



SECTION 2

Time — 25 minutes

20 Questions

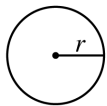
Turn to Section 2 (page 4) of your answer sheet to answer the questions in this section.

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 scratchwork.

Notes

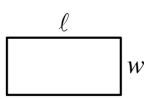
- The use of a calculator is permitted.
- All numbers used are real numbers.
- Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not 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

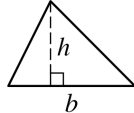


$$A = \pi r^2$$

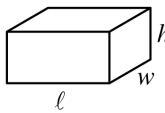
$$C = 2\pi r$$



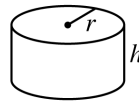
$$A = \ell w$$



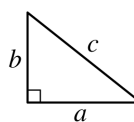
$$A = \frac{1}{2}bh$$



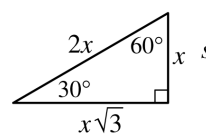
$$V = \ell wh$$



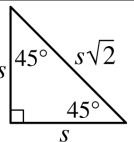
$$V = \pi r^2 h$$



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



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.

- If $x^2 - 36 = 0$, which of the following could be a value of x ?
 - 6
 - 4
 - 0
 - 3
 - 12
 - The length of a rectangular rug is 2 feet more than its width. If the length of the rug is 8 feet, what is the area of the rug in square feet?
 - 16
 - 48
 - 66
 - 80
 - 96
 - If $r = 2t$ and $t = 3$, what is the value of $2r$?
 - 2
 - 4
 - 6
 - 8
 - 12
- Some integers in set X are even.
- If the statement above is true, which of the following must also be true?
 - If an integer is even, it is in set X .
 - If an integer is odd, it is in set X .
 - All integers in set X are even.
 - All integers in set X are odd.
 - Not all integers in set X are odd.

GO ON TO THE NEXT PAGE



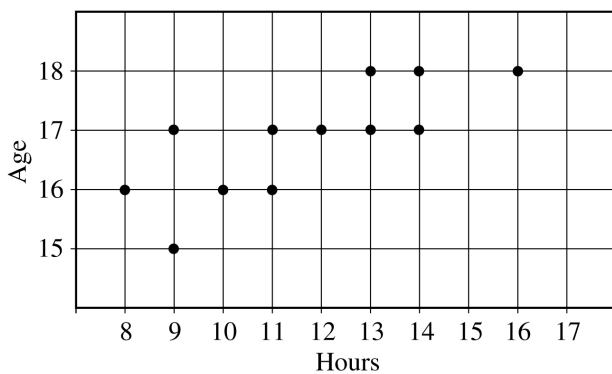
5. A triangle has a perimeter of 13 and one side of length 3. If the lengths of the other two sides are equal, what is the length of each of them?

(A) 4
(B) 5
(C) 6
(D) 7
(E) 8

7. Squaring the product of z and 5 gives the same result as squaring the sum of z and 5. Which of the following equations could be used to find all possible values of z ?

(A) $5z^2 = (z + 5)^2$
(B) $(5z)^2 = z^2 + 5^2$
(C) $5^2z = z^2 + 5^2$
(D) $(5z)^2 = (z + 5)^2$
(E) $5z^2 = z^2 + 5^2$

HOURS WORKED BY STUDENTS



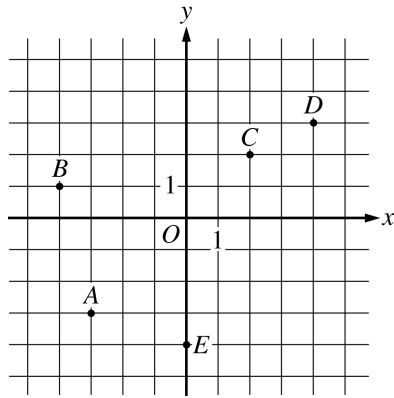
6. The grid above shows the number of hours worked last week by 12 students of various ages at after-school jobs. Which of the following is true, according to this grid?

(A) Half of the students worked more than 12 hours each.
(B) One student worked exactly 15 hours.
(C) One 16 year old worked more than 11 hours.
(D) More 18 year olds than 17 year olds worked at least 13 hours each.
(E) Most of the students were under 16 years old.

8. If as many 7-inch pieces of wire as possible are cut from a wire that is 3 feet long, what is the total length of the wire that is left over? (12 inches = 1 foot)

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

GO ON TO THE NEXT PAGE



9. Which of the lettered points in the figure above has coordinates (x, y) such that $|x| + |y| = 5$?

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

$$A = \left\{ \frac{4}{7}, 1, \frac{5}{2}, 4, \frac{11}{2}, 7 \right\}$$

$$B = \left\{ \frac{4}{7}, \frac{7}{4}, 4, 7 \right\}$$

10. If n is a member of both set A and set B above, which of the following must be true?

I. n is an integer.
II. $4n$ is an integer.
III. $n = 4$

(A) None
(B) II only
(C) I and II only
(D) I and III only
(E) I, II, and III

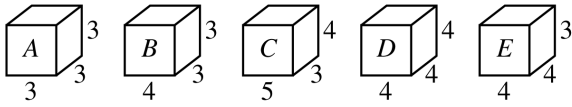
11. If y is directly proportional to x and if $y = 20$ when $x = 6$, what is the value of y when $x = 9$?

(A) $\frac{10}{3}$
(B) $\frac{40}{3}$
(C) 23
(D) 27
(E) 30

12. The n th term of a sequence is defined to be $4n + 3$. The 50th term is how much greater than the 45th term?

(A) 5
(B) 16
(C) 20
(D) 23
(E) 24

GO ON TO THE NEXT PAGE



Note: Figures not drawn to scale.

13. Which of the rectangular solids shown above has a volume closest to the volume of a right circular cylinder with radius 2 and height 4?
- (A) A
(B) B
(C) C
(D) D
(E) E

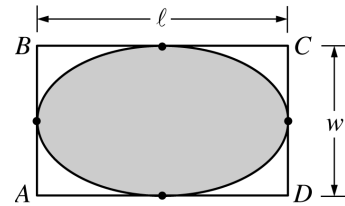
$$j = x^2 - 0.49$$

$$k = (x - 0.49)^2$$

$$m = x^3 - 0.49$$

14. If x is a negative integer, what is the ordering of j , k , and m from least to greatest?
- (A) $j < k < m$
(B) $j < m < k$
(C) $k < j < m$
(D) $m < j < k$
(E) $m < k < j$

15. Flour, water, and salt are mixed by weight in the ratio of 5:4:1, respectively, to produce a certain type of dough. In order to make 5 pounds of this dough, what weight of salt, in pounds, is required?
- (A) $\frac{1}{4}$
(B) $\frac{1}{2}$
(C) $\frac{3}{4}$
(D) 1
(E) 2

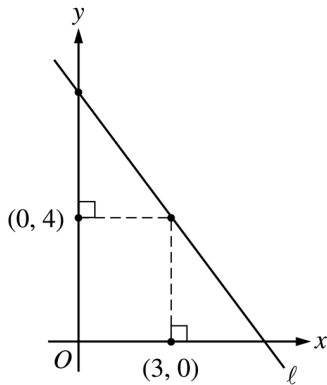


16. In rectangle $ABCD$ above, the area of the shaded region is given by $\frac{\pi \ell w}{4}$. If the area of the shaded region is 7π , what is the total area, to the nearest whole number, of the unshaded regions of rectangle $ABCD$?
- (A) 4
(B) 6
(C) 8
(D) 9
(E) 10

GO ON TO THE NEXT PAGE



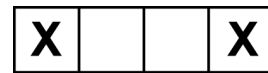
17. The city library donated some children's books to Mr. Clark's first-grade class. If each student takes 4 books, there will be 20 books left. If 3 students do not take a book and the rest of the students take 5 books each, there will be no books left. How many books were donated to the class?
- (A) 120
(B) 140
(C) 160
(D) 175
(E) 185



Note: Figure not drawn to scale.

18. In the figure above, if line ℓ has a slope of -2 , what is the y -intercept of ℓ ?
- (A) 7
(B) 8
(C) 9
(D) 10
(E) 12

19. For all positive integers w and y , where $w > y$, let the operation \otimes be defined by $w \otimes y = \frac{2^{w+y}}{2^{w-y}}$. For how many positive integers w is $w \otimes 1$ equal to 4?
- (A) None
(B) One
(C) Two
(D) Four
(E) More than four



20. The figure above represents four offices that will be assigned randomly to four employees, one employee per office. If Karen and Tina are two of the four employees, what is the probability that each will be assigned an office indicated with an X?
- (A) $\frac{1}{16}$
(B) $\frac{1}{12}$
(C) $\frac{1}{6}$
(D) $\frac{1}{4}$
(E) $\frac{1}{2}$

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.



SECTION 6

Time — 25 minutes

18 Questions

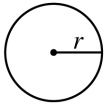
Turn to Section 6 (page 6) of your answer sheet to answer the questions in this section.

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 scratchwork.

Notes

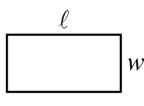
- The use of a calculator is permitted.
- All numbers used are real numbers.
- Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not 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

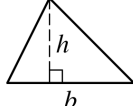


$$A = \pi r^2$$

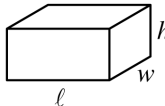
$$C = 2\pi r$$



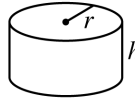
$$A = \ell w$$



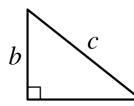
$$A = \frac{1}{2}bh$$



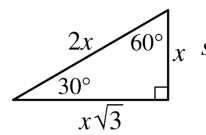
$$V = \ell wh$$



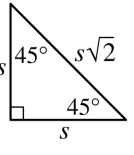
$$V = \pi r^2 h$$



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

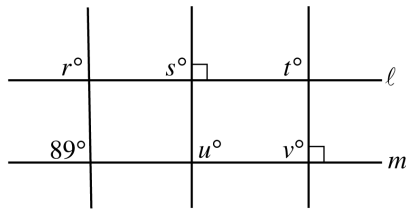


Special Right Triangles



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 figure above shows five lines. If $\ell \parallel m$, which of the following is NOT equal to 90 ?

- (A) r
 (B) s
 (C) t
 (D) u
 (E) v

2. Which of the following is divisible by 3 and by 5 but is not divisible by 10 ?

- (A) 30
 (B) 35
 (C) 40
 (D) 45
 (E) 60

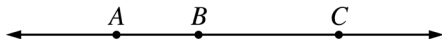
GO ON TO THE NEXT PAGE



t	0	1	2	3
$f(t)$	-1	1	3	5

3. The table above gives values of the function f for several values of t . If the graph of f is a line, which of the following defines $f(t)$?

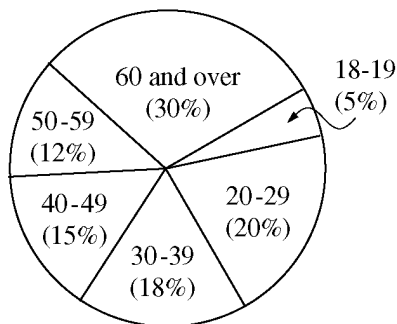
- (A) $f(t) = t - 1$
 (B) $f(t) = t + 1$
 (C) $f(t) = 2t + 1$
 (D) $f(t) = 2t - 1$
 (E) $f(t) = 1 - 2t$



4. In the figure above, the intersection of ray \overrightarrow{AC} and ray \overrightarrow{BA} is

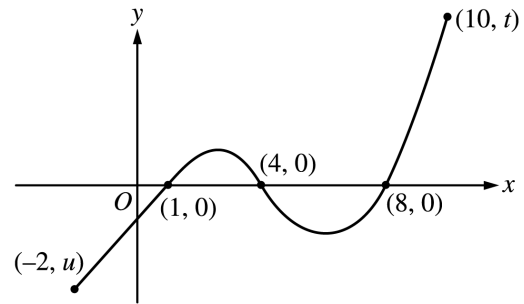
- (A) Segment \overline{AC}
 (B) Segment \overline{AB}
 (C) Ray \overrightarrow{AC}
 (D) Ray \overrightarrow{BA}
 (E) Line \overleftrightarrow{AC}

AGE DISTRIBUTION OF REGISTERED
VOTERS IN WASHINGTON COUNTY



5. According to the graph above, if there are 6,000 registered voters aged 60 and over in Washington County, how many registered voters are under the age of 30?

- (A) 1,000
 (B) 2,000
 (C) 3,000
 (D) 4,000
 (E) 5,000



6. Based on the graph of the function f above, what are the values of x for which $f(x)$ is positive?

- (A) $-2 \leq x < 1$ or $8 < x \leq 10$
 (B) $-2 \leq x < 1$ or $4 < x < 8$
 (C) $1 < x < 4$ or $8 < x \leq 10$
 (D) $-2 \leq x \leq 10$
 (E) $1 < x < 8$

7. Bernardo drives to work at an average speed of 50 miles per hour and returns along the same route at an average speed of 25 miles per hour. If his total travel time is 3 hours, what is the total number of miles in the round-trip?

- (A) 225
 (B) 112.5
 (C) 100
 (D) 62.5
 (E) 50

8. If x and y are integers such that $x^2 = 64$ and $y^3 = 64$, which of the following could be true?

- I. $x = 8$
 II. $y = -4$
 III. $x + y = -4$

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

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 scratchwork.

Write answer in boxes.

Answer: $\frac{7}{12}$

	7	/	1	2
	•	•	•	•
	0	0	0	0
1	1	•	1	•
2	2	•	2	•
3	3	•	3	•
4	4	•	4	•
5	5	•	5	•
6	6	•	6	•
7	•	7	7	•
8	8	•	8	•
9	9	•	9	•

Grid in result.

Fraction line

Answer: 2.5

	2	.	5
	•	•	•
	0	0	0
1	1	•	1
2	•	2	•
3	3	•	3
4	4	•	4
5	5	•	•
6	6	•	6
7	7	•	7
8	8	•	8
9	9	•	9

Decimal point

Answer: 201

Either position is correct.

	2	0	1
	•	•	•
	0	•	0
1	1	•	•
2	•	2	•
3	3	•	3
4	4	•	4

	2	0	1
	•	•	•
	0	•	0
1	1	•	•
2	•	2	•
3	3	•	3
4	4	•	4

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	/	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:

	2	/	3
	•	•	•
	0	0	0
1	1	•	1
2	•	2	•
3	3	•	3
4	4	•	4
5	5	•	5
6	6	•	6

	.	6	6	6
	•	•	•	•
	0	0	0	0
1	1	•	1	•
2	2	•	2	•
3	3	•	3	•
4	4	•	4	•
5	5	•	5	•
6	•	6	6	•

	.	6	6	7
	•	•	•	•
	0	0	0	0
1	1	•	1	•
2	2	•	2	•
3	3	•	3	•
4	4	•	4	•
5	5	•	5	•
6	•	6	6	•

9. When a certain number is multiplied by $\frac{1}{4}$ and the product is then multiplied by 32, the result is 60. What is the number?

10. What is the greatest integer value of x for which $2x - 20 < 0$?

GO ON TO THE NEXT PAGE



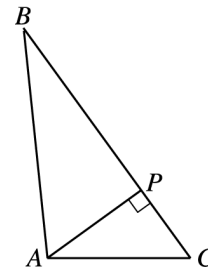
11. An object thrown upward from a height of h feet with an initial velocity of v feet per second will reach a maximum height of $h + \frac{v^2}{64}$ feet. If the object is thrown upward from a height of 6 feet with an initial velocity of 32 feet per second, what will be its maximum height, in feet?

12. The three angles of a triangle have measures of x° , $2x^\circ$, and y° , where $x > 55$. If x and y are integers, what is one possible value of y ?

CARMEN'S EXPENSES

	Meals	Hotel	Total
Wednesday	\$30		
Thursday	\$25		
Friday	\$26		
Total			\$291

13. The incomplete table above is an expense sheet for Carmen's business trip. If her hotel expenses were the same each day, what were her total expenses for Friday, in dollars? (Disregard the \$ sign when gridding your answer.)



14. In $\triangle ABC$ above, $AC = 5$, $PC = 3$, and $BP = 4\sqrt{3}$. What is the length of \overline{AB} ?

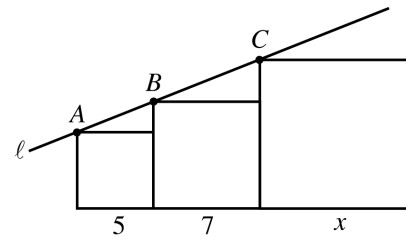
GO ON TO THE NEXT PAGE



15. On Monday morning Mr. Smith had a certain amount of money that he planned to spend during the week. On each subsequent morning, he had one fourth the amount of the previous morning. On Saturday morning, 5 days later, he had \$1. How many dollars did Mr. Smith originally start with on Monday morning? (Disregard the \$ sign when gridding your answer.)

17. When the positive integer m is divided by 5, the remainder is 3. What is the remainder when $20m$ is divided by 25?

16. The median of a list of 99 consecutive integers is 60. What is the greatest integer in the list?



18. The figure above shows three squares with sides of length 5, 7, and x , respectively. If A , B , and C lie on line ℓ , what is the value of x ?

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.



SECTION 8
Time — 20 minutes
16 Questions

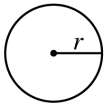
Turn to Section 8 (page 7) of your answer sheet to answer the questions in this section.

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 scratchwork.

Notes

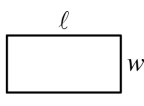
1. The use of a calculator is permitted.
2. All numbers used are real numbers.
3. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.
4. 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

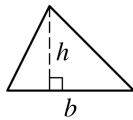


$$A = \pi r^2$$

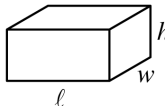
$$C = 2\pi r$$



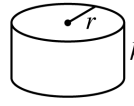
$$A = \ell w$$



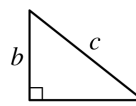
$$A = \frac{1}{2}bh$$



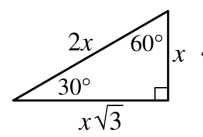
$$V = \ell wh$$



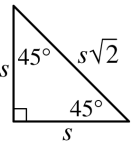
$$V = \pi r^2 h$$



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



Special Right Triangles

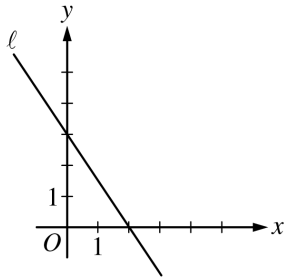


The number of degrees of arc in a circle is 360.

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

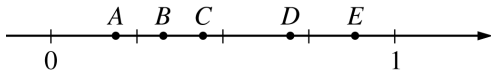
1. If notebooks cost \$2 each and backpacks cost \$32 each, which of the following represents the cost, in dollars, of n notebooks and b backpacks?
 - (A) $16nb$
 - (B) $34nb$
 - (C) $34(n + b)$
 - (D) $2n + 32b$
 - (E) $2(n + 32b)$
2. The average (arithmetic mean) of 6, 19, and x is 19. What is the value of x ?
 - (A) 19
 - (B) 25
 - (C) 31
 - (D) 32
 - (E) 57
3. Ali, Ben, and Carla made a total of 20 sandwiches. Ben made 3 times as many as Ali, and Carla made twice as many as Ben. How many sandwiches did Ali make?
 - (A) Two
 - (B) Four
 - (C) Five
 - (D) Six
 - (E) Ten
4. If 0.03 percent of n is 3, what is 3 percent of n ?
 - (A) 900
 - (B) 600
 - (C) 300
 - (D) 0.006
 - (E) 0.003

GO ON TO THE NEXT PAGE



5. What is an equation of line ℓ in the figure above?

- (A) $y = -\frac{3}{2}x + 2$
 (B) $y = -\frac{3}{2}x + 3$
 (C) $y = -\frac{2}{3}x + 3$
 (D) $y = \frac{2}{3}x + 2$
 (E) $y = \frac{2}{3}x + 3$

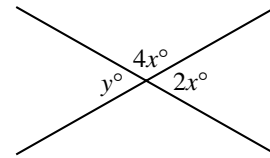


6. If the tick marks on the number line above are equally spaced, which of the lettered points A through E is between $\frac{1}{4}$ and $\frac{3}{8}$?

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

7. If $x^{-1}h = 1$, what does h equal in terms of x ?

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



8. In the figure above, what is the value of y ?

- (A) 40
 (B) 45
 (C) 50
 (D) 60
 (E) 72

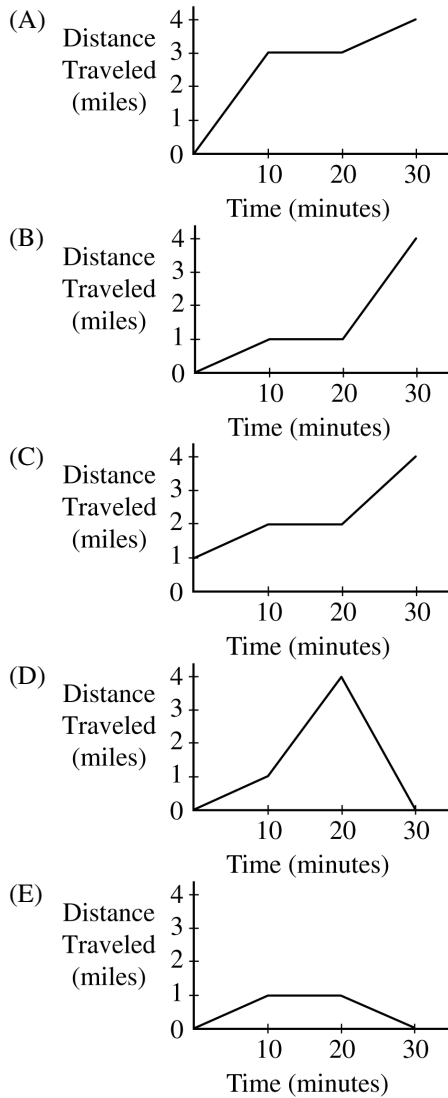
9. If $x^2 + x = 30$, which of the following is a possible value of $x^2 - x$?

- (A) -30
 (B) 10
 (C) 20
 (D) 30
 (E) 870

GO ON TO THE NEXT PAGE

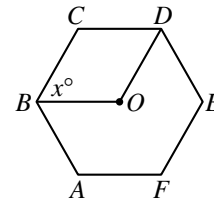


10. Mark began a 4-mile bicycle trip by riding slowly uphill for 1 mile. He rested for 10 minutes and then rode quickly downhill for the rest of the trip. Which of the following graphs could correctly represent his trip?



11. There are 6 red, 6 brown, 6 yellow, and 6 gray scarves packaged in 24 identical, unmarked boxes, 1 scarf per box. What is the least number of boxes that must be selected in order to be sure that among the boxes selected 3 or more contain scarves of the same color?

- (A) 3
(B) 6
(C) 7
(D) 8
(E) 9

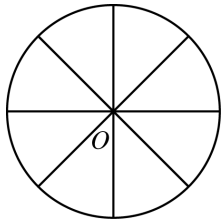


12. In the figure above, $ABCDEF$ is a regular hexagon, and its center is point O . What is the value of x ?
- (A) 80
(B) 60
(C) 40
(D) 30
(E) 20



13. Let the function f be defined by $f(x) = 5x$ for all numbers x . Which of the following is equivalent to $f(p + r)$?

- (A) $\frac{p+r}{5}$
 (B) $5p + r$
 (C) $5p + 5r$
 (D) $10(p + r)$
 (E) $25pr$



14. The circle above has an area of 25π and is divided into 8 congruent regions. What is the perimeter of one of these regions?

- (A) $10 - 25\pi$
 (B) $10 + \frac{5}{8}\pi$
 (C) $10 + \frac{5}{4}\pi$
 (D) $10 + 5\pi$
 (E) $10 + 25\pi$

$$2x - 5y = 8$$

$$4x + ky = 17$$

15. For which of the following values of k will the system of equations above have no solution?

- (A) -10
 (B) -5
 (C) 0
 (D) 5
 (E) 10

RESULTS OF BEANBAG GAME

Number of Throws	Number of People
1	7
2	6
3	6
4	4
5	2

16. In a certain game, each person threw a beanbag at a target until the person missed the target. The table shows the results for the 25 people who played the game. For example, 4 people hit the target on their first 3 throws and missed on their 4th throw. Based on the information in the table, which of the following must be true?

- I. More than half the people hit the target on their first throw.
 II. For all of the throws attempted, more hit the target than missed the target.
 III. No one hit the target 5 times.

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

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.