SECTION 4
Time — 25 minutes
20 Questions

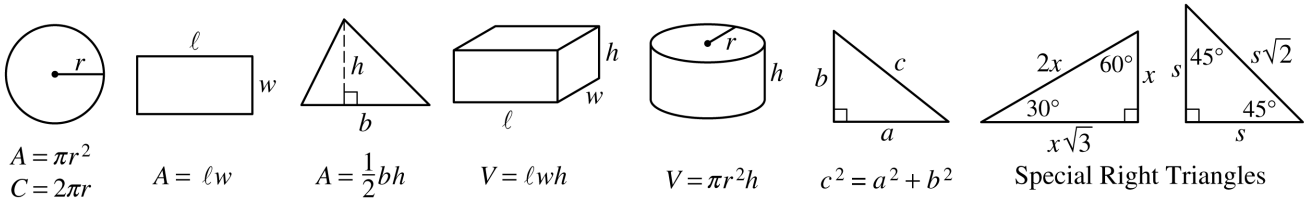
Turn to Section 4 (page 5) of your answer sheet to answer the questions in this section.

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 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

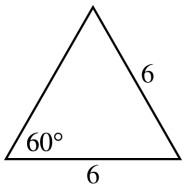


$A = \pi r^2$, $C = 2\pi r$ | $A = \ell w$ | $A = \frac{1}{2}bh$ | $V = \ell wh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

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. Which of the following triples (x, y, z) does NOT satisfy the equation $\frac{xy}{z} = 6$?

(A) $(9, 2, 3)$
(B) $(6, 6, 6)$
(C) $(6, 4, 4)$
(D) $(6, 3, 2)$
(E) $(4, 3, 2)$



2. What is the perimeter of the triangle shown above?

(A) 18
(B) 16
(C) 15
(D) 12
(E) 9

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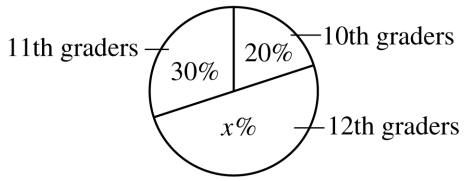
DEBATING TEAM MEMBERSHIP



3. Based on the information in the graph above, what percent of the membership of the debating team is made up of 11th and 12th graders?

(A) 40%
(B) 50%
(C) 60%
(D) 70%
(E) 80%

4. Points P, Q, R, and S lie on a line in that order. Q is the midpoint of $\overline{PR}$. If the length of $\overline{RS}$ is 3 and the length of $\overline{PS}$ is 13, what is the length of $\overline{QR}$?

(A) 5
(B) 6
(C) 8
(D) 9
(E) 10

5. If three times a number x is twelve more than x, what is x ?

(A) 2
(B) 3
(C) 4
(D) 6
(E) 9

6. Today, Joaquín has 45 cents in his piggy bank and Marcy has 93 cents in her piggy bank. Starting tomorrow, Joaquín will add 6 cents to his bank each day and Marcy will add 4 cents to her bank each day. In how many days will the amount in Joaquín's bank first be greater than the amount in Marcy's bank?

(A) 5
(B) 15
(C) 20
(D) 25
(E) 58

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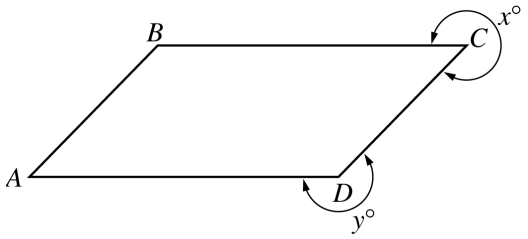


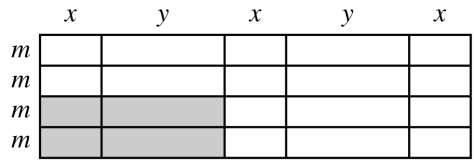
Note: Figure not drawn to scale.

7. In the figure above, $ABCD$ is a parallelogram. If $x = 300$, what is the value of y ?

(A) 200
(B) 240
(C) 280
(D) 320
(E) 330

8. If $xy = 2$, $yz = 5$, $xz = 10$, and $x > 0$, then $xyz =$

(A) 5
(B) 10
(C) 17
(D) 50
(E) 100



9. In the figure above, all angles are right angles and $y = 2x$. If m, x, and y are lengths of the segments indicated, what fraction of the figure is shaded?

(A) $\frac{1}{7}$
(B) $\frac{1}{5}$
(C) $\frac{3}{14}$
(D) $\frac{3}{10}$
(E) $\frac{5}{14}$

10. When a certain odd number is divided by 5, the remainder is 1. Which digit must be in the units place of this odd number?

(A) 1
(B) 3
(C) 5
(D) 7
(E) 9

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11. Let the functions f, g, and h be defined by $f(x) = x^2$, $g(x) = x$, and $h(x) = f(x) - g(x)$. For $x > 10$, which of the following describes what happens to h as x gets farther from 10 ?

(A) h increases only.
(B) h decreases only.
(C) h stays the same.
(D) h decreases at first and then increases.
(E) h increases at first and then decreases.

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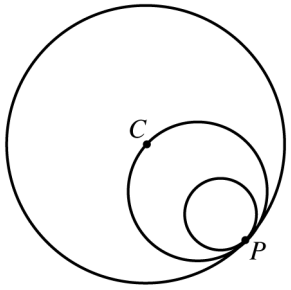
12. A certain physical fitness test lasts a total of 3 hours. Each part of the test requires the same amount of time, and 12-minute breaks are included between consecutive parts. If there are a total of 3 breaks during the 3 hours, what is the required time, in minutes, for each part of the test?

(A) 33
(B) 36
(C) 38
(D) 45
(E) 48

If x is an integer between 2,000 and 2,016 and if the sum of the digits of x is even, then x must be even.

13. Which of the following is one possible value of x that proves that the statement above is FALSE?

(A) 2,008
(B) 2,009
(C) 2,010
(D) 2,011
(E) 2,012



14. The centers of the three circles above lie on segment $\overline{CP}$ (not shown), and the three circles are mutually tangent at point P. The center of the largest circle is point C, and the center of the middle circle lies on the smallest circle. If the radius of the smallest circle is 5, what is the circumference of the largest circle?

(A) 10π
(B) 20π
(C) 30π
(D) 40π
(E) 60π

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15. Let a "prd" number be defined as one in which the product of the positive divisors of the number, not including the number itself, is greater than the number. Which of the following is a prd number?

(A) 8
(B) 15
(C) 18
(D) 21
(E) 27

16. If $k^2x = kx$ for every value of x, what are all possible values of k?

(A) 0 only
(B) 1 only
(C) 0 or 1 only
(D) 1 or -1 only
(E) 0, 1, or -1

17. Tickets for a community play cost \$2.00 for a child and \$4.00 for an adult. If 200 tickets were sold for a total of \$700, what was the ratio of the number of children's tickets sold to the number of adults' tickets sold?

(A) 1 to 4
(B) 1 to 3
(C) 1 to 2
(D) 4 to 7
(E) 2 to 3

18. The average (arithmetic mean) of 3 numbers is x. If one of the numbers is y, what is the average of the remaining 2 numbers in terms of x and y?

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

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19. A container in the shape of a right circular cylinder has an inside base radius of 4 inches and an inside height of 9 inches. This cylinder is completely filled with water. All of the water is then poured into a second right circular cylinder with a larger inside base radius of 9 inches. What must be the minimum inside height, in inches, of the second container?

(A) $\frac{4}{3}$

(B) $\frac{16}{9}$

(C) $\frac{9}{4}$

(D) 4

(E) 6

20. In the xy-plane, the graph of the function f is a line. If $f(2) = 7$ and $f(12) = 1$, what is the value of $f(7)$?

(A) 5.2
(B) 5
(C) 4.6
(D) 4
(E) 3.4

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.