

## June 2014 Administration

**ESSAY**Unauthorized copying or reuse of  
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Time — 25 minutes

**Turn to page 2 of your answer sheet to write your ESSAY.**

The essay gives you an opportunity to show how effectively you can develop and express ideas. You should, therefore, take care to develop your point of view, present your ideas logically and clearly, and use language precisely.

Your essay must be written on the lines provided on your answer sheet—you will receive no other paper on which to write. You will have enough space if you write on every line, avoid wide margins, and keep your handwriting to a reasonable size. Remember that people who are not familiar with your handwriting will read what you write. Try to write or print so that what you are writing is legible to those readers.

**Important Reminders:**

- **A pencil is required for the essay.** An essay written in ink will receive a score of zero.
- **Do not write your essay in your test book.** You will receive credit only for what you write on your answer sheet.
- **An off-topic essay will receive a score of zero.**
- **If your essay does not reflect your original and individual work, your scores for the entire test may be canceled.**
- **An electronic copy of your essay will be made available to each of your designated score recipients: colleges, universities, and scholarship programs.**

You have twenty-five minutes to write an essay on the topic assigned below.

Think carefully about the issue presented in the following excerpt and the assignment below.

People who move from place to place often say that they feel happier and more fulfilled than they would if they lived out their lives in one place. Other people say that spending a lifetime in the same community is actually a more rewarding option, because doing so enables them to maintain a strong network of family and friends—something that people who move around a lot may find difficult to develop.

**Assignment:** Are people who stay in the same community happier than those who move from one place to another? Plan and write an essay in which you develop your point of view on this issue. Support your position with reasoning and examples taken from your reading, studies, experience, or observations.

**BEGIN WRITING YOUR ESSAY ON PAGE 2 OF THE ANSWER SHEET.**

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

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## SECTION 2

Time — 25 minutes

35 Questions

Turn to Section 2 (page 4) of your answer sheet to answer the questions in this section.

**Directions:** For each question in this section, select the best answer from among the choices given and fill in the corresponding circle on the answer sheet.

The following sentences test correctness and effectiveness of expression. Part of each sentence or the entire sentence is underlined; beneath each sentence are five ways of phrasing the underlined material. Choice A repeats the original phrasing; the other four choices are different. If you think the original phrasing produces a better sentence than any of the alternatives, select choice A; if not, select one of the other choices.

In making your selection, follow the requirements of standard written English; that is, pay attention to grammar, choice of words, sentence construction, and punctuation. Your selection should result in the most effective sentence—clear and precise, without awkwardness or ambiguity.

## EXAMPLE:

Laura Ingalls Wilder published her first book and she was sixty-five years old then.

- (A) and she was sixty-five years old then
- (B) when she was sixty-five
- (C) at age sixty-five years old
- (D) upon the reaching of sixty-five years
- (E) at the time when she was sixty-five

(A)  (B)  (C)  (D)  (E)

2. Although there are more electric vehicles available to drivers than ever before, traditional gasoline-powered vehicles are the ones that remain much more common.
  - (A) are the ones that remain much more common
  - (B) are what remain much more common
  - (C) remain much more common
  - (D) remain more commoner
  - (E) remain most commonest
3. By midnight a heavy snow has began to fall, enveloping the city in a soft, white silence.
  - (A) has began
  - (B) that began
  - (C) begun
  - (D) had begun
  - (E) having begun
4. After looking at the subway map, Vincent has realized that he took the wrong train.
  - (A) has realized that he took
  - (B) realizes his having taken
  - (C) realized that he has taken
  - (D) realized that he had took
  - (E) realized that he had taken

1. Candice was teaching herself to make risotto, an Italian rice dish required time and patience.
  - (A) required
  - (B) that requires
  - (C) requires
  - (D) does require
  - (E) which requiring

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2

5. A synthetic fiber developed in the 1930s as a substitute for silk, the uses of nylon include clothing, seat belts, and even parachutes.
- (A) the uses of nylon include clothing, seat belts, and even parachutes  
 (B) included in the uses of nylon are: clothing, seat belts, and even parachutes  
 (C) clothing, seat belts, and even parachutes are included in the uses of nylon  
 (D) they use nylon to make clothing, seat belts, and even parachutes  
 (E) nylon is used to make clothing, seat belts, and even parachutes
6. Women first competed alongside men in Olympic equestrian events in 1952, they have since won many medals in these competitions.
- (A) 1952, they have since won many medals  
 (B) 1952, they had since won many medals  
 (C) 1952, they have won many medals since then  
 (D) 1952 and have since won many medals  
 (E) 1952 and winning many medals since then
7. Reclusive by nature, coral snakes will generally attempt to flee when confronted by humans, biting only as a last resort.
- (A) Reclusive by nature, coral snakes will generally attempt to flee when confronted by humans, biting  
 (B) Reclusive by nature, coral snakes, who will generally attempt to flee when confronted by humans, biting  
 (C) Coral snakes, who are reclusive by nature, will generally attempt to flee when confronted by humans, they bite  
 (D) Coral snakes, reclusive by nature, they will generally attempt to flee when confronted by humans and bite  
 (E) Generally attempting to flee when confronted by humans are coral snakes: it is reclusive by nature and bites
8. The reason politicians should study classical rhetorical principles is that it offers rules and techniques for effective public speaking.
- (A) is that it offers  
 (B) is that it offered  
 (C) is that they offer  
 (D) are because they offer  
 (E) are because these offer
9. Despite the increasing acceptance of new automotive technologies, the growth of hybrid car sales in the United States were not as strong as many analysts had expected.
- (A) were not as strong as many analysts had expected  
 (B) were not as strong as many analysts have expected  
 (C) were not as strong as many analysts expected  
 (D) was not as strong as many analysts expect  
 (E) was not as strong as many analysts had expected
10. When painting buildings near power lines, a metal ladder should not be used, as accidental contact between the ladder and the lines could cause an electrical shock.
- (A) a metal ladder should not be used  
 (B) a metal ladder should not be in use  
 (C) a metal ladder that should not be used  
 (D) there should not be a metal ladder in use  
 (E) one should not use a metal ladder
11. The computer industry occasionally undergoes upheavals during which an aging technology is replaced by something newer, cheaper, and better.
- (A) upheavals during which  
 (B) upheavals that  
 (C) upheavals, which  
 (D) upheavals, where  
 (E) upheavals,

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The following sentences test your ability to recognize grammar and usage errors. Each sentence contains either a single error or no error at all. No sentence contains more than one error. The error, if there is one, is underlined and lettered. If the sentence contains an error, select the one underlined part that must be changed to make the sentence correct. If the sentence is correct, select choice E. In choosing answers, follow the requirements of standard written English.

EXAMPLE:

The other delegates and him immediately  
A B C  
accepted the resolution drafted by the  
D  
neutral states. No error  
E

(A) ● (C) (D) (E)

12. Thinking that customers might prefer jade earrings  
A B  
to those made of turquoise, the jeweler placing them  
C D  
in the front of the window display. No error  
E
13. Tourists which want to explore the forested areas  
A B  
of the Jaldapara Wildlife Sanctuary in India must ride  
C  
elephants to do so. No error  
D E
14. In 1919 Alice Hamilton, by then a leading expert  
A  
on lead poisoning and one of only a handful of  
B  
industrial safety specialists, were invited to teach  
C D  
at Harvard. No error  
E
15. Because of unforeseen changes to the league rules,  
A B  
the games scheduled to be played at the end of this  
C  
month will be postponed until after our new season  
started. No error  
D E
16. Although the freeway system in the city is quite  
A B  
complex, traffic usually moves speedy even during  
C D  
rush hours. No error  
E
17. Located in California's White Mountains are  
A  
a bristlecone pine tree that started growing  
B  
around the time the Great Pyramid of Giza  
C  
was completed in the third millennium B.C.E.  
D  
No error  
E
18. The belief that if you eat food containing garlic,  
A  
one will be healthy was long judged superstitious  
B  
but is now thought to have scientific merit. No error  
C D E
19. The plastic trash can has become perhaps the  
A  
more familiar of the hundreds of products that  
B C  
Charles Harrison designed for home use. No error  
D E

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20. Although the old penny-farthing bicycle, with its  
A B  
high front wheel and small back one, was not  
very fast, it must have been fun to ride. No error  
C D E
21. With startling suddenness, a reef loomed before the  
A  
weary sailors, which were cautiously rowing their  
B C D  
battered boat through a thick fog. No error  
E
22. The term "Anasazi," sometimes mistakenly used  
A  
to refer to the ancestors of modern Pueblo Indians,  
B  
is in fact Navajo in origin and means "ancient  
C D  
enemies." No error  
E
23. Although both soldier beetles and Asian longhorn  
beetles are insects that can feed on trees, an important  
A  
difference between these two species is that it is  
B C  
much more harmful to living trees. No error  
D E
24. Although many domesticated rabbits become  
A  
alarmed when they are lifted off the ground  
B  
and therefore do not enjoy to be held, some  
C  
tolerate such handling quite well. No error  
D E
25. For cryptographers—experts who decipher messages  
A B  
in secret code—shorter codes are often more difficult  
C  
than solving longer ones. No error  
D E
26. According to the recipe, Francisco was  
A  
suppose to use buttermilk, but since he had none,  
B C  
he substituted regular milk soured with lemon juice.  
D  
No error  
E
27. Though the left and right side of the brain share  
A B  
information, language is typically processed on  
C  
the left side, while spatial abilities are generally  
D  
concentrated on the right side. No error  
E
28. Some political candidates do not expect to be elected,  
A  
running for office simply in the hope to generate  
B  
publicity for issues that otherwise might be ignored.  
C D  
No error  
E
29. Even after lowering the volume, Suzanne found that  
A B  
her electric guitar so annoyed her neighbors that they  
C D  
complained to the building's manager. No error  
E

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**Directions:** The following passage is an early draft of an essay. Some parts of the passage need to be rewritten.

Read the passage and select the best answers for the questions that follow. Some questions are about particular sentences or parts of sentences and ask you to improve sentence structure or word choice. Other questions ask you to consider organization and development. In choosing answers, follow the requirements of standard written English.

Questions 30-35 refer to the following passage.

(1) Since its invention in the mid-nineteenth century, chewing gum has become one of the world's most popular confections. (2) Over 374 trillion sticks of gum are now produced annually, a number so huge that if they were stacked on top of each other, the resulting tower would soar more than two million miles high. (3) That's a lot of gum, and the corresponding increase in chewing-gum litter creates a very sticky issue for cities that want to keep their sidewalks clean.

(4) Recommended methods for getting rid of gum stuck to the sole of a shoe include scraping, chilling the gum with ice so that it is easier to peel off, and applying various kinds of oils to make the gum more pliable. (5) Imagine, then, the challenge faced by municipalities that have been trying to remove millions of pieces of carelessly discarded gum from sidewalks. (6) Like the methods people use to remove chewing gum from shoes, large-scale gum-removal techniques are only partly effective. (7) Not only that, but they are quite expensive. (8) People who do not chew gum cannot understand why anyone would want to. (9) Removing gum from the sidewalk through scraping, sandblasting, or the use of solvents can cost as much as three dollars per piece of gum.

(10) Taking a different approach, some local governments are engaging in experiments. (11) They have to do with chewing-gum recycling programs and getting citizens to support them. (12) Yes, gum can be recycled—not, thankfully, to make new chewing gum but to manufacture a rubberlike substance for use in construction. (13) To encourage this, cities are installing gumball-colored recycling containers, each capable of holding up to a thousand pieces of gum, in public places. (14) The hope is that anyone who has ever stepped on a freshly discarded wad of gum will be eager to use the recycling bin.

30. In context, which is best to add at the very beginning of sentence 2 (reproduced below) ?

*Over 374 trillion sticks of gum are now produced annually, a number so huge that if they were stacked on top of each other, the resulting tower would soar more than two million miles high.*

- (A) Because of it,  
(B) In fact,  
(C) Nevertheless,  
(D) Likewise,  
(E) On the other hand,

31. In context, which is the best version of the underlined portion of sentence 3 (reproduced below) ?

*That's a lot of gum, and the corresponding increase in chewing-gum litter creates a very sticky issue for cities that want to keep their sidewalks clean.*

- (A) (as it is now)  
(B) had literally been sticky  
(C) prolongs the debate  
(D) is more of a nuisance than a serious problem  
(E) would, however, be a challenge

32. Which of the following sentences, if inserted immediately before sentence 4, would most effectively introduce the second paragraph and link it to the first paragraph?

- (A) Removing chewing gum is notoriously difficult.  
(B) As we all know, there is more than one way to remove chewing gum from the bottom of one's shoes.  
(C) Many people who chew gum throw it on the ground.  
(D) You should, therefore, never underestimate the power of chewing gum.  
(E) London is one city caught in the struggle to remove chewing gum from public pavements.

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33. In context, which of the following would be the best way to revise and combine sentences 10 and 11 (reproduced below) ?

*Taking a different approach, some local governments are engaging in experiments. They have to do with chewing-gum recycling programs and getting citizens to support them.*

- (A) Taking a different approach, unfortunately, some local governments are engaging in experiments with recycling programs and getting citizens to support them.
- (B) Taking a different approach, they have been engaging in experiments with chewing-gum recycling programs and getting citizens to support them.
- (C) Taking a different approach, some local governments are experimenting with chewing-gum recycling programs and getting citizens to support these efforts.
- (D) Some local governments took a different approach; their experiments had to do with recycling programs and getting citizens to support these efforts.
- (E) Experimenting with chewing-gum recycling programs and getting citizens to support them, some local governments are nonetheless taking a different approach.

34. In context, which of the following phrases would most effectively replace the word “this” in sentence 13 (reproduced below) ?

*To encourage this, cities are installing gumball-colored recycling containers, each capable of holding up to a thousand pieces of gum, in public places.*

- (A) removal efforts
- (B) gum chewing
- (C) such things
- (D) new construction
- (E) citizen participation
35. Which of the following sentences should be deleted because it does not contribute to the logical development of the passage?
- (A) Sentence 1
- (B) Sentence 5
- (C) Sentence 8
- (D) Sentence 9
- (E) Sentence 12

**S T O P**

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## SECTION 3

Time — 25 minutes

20 Questions

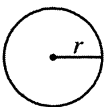
Turn to Section 3 (page 4) of your answer sheet to answer the questions in this section.

**Directions:** For this section, solve each problem and decide which is the best of the choices given. Fill in the corresponding circle on the answer sheet. You may use any available space for scratch work.

Notes

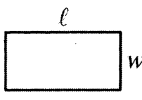
- The use of a calculator is permitted.
- All numbers used are real numbers.
- Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.
- Unless otherwise specified, the domain of any function  $f$  is assumed to be the set of all real numbers  $x$  for which  $f(x)$  is a real number.

Reference Information

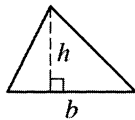


$$A = \pi r^2$$

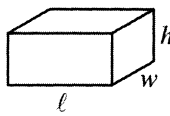
$$C = 2\pi r$$



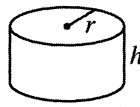
$$A = \ell w$$



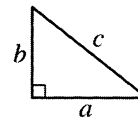
$$A = \frac{1}{2}bh$$



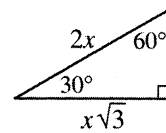
$$V = \ell wh$$



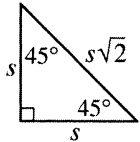
$$V = \pi r^2 h$$



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



Special Right Triangles

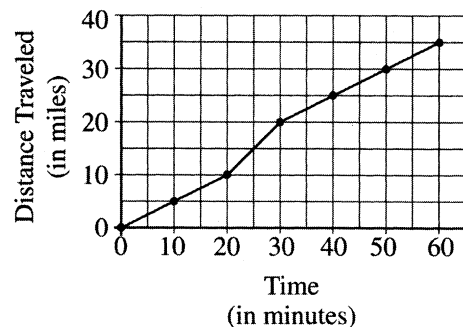


The number of degrees of arc in a circle is 360.

The sum of the measures in degrees of the angles of a triangle is 180.

1. If  $x^2 - 4 = 0$ , what is the value of  $x^4$ ?

- (A) -16  
(B) -8  
(C) 0  
(D) 8  
(E) 16



2. The graph above shows the distance traveled by a car during one hour. According to this graph, how many minutes did it take the car to travel the first 20 miles?

- (A) 10  
(B) 20  
(C) 30  
(D) 40  
(E) 50

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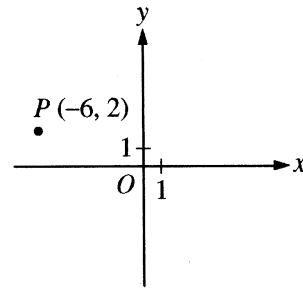
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3. If the number 2.05 is written as a fraction in the form

$\frac{x}{100}$ , what does  $x$  equal?

- (A) 0.205  
(B) 20.5  
(C) 205  
(D) 2,050  
(E) 20,500



5. In the  $xy$ -plane above, point  $Q$  (not shown) is located 5 units directly below point  $P$ . Point  $R$  (not shown) is the reflection of point  $Q$  over the  $y$ -axis. What are the coordinates of point  $R$ ?

- (A)  $(-6, -8)$   
(B)  $(-6, -3)$   
(C)  $(-6, -2)$   
(D)  $(6, -3)$   
(E)  $(6, -2)$

One of Tom's sweaters is brown.

4. If the statement above is true, which of the following statements must also be true?

- (A) All of Tom's sweaters are green.  
(B) All of Tom's sweaters are brown.  
(C) One of Tom's sweaters is green.  
(D) None of Tom's sweaters are green.  
(E) Not all of Tom's sweaters are green.

6. If  $a$  and  $b$  are integers for which  $3a$  is an odd number and  $b$  is an even number, which of the following must be an odd number?

- (A)  $a + b$   
(B)  $2a + b$   
(C)  $3a - 1$   
(D)  $b + 2$   
(E)  $ab$

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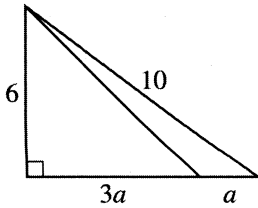
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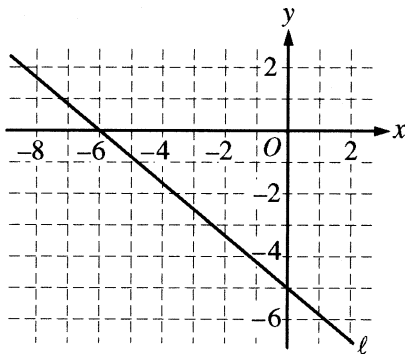
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7. In the figure above, what is the value of  $a$ ?

- (A)  $\frac{1}{2}$   
 (B) 1  
 (C)  $\frac{3}{2}$   
 (D) 2  
 (E)  $\frac{5}{2}$



8. Which of the following is an equation of line  $\ell$  graphed in the  $xy$ -plane above?

- (A)  $y = -\frac{5}{6}x - 6$   
 (B)  $y = -\frac{5}{6}x - 5$   
 (C)  $y = -\frac{5}{6}x + 5$   
 (D)  $y = \frac{5}{6}x - 5$   
 (E)  $y = \frac{5}{6}x - 6$

9. If  $(3^n)^2 = 9 \cdot 3 \cdot 3 \cdot 3$ , what is the value of  $n$ ?

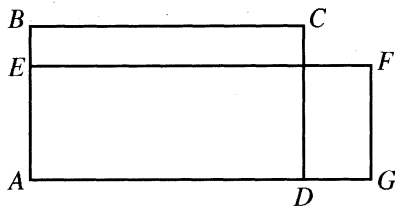
- (A) 1  
 (B) 2  
 (C) 3  
 (D) 4  
 (E) 5

10. If 6 more than a number  $x$  is equal to the square of  $x$ , which of the following equations, when solved, gives all possible values of  $x$ ?

- (A)  $x^2 + 7x = 0$   
 (B)  $x^2 + x + 6 = 0$   
 (C)  $x^2 + x - 6 = 0$   
 (D)  $x^2 - x + 6 = 0$   
 (E)  $x^2 - x - 6 = 0$

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Note: Figure not drawn to scale.

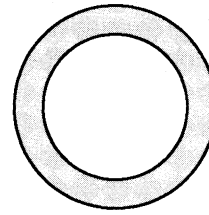
11. In the figure above,  $ABCD$  and  $AEFG$  are rectangles of equal area. If  $AB = 14$ ,  $BC = 42$ , and  $BE = 2$ , what is the length of  $\overline{DG}$ ?

(A) 2  
(B) 3  
(C) 4  
(D) 5  
(E) 7

$-\frac{1}{3}, \pi, -\sqrt{49}, \frac{1}{4}, -0.006, (-1)^{11}, (-2)^4$

12. If the numbers in the list above are to be arranged from least to greatest, which number will be in the middle of the new list?

(A)  $\pi$   
(B)  $-\sqrt{49}$   
(C)  $\frac{1}{4}$   
(D)  $-0.006$   
(E)  $(-1)^{11}$



13. The figure above shows two circles that have the same center. The radius of the smaller circle is 5, and the radius of the larger circle is 7. What is the area of the shaded region?

(A)  $4\pi$   
(B)  $6\pi$   
(C)  $12\pi$   
(D)  $24\pi$   
(E)  $35\pi$

14. How many positive values of  $x$  are possible if  $4x + 2y \leq 4$  and  $y \geq 2$ ?

(A) None  
(B) One  
(C) Two  
(D) Four  
(E) More than four

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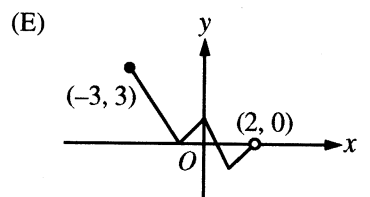
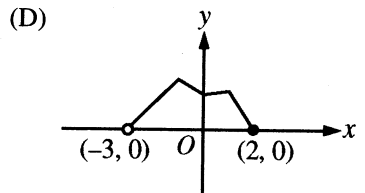
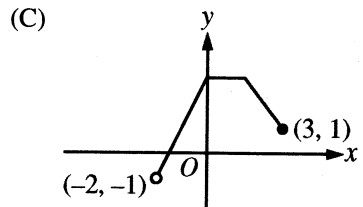
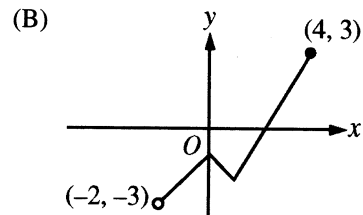
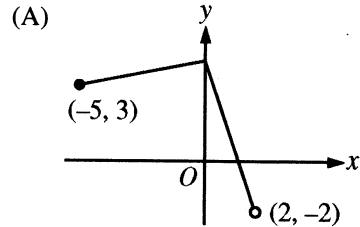
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15. If the average (arithmetic mean) of  $a$  and  $b$  is 8, and the average of  $c$ ,  $d$ , and  $e$  is 18, what is the average of  $a$ ,  $b$ ,  $c$ ,  $d$ , and  $e$ ?
- (A) 10.4  
(B) 12  
(C) 13  
(D) 14  
(E) 16

16. Three lines in a plane intersect at a point to form six nonoverlapping angles. What is the maximum number of the six angles that could measure more than  $90^\circ$  but less than  $180^\circ$ ?
- (A) Two  
(B) Three  
(C) Four  
(D) Five  
(E) Six

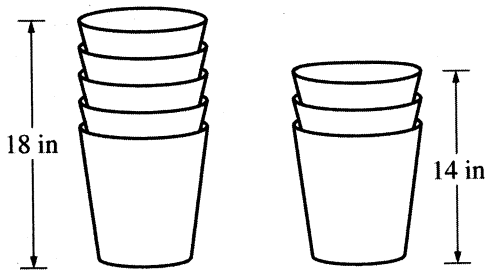
17. The function  $f$  is only defined for values of  $x$  such that  $-2 < x \leq 3$ . Which of the following could be the graph of  $y = f(x)$  in the  $xy$ -plane?



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18. The figure above shows the heights, in inches, of two stacks of identical pails. If the pails stack uniformly, what would be the height, in inches, of a stack of 20 of these pails?

(A) 40  
(B) 48  
(C) 56  
(D) 64  
(E) 72

19. In the  $xy$ -plane, the graph of  $y = 5x^3 - 4x^2 + 3x - 2$  intersects the  $y$ -axis at  $(r, s)$ . What is the value of  $r$ ?

(A) -4  
(B) -2  
(C) 0  
(D) 3  
(E) 5

STUDENT PREFERENCES  
IN SALADS AND DRESSINGS

|               |        | Type of Dressing |         |       |
|---------------|--------|------------------|---------|-------|
|               |        | French           | Italian | Ranch |
| Type of Salad | Garden | 50               | 46      | 24    |
|               | Chef   | 4                | 20      |       |

20. The table above summarizes the results of a cafeteria survey of student preferences among 2 different salads and 3 different dressings, except that one number is missing. Each student chose one type of salad and one type of dressing. If 40 percent of the students chose ranch dressing as their preference, what is the total number of students who chose chef salad as their preference?

(A) 36  
(B) 80  
(C) 96  
(D) 100  
(E) 120

**STOP**

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

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## SECTION 4

Time — 25 minutes

20 Questions

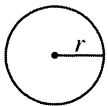
Turn to Section 4 (page 5) of your answer sheet to answer the questions in this section.

**Directions:** For this section, solve each problem and decide which is the best of the choices given. Fill in the corresponding circle on the answer sheet. You may use any available space for scratch work.

Notes

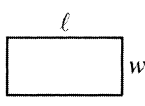
- The use of a calculator is permitted.
- All numbers used are real numbers.
- Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.
- Unless otherwise specified, the domain of any function  $f$  is assumed to be the set of all real numbers  $x$  for which  $f(x)$  is a real number.

Reference Information

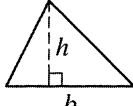


$$A = \pi r^2$$

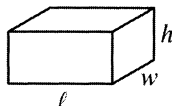
$$C = 2\pi r$$



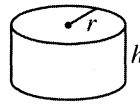
$$A = \ell w$$



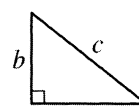
$$A = \frac{1}{2}bh$$



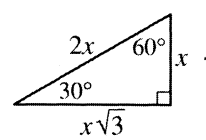
$$V = \ell wh$$



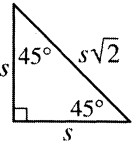
$$V = \pi r^2 h$$



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



Special Right Triangles



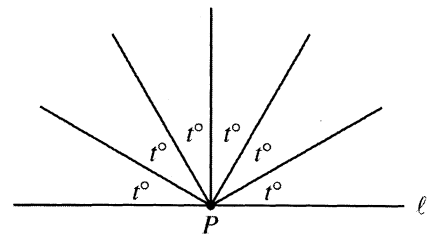
The number of degrees of arc in a circle is 360.

The sum of the measures in degrees of the angles of a triangle is 180.

$$3x + y = 12$$

1. In the equation above, if  $x = 2$ , what is the value of  $y$ ?

- (A) 2  
(B) 3  
(C) 4  
(D) 5  
(E) 6



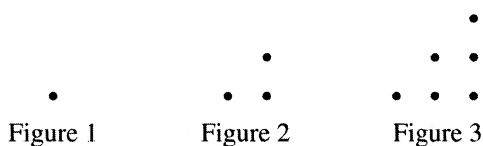
2. In the figure above, point  $P$  is on line  $\ell$ . What is the value of  $t$ ?

- (A) 15  
(B) 24  
(C) 30  
(D) 36  
(E) 60

SALES OF COMPANIES X AND Y

| Year | Sales (millions of dollars) |   |
|------|-----------------------------|---|
|      | X                           | Y |
| 2002 | 3                           | 3 |
| 2003 | 4                           | 3 |
| 2004 | 5                           | 4 |
| 2005 | 4                           | 4 |
| 2006 | 4                           | 1 |

3. The chart above shows the sales made by two companies for the years 2002 through 2006. In what year were the combined sales made by both companies the least?
- (A) 2002  
(B) 2003  
(C) 2004  
(D) 2005  
(E) 2006

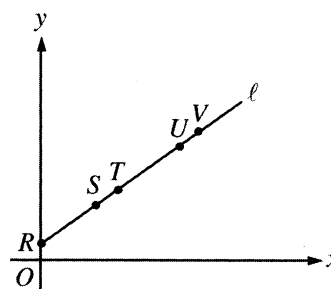


4. Figure 1 above consists of one dot. Each figure after the first adds a column of dots that has one dot more than the highest column of dots in the previous figure, as shown. How many dots would be in Figure 5?
- (A) Ten  
(B) Twelve  
(C) Fourteen  
(D) Fifteen  
(E) Sixteen

$$f(x) = x + 3$$

$$g(x) = 2x - 1$$

5. Functions  $f$  and  $g$  are defined above. What is the value of  $f(3) - g(3)$ ?
- (A) 1  
(B) 3  
(C) 5  
(D) 6  
(E) 11



6. On line  $\ell$  above, the slope is greatest between which two of the consecutive labeled points?
- (A) R and S  
(B) S and T  
(C) T and U  
(D) U and V  
(E) The slope is the same between each pair of labeled points.



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7. The figure above shows an accurate digital clock. Let the "sum-time" for this clock be defined to be the number of hours plus the number of minutes of the time shown. For example, the sum-time of the time shown is 19. How many minutes will pass before the sum-time is next equal to 19?
- (A) 49  
(B) 59  
(C) 99  
(D) 118  
(E) 177

$$w = 3km$$

$$x = k^2(m - 1)$$

8. If  $w$  and  $x$  are defined by the equations above, which of the following represents  $(w, x)$  when  $k = 4$  and  $m = 1$ ?
- (A) (0, 12)  
(B) (12, 0)  
(C) (12, 16)  
(D) (12, 32)  
(E) (16, 0)

9. Samantha babysat 20 different times in December. The lowest amount she earned for babysitting was \$10, and the highest amount she earned was \$22. Of the following, which could be the total amount she earned for babysitting during December?

- (A) \$190  
(B) \$200  
(C) \$320  
(D) \$440  
(E) \$640

10. An equilateral triangle and a square have the same perimeter. If the sum of the lengths of two sides of the triangle is 16, what is the length of one side of the square?

- (A) 3  
(B) 4  
(C) 6  
(D) 8  
(E) 10

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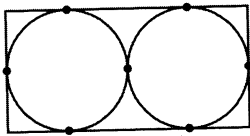
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11. The product of six consecutive integers, the least of which is 5, is how many times the product of five consecutive integers, the least of which is 5?

(A) 9  
(B) 10  
(C) 11  
(D) 25  
(E) 30



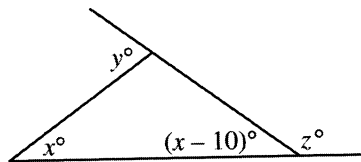
12. In the figure above, two circles of the same size are tangent to each other and to the rectangle at the points shown. If the area of the rectangle is 72, what is the diameter of each circle?

(A) 4  
(B) 6  
(C) 8  
(D) 9  
(E) 12

13. For which of the following sets of numbers is the sum of any two numbers in the set also in the set?

I. The set of even integers  
II. The set of odd integers  
III. The set of negative integers

(A) I only  
(B) II only  
(C) I and II only  
(D) I and III only  
(E) I, II, and III



Note: Figure not drawn to scale.

14. In the figure above, two sides of the triangle have been extended. If  $y = 70$ , what is the value of  $z$ ?

(A) 70  
(B) 110  
(C) 130  
(D) 140  
(E) 150

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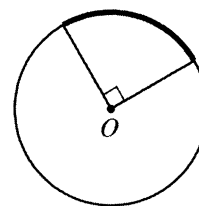
15. If  $a = 2^{3000}$ ,  $b = 3^{2000}$ , and  $c = 7^{1000}$ , which of the following is true?

- (A)  $a > b > c$
- (B)  $a > c > b$
- (C)  $b > a > c$
- (D)  $b > c > a$
- (E)  $c > a > b$

16. Henry used  $\frac{2}{3}$  of the length of a board to make a box and  $\frac{1}{4}$  of the original length of the board to repair a step. The remaining piece of the board was 2 feet long.

How many feet long was the original board?

- (A) 8
- (B) 12
- (C) 18
- (D) 22
- (E) 24



17. In the figure above,  $O$  is the center of the circle of radius 2. What is the length of the darkened arc?

- (A)  $\frac{\pi}{2}$
- (B)  $\pi$
- (C)  $\frac{3\pi}{2}$
- (D)  $2\pi$
- (E)  $4\pi$

18. If the ratio of  $r$  to  $t$  is 4 to 1 and the ratio of 4 to  $v$  is 10 to 1, what is  $\frac{r}{v}$  in terms of  $t$ ?

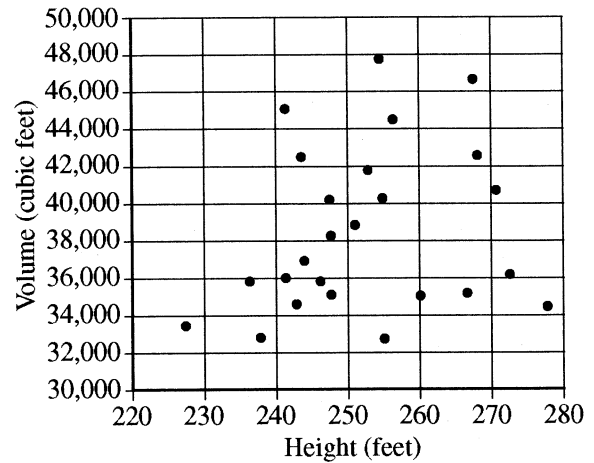
- (A)  $10t$
- (B)  $16t$
- (C)  $40t$
- (D)  $\frac{10}{t}$
- (E)  $\frac{40}{t}$

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19. The graph of a function in the  $xy$ -plane is a parabola that opens upward and has its vertex at point  $(c, d)$ . If the line  $\ell$  is tangent to the parabola at its vertex, which of the following must be another point on line  $\ell$ ?

- (A)  $(-5, d)$   
 (B)  $(-5, -d)$   
 (C)  $(0, 0)$   
 (D)  $(c, -5)$   
 (E)  $(-5, -c)$

## HEIGHTS AND VOLUMES OF 25 SEQUOIA TREES



20. The graph above shows the heights and volumes of 25 different giant sequoia trees. Which of the following pairs could be the median height and the median volume of these trees?

- (A) 244 ft and  $37,000 \text{ ft}^3$   
 (B) 244 ft and  $39,000 \text{ ft}^3$   
 (C) 248 ft and  $38,000 \text{ ft}^3$   
 (D) 251 ft and  $37,000 \text{ ft}^3$   
 (E) 251 ft and  $39,000 \text{ ft}^3$

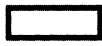
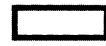
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## SECTION 5

Time — 25 minutes

25 Questions

Turn to Section 5 (page 5) of your answer sheet to answer the questions in this section.

**Directions:** For each question in this section, select the best answer from among the choices given and fill in the corresponding circle on the answer sheet.

Each sentence below has one or two blanks, each blank indicating that something has been omitted. Beneath the sentence are five words or sets of words labeled A through E. Choose the word or set of words that, when inserted in the sentence, best fits the meaning of the sentence as a whole.

**Example:**

Hoping to ----- the dispute, negotiators proposed a compromise that they felt would be ----- to both labor and management.

- (A) enforce . . useful  
(B) end . . divisive  
(C) overcome . . unattractive  
(D) extend . . satisfactory  
(E) resolve . . acceptable

(A) (B) (C) (D) ●

- The debate between Ron and Victor was ----- yet -----; in other words, it was heated but adequately courteous.
 

(A) emotional . . vigorous  
(B) moderate . . polite  
(C) intense . . civil  
(D) restrained . . friendly  
(E) charged . . explosive
- Arctic animals have adapted to the cold, Arctic climate in exceptional ways, but humans have ----- them in one respect: the ability to use fire.
 

(A) surpassed (B) resisted (C) appreciated  
(D) assisted (E) undermined
- Because the accused persisted in explaining his actions through an absurd story, he ----- his own -----, creating difficulties for lawyers trying to clear his name.
 

(A) restored . . reputation  
(B) exceeded . . situation  
(C) prevented . . downfall  
(D) admitted . . innocence  
(E) hindered . . defense
- Stress can weaken defenses and ----- the onset of illness, but small amounts of stress may have the opposite effect and ----- the body.
 

(A) mitigate . . incapacitate  
(B) promote . . weaken  
(C) facilitate . . fortify  
(D) jeopardize . . cure  
(E) circumvent . . immunize
- Best known for her children's books, Beatrix Potter was also one of the first naturalists to observe that a lichen results from -----, an interdependent relationship between two different organisms.
 

(A) parity (B) autonomy (C) symbiosis  
(D) similitude (E) synchronicity
- Jerry's praise of his own business ----- was clearly -----: so many inexperienced entrepreneurs who followed his advice failed.
 

(A) expertise . . pertinent  
(B) supremacy . . sincere  
(C) ineptitude . . illusory  
(D) acumen . . unwarranted  
(E) background . . authoritative
- Frida Kahlo's haunting and often brutal self-portraits have such ----- effect that, once seen, they become impossible to forget.
 

(A) a sporadic (B) a hermetic (C) a mirthful  
(D) an indelible (E) an insipid
- Physician and researcher Lewis Mehl-Madrona ----- traditional and modern medicine, thereby combining techniques of each form of medicine.
 

(A) redresses (B) castigates (C) proffers  
(D) amalgamates (E) abjures

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The passages below are followed by questions based on their content; questions following a pair of related passages may also be based on the relationship between the paired passages. Answer the questions on the basis of what is stated or implied in the passages and in any introductory material that may be provided.

Questions 9-13 are based on the following passages.

### Passage 1

The novelist Jane Austen (1775–1817) wrote about what she understood. But did she understand enough? Her world was not merely small but narrow. Her novels are sometimes referred to as miniatures, but the analogy is not apt. We do not get from *Emma* a condensed and refined sense of a larger entity, nor does the work suggest references far beyond its surface. The limitation and the narrowness of the small English rural towns her novels are often set in is the limitation of class society. And the one important criticism of Jane Austen is that her vision is limited by her unquestioning acceptance of that society.

### Passage 2

How does the fact that Jane Austen depicts in her novels the “class society” that she lived in demonstrate the class basis of her standards or indicate that she calls on us to admire the standards of that society? I would maintain, on the contrary, that her standards, her moral values, have no class basis whatsoever. She values honesty, decency, clear-sightedness, emotional responsiveness in whatever class they occur; her most contemptible characters—Lady Catherine de Bourgh, Sir Walter Elliot, General Tilney—are often the highest in the scale of wealth and social prestige.

9. Which statement best describes the relationship between the two passages?

- (A) The author of Passage 2 poses a possible solution to a problem introduced by the author of Passage 1.
- (B) The author of Passage 2 refutes an argument presented by the author of Passage 1.
- (C) The author of Passage 2 discusses the historical context of a situation described by the author of Passage 1.
- (D) The author of Passage 2 provides data to support a claim made by the author of Passage 1.
- (E) The author of Passage 2 evaluates a recommendation offered by the author of Passage 1.

10. The authors of both passages would most likely agree that

- (A) Austen’s view of the politics of her time was not influenced by her place in society
- (B) Austen’s upper-class characters are generally portrayed sympathetically
- (C) Austen depicted important historical events in her novels
- (D) Austen did not understand a lot about current social issues
- (E) Austen wrote about a world with which she was familiar

11. The author of Passage 1 indicates that Austen’s novels cannot be considered “miniatures” (line 4) because they

- (A) treat broad philosophical themes
- (B) trace characters’ lives over years
- (C) develop highly complex plots
- (D) do not convey a sense of the world at large
- (E) do not distinguish between social classes

12. The author of Passage 2 would most likely consider the statement about Austen’s “vision” (line 10, Passage 1) to be

- (A) contradicted by examples from Austen’s fiction
- (B) accepted by most critics of Austen’s novels
- (C) unsupported by recently revealed evidence
- (D) confirmed by Austen’s basic sense of values
- (E) reinforced by facts about Austen’s biography

13. In line 21, “scale” most nearly means

- (A) number
- (B) balance
- (C) size
- (D) ratio
- (E) ranking

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Questions 14-25 are based on the following passage.

This passage, adapted from the introduction to a 2004 book, refers to the famous violinmaker Antonio Stradivari (1644-1737).

I gave up the violin when I left school. In the twenty years since, I have come to understand as a listener what I never did as a mediocre player—that the members of the violin family (principally the violin itself, the viola, and the cello) are indisputably the kings of all the instruments. The violin, so deceptively simple, can both portray and inspire every emotion imaginable, imitating the braying of a donkey or delivering a tune of heart-rending beauty. Lyrical and expressive, or harsh and violent, it is the master of adaptability; only the human voice can match it. By comparison, the piano's eighty-odd notes a semi-tone apart may make it a mechanical marvel of polyphony, but where is the ability to thrill with almost imperceptible changes in pitch or volume? As for the other members of the orchestra—woodwind, brass, percussion—the very names hint at the paucity of their tonal range.

Not only do the violin and its sister instruments dominate the orchestra, there remains no question of who is their most famous maker—perhaps the most celebrated craftsman in history. From Melbourne to Milwaukee, the bus driver will ask you, as you struggle with your violin case, “Is that a Stradivarius?” His reputation for excellence is ubiquitous.

This reputation stems from the players themselves. To anyone, but most of all those lucky enough to perform on them, Strads are far more than just instruments. They are works of art, bringing together utility and aesthetics in a way that no other object can quite match. The British cellist Steven Isserlis borrows his Stradivarius from the Nippon Music Foundation: “My heart leaps every day when I take it out of the case. Its beautiful color glows.”

Maxim Vengerov, a Russian who is probably the most admired of the younger generation of violinists, is even more direct about his relationship with his Strad: “It is a marriage.” The violin is such a feminine instrument that the metaphor seems almost inescapable, at least for men. Women are more likely to regard their violins as an extension of themselves. One friend told me this is why she does not use a shoulder-rest. The German virtuosa Anne-Sophie Mutter rests her Stradivarius on her bare shoulder: even clothes are too great a barrier. The exception only seems to prove the rule. When the young Soviet violinist Viktoria Mullova took a taxi across the border from Finland into Sweden in 1983, she left her government-owned Strad on the hotel-room bed. As a result her KGB\* minders wasted valuable hours on the assumption that she could not possibly be defecting.

Finally, there is the most obvious and concrete way in which violinists put a value on their instruments. Vengerov's Strad—the Kreutzer—set an auction record of \$1.6 million when it was bought for him in 1998. Even that figure is put in the shade by private deals. Scarcity and the need for age have combined to drive a seemingly unstoppable rise in the prices of string instruments. What other profession faces a situation where the tools of its trade have become so expensive as to be almost unobtainable? Every maker has his price—the violin says something about its player's status, even before bow is put to string—but none commands more respect than Antonio Stradivari.

Fame, beauty, history, value, the peculiar devotion that Strads inspire: it is a heady mix. And it all results from their most remarkable characteristic. More than 250 years after his death, Stradivari's violins and cellos remain the best in the world. On song and in the right hands they are magnificent, projecting glorious tone to the back of the largest concert hall. A violinist who is attuned to his Strad, and knows that it will do everything required of it, can relax into playing, confident that he will not have to force to be heard. Strads are the ultimate rebuke to the arrogance of the modern age: science does not have all the answers; Renaissance technology still cannot be bettered.

\* The KGB was the national security agency of the Soviet Union that monitored dissent and controlled the activities of Soviet citizens, even entertainers on tour.

From *Stradivari's Genius* by Toby Faber, copyright © 2005 by Toby Faber. Used by Permission of Random House, Inc.

14. The passage is best described as

- (A) an explanation of a recent discovery
- (B) an analysis of an enigmatic condition
- (C) an investigation of a controversial claim
- (D) a consideration of a remarkable artifact
- (E) a presentation of a personal narrative

15. In line 10, the author compares “the human voice” to

- (A) a flawless design
- (B) a musical instrument
- (C) a familiar presence
- (D) an enduring achievement
- (E) an unforgettable performance

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16. Which best describes the effect of the question in lines 12-14 (“but . . . volume”)?
- (A) It expresses the author’s view about a particular subject.  
 (B) It establishes the terms of a puzzle to be solved.  
 (C) It highlights the inadequacy of available information.  
 (D) It challenges the author’s opinion about a current topic.  
 (E) It reveals the author’s lack of knowledge about a particular phenomenon.
17. Which best describes the role of lines 17-23 in presenting the author’s argument?
- (A) They shift the focus of the passage from instruments to performers.  
 (B) They introduce an alternative interpretation of information in the opening paragraph.  
 (C) They provide a transition from a broad overview to a specific topic.  
 (D) They question the assumptions underlying earlier assertions.  
 (E) They offer examples in support of previously made claims.
18. Which best describes how “the players themselves” (line 24) determine the reputation of Stradivarius violins?
- (A) They publicize their desire to own one of the violins.  
 (B) They ensure the preservation of the violins.  
 (C) They treat the violins as exceptional objects.  
 (D) They play as many concerts as possible.  
 (E) They lecture audiences before performing.
19. In lines 32-47, the author refers to Vengerov, Mutter, and Mullova to
- (A) explore ways that Stradivarius players relate to their violins  
 (B) illustrate advantages that Stradivarius players gain from their violins  
 (C) reveal innovations that shaped performance styles for Stradivarius players  
 (D) cite cases that document the effect of Stradivarius violins on history  
 (E) correct misconceptions that have arisen about Stradivarius violins
20. Which hypothetical statement by a violinist who plays a Stradivarius would most directly support the point made in lines 37-41 (“Women . . . barrier”)?
- (A) “I wish I owned a dozen of these violins.”  
 (B) “I needed some time to adjust to my violin’s peculiarities.”  
 (C) “I prefer to play my violin only for small audiences.”  
 (D) “I think my violin has a will of its own.”  
 (E) “I feel incomplete without my violin.”
21. Why does the author consider Mullova an “exception” (line 41) to the rule?
- (A) Mullova was able to leave her violin behind when she left Finland.  
 (B) Mullova did not know the full commercial value of her Stradivarius.  
 (C) Mullova was one of the few Soviet women who played a Stradivarius.  
 (D) The Soviet government was unable to prevent Mullova from escaping her KGB minders.  
 (E) The Soviet government did not restrict other violinists from using Mullova’s instrument.
22. In line 61, the author uses a list (“Fame . . . devotion”) primarily to
- (A) reveal the complexity of a proposal  
 (B) convey the scope of an international dilemma  
 (C) identify the components of an invention  
 (D) suggest the richness of a popular reputation  
 (E) indicate the predictability of an emotional response
23. In line 62, “heady” most nearly means
- (A) rash  
 (B) violent  
 (C) intoxicating  
 (D) intellectual  
 (E) shrewd



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24. In lines 70-72 (“Strads . . . bettered”), the author characterizes the spirit of the modern age as being

- (A) incomprehensible
- (B) overbearing
- (C) ominous
- (D) logical
- (E) belligerent

25. The author’s point of view in the passage is that of

- (A) a meticulous analyst
- (B) an experienced arbiter
- (C) a knowledgeable fan
- (D) an aspiring scholar
- (E) a disappointed reviewer

**STOP**

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

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## SECTION 6

Time — 25 minutes

18 Questions

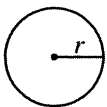
Turn to Section 6 (page 6) of your answer sheet to answer the questions in this section.

**Directions:** This section contains two types of questions. You have 25 minutes to complete both types. For questions 1-8, solve each problem and decide which is the best of the choices given. Fill in the corresponding circle on the answer sheet. You may use any available space for scratch work.

Notes

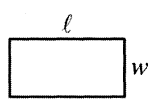
- The use of a calculator is permitted.
- All numbers used are real numbers.
- Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.
- Unless otherwise specified, the domain of any function  $f$  is assumed to be the set of all real numbers  $x$  for which  $f(x)$  is a real number.

Reference Information

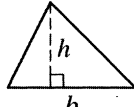


$$A = \pi r^2$$

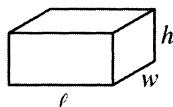
$$C = 2\pi r$$



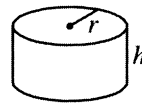
$$A = \ell w$$



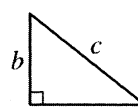
$$A = \frac{1}{2}bh$$



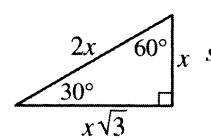
$$V = \ell wh$$



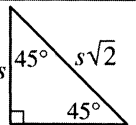
$$V = \pi r^2 h$$



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



Special Right Triangles

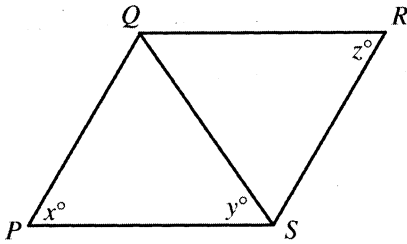


The number of degrees of arc in a circle is 360.

The sum of the measures in degrees of the angles of a triangle is 180.

- To rent a meeting room, the charge is \$75 per hour plus \$7 per person for refreshments. Which of the following functions represents the charge, in dollars, to rent the meeting room for 3 hours with refreshments for  $n$  people?
  - $f(n) = 82n$
  - $f(n) = 225n$
  - $f(n) = 225n + 7$
  - $f(n) = 225 + 7n$
  - $f(n) = 225 + 7^n$
- If  $z$  is 10 greater than  $x$ , then  $z - 10$  is how much greater than  $x$ ?
  - 0
  - 5
  - 10
  - 20
  - 100

GO ON TO THE NEXT PAGE



Note: Figure not drawn to scale.

3. In the figure above,  $PQRS$  is a parallelogram. Which of the following must be true?

- (A)  $x = y$   
 (B)  $x = z$   
 (C)  $y = z$   
 (D)  $x + y = 120$   
 (E)  $y + z = 120$

4. In a basket of 13 apples, there are 3 McIntosh apples, 4 Gala apples, and 6 Red Delicious apples. If Juanita selects an apple at random, what is the probability that she will not select a Gala apple?

- (A)  $\frac{1}{13}$   
 (B)  $\frac{3}{13}$   
 (C)  $\frac{4}{13}$   
 (D)  $\frac{9}{13}$   
 (E)  $\frac{10}{13}$

5. If  $D$  and  $E$  are nonzero digits and  $O$  is the digit zero, which of the following numbers is equal to  $D \times 10^3 + E \times 10$ ?

- (A)  $DEO$   
 (B)  $DOE$   
 (C)  $D,EOO$   
 (D)  $D,OEO$   
 (E)  $D,OOE$

6. Let  $\otimes x$  be defined by  $\otimes x = \frac{360}{x}$  for all  $x$  such that  $x \neq 0$ . What is the value of  $\otimes \frac{1}{2}$ ?

- (A) 60  
 (B) 90  
 (C) 180  
 (D) 540  
 (E) 720

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7. In a circle,  $\overline{AB}$  and  $\overline{CD}$  are diameters. Which of the following must be true?

- I. The length of arc  $\widehat{ABD}$  is equal to the length of arc  $\widehat{BAC}$ .
  - II.  $\overline{AB}$  is perpendicular to  $\overline{CD}$ .
  - III.  $ACBD$  is a square.
- (A) I only  
(B) II only  
(C) I and II only  
(D) II and III only  
(E) I, II, and III

1, 8, 18, ...

8. In the sequence above, the first term is 1 and the sum of the first  $n$  terms is equal to  $3^n$  for all  $n > 1$ . What is the fourth term in the sequence?

- (A) 27  
(B) 31  
(C) 54  
(D) 58  
(E) 81

GO ON TO THE NEXT PAGE

**Directions:** For Student-Produced Response questions 9-18, use the grids at the bottom of the answer sheet page on which you have answered questions 1-8.

Each of the remaining 10 questions requires you to solve the problem and enter your answer by marking the circles in the special grid, as shown in the examples below. You may use any available space for scratch work.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                                                                                                                                                                                                                  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| <p>Write answer in boxes. →</p> <p style="text-align: center;">Answer: <math>\frac{7}{12}</math></p> <table border="1" style="margin-left: auto; margin-right: auto; text-align: center;"> <tr><td>7</td><td>/</td><td>1</td><td>2</td></tr> <tr><td>○</td><td>●</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td><td>○</td></tr> </table> <p>Grid in result. →</p> <p style="text-align: right;">← Fraction line</p> | 7 | / | 1 | 2 | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | <p style="text-align: center;">Answer: 2.5</p> <table border="1" style="margin-left: auto; margin-right: auto; text-align: center;"> <tr><td>2</td><td>.</td><td>5</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> </table> <p style="text-align: right;">← Decimal point</p> | 2 | . | 5 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | <p style="text-align: center;">Answer: 201<br/>Either position is correct.</p> <table border="1" style="margin-left: auto; margin-right: auto; text-align: center;"> <tr><td>2</td><td>0</td><td>1</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> <tr><td>○</td><td>○</td><td>○</td></tr> </table> <table border="1" style="margin-left: auto; 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**Note:** You may start your answers in any column, space permitting. Columns not needed should be left blank.

- Mark no more than one circle in any column.
- Because the answer sheet will be machine-scored, **you will receive credit only if the circles are filled in correctly.**
- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- **Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as

3.5 or  $7/2$ . (If 

|   |   |   |   |
|---|---|---|---|
| 3 | 1 | / | 2 |
| ○ | ○ | ○ | ○ |

 is gridded, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)

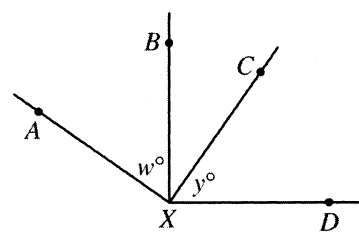
- **Decimal Answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid. For example, if you obtain an answer such as 0.6666..., you should record your result as .666 or .667. **A less accurate value such as .66 or .67 will be scored as incorrect.**

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

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| 2 | / | 3 |
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9. In the figure above,  $w = 55$ ,  $\overline{XA} \perp \overline{XC}$ , and  $\overline{XB} \perp \overline{XD}$ . What is the value of  $y$ ?

10. If  $2x + 5 < 13$ , what is the greatest possible integer value of  $x$ ?

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6



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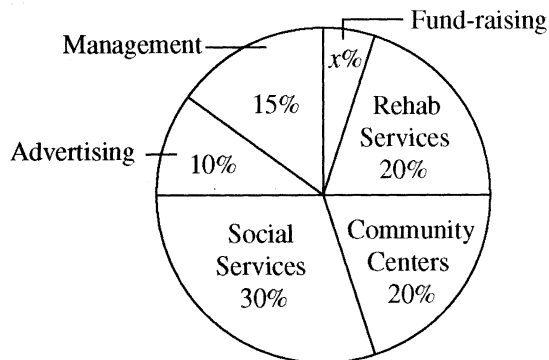
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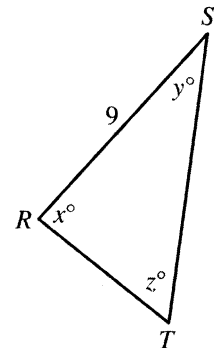
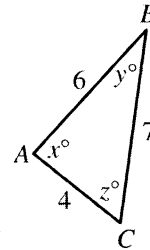
EXPENDITURES BY A CHARITY



11. The circle graph above shows the distribution of \$100,000 in expenditures by a charity. Based on the graph, how much, in dollars, of the \$100,000 was spent on fund-raising? (Disregard the \$ sign when gridding your answer.)

12. If  $3 < y < 8$  and  $\frac{x}{y} = y$ , where  $y$  is an odd integer, what is one possible value of  $x$ ?

13. Angie planned to take a train scheduled to leave at 3:04 P.M. When Angie arrived at the train station, her watch read 2:45 P.M., but her watch always reads 7 minutes ahead of the correct time. If the train left on time, how many minutes did Angie arrive before the train left the station?



14. Triangles  $ABC$  and  $RST$  are shown in the figures above. What is the value of  $RT + ST$ ?

GO ON TO THE NEXT PAGE

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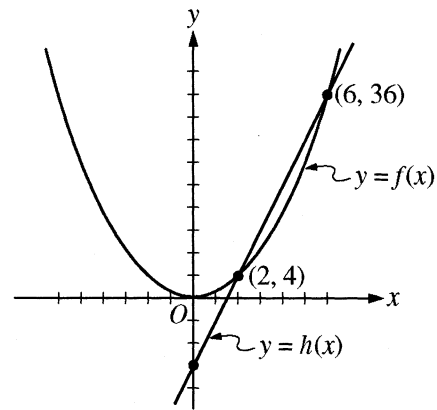
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6

15. Two servings of juice  $X$  and one serving of juice  $Y$  together contain 550 milligrams of vitamin C. One serving of juice  $X$  and two servings of juice  $Y$  together contain 410 milligrams of vitamin C. How many milligrams of vitamin C are in one serving of juice  $X$  together with one serving of juice  $Y$ ?

16. A sphere of radius  $r$  fits exactly into a right circular cylinder. If the height of the cylinder is equal to the diameter of the sphere, then the volume of the sphere is what fraction of the volume of the cylinder? (The volume of a sphere with radius  $r$  is  $\frac{4}{3}\pi r^3$ .)



17. The graphs of functions  $f$  and  $h$  are shown in the  $xy$ -plane above, where  $f(x) = x^2$  and  $h(x) = 8x - 12$ . If  $g$  is a function such that  $f(x) < g(x) < h(x)$  in the interval  $2 < x < 6$ , what is one possible value of  $g(5)$ ?

$$n = 100110021003 \dots 1020$$

18. The integer  $n$  above is formed by writing consecutive integers, starting with 1001 and ending with 1020. What is the sum of the digits of  $n$ ?

**STOP**

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



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**SECTION 7**

Time — 25 minutes

23 Questions

**Turn to Section 7 (page 6) of your answer sheet to answer the questions in this section.**

**Directions:** For each question in this section, select the best answer from among the choices given and fill in the corresponding circle on the answer sheet.

Each sentence below has one or two blanks, each blank indicating that something has been omitted. Beneath the sentence are five words or sets of words labeled A through E. Choose the word or set of words that, when inserted in the sentence, best fits the meaning of the sentence as a whole.

**Example:**

Hoping to ----- the dispute, negotiators proposed a compromise that they felt would be ----- to both labor and management.

- (A) enforce . . useful  
(B) end . . divisive  
(C) overcome . . unattractive  
(D) extend . . satisfactory  
(E) resolve . . acceptable

(A) (B) (C) (D) ●

1. By authorizing programs that ----- people with a wide range of interests, the city council has managed to ----- the long-neglected downtown area.
- (A) engage . . revitalize  
(B) deter . . consolidate  
(C) fascinate . . dismantle  
(D) occupy . . marginalize  
(E) offend . . refurbish

2. Writer Paule Marshall often creates characters who experience -----, moments of revelation in which self-understanding dawns.
- (A) triumphs (B) indignities (C) epiphanies  
(D) tribulations (E) contingencies
3. Manfred's attitude was one of -----, but his classmates refused to pay any attention to his airs of superiority.
- (A) severity (B) solicitousness (C) frivolity  
(D) condescension (E) contrition
4. Although often -----, Carmen was nonetheless -----; for instance, while disinclined to talk about her goals, she pursued them relentlessly.
- (A) unabashed . . resolute  
(B) diffident . . dilatory  
(C) pretentious . . unswerving  
(D) succinct . . impetuous  
(E) taciturn . . tenacious
5. The electronic-media entrepreneur maintained that traditional newspapers, books, and magazines are -----: not quite dead, but in rapid decline.
- (A) moribund (B) defunct (C) redundant  
(D) improvident (E) tendentious





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The passages below are followed by questions based on their content; questions following a pair of related passages may also be based on the relationship between the paired passages. Answer the questions on the basis of what is stated or implied in the passages and in any introductory material that may be provided.

Questions 6-7 are based on the following passage.

The initial exhibition of quilts by the women of Gee's Bend exploded into the world of modern art with great fanfare, rocking critics who generally dismiss cloth art. The quilts are made by descendants of slaves, who live in the small rural community in Alabama called Gee's Bend, once the site of cotton plantations. These women spend their spare time splicing scraps of old cloth to make robust objects of refined, abstract designs. The best of them, unusually minimalist and spare, are so gorgeous that it is hard to know how to begin to account for them. But then, good art can never be fully accounted for, just described.

6. The primary purpose of the passage is to

- (A) describe the accomplishments of a famous artist
- (B) recount the historical origins of a rural community
- (C) explain the technique of quilt making to beginners
- (D) call attention to a set of impressive works of art
- (E) argue for a greater appreciation of cloth art

7. In line 3, "rocking" most nearly means

- (A) infuriating
- (B) amusing
- (C) swaying
- (D) astonishing
- (E) lulling

Questions 8-9 are based on the following passage.

How do children learn so much? Through experience, experimentation, and observation: tasting, smelling, hearing, touching. It is the real-life lessons—the climbing over and scooting under, putting one cup inside another, and chasing grapes around the kitchen floor—that teach children how the world and their bodies work. Pushing a computer key to make an animated monkey dance does not have the same effect. "Two-dimension play is not as good as three-dimension play," says Kathy Hirsh-Pasek, director of the Infant Laboratory at a Philadelphia university. "For young children, seeing circles and squares is not as good as manipulating circles and squares."

8. The quote from Kathy Hirsh-Pasek (lines 8-12) functions primarily as a

- (A) detailed example
- (B) contrasting argument
- (C) flippant reply
- (D) speculative interpretation
- (E) supporting statement

9. The passage suggests that Kathy Hirsh-Pasek would most likely DISAGREE with which claim about young children?

- (A) They need to spend more time creating their own stories.
- (B) They appreciate being encouraged to explore their surroundings.
- (C) They learn best when engaging their primary senses.
- (D) They benefit greatly from extensive exposure to computers.
- (E) They benefit from active play with one another.



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Questions 10-15 are based on the following passage.

The passage is adapted from a 1998 nonfiction book about orchids in Florida.

You have to want something very badly to go looking for it in the Fakahatchee Strand. For me, it was the *Polyrrhiza lindenii*, the ghost orchid, the only really pretty orchid in the Fakahatchee. The ghost orchid usually grows  
 Line 5 around the trunks of pop ash and pond apple and custard apple trees. It normally blooms no more than once a year. It has no foliage. It is nothing but roots, a tangle of flat green roots about the width of linguine wrapped around a tree. The roots are chlorophyllous; that is, they serve as both  
 10 roots and leaves. The flower is a lovely papery white. It has the intricate lip that is characteristic of all orchids, but its lip is especially pronounced and pouty, and each corner tapers into a long, fluttery tail. These tails are so delicate that they tremble in a light breeze. The whiteness of the  
 15 flower is as startling as a spotlight in the grayness and greenness of a swamp. Because the plant has no foliage and its roots are almost invisible against tree bark, the flower looks like it is magically suspended in midair. People say a ghost orchid in bloom looks like a flying white frog—an  
 20 ethereal and beautiful flying white frog. Carlyle Luer, the author of *The Native Orchids of Florida*, once wrote of the ghost orchid, “Should one be lucky enough to see this flower, all else will seem eclipsed.”

Near a large sinkhole, Tony, my guide, pointed out some  
 25 little green straps on a tree and said they were ghost orchids that were done blooming for the year. We walked for another hour, and he pointed out more green ghost-orchid roots on more trees. The light was flattening out, and I was muddy and scratched and scorched. Finally we turned  
 30 around and walked 5,000 miles back to Tony’s Jeep. It had been a hard day, and I hadn’t seen what I had come to see. I kept my mind busy as we walked out by wondering if the hard-to-find, briefly seen, irresistibly beautiful ghost orchid was just a fable and not a real flower at all.

Yet if the ghost orchid was really only a phantom, it was  
 35 still such a bewitching one that it could seduce people to pursue it year after year and mile after miserable mile. If it was a real flower, I wanted to keep coming back to Florida until I could see one. The reason was not that I love  
 40 orchids. I don’t even especially *like* orchids. What I wanted was to see this thing that people were drawn to in such a singular and powerful way. Everyone I was meeting connected to orchids had circled their lives around some great desire, a desire that then answered questions for them  
 45 about how to spend their time and their money and who their friends would be and where they would travel and

what they did when they got there. It was religion. I *wanted* to want something as much as these people wanted these plants. I wanted to know what it feels like to care about something so passionately.

10. The passage is best characterized as an account of

- (A) a personal quest
- (B) a business enterprise
- (C) a disastrous misadventure
- (D) a particular ecosystem
- (E) an unexpected discovery

11. The discussion in lines 14-20 (“The whiteness . . . frog”) creates an impression of the ghost orchid by using

- (A) broad generalizations
- (B) evocative comparisons
- (C) hypothetical statements
- (D) authoritative sources
- (E) scientific data

12. Lines 28-31 (“The light . . . see”) present the author as

- (A) morose
- (B) dispirited
- (C) dismissive
- (D) incredulous
- (E) acrimonious

13. In line 30, the author’s use of “5,000 miles” is best described as

- (A) blunt conjecture
- (B) careful euphemism
- (C) dramatic speculation
- (D) humorous exaggeration
- (E) objective reporting



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14. Which statement best summarizes the perspective presented in lines 39-42 (“The reason . . . way”)?

- (A) The author finds orchids objectionable.
- (B) The author wants to meet people who have successfully cultivated orchids.
- (C) The author regrets having decided to search for the ghost orchid.
- (D) The ghost orchid is less important to the author than the state of mind it sometimes inspires.
- (E) The ghost orchid is more important to the author than its ecology.

15. The author refers to “religion” (line 47) in order to

- (A) show that orchid collecting involves a certain set of rituals
- (B) suggest that an attraction to orchids automatically involves a set of shared beliefs
- (C) indicate that orchid enthusiasts routinely join organized societies
- (D) underscore how people connected to orchids are especially devoted to environmental causes
- (E) emphasize the importance of orchids in some people’s lives



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Questions 16-23 are based on the following passages.

*As part of the Apollo program, twelve United States astronauts walked on the Moon between 1969 and 1972. No Moon landings have occurred since, as robotic spaceflight has become the leading mode of space exploration for all nations. The following passages discuss the issues related to human spaceflight.*

### Passage 1

Not only is robotic spaceflight cheaper and safer than human spaceflight, it is more scientifically productive. As of 2010, robotic rovers have provided us with more than thirteen years of scientific observations from Mars; combined, the Apollo missions spent less than a month on the Moon. Humans can travel much faster across extraterrestrial surfaces than robots can, but we cannot compete with robots in terms of the total amount of data collected. Astronomer James Van Allen went so far as to say, "Almost all of the space program's important advances in scientific knowledge have been accomplished by hundreds of robotic spacecraft."

Yet why do all of us old enough to remember July 20, 1969, recall where we were that day, when Neil Armstrong and Buzz Aldrin became the first human beings to set foot on the Moon, but nobody except those involved and a handful of space diehards remembers July 4, 1997, January 4, 2004, or January 25, 2004, the dates the rovers Sojourner, Spirit, and Opportunity landed on Mars? Why are there more than a dozen schools named after Neil Armstrong but no Sojourner Middle School or Spirit Elementary?

Robotic spaceflight fails to captivate us because it lacks human drama. Rovers are magnificent technical accomplishments, but that's what they are—technical. The sight of human beings speaking to us from the Moon is soul stirring, an expression of the greatest dreams and abilities of our species; the Mars rovers look like toys puttering around a rocky desert. Van Allen dismissively said, "the only surviving motivation for continuing human spaceflight is the ideology of adventure," but surely this spirit of adventure is a worthwhile motivation. It took us to space in the first place, after all. It is the rocket booster powering the whole history of human exploration.

Yes, human spaceflight is expensive. And unless we keep trying and thus find more efficient ways to take people into space, it will remain expensive. But robotic spaceflight enthusiasts who want a "cost-effective" space program use ruthless calculators. Even if there's no place for it on a budgetary balance sheet, there is immense value in sending humans into space to expand our frontiers and inspire future generations to soar into the unknown.

### Passage 2

In any assessment of performance, overall effectiveness is influenced by cost. In that respect, human flight does not do well. The United States Congress provided \$820 million for the mission that placed the rovers Spirit and Opportunity on the surface of Mars in 2004. The cost of the expeditions that landed humans on the Moon, expressed in 2004 dollars, totaled approximately \$150 billion. The Apollo astronauts may have driven five times as far in just nine days on the lunar surface, but they required 180 times as much money to do so.

Advocates of human flight note that in spite of the disadvantages imposed by their high cost, human missions still remain cost-effective because they can accomplish more work. To a certain extent, this is true. Although the human lunar and Mars rover missions lack perfect equivalency, a statistical comparison that equalizes the relative costs of the two missions suggests that the Apollo astronauts still covered more ground in less time than the rovers.

Based on the achievements of Apollo astronauts, advocates of human flight continued to argue that a civil space program uniting people and machines would outperform one relying on robots alone. The high cost of moving humans through space sobered everyone up. No factor inhibits the future of human space travel more than the contemplation of its cost. The persistent inability of spaceflight engineers to reduce the high cost of building spacecraft capable of housing human beings and launching them through space significantly retarded that enterprise in the late twentieth century and continues to impose the principal challenge to human endeavors in the twenty-first.

16. Which statement best describes the relationship between the passages?

- (A) Passage 1 advances a position that Passage 2 presents as impractical.
- (B) Passage 1 describes a problem for which Passage 2 provides a solution.
- (C) Passage 1 argues against a reform that Passage 2 insists is necessary.
- (D) Passage 1 explains a phenomenon that Passage 2 presents as mysterious.
- (E) Passage 1 questions the accuracy of data that Passage 2 presents as definitive.

17. Both authors indicate that robotic rovers are

- (A) more slow-moving than humans
- (B) more vulnerable than humans
- (C) difficult to operate
- (D) costly to design
- (E) easy to replace

GO ON TO THE NEXT PAGE



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18. James Van Allen's comments (lines 10-12 and 29-31, Passage 1) suggest that he would most likely consider the "endeavors" (line 73, Passage 2) to be
- (A) unpopular  
(B) unjustifiable  
(C) risky  
(D) manageable  
(E) overdue
19. In the context of Passage 1, lines 13-22 serve to
- (A) signal a shift in perspective  
(B) challenge a decision  
(C) recollect an earlier era  
(D) point out an injustice  
(E) introduce a digression
20. Lines 35-37 ("Yes, . . . expensive") suggest that the author of Passage 1 regards the "inability" mentioned in line 68, Passage 2, as
- (A) inevitable  
(B) surprising  
(C) negligible  
(D) incomprehensible  
(E) surmountable
21. The author of Passage 1 would most likely say that the assessment that "human flight does not do well" (lines 44-45, Passage 2) is
- (A) incomplete because it ignores the speed of human explorers  
(B) inadequate because it focuses solely on issues related to cost  
(C) faulty because it ignores the scientific benefits of spaceflight  
(D) comprehensive because it considers both human and robotic spaceflight  
(E) accurate because it emphasizes the value of robotic spaceflight
22. Lines 62-66 ("Based . . . up") suggest that human spaceflight is
- (A) more politically popular than it once was  
(B) more expensive per mission than it once was  
(C) less strongly supported than it once was  
(D) less productive per day than robotic spaceflight  
(E) less technically difficult than robotic spaceflight
23. Lines 68-73 ("The persistent . . . twenty-first") imply that if the cost fell, human spaceflight would likely become
- (A) less rewarding  
(B) less productive  
(C) less inspirational  
(D) more common  
(E) more complex

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## SECTION 8

Time — 20 minutes

16 Questions

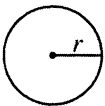
Turn to Section 8 (page 7) of your answer sheet to answer the questions in this section.

**Directions:** For this section, solve each problem and decide which is the best of the choices given. Fill in the corresponding circle on the answer sheet. You may use any available space for scratch work.

Notes

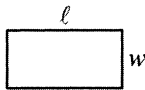
- The use of a calculator is permitted.
- All numbers used are real numbers.
- Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.
- Unless otherwise specified, the domain of any function  $f$  is assumed to be the set of all real numbers  $x$  for which  $f(x)$  is a real number.

Reference Information

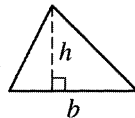


$$A = \pi r^2$$

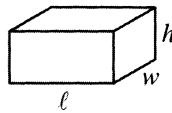
$$C = 2\pi r$$



$$A = \ell w$$



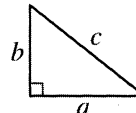
$$A = \frac{1}{2}bh$$



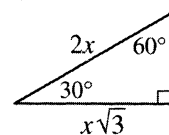
$$V = \ell wh$$



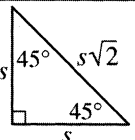
$$V = \pi r^2 h$$



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



Special Right Triangles

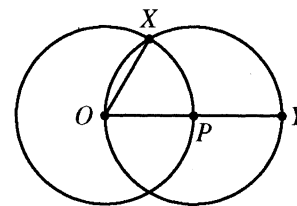


The number of degrees of arc in a circle is 360.

The sum of the measures in degrees of the angles of a triangle is 180.

1. The combined weight of 3 identical erasers is equal to the weight of a pencil. If the weight of the pencil is 9 grams, what is the weight, in grams, of each eraser?

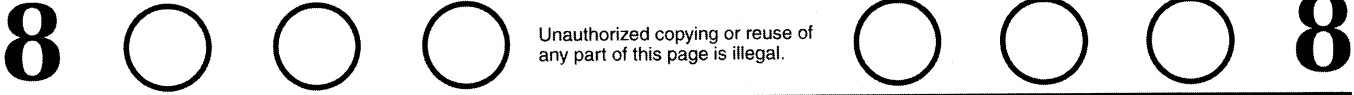
- (A) 2  
(B) 3  
(C) 6  
(D) 18  
(E) 27



2. In the figure above, points  $O$  and  $P$  are the centers of the two circles. What is the ratio of the length of  $\overline{OX}$  to the length of  $\overline{OY}$ ?

- (A) 1 to 2  
(B) 1 to 3  
(C) 2 to 5  
(D) 3 to 4  
(E) 3 to 5

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3. Sheng bought  $n$  notebooks that cost \$1.88 each, where  $n < 10$ , and paid for the notebooks with a 20-dollar bill. In terms of  $n$ , what was Sheng's change, in dollars, if no tax was charged?

- (A)  $0.12n$   
 (B)  $1.88n$   
 (C)  $20 - 1.88n$   
 (D)  $20n - 1.88$   
 (E)  $(20n - 1.88)n$

4. If  $0 < r < s$ , then  $\left(\frac{r}{s}\right)\left(\frac{s}{r}\right) =$

- (A) 0  
 (B) 1  
 (C)  $\frac{r^2}{s^2}$   
 (D)  $\frac{s^2}{r^2}$   
 (E)  $\frac{2r}{2s}$

OPERATING COSTS PER HOUR

| Expense Category | Airline |         |         |         |
|------------------|---------|---------|---------|---------|
|                  | A       | B       | C       | D       |
| Crew             | \$370   | \$740   | \$512   | \$703   |
| Fuel             | \$737   | \$756   | \$811   | \$737   |
| Maintenance      | \$378   | \$159   | \$503   | \$858   |
| Ownership        | \$422   | \$430   | \$351   | \$438   |
| Other            | \$92    | \$80    | \$136   | \$69    |
| Total            | \$1,999 | \$2,165 | \$2,313 | \$2,805 |

5. The chart above shows four airlines' average operating costs per hour for a plane traveling along a certain route. Which expense category contributes most toward  $B$ 's total operating costs per hour being higher than  $A$ 's?
- (A) Crew  
 (B) Fuel  
 (C) Maintenance  
 (D) Ownership  
 (E) Other

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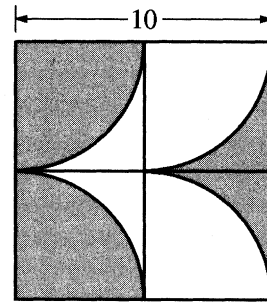
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6. The sides of  $\triangle ABC$  have different lengths. Side  $\overline{AB}$  is the longest side of the triangle, and side  $\overline{AC}$  is the shortest side. The perimeter of the triangle is 14, and  $AB = 6$ . Which of the following could be the length of side  $\overline{AC}$ ?

- (A) 1  
(B) 2  
(C) 3  
(D) 4  
(E) 5



8. In the figure above, the square with sides of length 10 is divided into 4 congruent squares. A quarter circle is drawn in each of these small squares, as shown. What is the sum of the areas of the shaded regions?

- (A) 5  
(B) 10  
(C) 25  
(D) 50  
(E) 100

3, 12, 39, ...

7. In the sequence above, the first term is 3 and each term after the first term is three times the value of one more than the preceding term. For example, the value of the third term is 39 since  $3(12 + 1) = 39$ . The number 1,092 is a term in this sequence. What is the value of the term that comes immediately before 1,092?

- (A) 117  
(B) 120  
(C) 351  
(D) 360  
(E) 363

GO ON TO THE NEXT PAGE



9. If  $\frac{3}{8}$  of  $x$  is equal to  $\frac{1}{8}$  of  $y$ , what is  $y$  in terms of  $x$ ?

- (A)  $\frac{1}{3}x$   
 (B)  $\frac{1}{2}x$   
 (C)  $2x$   
 (D)  $3x$   
 (E)  $\frac{8}{3}x$

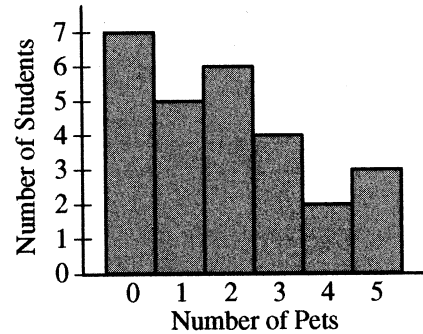
10. The height,  $h$ , in inches, of each person in a certain

population satisfies the inequality  $\left| \frac{h - 68.5}{2.7} \right| \leq 1$ .

Which of the following CANNOT be the height, in inches, of a person in this population?

- (A) 65  
 (B) 66  
 (C) 68  
 (D) 70  
 (E) 71

NUMBER OF PETS OWNED BY STUDENTS



11. The histogram above shows the number of pets owned by the 27 students in a class. What is the median number of pets owned by the students?

- (A) 0  
 (B) 1  
 (C) 2  
 (D) 3  
 (E) 4

8

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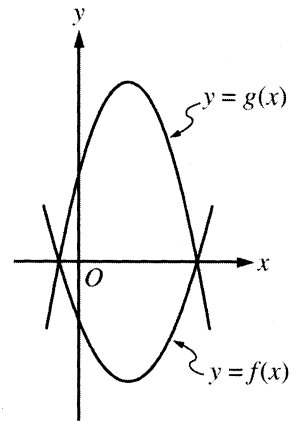
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12. In the  $xy$ -plane, point  $A$  has coordinates  $(2 - k, 3)$  and point  $B$  has coordinates  $(8 + k, 3)$ . What is the  $x$ -coordinate of the midpoint of  $\overline{AB}$ ?

- (A) 3  
(B) 5  
(C) 6  
(D) 7  
(E) 10

13. If  $ax + ay = a^2$  and  $a > 1$ , then  $x + y$  is equal to which of the following?

- (A)  $-a$   
(B) 0  
(C) 1  
(D)  $a$   
(E)  $a^2$



14. The graphs of two quadratic functions,  $f$  and  $g$ , are shown in the  $xy$ -plane above. How many other quadratic functions have graphs with the same two  $x$ -intercepts as  $f$  and  $g$ ?

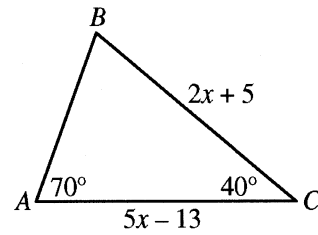
- (A) None  
(B) One  
(C) Two  
(D) Three  
(E) More than three

GO ON TO THE NEXT PAGE

15. If  $\frac{a+b}{2} = \sqrt{ab}$ , which of the following could be true?

- I.  $a < 0$
- II.  $a = 0$
- III.  $a > 0$

- (A) II only
- (B) III only
- (C) I and III only
- (D) II and III only
- (E) I, II, and III



16. In the triangle above, what is the length of  $\overline{AC}$ ?

- (A) 2.5
- (B) 6
- (C) 17
- (D) 30
- (E) It cannot be determined from the information given.

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## SECTION 9

Time — 20 minutes

19 Questions

Turn to Section 9 (page 7) of your answer sheet to answer the questions in this section.

**Directions:** For each question in this section, select the best answer from among the choices given and fill in the corresponding circle on the answer sheet.

Each sentence below has one or two blanks, each blank indicating that something has been omitted. Beneath the sentence are five words or sets of words labeled A through E. Choose the word or set of words that, when inserted in the sentence, best fits the meaning of the sentence as a whole.

**Example:**

Hoping to ----- the dispute, negotiators proposed a compromise that they felt would be ----- to both labor and management.

- (A) enforce . . useful  
(B) end . . divisive  
(C) overcome . . unattractive  
(D) extend . . satisfactory  
(E) resolve . . acceptable

(A) (B) (C) (D) ●

- Though Michael's arrival was -----, Gina greeted him affectionately: she was ----- to unexpectedly see her favorite uncle.
 

(A) surprising . . delighted  
(B) convenient . . irked  
(C) unannounced . . mortified  
(D) exciting . . thrilled  
(E) predictable . . startled
- A prepublication review of *Zora and Me* ----- the 192-page mystery novel by calling it "absolutely outstanding."
 

(A) quoted (B) revised (C) printed  
(D) hailed (E) renewed
- In contrast to those authors who describe only the triumphs of science, Chang offers a ----- view that also emphasizes the importance of ----- to subsequent scientific advances.
 

(A) pessimistic . . breakthroughs  
(B) lopsided . . setbacks  
(C) balanced . . results  
(D) revisionist . . accomplishments  
(E) tempered . . failures
- The judge was not known for -----: she penalized each ----- severely because she felt that every breach of the law was an affront to society.
 

(A) empathy . . portent  
(B) mercy . . verdict  
(C) rigor . . infraction  
(D) leniency . . transgression  
(E) vigilance . . misdemeanor
- The division that the issue sparked within the scientific community was so pronounced that it nearly amounted to ----- .
 

(A) a hiatus (B) a chimera (C) an edict  
(D) a schism (E) a disparity
- Only three minutes long, Lincoln's Gettysburg Address achieved more through its ----- than did the two-hour oration that preceded it.
 

(A) pedantry (B) impertinence (C) pithiness  
(D) precocity (E) preeminence

GO ON TO THE NEXT PAGE

The passage below is followed by questions based on its content. Answer the questions on the basis of what is stated or implied in the passage and in any introductory material that may be provided.

**Questions 7-19 are based on the following passage.**

The following passage is from a short story first published in 1998. Mrs. Dutta has recently moved to the United States to live with her son Sagar, his wife Shyamoli, and their children.

Line 5 It is 9:00 A.M. and the house, after the flurry of departures, of frantic “I can’t find my socks,” and “Mom, he took my lunch money,” and “I swear I’ll leave you kids behind if you’re not in the car in exactly one minute,” has settled into its placid daytime rhythms.

Busy in the kitchen, Mrs. Dutta has recovered her spirits. It is too exhausting to hold on to grudges, and, besides, the kitchen—sunlight sliding across its countertops while the refrigerator hums reassuringly— is her favorite place.

Mrs. Dutta hums too as she fries potatoes for alu dum. Her voice is rusty and slightly off-key. In India she would never have ventured to sing, but with everyone gone, the house is too quiet, all that silence pressing down on her like the heel of a giant hand, and the TV voices, with their unreal accents, are no help at all. As the potatoes turn golden-brown, she permits herself a moment of nostalgia for her Calcutta kitchen—the new gas stove bought with the birthday money Sagar sent, the scoured brass pots stacked by the meat safe, the window with the lotus-pattern grille through which she could look down on children playing cricket after school. The mouth-watering smell of ginger and chili paste, ground fresh by Reba the maid, and, in the evening, strong black Assam cha brewing in the kettle when Mrs. Basu came by to visit. In her mind she writes to Mrs. Basu, *Oh, Roma, I miss it all so much, sometimes I feel that someone has reached in and torn out a handful of my chest.*

But only fools indulge in nostalgia, so Mrs. Dutta shakes her head clear of images and straightens up the kitchen. She pours the half-drunk glasses of milk down the sink, though Shyamoli has told her to save them in the refrigerator. But surely Shyamoli, a girl from a good Hindu family, doesn’t expect her to put contaminated jutha\* things in with the rest of the food? She washes the breakfast dishes by hand instead of letting them wait inside the dishwasher till night, breeding germs. With practiced fingers, she throws an assortment of spices into the blender: coriander, cumin, cloves, black pepper, a few red chilies for vigor. No stale bottled curry powder for her! *At least the family’s eating well since I arrived,* she writes in her mind, *proper Indian food, rutis that puff up the way they should, fish curry in*

*mustard sauce, and real pulao with raisins and cashews and ghee—the way you taught me, Roma—instead of Rice-a-roni.* She would like to add, *They love it,* but thinking of Shyamoli she hesitates.

At first Shyamoli had been happy enough to have someone take over the cooking. It’s wonderful to come home to a hot dinner, she’d say, or Mother, what crispy papads, and your fish gravy is out of this world. But recently she’s taken to picking at her food, and once or twice from the kitchen, Mrs. Dutta has caught wisps of words, intensely whispered: *cholesterol, all putting on weight, she’s spoiling you.* And though Shyamoli always refuses when the children ask if they can have burritos from the freezer instead, Mrs. Dutta suspects that she would really like to say yes.

The children. A heaviness pulls at Mrs. Dutta’s entire body when she thinks of them. Like so much in this country they have turned out to be—yes, she might as well admit it—a disappointment.

For this she blames, in part, the Olan Mills portrait. Perhaps it had been impractical of her to set so much store on a photograph, especially one taken years ago. But it was such a charming scene—Mrinalini in a ruffled white dress with her arm around her brother, Pradeep chubby and dimpled in a suit and bow tie, a glorious autumn forest blazing red and yellow behind them. (Later Mrs. Dutta would learn, with a sense of having been betrayed, that the forest was merely a backdrop in a studio in California, where real trees did not turn such colors.)

The picture had arrived, silver-framed and wrapped in a plastic sheet filled with bubbles, with a note from Shyamoli explaining that it was a Mother’s Day gift. (A strange concept, a day set aside to honor mothers.) For a week Mrs. Dutta could not decide where it should be hung. If she put it in the drawing room, visitors would be able to admire her grandchildren, but if she put it on the bedroom wall, she would be able to see the photo, last thing, before she fell asleep. She had finally opted for the bedroom, and later, when she was too ill with pneumonia to leave her bed for a month, she’d been glad of it.

\* leftover

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7. The passage is primarily concerned with
- conveying a character's introspections
  - examining a conflict between two characters
  - representing a disquieting scene
  - revealing the differences between two cultures
  - exploring the reasons behind a decision
8. Lines 1-5 depict a transition from
- chaos to tranquillity
  - openness to secrecy
  - certainly to doubt
  - routine to novelty
  - simplicity to complexity
9. Lines 6-10 indicate that Mrs. Dutta views "the kitchen" as
- cheerless
  - cramped
  - disorganized
  - comforting
  - stylish
10. The narrator suggests that Mrs. Dutta "hums" (line 11) because she
- prefers practicing her singing when alone
  - enjoys cooking more when singing
  - aims to continue a practice from her past
  - needs to counter a feeling of loneliness
  - wants to fit in with her new surroundings
11. The description of Mrs. Dutta in lines 37-45 ("With . . . *Rice-a-roni*") emphasizes her
- optimism
  - self-assurance
  - curiosity
  - bravery
  - compassion
12. Lines 47-50 ("At . . . world") suggest that Shyamoli's attitude toward Mrs. Dutta's doing the family cooking was initially one of
- suspicion
  - curiosity
  - ambivalence
  - surprise
  - appreciation
13. In context, the phrase "wisps of words" (lines 52-53) primarily refers to
- pragmatic suggestions
  - hateful reproofs
  - furtive complaints
  - imaginary conversations
  - vacuous statements
14. The main point of lines 58-61 is that
- Mrs. Dutta is overwhelmed by her duties in America
  - Mrs. Dutta's feelings are easily hurt by others
  - Mrs. Dutta is unhappy with American culture
  - Mrs. Dutta's expectations about her grandchildren have not been realized
  - Mrs. Dutta is upset that her grandchildren do not enjoy spending time with her
15. The statement in line 60 ("yes, . . . it") conveys a sense of
- resignation
  - incredulity
  - perplexity
  - denial
  - outrage
16. The narrator implies that Mrs. Dutta ultimately finds the background in the "Olan Mills portrait" (line 62) to be
- quaint
  - arresting
  - deceptive
  - enigmatic
  - endearing
17. In line 63, "store" most nearly means
- supply
  - preparation
  - accumulation
  - enlightenment
  - value

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18. In the passage as a whole, the relationship between Mrs. Dutta and Shyamoli is best described as

- (A) respectful
- (B) strained
- (C) vindictive
- (D) manipulative
- (E) volatile

19. The narrator suggests that Mrs. Dutta's move to America is

- (A) an unforeseen pleasure
- (B) a stimulating undertaking
- (C) an overwhelming ordeal
- (D) a frightening affair
- (E) an unsatisfying experience

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## SECTION 10

Time — 10 minutes

14 Questions

Turn to Section 10 (page 7) of your answer sheet to answer the questions in this section.

**Directions:** For each question in this section, select the best answer from among the choices given and fill in the corresponding circle on the answer sheet.

The following sentences test correctness and effectiveness of expression. Part of each sentence or the entire sentence is underlined; beneath each sentence are five ways of phrasing the underlined material. Choice A repeats the original phrasing; the other four choices are different. If you think the original phrasing produces a better sentence than any of the alternatives, select choice A; if not, select one of the other choices.

In making your selection, follow the requirements of standard written English; that is, pay attention to grammar, choice of words, sentence construction, and punctuation. Your selection should result in the most effective sentence—clear and precise, without awkwardness or ambiguity.

## EXAMPLE:

Laura Ingalls Wilder published her first book and she was sixty-five years old then.

- (A) and she was sixty-five years old then
- (B) when she was sixty-five
- (C) at age sixty-five years old
- (D) upon the reaching of sixty-five years
- (E) at the time when she was sixty-five

(A) ● (C) (D) (E)

1. The brochure promised that the tour would enable travelers to expand their horizons, have fun, and new friends will be made.
  - (A) new friends will be made
  - (B) new friends will have been made
  - (C) it says they will make new friends
  - (D) making new friends
  - (E) make new friends

2. Plants of the onion family, including onions, leeks, scallions, and garlic, often possesses bright flowers.
  - (A) often possesses
  - (B) often possess
  - (C) often possessing
  - (D) they often possess
  - (E) it often possesses
3. Before being appointed secretary of the Department of Veterans Affairs in 2009, retired general Eric K. Shinseki has served as army chief of staff from 1999 until 2003.
  - (A) has served
  - (B) who served
  - (C) having served
  - (D) serving
  - (E) served
4. At the botanical gardens, visitors can see many varieties of plants and flowers walking along the paths.
  - (A) visitors can see many varieties of plants and flowers walking along the paths
  - (B) visitors walking along the paths, who can see many varieties of plants and flowers
  - (C) visitors who walk along the paths can see many varieties of plants and flowers
  - (D) many varieties of plants and flowers walking along the paths can be seen by visitors
  - (E) many varieties of plants and flowers seen by visitors who walk along the paths



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5. When one develops an immunity to mosquito bites, as sometimes happens, it no longer caused swelling and itching of the skin.
- (A) it no longer caused swelling and itching of the skin  
(B) they no longer cause one's skin to swell and itch  
(C) they no longer cause your skin to swell and itch  
(D) no longer causing one's skin to swell and itch  
(E) no longer causing swelling and itching of the skin
6. Although the Linnaean system remains the most common method of classifying plants, but some scientists are beginning to use a new classification system based on DNA studies.
- (A) but some scientists are beginning  
(B) however, some scientists have begun  
(C) some scientists are beginning  
(D) some scientists, beginning  
(E) some scientists had began
7. For decades, nightclubs at popular summer resorts in the Catskill Mountains of New York State served as training grounds for aspiring comedians, singers, and for other entertainers as well.
- (A) and for other entertainers as well  
(B) and also for other entertainers  
(C) and other entertainers  
(D) as well as for other entertainers  
(E) other entertainers as well
8. Beekeeping was important in medieval times: honey was used to sweeten food, while candles made from beeswax illuminated religious ceremonies and helped with timekeeping.
- (A) to sweeten food, while candles made from beeswax illuminated  
(B) when they sweetened food, meanwhile candles made from beeswax illuminated  
(C) in sweetening food, with candles made from beeswax, they illuminated  
(D) when sweetening food, with candles made from beeswax to illuminate  
(E) in sweetening food, meanwhile candles made from beeswax would illuminate
9. In addition to being a good source of protein and calcium, yogurt contains bacteria that are good for and beneficial to the human immune system.
- (A) yogurt contains bacteria that are good for and  
(B) yogurt contains bacteria not only good for but also  
(C) yogurt contains bacteria that are  
(D) yogurt, it contains bacteria that are  
(E) yogurt's bacteria are good for and
10. One of the most charming fishing villages on Galway Bay, Kinvara's appeal lies in its sheltered harbor and traditional seafaring atmosphere.
- (A) One of the most charming fishing villages on Galway Bay, Kinvara's appeal  
(B) One of Galway Bay's most charming fishing villages, the appeal of Kinvara  
(C) The appeal of Kinvara, one of the most charming fishing villages on Galway Bay,  
(D) The appeal of Kinvara, one of the most charming fishing villages on Galway Bay, it  
(E) Kinvara, one of the most charming fishing villages on Galway Bay, whose appeal
11. The harsh conditions in which bristlecone pine trees live may help to explain their exceptional longevity, because those same conditions are also inhospitable to the pests that can attack the trees.
- (A) because those same conditions are also inhospitable to  
(B) because those same conditions were inhospitable also for  
(C) the same conditions being also inhospitable with  
(D) since those conditions that are also inhospitable to  
(E) those conditions are also inhospitable to
12. After servicing every vehicle in the fleet, the alarming grinding noises that had been coming from many of the trucks disappeared.
- (A) servicing every vehicle in the fleet  
(B) servicing all the vehicles in the fleet  
(C) every vehicle in the fleet has been serviced  
(D) all the vehicles in the fleet had been serviced  
(E) servicing all the fleet's vehicles

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13. Some Mexican American fiction writers use a technique called code-switching, they shift back and forth between Spanish and English to represent the bilingual experience of their characters.

- (A) code-switching, they shift
- (B) code-switching, where it shifts
- (C) code-switching, shifting
- (D) code-switching: he or she shifts
- (E) code-switching; which is shifting

14. What distinguishes the paintings of this artist from her contemporaries are the combination of vibrant colors with striking patterns.

- (A) her contemporaries are
- (B) her contemporaries is
- (C) those of her contemporaries are
- (D) those of her contemporaries is
- (E) that of her contemporaries are

**STOP**

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