whales

33. In what activity does the author suggest that the breaching whale may be engaged?

- **A.** feeding
- **B.** playing
- **C.** showing its strength
- **D.** escaping from pursuers
- **E.** guarding the pod

34. The "other whales" referred to in the last line most likely include which of the following?

- **F.** whales searching for food
- **G.** whales concerned with mating
- **H.** whales under attack by whalers
- **J.** whales that do not practice breaching
- **K.** whales swimming more than a few kilometers from the breaching whale

CONTINUE ON TO THE NEXT PAGE ▶

35. Which of the following provides the strongest evidence that whales communicate by breaching?

A. Breaching requires tremendous physical effort.
B. Whales usually travel in social groups called pods.
C. Breaching is practiced by almost all whale species.
D. After one whale breaches, a nearby whale may also breach.
E. A whale will sometimes breach several times in succession.

CONTINUE ON TO THE NEXT PAGE ▶

1

The tenth century A.D. was a period of cultural and artistic revival in the European countries bordering the Mediterranean Sea. The magnificent works of art and architecture of that period used, among other materials, African gold, ivory, and rock crystals. But most of these materials would have been unavailable to European artists without a sophisticated trading network established along the east coast of Africa, from present-day Somalia to northern Mozambique. The African traders represented many groups but were united by their common use of the Swahili language. For that reason, the traders are collectively known as "Swahili."

For centuries before trading with Europe, the Swahili had sailed the African coast in small, seaworthy boats of their own design. They were expert navigators, and their knowledge of the dangerous coastal waters enabled them to expand their influence along 3,000 kilometers of East African coastline. In this region, known as the Swahili corridor, the Swahili traded salt, cloth, and iron products for a wide range of goods from groups living in the African interior.

In the ninth century, the Swahili began also trading with Persian Gulf merchants, who in turn traded with China. The exchanges involved Chinese pottery—discovered in recent East African coastal excavations—for African goods, particularly ivory. In the tenth century a new trade sprang up as Muslim traders from the Red Sea came to East Africa seeking African gold, ivory, and crystals to sell to Mediterranean Europe. They found the Swahili trading network already in place. For the goods they sought, the Muslims offered not only money but technical advice in matters that ranged from building techniques to arts and crafts.

The Swahili trading network did more than help the circulation of international products between Europe, Asia, and Africa. Since the Swahili traded with varied African societies, from herders and farmers to hunters, they became a source of exchange for both goods and information within the region. Their network brought both economic advancement and a degree of cultural unity among the people of East Africa.

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

- **F.** the role played by the Swahili in international trade in the ninth and tenth centuries
- **G.** the Swahili contribution to a revival of African art and culture
- **H.** the effect of the Swahili traders on the art of tenth-century Europe
- **J.** the sailing and boatbuilding skills of the Swahili traders
- **K.** how the Swahili traders used their wealth to develop their homeland

37. What is an example of the goods sought by the traders from the Red Sea?

- **A.** Chinese pottery
- **B.** money
- **C.** art objects
- **D.** building techniques
- **E.** ivory

38. What was most important in enabling the Swahili to establish their trade along the East African coast?

- **F.** large holdings of gold and ivory
- **G.** knowledge of the coastal waters
- **H.** ability to trade with European countries
- **J.** knowledge of European art
- **K.** possession of goods from China

39. What was the most likely location for the Swahili to exchange gold for Chinese pottery?

- **A.** in the interior of Africa
- **B.** on the coast of East Africa
- **C.** in the Persian Gulf
- **D.** on the shores of the Red Sea
- **E.** somewhere in China

40. In what way were Swahili traders involved in the artistic revival in tenth-century Europe?

F. The materials they traded with Muslim traders from the Red Sea were used in the European revival.
G. They sold African gold, ivory, and crystals to the Europeans in exchange for arts and crafts.
H. They traded salt, cloth, and iron products with Persian Gulf merchants in exchange for gold, ivory, and crystals.
J. They offered technical advice as well as money in exchange for European art.
K. Their network introduced artistic practices of the Chinese to Europeans.

CONTINUE ON TO THE NEXT PAGE ▶

1

Hailed as a breakthrough by the communications industry, fiber optic technology is used to send vast quantities of data over long distances. This technology uses continuous strands of thin glass fibers, bundled together into cables of various sizes. Electrical signals representing information (such as sounds or numbers) are converted to coded light impulses which are then transmitted for miles within one of the strands of the flexible bundle. At the receiving terminal point, the signals are reconverted to electrical impulses.

Interestingly, scientists have now discovered that certain plants, such as the oat seedling, have been using the plant equivalent of fiber optics all along. An oat seedling is made of long, stacked columns of cells. Scientists found that when the seedling is illuminated at one end, the light does not escape out the sides, but rather is transmitted faithfully through the interior of the cells and from one cell to the next. Light can travel as far as 4.5 centimeters along the seedling.

Does this property of oat seedlings have a function? Experiments have demonstrated that certain wavelengths of sunlight penetrate the ground and travel below the surface. These wavelengths are composed of red light, a narrow part of the solar spectrum. Scientists speculate that the seedling can sense a minute amount of this light and use it as a coded signal to regulate plant growth. For example, the development of oat plants and other grasses requires the formation of the leaf base (node) just below the soil surface, regardless of the depth of the seed itself. The subsurface red light picked up by the seedling "light pipe" is believed to trigger node growth at the correct position. Once the shoot breaks the surface, more light—now from the full solar spectrum—is piped down into the interior of the seedling.

The action of light on the growth processes within a seedling is not yet fully understood. It remains for future experiments to determine how oats and other plants fully exploit their "fiber optics" to coordinate growth activity.

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

- **A.** a plant equivalent to fiber optics
- **B.** the development of fiber optic technology
- **C.** the essentials of plant physiology
- **D.** the importance of seedlings to fiber optic research
- **E.** predicting node development in plants

42. Which of the following is believed to affect the proper placement of the node of the oat seedling?

- **F.** the depth of the seed
- **G.** the red light penetrating the surface of the soil
- **H.** how quickly the shoot breaks through the soil surface
- **J.** how far light can travel along a shoot
- **K.** the flexibility of the shoot

43. Which of the following is essential to oat plant development?

- **A.** The shoot must be at least 4.5 centimeters long.
- **B.** The node cells must be arranged in a flexible bundle.
- **C.** The node of the seedling must form just below the surface of the soil.
- **D.** The seed must be deep enough to trigger the growth of a node.
- **E.** The seed must collect only a certain type of red light.

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44. Which of the following best describes how oat seedlings and fiber optic bundles are alike?

F. They both convert electrical energy into red light.
G. Fiber optic bundles are modeled after oat seedlings.
H. Both allow communication, either between people or oat plants.
J. The flexible cell structure of oat seedlings suggests additional uses for fiber optic bundles.
K. Their structures allow the transmission of light impulses along their lengths.

45. Which of the following describes the relationship between oat seedling research and the development of fiber optic technology?

A. Fiber optic technology used the research as a model.
B. Both were researched by the same scientists.
C. The electrical signals from fiber optics are used to stimulate the growth of oat seedlings.
D. The parallels between them have been noted, but they were developed independently.
E. The same red light that stimulates oat seedlings is used to send electrical signals along fiber optic bundles.

CONTINUE ON TO THE NEXT PAGE ▶

1

Louis Braille (pronounced brale), the French inventor of the Braille writing and printing system for the blind, lost his sight in an accident when he was three years old. In 1819, at the age of ten, he became a student at a school for the blind in Paris. Braille was fortunate—few blind people of that time were taught to read and write. Denied a chance to develop their minds, they often faced lives of poverty and dependence.

Braille was a good student, but he was frustrated by "raised print"—the system of raised standard printing that the blind were taught to read by touch. Certain letters, such as Q and O, were very hard to distinguish from one another. Also, printing books in raised print was expensive and the school's library was quite limited. Hungry for the knowledge in books, Braille was determined to find a better method.

His first clue came when he learned of night-writing, a system used by the French Army to send messages. By punching raised marks into thick paper, soldiers could send messages that could be read using only the sense of touch. This technique eliminated the need for a light, always a danger in battle areas at night. Braille realized that raised dots, which were much easier to feel than letters, were part of his answer. The night-writing code, however, was based on sounds rather than letters. Although adequate for brief messages such as "Advance at dawn," it could not be used to print the world's literature.

With thick paper and a long pointed tool, Braille began to experiment. His final solution was the "braille cell" of six dots: two wide and three high. Depending on which dots were raised, each cell represented a letter, numeral, punctuation mark, or musical symbol. The result was a triumph: a fifteen-year-old boy had created a system that would eventually allow hundreds of thousands of visually impaired people to read and write in countless languages.

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

- **F.** the education of Louis Braille
- **G.** how blind people read
- **H.** Louis Braille's invention
- **J.** how Braille books are made
- **K.** how night-writing was invented

47. Why were Braille's studies using "raised print" frustrating?

- **A.** Few books were available in "raised print."
- **B.** "Raised print" could not be used for literature.
- **C.** "Raised print" was not intended for use by blind readers.
- **D.** Most writers did not know the alphabet used in "raised print."
- **E.** "Raised print" was used primarily for military purposes.

48. What does the passage imply was the primary purpose of night-writing?

- **F.** to allow soldiers who do not know how to read or write to exchange messages
- **G.** to allow soldiers to read coded words in secret messages more quickly
- **H.** to enable blind people to read and write
- **J.** to increase the number of soldiers who were able to send messages
- **K.** to allow soldiers to read a message without giving away their location

49. What was a major reason for the success of Braille printing for the blind?

- **A.** It was based on speech sounds.
- **B.** Unlike earlier systems, it was based on the sense of touch.
- **C.** It was both simple and extremely versatile.
- **D.** It had many uses beyond printing for the blind.
- **E.** It used the standard shapes of letters and numbers.

CONTINUE ON TO THE NEXT PAGE ▶

50. What does the passage suggest about Braille's invention of a writing and printing system?

- **F.** Braille's invention would be adopted by the French Army to replace night-writing.
- **G.** Braille invented the system long before there was a need for it.
- **H.** Braille's blindness made the inventing process much more difficult.
- **J.** Braille's desire for knowledge was a key factor behind the invention.
- **K.** Braille's invention was suggested to him by his teachers.

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PART 2 — MATH

Suggested Time — 60 Minutes

50 QUESTIONS

GENERAL INSTRUCTIONS

Solve each of the following problems by selecting your answer from the choices given. You can do your figuring in the test booklet or on paper provided by the proctor. ***DO NOT FIGURE ON YOUR ANSWER SHEET***.

IMPORTANT NOTES:

(1) Diagrams 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.

(2) Assume that a diagram is in one plane unless the problem specifically states that it is not.

(3) Reduce all fractions to lowest terms.

SYMBOLS, FORMULAS, AND INDICATIONS

The following formulas and other reference information may be of use while solving the problems. You may refer to this information as needed during the test.

SYMBOLS:

$\neq$ is not equal to
$<$ is less than
$>$ is greater than
$\leq$ is less than or equal to
$\geq$ is greater than or equal to
// is parallel to
$\perp$ is perpendicular to

INDICATIONS:

Angles are indicated by  .

Right angles are indicated by  .

FORMULAS:

Circumference of a circle with radius r: $2\pi r$

Sum of the measures of the interior angles of a triangle = 180 degrees
Sum of the measures of the interior angles of a quadrilateral = 360 degrees

Areas:

Triangle with base b and height h: $\frac{1}{2}bh$

Parallelogram with base b and height h: bh

Trapezoid with parallel sides a and b, and height h: $\frac{1}{2}(a + b)\,h$

Circle with radius r: πr^2

EXAMPLE 2

DIRECTIONS: Solve the problem. Find the **best** answer among the answer choices given.

E2. $\frac{1}{4} \cdot \frac{1}{2} =$

A. $\frac{1}{8}$

B. $\frac{1}{6}$

C. $\frac{3}{8}$

D. $\frac{3}{4}$

E. 1

EXAMPLE ANSWER

E2. ● Ⓑ Ⓒ Ⓓ Ⓔ

CONTINUE ON TO THE NEXT PAGE ▶

MATHEMATICS PROBLEMS

QUESTIONS 51-100

DIRECTIONS: Solve each problem. Find the **best** answer among the answer choices given. Mark the letter of your answer on the answer sheet.

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

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

52. Mrs. Garcia determines math grades on the basis of 5 tests, each worth 100 points. An average of at least 80 points is needed for a grade of B. On the first 4 tests, Hilary scored 91, 72, 69, and 83. What is the lowest score she may receive on the final test and still earn a B?

F. 80
G. 82
H. 84
J. 85
K. 86

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

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

54. A basketball team scored 60 points in the first game and 50 in the second game. How many points did the team score in the third game if their mean score for the 3 games was 51 points?

F. 43
G. 45
H. 47
J. 49
K. 55

55. Three chains, each 14 feet in length, are linked end to end. Two longer chains of equal length are added to make a total length of 100 feet. What is the length of one of the longer chains?

A. 29 ft
B. 36 ft
C. 42 ft
D. 58 ft
E. 72 ft

56. If $2x + 2y - 6 = 14$, what is the value of x in terms of y?

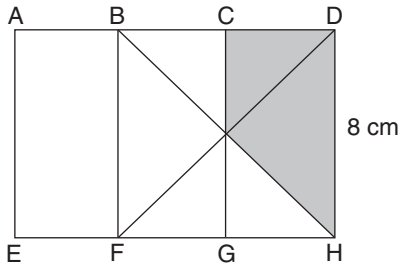
F. $10 - y$
G. $10 - 2y$
H. $8 - y$
J. $8 - 2y$
K. $4 - y$

CONTINUE ON TO THE NEXT PAGE ▶

57. If $x = y - 7$, what is the value of $3x - 3$ in terms of y?

A. $3y - 18$
B. $3y - 24$
C. $2y - 4$
D. $2y - 10$
E. $y - 10$

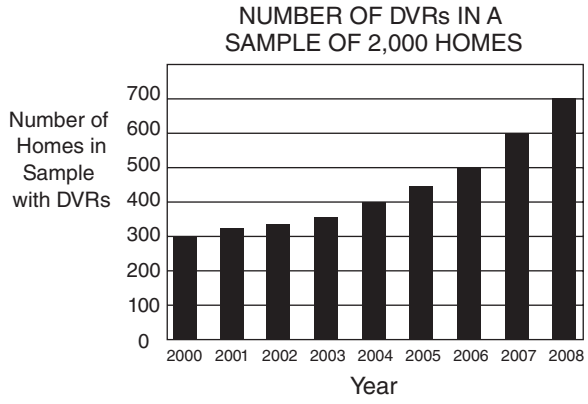
58.



ACGE and BDHF are squares, and $\overline{ABCD}$ is a straight line segment. $\overline{CG}$ and the diagonals $\overline{BH}$ and $\overline{DF}$ pass through the same point. What is the area of the shaded region?

F. 16 sq cm
G. 24 sq cm
H. 32 sq cm
J. 40 sq cm
K. 56 sq cm

59.



Based on the graph above, what was the first year in which at least 25 percent of the homes in the sample of 2,000 had DVRs?

A. 2000
B. 2001
C. 2004
D. 2006
E. 2008

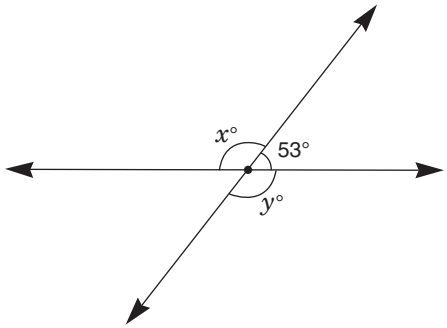
60. If a rectangular room is 3 times as long as it is wide, and if the width is 8 feet, how many square feet of carpet are needed to cover the floor?

F. 24 sq ft
G. 32 sq ft
H. 72 sq ft
J. 88 sq ft
K. 192 sq ft

61. How much greater than 1.095 is the value obtained by rounding 1.095 to the nearest tenth?

A. 0.005
B. 0.5
C. 1.005
D. 1.1
E. 5

62.



The figure above shows two intersecting lines. What is the sum of x and y?

F. 53
G. 74
H. 106
J. 127
K. 254

CONTINUE ON TO THE NEXT PAGE ▶

63. When n is divided by 5, the remainder is 2. What is the remainder when $n + 4$ is divided by 5?

A. 1
B. 2
C. 3
D. 4
E. 6

64. An 11-sided polygon has 3 sides each of length x centimeters and 6 sides each of length $2x$ centimeters. The lengths of the other 2 sides are 12 centimeters and 13 centimeters. If the perimeter of the polygon is 100 centimeters, what is the value of x?

F. 3
G. 5
H. 12
J. 25
K. 75

65. N, M, and T are integers.
N + M is an odd number.
M + T is an odd number.

Which of the following **must** be true?

A. N × T is even.
B. N × T is odd.
C. N + T is odd.
D. N + T is even.
E. N − T is odd.

66. What is the value of $(x + y)(y - x)$ when $x = 5.5$ and $y = 4.5$?

F. $^{-}10$
G. 0
H. 9
J. 10
K. 11

67. What is the greatest prime factor of 210?

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

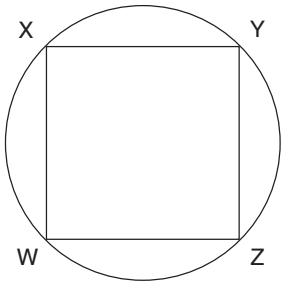
68. $2x(3y + 1) =$

F. $3y + 2x$
G. $5xy + 2x$
H. $6xy + 1$
J. $5xy + 2x + 1$
K. $6xy + 2x$

69. M is 20% of N, and N is 5% of 1,000. What is the value of M?

A. 10
B. 40
C. 100
D. 250
E. 1,000

70.



In the figure above, W, X, Y, Z are points on a circle and WXYZ is a square. If the diagonal of the square is 16 centimeters long, what is the circumference of the circle?

F. 8π cm
G. 16π cm
H. 32π cm
J. $64\pi^2$ cm
K. $1{,}600\pi$ cm

CONTINUE ON TO THE NEXT PAGE ▶

71. If the numeral Q,RSX,Y23.1 is multiplied by 100, which letter will be in the millions place?

A. Q
B. R
C. S
D. X
E. Y

72. Suppose that 387 people will travel on a shuttle with room for 420 people. Each compartment seats 14 people before the next compartment opens. How many people will ride in the last compartment that opened?

F. 8
G. 9
H. 11
J. 12
K. 31

73. For what value of x is $\frac{2(x+1)}{3} = 1$?

A. 0
B. $\frac{1}{2}$
C. 1
D. 2
E. $\frac{5}{2}$

74.

MUSEUM VISITORS

Day	1	2	3	4	5	6	7	8	9
Number of Visitors	142	106	117	127	106	113	106	95	117

What was the median number of visitors for the days shown?

F. 95
G. 106
H. 113
J. 117
K. 142

75.

What is the sum of the lengths of $\overline{QR}$ and $\overline{RS}$?

A. 1
B. 2
C. 3
D. 6
E. 9

76. If $w < 0$ and if $z > 0$, which expression **must** be positive?

F. $w - z^2$
G. $z + w^2$
H. $z^2 \div w$
J. $z - w^2$
K. $w + z^2$

77. What is the difference between 90% of 9 and 9% of 90?

A. 0
B. 2
C. 7.29
D. 10
E. 81

78. Katie swam $\frac{3}{4}$ as many laps as Ruby.

Katie swam $3\frac{1}{2}$ laps. How many laps did Ruby swim?

F. $2\frac{1}{4}$
G. $2\frac{5}{8}$
H. $2\frac{3}{4}$
J. $4\frac{1}{4}$
K. $4\frac{2}{3}$

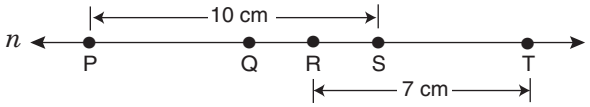
79. N is an element of the set $\{0.2, 0.7, 1.4, 2.0, 7.0\}$, and $\frac{4.2N}{1.2}$ is an integer. What is N?

A. 0.2
B. 0.7
C. 1.4
D. 2.0
E. 7.0

80. Raoul is x years old now and Phil is 8 years older than Raoul. In 2 years, Phil will be exactly twice as old as Raoul is then. How old is Raoul now?

F. 3
G. 5
H. 6
J. 8
K. 10

81.



On line n, if QS = 6 centimeters and QR = RS, what is the length of $\overline{PT}$?

A. 12 cm
B. 13 cm
C. 14 cm
D. 16 cm
E. 17 cm

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

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

83. There are 10,000 fish in a pond. Of 50 fish caught in a net, 35 are female and 15 are male. Which is the best estimate of the number of male fish in the pond before the 50 fish were caught?

A. 750
B. 1,500
C. 3,000
D. 3,500
E. 7,000

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

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

85. Of 27 marbles in a can, 7 were black, 4 were yellow, and the rest were red. Kang removed 3 black marbles, then one more marble at random. What is the probability that it was red?

A. $\frac{1}{3}$
B. $\frac{5}{9}$
C. $\frac{16}{27}$
D. $\frac{5}{8}$
E. $\frac{2}{3}$

CONTINUE ON TO THE NEXT PAGE ▶

86. Joe ate $\frac{1}{8}$ of a pizza. Anna ate twice as much of the same pizza as Joe. What is the ratio of the amount of pizza the two ate to the amount of pizza remaining?

F. 1:2
G. 1:4
H. 3:5
J. 3:8
K. 5:8

87. Lindsey is now x years old and Xiu Dan is 2 years older than Lindsey. In terms of x, how old was Xiu Dan 3 years ago?

A. x
B. $x - 1$
C. $x - 3$
D. $x - 5$
E. $2x - 3$

88. There are 660 feet in one furlong, and $\frac{1}{2}$ of a fathom in one yard. How many fathoms are there in one furlong?

F. 55
G. 110
H. 220
J. 330
K. 440

89. Simplify the expression

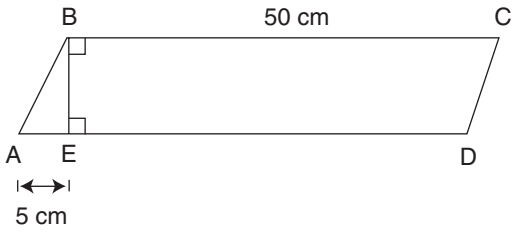
$r\left[s\left(\frac{r+s}{r-s}\right)\left(\frac{r-s}{r+s}\right)\right]$, where $r \neq s$ and $r \neq {}^{-}s$.

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

90. Between which two consecutive positive integers is $\sqrt{6^2 + 7^2}$?

F. 6 and 8
G. 8 and 9
H. 9 and 10
J. 12 and 14
K. 36 and 49

91.



What is the area of parallelogram ABCD if the area of triangle ABE is 25 square centimeters?

A. 140 sq cm
B. 150 sq cm
C. 250 sq cm
D. 500 sq cm
E. 550 sq cm

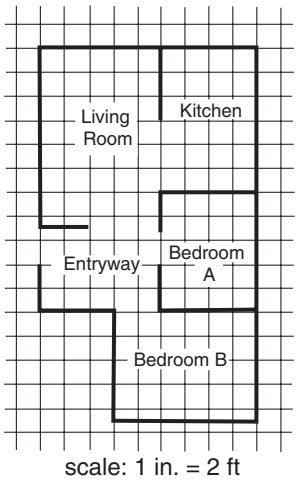
92. {1, 2, 3, . . . , 175, 176, 177, 178}

How many numbers in the set above have 5 as a factor but do not have 10 as a factor?

F. 1
G. 3
H. 4
J. 17
K. 18

CONTINUE ON TO THE NEXT PAGE ▶

93.



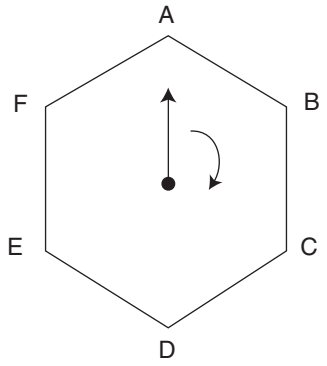
The floor plan above is drawn on a grid made up of 1-inch squares. About how many square **yards** of carpet are needed to cover bedroom B?

A. 12 sq yd
B. 27 sq yd
C. 54 sq yd
D. 81 sq yd
E. 108 sq yd

94. From a box containing 5 black marbles, 8 pink marbles, 6 white marbles, and 5 yellow marbles, Shaniece removed 4 marbles, one of which was black. If she removes one more marble at random, what is the probability that it will be black?

F. $\frac{1}{6}$
G. $\frac{4}{21}$
H. $\frac{1}{5}$
J. $\frac{5}{21}$
K. $\frac{1}{4}$

95.



ABCDEF is a regular hexagon. The arrow in it rotates at a constant rate of 5 revolutions per minute. If the arrow points to A for the first time at 0 seconds as shown, how many **seconds** will elapse before the arrow points to B for the eleventh time?

A. 12 sec
B. 110 sec
C. 120 sec
D. 122 sec
E. 134 sec

96. Firefighters sprayed a 9-**inch**-thick layer of foam over a burning rectangular region 10 yards wide and 50 yards long. What volume of foam was used on the fire?

F. 55 cu yd
G. 125 cu yd
H. 250 cu yd
J. 450 cu yd
K. 4,500 cu yd

97. In an election between two candidates, the winner received 55% of the 17,000 votes. The loser received the remaining votes. How many more votes did the winner receive than the loser?

A. 500
B. 1,700
C. 3,000
D. 7,650
E. 9,350

98. One side of a square is 10 units long and lies on the y-axis of a coordinate system. Another side of the square lies on the x-axis of the coordinate system. What must be the coordinates of one corner of this square?

F. (0, 0)
G. (0, 10)
H. (10, 0)
J. (10, 10)
K. ($^{-}10$, $^{-}10$)

99. In a scale diagram, 1 inch represents 100 feet. How many square inches on the diagram represent 1 square foot?

A. 0.000001 sq in.
B. 0.0001 sq in.
C. 0.01 sq in.
D. 0.1 sq in.
E. 100 sq in.

100. A goat is tied by a 6 meter rope to the outside corner of a rectangular shed measuring 8 meters by 8 meters. What is the area of the surrounding grass on which the goat can graze?

F. 6π sq m
G. 8π sq m
H. 27π sq m
J. 36π sq m
K. 48π sq m

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. ■

SCRAMBLED PARAGRAPHS

Paragraph 1 (QURST)

The opening sentence states a fact that scientists have "long known" about chimpanzees. Sentence Q makes the transition from chimps in general to one particular, though unnamed, animal. (The other sentences all refer to this specific individual animal by name.) Sentence Q also makes another transition from the opening sentence, from chimps' use of tools for one purpose (food gathering and preparation) to their use of tools for "other purposes."

Sentence U follows sentence Q because U names the individual chimp (Kalunde) and adds the information that Kalunde had the flu. Sentence R continues the reference to Kalunde's illness by describing his symptoms, cough and congestion. Sentence S presents the result of this congestion: Kalunde had to breathe through his mouth, which made eating difficult. Sentence T shows how Kalunde used a tool, a stick or twig, to clear his congestion, which concludes the paragraph. QURST has made a paragraph that is logically and grammatically correct.

QRUST might look appealing, but its transition from Q to R is poor. Sentence Q does not mention anything about an illness, nor does it name the chimp, yet sentence R refers to "the afflicted Kalunde" and describes his illness. The chimp's illness is not introduced until the next sentence, sentence U. The resulting paragraph (QRUST) is poorly organized.

QUSTR is also incorrect. When sentence R, which describes Kalunde's flu symptoms, is placed last, the paragraph becomes disjointed. The previous sentence (T) has said that Kalunde accomplishes his goal of clearing his nasal passages after using his tool. Sentence R describes Kalunde's condition **before** he used his tool, so it should appear earlier in the paragraph, as it does in the correct order (QURST).

Paragraph 2 (SRUTQ)

The given sentence introduces the topic of songs from the American Revolutionary War. S is next, beginning with the phrase, "The first American patriotic ballad …", which provides an example of a song published before the Revolution began. R follows S, with its mention of "another American original" written during the Revolution and sung by American troops.

U links to R with another song, "Yankee Doodle," sung by the British, not the Americans. T is next—the song is "Yankee Doodle," mentioned in U, and the statement that Americans "took it for their own" follows U's statement that "Yankee Doodle" was originally a British song. Q ends the paragraph with an ironic twist that the Americans eventually played the song to surrendering British troops.

Paragraph 3 (QUSTR)

The given sentence says that Jules Verne was not the first writer to write about space travel, which sets the stage for a discussion of other writers. Q is next because it links to Verne and starts the backward chronological sequence from Verne to Kepler (Q) and Godwin in the sixteenth century (U), to a Persian poet in A.D. 1010 (S), to a second-century Greek (T). R concludes the paragraph with its statement that fantasies of space travel have existed for thousands of years. Note that the order of the middle three sentences cannot be TSU, a forward chronology. S cannot follow T because of its time reference, "even earlier"; A.D. 1010 in S is not earlier than the second-century story in T.

Paragraph 4 (TRUQS)

It might seem as if two sentences, R and T, could follow the opening sentence. Which is correct? We will try both possibilities and compare the results. When R follows the opening sentence, it continues the discussion of volcanoes, including Kilauea, the most active volcano in the world. Sentence U follows R with its reference to "that volcano," referring to Kilauea, and reinforces Kilauea's activity. U also names Hawaii Volcanoes National Park, so "In the same park" (sentence Q) logically follows U. Q mentions another volcano, Mauna Loa, and sentence S ("Both of these are shield volcanoes . . .") follows it well. But then a problem arises. The remaining sentence, T, explains that volcanoes were named for Vulcan and it defines a volcano. Sentence T doesn't logically follow sentence S, and it ends the paragraph on an awkward note: the only other reference to Vulcan is in the opening sentence. Placing T at the end also means that the definition of the paragraph's topic (volcanoes) appears after, not before, further discussion of the topic. Remember that the completed scrambled paragraph must be well-organized and cohesive. RUQST seemed well-organized until the last sentence, but then it fell apart.

Try placing sentence T immediately after the opening sentence instead of at the end. Now the opening sentence is followed with another reference to Vulcan, and the definition of a volcano ("vents in the crust of the earth") appears early in the paragraph. The only sentence that can follow T is R, and the logic and flow of thought that formed RUQS in the previous paragraph is the same. The last sentence (S) is a fitting conclusion. TRUQS has created a well-organized, cohesive paragraph and it is the only correct answer.

Paragraph 5 (SUTQR)

The opening sentence states what early European explorers thought about Africa, setting the reader up for a contrasting statement. Sentence S fills that role, saying that European travelers to Africa were beginning to change their impressions. The reason for their change in perception is given in sentence U—their (the travelers') visit to the city of Timbuktu. Among the remaining sentences, the best sentence to follow U is T. Both take place in the fifteenth century, and "these stories" in T refers to the travelers' tales of Timbuktu. Sentence T, by naming Benedetto Dei, leads into sentence Q, which begins with the pronoun "he," referring to Dei. Only sentence R is left, and it provides a good conclusion, both chronologically (ending with the nineteenth century) and content-wise (the decline of Timbuktu).

SUQTR might seem correct, but it contains a grammatical problem. The "he" in Q has no referent in the previous sentence. Another popular choice, SUTRQ, is incorrect because the sequence RQ does not make sense. R describes the decline of Timbuktu, while Q describes it as a thriving metropolis.

LOGICAL REASONING

11. (**C**) Use a diagram to help solve this problem. Write "Top" and "Bottom" on your scratch paper and the numbers 1 through 5, beginning at the bottom with 1. Then look for specific locations for each tree. Statement 2 says that the last (fifth) tree is an elm; write "elm" next to 5. Statement 3 says that the second tree is a sugar maple; write "sugar maple" next to 2.

TOP
5 elm
4
3
2 sugar maple
1
BOTTOM

Now read the other statements and place the remaining three trees in their correct positions. Statement 4 says that the hickory tree is after the sugar maple, but before the aspen. Thus the hickory tree must be third or fourth, and the aspen must be fourth or fifth. The fifth place is already taken, so the aspen must be fourth. (That leaves the hickory tree in third place and the red oak in first place.)

TOP
5 elm
4 aspen
3 hickory
2 sugar maple
1 red oak
BOTTOM

Thus the correct answer is option C: the aspen is in the fourth position.

12. (**H**) Write the following on your scratch paper (six years are shown because six is the largest option):

	YEAR					
	1	2	3	4	5	6
soccer						
lacrosse						
basketball						

The question does not provide information about the order in which Tessa played each sport, or whether the years in each sport were consecutive. Since she played lacrosse longer than the other sports, start with lacrosse. Put an X under years 1, 2, and 3, to represent Tessa's three years in that sport.

	YEAR					
	1	2	3	4	5	6
soccer						
lacrosse	X	X	X			
basketball						

Tessa played soccer and basketball for two years each, and she never played more than two sports at a time. One possibility is that she played soccer during her first and second years. After "soccer," put an X under years 1 and 2. Since Tessa never played more than two sports at a time, she could not have started basketball until year 3. She could have played it in years 3 and 4. After "basketball," put an X under years 3 and 4.

	YEAR					
	1	2	3	4	5	6
soccer	X	X				
lacrosse	X	X	X			
basketball			X	X		

This is one possible arrangement, and it requires four years. All other possibilities require at least four years. Option H is correct.

Notice that Tessa played only one sport in year 4. This is all right, since the question says only that she played no more than two sports each year. That allows the possibility that she sometimes played only one sport.

13. (**B**) Evaluate each option to determine whether it **must** be true, as the question asks. You know that Paul followed the described procedure exactly, since the question says that he does. Options A and C are ruled out because they do not follow the procedure. Options D and E are incorrect because there is nothing in the problem to support them. The correct answer is Option B. Since procedure M did not solve the problem, as directed in Statement 4, Paul notified Sue.

14. (**H**) The problem says that two circumstances, a full moon and the sight of a cat, will cause my dog to bark. We **do not** know that these are the only two circumstances because the information given does not say so. Therefore, you can rule out options F and G. J is wrong because the information given says nothing about what the dog would do when the moon is not full. K is wrong because it incorrectly combines two pieces of information. H is correct. If my dog does not bark, then the moon cannot be full; otherwise it will bark. It also has not seen a cat; again, it will bark otherwise.

15. (**B**) Tyrone cannot be the smallest man on the Bruiser team since he cannot eat six bowls of soup in one sitting. However, Tyrone could still be on the team, which eliminates Option A. Option C is incorrect because the question says nothing about size and soup-eating talents being related. Options D and E can be ruled out because we know nothing about how much soup the other team members can eat. Option B is correct; this is all we definitely know.

16. (**K**) On your scratch paper, draw a diagram with the words "Highest" and "Lowest." Write the numbers 1 through 4 to represent the positions of the four people in the flying contest.

HIGHEST
1
2
3
4
LOWEST

Neither of the two statements places a contestant in a definite position. Rather, they give information about contestants relative to each other: Alice's airplane flew higher than Huang's, and Mariah's airplane did not fly as high as Alice's. From this information you can infer the following order:

HIGHEST	
Statement 1	Statement 2
???	???
Alice	Alice
???	???
Huang	Mariah
???	???
LOWEST	

The question marks are placeholders for one or more other possible contestants. Notice that no information is given about the position of Sidney's airplane.

For a question like this, in which all of the information is relative, it is best to evaluate each option in turn and determine which **must** be true. Options F, G, H, and J **might** be true, but not enough information is given to conclude that any of them **must** be true. Only Option K **must** be true. If Sidney finished second, then Sidney finished ahead of Huang and Mariah, and Alice won. The diagram makes this clear. Even though Huang and Mariah's exact positions are unknown, the question can still be answered correctly.

17. (**C**) If only two of the five flashlights use the same size batteries, there must be four different battery sizes. Since Sarah wants to keep one extra of each size, she must keep a minimum of four extra batteries.

18. (**G**) Start by drawing a diagram with the words "Highest" and "Lowest" and place the three buildings in positions relative to each other. In addition, we know that all buildings in Urbanville are taller than the Stump Building, so add a phrase to the diagram to show that.

HIGHEST
Bump
All buildings in Urbanville
Tork = Stump
LOWEST

Now evaluate each answer option. There is no information to support Option F, that the Bump Building is in Urbanville. It **may** be—it is tall enough—but the problem does not say it is. Options H and J are contradicted by the information in the problem. Option K may or may not be true, so we cannot conclude that it **must** be true. Option G is the correct answer. The Tork Building, which is the same height as the Stump Building, is not tall enough to be in Urbanville.

19. (**A**) This question asks you to match each driver with his or her car and place the cars in order of crossing the finish line. First, look for statements that provide information about the driver of each car. Statement 4 says that Pierre was in the red car, statement 5 says that Stephanie drove the yellow car, and statement 3 says that Charles was not in the blue car. Thus the driver of the blue car must be Jennifer, leaving Charles with the green car. Now put the four cars and drivers in order. Based on statement 1, draw a diagram showing the order in which the cars crossed the finish line.

FIRST
Pierre (red car)
Jennifer (blue car)
LAST

Based on statements 2 and 5, Charles (green car) and Stephanie (yellow car) finished behind Jennifer. Either of the following orders could be correct, based on the information provided.

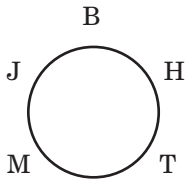
FIRST		FIRST
Pierre		Pierre
Jennifer	**OR**	Jennifer
Charles		Stephanie
Stephanie		Charles
LAST		**LAST**

In either order, the blue car, driven by Jennifer, finished before the green car, driven by Charles.

20. (**F**) The question asks which of the options **must** be true. Evaluate each option in turn. Options G, H, and J **may** be true, but not enough information is provided to conclude that any of them **must** be true. We do not know whether most deserts receive between 3 and 5 inches of rainfall each year, ruling out Option G. Nor can we conclude that deserts are the driest places on earth, since the question provides no definite information about this, or whether deserts always have at least some rainfall each year. Option K can be ruled out, because the information provided for the Sawli and Gobi deserts is rainfall per year, not per month. Only Option F **must** be true. The question says that the Sawli Desert, with a yearly rainfall of 5 inches, is the wettest desert in the world. From this information we can conclude that all deserts must receive less than 6 inches of rainfall each year.

21. (**D**) Draw a diagram that shows five places around a round table. It is not necessary to number the places. The question simply asks you to find the seating arrangement for the five students, starting with Melinda and going to her **left.** Use an initial to represent each student.

The three statements provide information about who is sitting next to (or **not** next to) whom. Two side-by-side pairs are given: Howard is on Tina's right, and Jamal is on Beth's right. But where do they sit in relation to each other? Statement 3 helps you determine how to start. Melinda is **not** sitting next to Beth. We know Jamal is on one side of Beth, so her other side must be occupied by Tina or Howard. Since Howard is at Tina's right, he must be at Beth's left.



Starting with Melinda and going to her left, the seating arrangement is Melinda-Jamal-Beth-Howard-Tina, which is Option D. None of the other answer options meet all the requirements given in the question. For example, Option A places Howard at Tina's left, not at her right, as specified in the question. The other options contain similar problems.

22. (**K**) This question requires you to solve two relationships: matching the horses with their owners and putting the horse-owner pairs in order. The four horses are bay, spotted, white, and chestnut. The four competitors are Anita, Pinh, Mia, and Juan. Start by matching the horses and their owners. List the horses and write down what is known about their owners:

Bay = Anita
Spotted ≠ Anita
White = Mia
Chestnut = ?

Pinh does not own the spotted horse so he must own the chestnut horse. The spotted horse must belong to Juan.

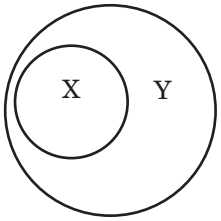
Now place the horses' owners in order, using the information above and the information given in the question. Mia is behind Juan (statement 3) and Juan is directly behind Anita (statement 4). According to statement 5, Juan (the owner of the chestnut horse) is behind Anita (the owner of the bay horse).

Either of the following orders could be correct:

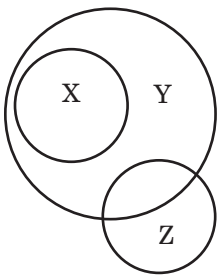
FIRST	FIRST
Anita	Anita
Juan	Juan
Pinh	Mia
Mia	Pinh
LAST	**LAST**

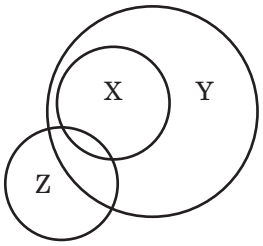
Based on the information given, it is not possible to determine who stood last in line, Mia or Pinh.

23. (**A**) To answer this question correctly, it is important to understand the relationships among the memberships of the three clubs. According to the question, every member of club X is also a member of club Y. It is helpful to draw a diagram to illustrate this relationship:



The question says that some members of club Z are also members of club Y. There are two possibilities for representing this relationship. With the information given, we cannot determine which possibility is correct.





The question says that Sonya is in exactly two of these clubs, but does not specify which ones. She could be in clubs X and Y, or clubs Y and Z. She cannot be in clubs X and Z because membership in club X implies membership in club Y, which adds up to membership in three clubs, not two.

Read each option and evaluate whether it **must** be true, based on the information given. Option A must be true; if Sonya is in club X, then her second club is Y, not Z. The other options may or may not be true, but we cannot conclude that any of them **must** be true. Option C looks appealing, but it has changed the information given in the question. "Every member of club X is also a member of club Y" does not mean "Every member of club Y is also a member of club X."

24. and 25. The directions state that the letters in a sentence may or may not appear in the same order as the words in that sentence. For example, in the first sentence, the first letter (M) may or may not represent the first word (John). You need not find out what every letter represents in the code.

24. (**J**) "Manuel" appears only once in the code, in the third sentence. The second and third sentences are identical except for the names "Lien" and "Manuel." Thus the letter that is unique in each sentence must represent the name. In sentence 3, the only letter that differs from the letters in sentence 2 is Z. So Z must represent "Manuel."

25. (**B**) The letter X appears in the last three sentences, but not in the first sentence. The only word that appears in the last three sentences, but not the first sentence, is "with," so Option B is correct.

READING

(Yani)

26. (**K**) Every reading passage will have a main idea question like this one. Among the answer options, look for a generalization about the passage that is broad, yet inclusive, and incorporates most of the details. Options F and J are important and interesting topics, but they are too specific. Option G is mentioned only briefly. Option H is too broad; the passage is about Yani's art, not the art created by other Chinese children. Option K, "the work of a child prodigy," is correct. The passage describes Yani's childhood and artistic achievement from ages two to sixteen.

27. (**C**) This question asks for information stated directly in the passage. The correct answer is found in the second paragraph, which says that four-year-old Yani's talent was first discovered after her paintings were sent to a famous artist who recognized her talent. The artist arranged for other artists to see her work, which led to Yani's own exhibition. Thus the correct answer is Option C. Options A and D are not true, according to the passage. Option B is true, but occurred long after Yani's talent was first discovered. Option E is not mentioned at all.

28. (**H**) Again the correct answer is found in the second paragraph. The Shanghai artists decided that Yani should have her own exhibition (lines 10-11). The reader can infer that an artist must be extremely talented in order to have her own exhibition. The correct answer is Option H. None of the other options is supported by the passage.

29. (**D**) The question asks you to draw an inference from the information in the passage. Yani's painting style is described in the fourth paragraph: it was "highly expressive" (line 28) and "the paintings seemed to pour out of Yani as though she had invented the style herself" (lines 30-32). The next sentence mentions the "swiftness and certainty with which she chooses her colors and makes her bold, wet, overlapping strokes" (lines 33-35). The answer choice that best summarizes her painting style is Option D, "created with bold strokes." Option A is ruled out by lines 29-30, which say that Yani did not use the careful, delicate strokes of the *gongbi* style. Option B is incorrect; Yani's parents encouraged her to trust her own talent, and her father, himself an artist, stopped painting in order to avoid influencing her work (lines 21-24). Option C cannot be correct because the difficulty of her style is not mentioned. Yani painted in the Chinese style known as *xieyi;* thus she was not influenced by European artists, which rules out Option E.

30. (**G**) Evaluate each option in turn. Option F is ruled out because Yani painted many pictures of monkeys and other zoo animals; the subject matter of her paintings was not unique or unusual. According to the passage, Yani painted in only one style (*xieyi*); she did not master different styles, eliminating Option H. Yani's use of the traditional *xieyi* style rules out Option J. The passage mentions several instances in which critics recognized Yani's work, making Option K incorrect.

    That leaves Option G. Yani was painting at age two and demonstrating her technique at age four. She had her own exhibition before age eight. All of these facts support Option G, "They were created by a very young child."

(Breaching Whales)

31. (**A**) Again you are asked to identify the general topic of the reading passage. Option B is mentioned only in the second paragraph, and Options D and E are minor details. Option C may seem attractive at first, since breaching is probably a means of communication, which could be considered a basis for the formation of social groups among whales. However, it is too broad. The only social groups mentioned in the passage are the pods mentioned in lines 33-34. The correct answer is Option A, "the nature of and reason for whale breaching." The passage spends the first two paragraphs describing the nature of breaching and the last two paragraphs discussing why whales breach.

32. (**J**) The correct answer is stated directly in lines 23-25: "In rare instances, a whale will propel its body completely clear of the water." Option J, "only rarely," restates that information.

33. (**C**) The passage states that "breaching might be useful in courtship as a general show of strength to other whales" (lines 48-50). Thus the correct answer is Option C, "showing its strength." Options A, B, and D are mentioned briefly in lines 9-11, but the author does not present any evidence for those activities. Option E is not mentioned at all.

34. (**G**) This question asks which group the "other whales" referred to in line 50 would most likely be a part of. To find the answer, go to the beginning of the fourth paragraph. It describes how a breaching whale might communicate its size and strength to other whales in courtship. Thus the "other whales" must be whales concerned with mating, which is Option G.

35. (**D**) This question asks you to determine which statement provides the strongest evidence that whales communicate by breaching. Option A focuses on physical effort rather than communication. Options B, C, and E are true statements, but do not provide evidence of communication. The correct answer is Option D, "After one whale breaches, a nearby whale may also breach." The implication is that one whale has received a signal from another whale and is signaling in return; that is, the whales have communicated.

(Swahili Trade)

36. (**F**) Option G may seem correct; however, the term "revival" in the passage refers to European, not African, culture and art. Options H and J are details. Option K is not mentioned. Option F is the best answer because it gives an excellent summary that is neither too broad nor too detailed.

37. (**E**) The answer is found in lines 34-37, which state that the Red Sea traders sought African gold, ivory, and crystals. Thus the correct answer is Option E. Options B and D are products offered, not sought, by the Red Sea traders. Option A refers to a product traded by another group, the Persian Gulf merchants, and Option C is not mentioned as a medium of exchange for any group.

38. (**G**) Options F, H, J, and K are aspects of the trade network, but none is related to the Swahilis' success in establishing trade along the dangerous coast of Africa. Lines 20-24 directly relate the Swahilis' knowledge of the coastal waters to their expanded influence. Option G is the best answer.

39. (**B**) The Swahilis were described as coastal traders (lines 17-19), so we can eliminate Option A. Options C and E are incorrect because the passage did not mention that they sailed outside the East African coast. We can eliminate Option D because traders from the Red Sea came to exchange goods (line 35). Thus the coast of East Africa is the only possible place where the trade took place.

40. (**F**) The first paragraph says that European artists obtained some of their materials through the Swahili trading network. Lines 34-37 state that Muslim traders from the Red Sea bought African gold, ivory, and crystals from Swahili traders to sell to Mediterranean Europe (Option F). Options G, J, and K are incorrect because the Swahili traders did not deal directly with the Europeans, nor did they purchase European art. Option H is contradicted by lines 28-33.

(Oat Seedlings)

41. (**A**) Since the reading passage presents two seemingly unrelated areas of research (fiber optics and oat seedling development) and finds something in common between them, the correct answer must somehow describe their relationship. The correct answer is Option A, "a plant equivalent to fiber optics." The other options are incorrect because they are only details (Options B and E), are too broad (Option C), or are based on an incorrect assumption that one area of research led to the other (Option D).

42. (**G**) The proper placement of the oat seedling's node is discussed in the third paragraph. Lines 39-42 state, "The subsurface red light picked up by the seedling 'light pipe' is believed to trigger node growth at the correct position." The "proper placement" in the question corresponds to "the correct position" in the reading passage. The correct answer is Option G, "the red light penetrating the surface of the soil." Lines 38-39 rule out Option F. Options H and K are not mentioned at all, and Option J is not related to the placement of the node.

43. (**C**) The second and third paragraphs provide information about oat plant development. The only "essential" mentioned is signaled by the word "requires" in line 37: "[T]he development of oat plants and other grasses requires the formation of the leaf based (node) just below the soil surface, regardless of the depth of the seed itself" (lines 35-39). The correct answer, then, is Option C, "The node of the seedling must form just below the surface of the soil." Option D is incorrect, since it contradicts the statement above. Options A and E are not mentioned as essential to oat plant development, and Option B is not a true statement.

44. (**K**) To answer this question correctly, you must locate the relevant information about oat seedlings and fiber optic bundles from several parts of the passage. The first paragraph describes fiber optic bundles, and the remaining three paragraphs describe oat seedlings. Read the five options and evaluate each one. Option F is not true for either fiber optics or oat seedlings. Option G is not correct; scientists did not discover similarities until some time after the development of fiber optic technology (lines 14-17). Option H is true for fiber optics but not for oat plants. Option J is not mentioned at all. Option K is correct. Both oat seedlings (lines 19-25, 42-45) and fiber optics (lines 7-11) allow the transmission of light impulses along their lengths.

45. (**D**) This question requires you to draw a conclusion about two seemingly unrelated areas of research, fiber optics and oat seedling development. A connection between them is given in lines 14-17, after a brief description of fiber optic technology (lines 1-13) and before a longer description of oat seedlings (lines 17-51). The correct answer is Option D, "The parallels between them have been noted, but they were developed independently." None of the other options correctly describes a relationship between oat seedling research and the development of fiber optic technology.

(Braille)

46. (**H**) The passage tells about the development of the technique known as Braille, which was invented by Louis Braille, so Option H, "Louis Braille's invention," is correct. Options F, G, J, and K are all important details of the passage, but none describes the broad theme or topic.

47. (**A**) Since "raised print" was used in books for blind people, Options B and C are clearly incorrect. Option D is incorrect because raised print used the regular alphabet. Option E is incorrect because night-writing, not raised print, was used in the military. The correct answer, Option A, is supported in lines 17-19.

48. (**K**) Some options may appear plausible, but a careful reading will reveal their weaknesses. Option F may have been true, but it is not mentioned in the passage. We cannot assume that Option G is correct, since speed of communication was not mentioned as a factor and thus could not be a primary incentive for night-writing. Option H is not a logical choice, since night-writing was based on French sounds. Option J has no relevance to the passage. Option K, however, is a logical choice, because the messages could be read without a light and lights had to be avoided in order to maintain the secrecy of the Army's location at night.

49. (**C**) Options A and E are incorrect; Braille is alphabetic and uses a system of dot patterns. Option B can be eliminated because earlier writing and printing systems were also based on touch. Option D may be true, but is not suggested in the passage, and would not, in any event, be a **reason** for the success of Braille printing for the blind. Option C is the best answer: The method was simple enough to be learned by "hundreds of thousands" (lines 45-46), and versatile because it could represent many languages, musical notation, and numerals (lines 42-47).

50. (**J**) The statements in Options F and K cannot be supported by the information in the passage. Option G is incorrect, since the need was clear: Most blind people at that time were denied the opportunity to learn to read and write. Option H is incorrect because Braille's blindness was not a hindrance but an incentive for his invention. Braille's desire for knowledge is clearly stated in the passage, especially lines 19-21, making Option J the correct answer.

51. (**B**) Convert the mixed number 3.6 to its fractional equivalent, $3\frac{6}{10}$. Then change it to an improper fraction, which is $\frac{36}{10}$. When dividing by a fraction, multiply the dividend by the reciprocal of the divisor.

$$\left(\frac{36}{10}\right)\left(\frac{3}{2}\right) = \frac{(36)(3)}{(10)(2)} = \frac{54}{10} = 5\frac{4}{10} = 5.4$$

52. (**J**) Let x represent the lowest score that Hilary can receive and earn a B, which requires an average score of 80 points. Set up the formula for the calculation of a mean of 80.

$$\frac{91 + 72 + 69 + 83 + x}{5} = 80$$
$$91 + 72 + 69 + 83 + x = 400$$
$$315 + x = 400$$
$$x = 85$$

53. (**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.

54. (**F**) Let x represent the score for the third game and set up an equation for calculating the mean score of the three games:

$$\frac{60 + 50 + x}{3} = 51$$
$$110 + x = 153$$
$$x = 43$$

55. (**A**) When the three 14-foot chains are linked end to end, their length is 3×14 ft $= 42$ ft. Let x represent the length of one of the longer chains and set up an equation.

$$42 + 2x = 100$$
$$2x = 58$$
$$x = 29$$

56. (**F**) To find the value of x in terms of y, solve for x.

$$2x + 2y - 6 = 14$$
$$2x + 2y = 20$$
$$x + y = 10$$
$$x = 10 - y$$

57. (**B**) Substitute $y - 7$ for x and simplify the expression.

$$3(y - 7) - 3$$
$$3y - 21 - 3$$
$$3y - 24$$

58. (**G**) From the figure, it is clear that the area of square BDHF is 64 sq cm. The diagonals intersect at the center of the square, and since $\overline{CG}$ passes through this center, C is the midpoint of $\overline{BD}$. Therefore, CD = 4 cm and the area of CDHG is 32 sq cm. The area of the unshaded part of CDHG is $\frac{1}{4}$ of the whole rectangle, so its area is 8 sq cm. The area of the shaded region is 32 sq cm − 8 sq cm = 24 sq cm.

59. (**D**) Twenty-five percent of the sample of 2,000 homes is 500 homes. The first year in which at least 500 homes had DVRs was 2006, which is Option D. (If you had incorrectly assumed that the sample consisted of 800 homes, based on the y-axis of the graph, you would conclude that 25 percent of the sample is 200 homes and choose Option A, 2000.)

60. (**K**) The formula for the area (A) of a rectangle is length (l) times width (w): area $= l \cdot w$. The question defines the length in terms of the width: $l = 3w$. Substituting $3w$ for l, we get:

$$3w \cdot w = \text{A}$$
$$\text{or} \quad 3w^2 = \text{A}$$

Since the question states that $w = 8$:

$$3(8^2) = 3(64) = 192 \text{ sq ft}$$

61. (**A**) The question asks you to round 1.095 to the nearest tenth, which is 1.1. (Rounding a number consists of only one operation. You do not need to round it to the nearest hundredth, then to the nearest tenth.) The question asks how much greater 1.1 is than 1.095. The answer is Option A, which is 0.005. (Some of the wrong answers result from errors with the decimal point.)

62. (**K**) The angles are formed by the intersection of two lines. The angle labeled 53° is opposite to the unlabeled angle, which by definition is also 53°. The sum of the four angles is 360°. Neither x nor y is being solved for, only their sum.

$$x + y + 2(53) = 360$$
$$x + y = 360 - 106$$
$$x + y = 254$$

63. (**A**) Let the quotient be q when n is divided by 5.

$$\begin{aligned} n &= 5q + 2 \\ n + 4 &= 5q + 2 + 4 \\ &= 5q + 6 \\ &= 5q + 5 + 1 \\ &= 5(q + 1) + 1 \end{aligned}$$

From this we know that the remainder must be 1 when $n + 4$ is divided by 5.

64. (**G**) Form an equation for the perimeter of the polygon with the information given:

$$\begin{aligned} 3x + 6(2x) + 12 + 13 &= 100 \\ 3x + 12x + 25 &= 100 \\ 15x &= 75 \\ x &= 5 \end{aligned}$$

65. (**D**) When the sum of two integers is odd, one integer must be odd and the other must be even. The sums N + M and M + T are both odd. If M is odd, then both N and T are even. If M is even, then both N and T are odd.

Evaluate each answer option. Options A and B **may** be true, but neither **must** be true. If N and T are both odd, their product will be odd; if both are even, their product will be even. Thus neither option **must** be true. Option D will always be true. The sum of two odd numbers, and the sum of two even numbers, will always be even. Options C and E cannot be true.

66. (**F**) Substitute $x = 5.5$ and $y = 4.5$ into the expression:

$$\begin{aligned} (x + y)(y - x) &= (5.5 + 4.5)(4.5 - 5.5) \\ &= 10(^{-}1) \\ &= {}^{-}10 \end{aligned}$$

67. (**B**) Factorize 210 into its prime factors.

$$\begin{aligned} 210 &= 21 \times 10 \\ &= 3 \times 7 \times 2 \times 5 \\ &= 2 \times 3 \times 5 \times 7 \end{aligned}$$

The greatest prime factor is 7.

68. (**K**) By the Distributive Rule,
$2x(3y + 1) = 2x \bullet 3y + 2x \bullet 1 = 6xy + 2x$

69. (**A**) Remember that 20% is equivalent to 0.20, and 5% to 0.05. First solve for N:
$N = (0.05)(1{,}000) = 50$
Now you can solve for M:
$M = (0.20)N = (0.20)(50) = 10$

70. (**G**) The diagonals ($\overline{WY}$ and $\overline{XZ}$) are lines of symmetry of square WXYZ. Since points W, X, Y, and Z are points on the circle, the entire figure is also symmetrical along $\overline{WY}$ and $\overline{XZ}$. The axis of symmetry for a circle is the diameter, so the diagonal of the square is equal to the diameter of the circle. Since the diagonal is 16 cm, the diameter is also 16 cm and the circumference is 16π.

71. (**C**) When a number is multiplied by 100, its decimal point moves two places to the right. For the numeral Q,RSX,Y23.1, add a zero after the 1 in the tenths place and move the decimal two places to the right. The result is QRS,XY2,310. The letter in the millions place is S.

72. (**G**) First find how many compartments will be filled by dividing 387 by 14. The answer is 27 full compartments with 9 people left to ride in the last compartment. (The total number of people the shuttle will hold is extraneous information.)

73. (**B**) Solve the equation.

$$\frac{2(x + 1)}{3} = 1$$
$$x + 1 = \frac{3}{2} = 1\frac{1}{2}$$
$$x = \frac{1}{2}$$

74. (**H**) To find the median, put the numbers in order: 95, 106, 106, 106, 113, 117, 117, 127, 142. The middle number (the fifth one) is 113. (Notice that the mode is 106, which is Option G.)

75. (**E**) RS = (5 − 1) = 4
QR = (1 − ⁻4) = 1 + 4 = 5
RS + QR = 4 + 5 = 9

76. (**G**) Evaluate each option to determine which expression **must** be positive. Options F and H must be negative, and Options J and K could be either positive or negative. Only Option G **must** be positive, because the addition of a positive number (z) and the square of any number (w^2) will always be positive.

77. (**A**) 90% of 9 = 0.9 × 9 = 8.1.
9% of 90 = 0.09 × 90 = 8.1.
So the difference is 0.

78. (**K**) Let the number of laps that Ruby swam be x. Then Katie swam $\frac{3}{4}x$ laps. Since Katie swam $3\frac{1}{2}$ laps, we have:

$$\frac{3}{4}x = 3\frac{1}{2}$$

$$x = \frac{3\frac{1}{2}}{\frac{3}{4}} = \frac{7}{2} \bullet \frac{4}{3} = \frac{14}{3} = 4\frac{2}{3}$$

79. (**D**) First simplify the fraction:

$$\frac{4.2N}{1.2} = \frac{42N}{12} = \frac{7N}{2}$$

This number is an integer. This means that N must be an even number, otherwise, $\frac{7N}{2}$ will not be an integer. We also know that N is an element of the set S. The only even number in S is 2.0. Therefore, $N = 2.0$. (Note that 0.2 and 1.4 are not even numbers, as only integers can be even or odd.)

80. (**H**) Raoul is now R years old and Phil is 8 years older:

$$P = R + 8$$

Two years from now, Phil will be twice as old as Raoul:

$$(P + 2) = 2(R + 2)$$

By substitution,

$$[(R + 8) + 2] = 2\,(R + 2)$$

$$R + 10 = 2R + 4$$

$$6 = R$$

Raoul is currently 6 years old.

81. (**C**) It is given that QS = 6 centimeters and that QR = RS. We can use that information to find the length of $\overline{RS}$.

QS = QR + RS
Using substitution because QR = RS:
QS = RS + RS
QS = 2(RS)
6 = 2(RS)
3 = RS
Now we can calculate the length of $\overline{ST}$.
We know RT = 7 cm from the diagram and we know RS = 3 cm.
RT = RS + ST
7 = 3 + ST
4 = ST
The length of $\overline{PT}$ is:
PT = PS + ST = 10 + 4 = 14 cm.

82. (**K**) Daquan sold x hot dogs. Let c represent the number of hot dogs that Caitlyn sold.

$$c + x = 5x - 2$$

$$c = 4x - 2$$

83. (**C**) You may assume that the fish caught were a random sample and represent the total number of fish in the pond. Of the 50 fish caught, 15 fish, or 30%, were male. Therefore, 30% of 10,000, or 3,000, is the best estimate of the number of male fish.

84. (**K**) Solve for s.

$$\frac{3t - s}{4} = 8s$$

$$3t - s = 32s$$

$$3t = 33s$$

$$\frac{t}{11} = s$$

85. (**E**) Of the 27 marbles, 7 were black, 4 were yellow, and 16 were red. After 3 black marbles were removed, 24 marbles remained. Since none of the 3 marbles removed were red, there are still 16 red marbles in the can. The probability of a red marble being drawn next is $\frac{16}{24}$, or $\frac{2}{3}$.

86. (**H**) If Anna ate twice as much as Joe, she ate $\frac{2}{8}$ of the pizza. Together they ate $\frac{3}{8}$, leaving $\frac{5}{8}$ remaining. Thus, the ratio of the amount they ate to the amount remaining is 3:5.

87. (**B**) If Lindsey is now x years old and Xiu Dan is 2 years older, he is now $x + 2$. Therefore, 3 years ago his age was $x + 2 - 3$, or $x - 1$.

88. (**G**) You are given the following relationships:

660 ft = 1 furlong

1 yd = $\frac{1}{2}$ fathom

The problem asks you to determine the relationship between fathoms and furlongs.

1 yd = 3 ft = $\frac{1}{2}$ fathom

1 fathom = 2 yd = 6 ft

1 furlong = 660 ft = $\frac{660}{6}$ fathoms = 110 fathoms

89. (**A**) The values of r and s are not known, but the information given ($r \neq s$ and $r \neq -s$) rules out the possibility that the denominator of either fraction could be zero, which would result in an undefined expression. Simplify the expression by canceling out $r + s$ and $r - s$. Only rs remains.

90. (**H**) Complete the calculations for the quantity under the square root sign.

$$\sqrt{6^2 + 7^2}$$
$$\sqrt{36 + 49}$$
$$\sqrt{85}$$

You need to know some common squares before you can solve the problem. 85 falls between the squares of 9 and 10, which are 81 and 100, respectively.

$$81 < 85 < 100$$
$$9^2 < 85 < 10^2$$

91. (**D**) Use the formula of the area of a triangle to solve for BE.

$$\text{Area} = \frac{1}{2}(\text{base})\,(\text{height})$$
$$25 = \frac{1}{2}(5)\,(\text{BE})$$
$$25 = 2.5\,(\text{BE})$$
$$10 = \text{BE}$$

The area of a parallelogram is base × height. The base of ABCD is 50 cm. BE is perpendicular to AED, so the height of the parallelogram is 10 cm.

Area = (50 cm)(10 cm)
Area = 500 sq cm

92. (**K**) Numbers that have 10 as a factor always end with 0. Numbers that have 5 as a factor always end with 5 or 0. Therefore, numbers that have 5 as a factor but do not have 10 as a factor always end with 5. Only one number ends with 5 in a consecutive group of 10 numbers. Notice that the given set can be divided into 18 groups:

1–10, 11–20, 21–30, . . . , 161–170, and 171–178

Each of these groups contains exactly one number ending with 5. Therefore, there are 18 such numbers in the set.

93. (**A**) Note that if 1 in. is equivalent to 2 ft, 1 sq in. is equivalent to 4 sq ft. Bedroom B consists of 6 • 4 full squares and 6 half-squares. So its area in the floor plan is 27 sq in., which is equivalent to 27 • 4 sq ft = 108 sq ft. Next, convert to square yards: 1 sq yd = 9 sq ft. So 108 sq ft = 12 sq yd.

94. (**H**) The sum of the marbles is 24, 5 of which are black. After Shaniece removes 4 marbles, 20 marbles remain, 4 of which are black. Shaniece's probability of choosing a black marble next out of the remaining 20 marbles is $\frac{4}{20} = \frac{1}{5}$.

95. (**D**) The distance from A to B is $\frac{1}{6}$ of a revolution. The arrow will point to B for the eleventh time after $10\frac{1}{6}$ revolutions. The rate of the arrow is

$$5\,\frac{\text{rev}}{\text{min}} = 5\,\frac{\text{rev}}{\text{min}} \times \frac{1\text{ min}}{60\text{ sec}} = \frac{1\text{ rev}}{12\text{ sec}}$$

Use the formula for rate × time = distance. Let x represent the number of seconds.

$$x\text{ sec}\left(\frac{1\text{ rev}}{12\text{ sec}}\right) = 10\frac{1}{6}\text{ revolutions}$$
$$\frac{x}{12} = \frac{61}{6}$$
$$x = \frac{(61)\,(12)}{6} = (61)\,(2)$$
$$= 122\text{ sec}$$

96. (**G**) The answers are given in cubic yards, so the dimensions of the foam must be calculated in yards. The width and length are 10 yards and 50 yards, respectively. The depth (height) of the foam is 9 inches, which is $\frac{1}{4}$ yard.

Volume = (length) (width) (height)
$= (50)\,(10)\left(\frac{1}{4}\right)$
$= \frac{500}{4}$ cu yd
$= 125$ cu yd

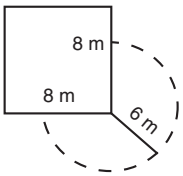
97. (**B**) The winner received 55% of 17,000 votes, or (0.55)(17,000) = 9,350 votes. The loser received the remaining votes, 17,000 – 9,350 = 7,650 votes. To calculate how many more votes the winner received than the loser, subtract 7,650 from 9,350 to get 1,700. If you did not read the problem carefully, you might have stopped after calculating the number of votes received by the winner and selected Option E, or stopped after calculating the number of votes received by the loser and selected Option D.

There is a simpler way to obtain the answer. The winner received 55% of the votes, so the loser received 45%. The difference between the number of votes received by the winner and loser is 10% of the votes, which is 1,700.

98. (**F**) One side of the square is on the x-axis, and another side is on the y-axis. That means one corner of the square must be at the point where the axes intersect, which is the origin (0, 0). Depending on where the square is placed, the points in Options G through K might or might not be corners.

99. (**B**) It is given that 1 in. is equivalent to 100 ft. Squaring both sides, $(1 \text{ in.})^2$ is equivalent to $(100 \text{ ft})^2$, or 1 sq in. = 10,000 sq ft. Therefore, 1 sq ft is equivalent to $\frac{1}{10{,}000}$ sq in., which is 0.0001 sq in.

100. (**H**) It may be helpful to draw a diagram of the shed and the grazing area.



(Notice that the lengths of the sides of the shed are not important to the solution of the problem, except to prevent the goat from walking around a corner.) The resulting grazing area is a circle with radius 6 meters, minus the area of the circle taken by the shed. The shed is rectangular so all of its corners are right angles. Thus the grazing area is $\frac{3}{4}$ of the area of the circle. The area of a circle is πr^2.

$$\text{Grazing area} = \frac{3}{4}\pi 6^2$$
$$= \frac{3}{4}\pi (36)$$
$$= 27\pi \text{ sq m}$$

Answer Key for Sample Test

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


irections: Read the
given and choose th
to each question.