

**MATHEMATICS TEST***60 Minutes—60 Questions*

DIRECTIONS: Solve each problem, choose the correct answer, and then fill in the corresponding oval on your answer document.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

You are permitted to use a calculator on this test. You may use your calculator for any problems you choose,

but some of the problems may best be done without using a calculator.

Note: Unless otherwise stated, all of the following should be assumed.

1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word *line* indicates a straight line.
4. The word *average* indicates arithmetic mean.

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1. On level ground, a vertical rod 12 feet tall casts a shadow 4 feet long, and at the same time a nearby vertical flagpole casts a shadow 12 feet long. How many feet tall is the flagpole?

- A. 4
B. 8
C. 12
D. 20
E. 36

2. The cost of a gym membership is a onetime fee of \$140, plus a monthly fee of \$40. Brendan wrote a \$500 check to pay his gym membership for a certain number of months, including the onetime fee. How many months of membership did he pay for?

- F. 3
G. 4
H. 9
J. 12
K. 13

3. If $x = -5$, what is the value of $\frac{x^2 - 1}{x + 1}$?

- A. -6
B. -4
C. 4
D. $5\frac{4}{5}$
E. 19

4. A museum offers a 2-hour guided group tour. For groups with fewer than 25 people the cost is \$9.25 per person; for groups with 25 people or more the cost is \$8.50 per person. The 27 people in the 9:00 a.m. tour group each paid \$9.25 in advance. What is the total refund that the museum owes the 9:00 a.m. group?

- F. \$12.50
G. \$13.00
H. \$18.75
J. \$20.25
K. \$25.00

DO YOUR FIGURING HERE.



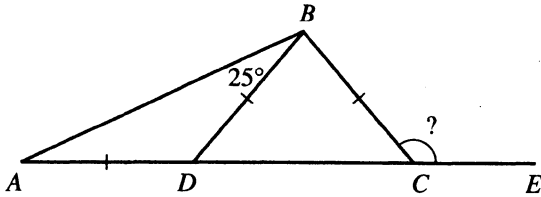
5. The 13-member math club needs to choose a student government representative. They decide that the representative, who will be chosen at random, CANNOT be any of the 3 officers of the club. What is the probability that Samara, who is a member of the club but NOT an officer, will be chosen?

DO YOUR FIGURING HERE.

- A. 0
- B. $\frac{1}{13}$
- C. $\frac{1}{10}$
- D. $\frac{3}{13}$
- E. $\frac{1}{3}$
6. What is the perimeter, in centimeters, of a rectangle with length 15 cm and width 6 cm?
- F. 21
- G. 30
- H. 42
- J. 90
- K. 180
7. Tickets for a community theater production cost \$6 each when bought in advance and \$8 each when bought at the door. The theater group's goal is at least \$2,000 in ticket sales for opening night. The theater group sold 142 opening-night tickets in advance. What is the minimum number of tickets they need to sell at the door on opening night to make their goal?
- A. 143
- B. 144
- C. 192
- D. 250
- E. 357
8. For what value of r is the equation $\frac{8}{12} = \frac{10}{r}$ true?
- F. 3
- G. 6
- H. 14
- J. 15
- K. 18
9. If $12(x - 11) = -15$, then $x =$?
- A. $-\frac{49}{4}$
- B. $-\frac{13}{6}$
- C. $-\frac{5}{4}$
- D. $-\frac{1}{3}$
- E. $\frac{39}{4}$



10. In the figure below, A , D , C , and E are collinear. \overline{AD} , \overline{BD} , and \overline{BC} are all the same length, and the angle measure of $\angle ABD$ is as marked. What is the degree measure of $\angle BCE$?



- F. 50°
 G. 100°
 H. 105°
 J. 130°
 K. 160°

11. If $f(x) = 9x^2 + 5x - 8$, then $f(-2) = ?$

- A. -54
 B. -18
 C. 18
 D. 36
 E. 38

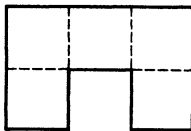
12. What is the least common multiple of 30, 20, and 70?

- F. 40
 G. 42
 H. 120
 J. 420
 K. 42,000

13. While doing a problem on his calculator, Tom meant to divide a number by 2, but instead he accidentally multiplied the number by 2. Which of the following calculations could Tom then do to the result on the calculator screen to obtain the result he originally wanted?

- A. Subtract the original number
 B. Multiply by 2
 C. Multiply by 4
 D. Divide by 2
 E. Divide by 4

14. The 8-sided figure below is divided into 5 congruent squares. The total area of the 5 squares is 125 square inches. What is the perimeter, in inches, of the figure?



- F. 25
 G. 60
 H. 80
 J. 100
 K. 125

DO YOUR FIGURING HERE.



15. In $\triangle ABC$, $\angle A$ measures greater than 43° and $\angle B$ measures exactly 90° . Which of the following phrases best describes the measure of $\angle C$?

A. Greater than 47°
 B. Equal to 47°
 C. Equal to 60°
 D. Equal to 133°
 E. Less than 47°

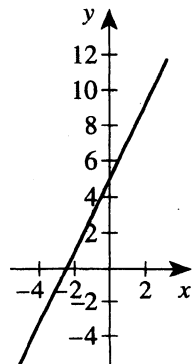
DO YOUR FIGURING HERE.

16. Among the following arithmetic operations, which could the symbol \diamond represent given that the equation $(2 \diamond 1)^4 + (6 \diamond 3)^2 = 10$ is true?

I. Addition
 II. Subtraction
 III. Division

F. I only
 G. II only
 H. III only
 J. I and II only
 K. I, II, and III

17. One of the following is an equation of the linear relation shown in the standard (x,y) coordinate plane below. Which equation is it?



A. $y = 5x$
 B. $y = 2x$
 C. $y = 5x + 2$
 D. $y = 2x - 5$
 E. $y = 2x + 5$

18. An integer, n , is added to 4. That sum is then multiplied by 8. This result is 10 less than twice the original integer. Which of the following equations represents this relationship?

F. $8(n + 4) = 2n - 10$
 G. $8(n + 4) - 10 = 2n$
 H. $8(n + 4) = 10 - 2n$
 J. $n + 4 \times 8 = 2n - 10$
 K. $4 + 8 = 2n - 10$



19. Two workers were hired to begin work at the same time. Worker A's contract called for a starting salary of \$20,000 with an increase of \$800 after each year of employment. Worker B's contract called for a starting salary of \$15,200 with an increase of \$2,000 after each year of employment. If x represents the number of full years' employment (that is, the number of yearly increases each worker has received), which of the following equations could be solved to determine the number of years until B's yearly salary equals A's yearly salary?

- A. $20,000 + 800x = 15,200 + 2,000x$
 B. $20,000 + 2,000x = 15,200 + 800x$
 C. $(20,000 + 800)x = (15,200 + 2,000)x$
 D. $(2,000 + 800)x = 20,000 - 15,200$
 E. $(2,000 - 800)x = 20,000 + 15,200$

20. A ramp for loading trucks is 13 feet long and covers 12 feet along the level ground, as shown below. How many feet high is the highest point on the ramp?

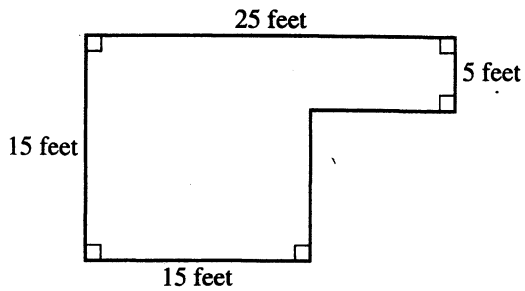


- F. 1
 G. 2
 H. 4
 J. 5
 K. $6\frac{1}{4}$
21. The expression $7(x + 3) - 3(2x - 2)$ is equivalent to:
- A. $x + 1$
 B. $x + 15$
 C. $x + 19$
 D. $x + 23$
 E. $x + 27$
22. If $x + y = 32$, and $x - y = 12$, then $y = ?$
- F. 6
 G. 10
 H. 20
 J. 22
 K. 44
23. When $(2x - 3)^2$ is written in the form $ax^2 + bx + c$, where a , b , and c are integers, $a + b + c = ?$
- A. -17
 B. -5
 C. 1
 D. 13
 E. 25

DO YOUR FIGURING HERE.



24. What is the area, in square feet, of the figure below?



DO YOUR FIGURING HERE.

- F. 60
 G. 80
 H. 275
 J. 375
 K. 450
25. The table below gives the values of 2 functions, f and g , for various values of x . One of the functions expresses a linear relationship. What is the value of that function at $x = 4$?

x	$f(x)$	$g(x)$
-2	1.4	0.6
-1	1.2	0.9
0		
1	0.8	1.3
2	0.6	1.6
3		
4		

- A. 0.2
 B. 0.4
 C. 1.9
 D. 2.0
 E. 2.2
26. What is the slope of the line represented by the equation $6y - 14x = 5$?
- F. -14
 G. $\frac{5}{6}$
 H. $\frac{7}{3}$
 J. 6
 K. 14
27. What is the sum of the 2 solutions of the equation $x^2 + x - 12 = 0$?
- A. -12
 B. -4
 C. -1
 D. 0
 E. 3



28. Two similar triangles have perimeters in the ratio 3:5. The sides of the smaller triangle measure 3 cm, 5 cm, and 7 cm, respectively. What is the perimeter, in centimeters, of the larger triangle?

F. 15
G. 18
H. 20
J. 25
K. 36

DO YOUR FIGURING HERE.

29. At a certain location, the low temperatures, in degrees Fahrenheit, for each of 7 consecutive days in January were -2°F , 4°F , -3°F , 1°F , 2°F , -5°F , and -6°F . What was the median of these low temperatures?

A. -2°F
B. -1°F
C. 1°F
D. 3°F
E. 4°F

30. When asked his age, the algebra teacher said, "If you square my age, then subtract 23 times my age, the result is 50." How old is he?

F. 23
G. 25
H. 27
J. 46
K. 50

31. The distance, d , an accelerating object travels in t seconds can be modeled by the equation $d = \frac{1}{2}at^2$, where a is the acceleration rate, in meters per second per second. If a car accelerates from a stop at the rate of 20 meters per second per second and travels a distance of 80 meters, about how many seconds did the car travel?

A. Between 1 and 2
B. Between 2 and 3
C. Between 3 and 4
D. 4
E. 8

32. Let a , b , c , and d be distinct positive integers. What is the 4th term of the geometric sequence below?

$bcd, abc^2d, a^2bc^3d, \dots$

F. a^3bc^4d
G. $a^3b^2c^3d$
H. $a^3b^2c^4d^2$
J. a^4bc^6d
K. a^4bc^9d