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.

DO YOUR FIGURING HERE.

1. If $\frac{4}{y} = 0.4$, then $y = ?$

   A. 0.04
   B. 0.1
   C. 0.4
   D. 4
   E. 10

2. A motel manager's costs are 24% higher this year than they had been when the room rate was \$60.00. If the room rate had increased by the same percent as the manager's costs, what would the room rate be this year?

   F. \$68.40
   G. \$70.00
   H. \$72.00
   J. \$74.40
   K. \$78.95

3. Louis earns his regular pay of \$10.00 per hour for up to 40 hours of work in a week. For each hour over 40 hours of work in a week, Louis is paid $1\frac{1}{2}$ times his regular pay. How much does Louis earn for a week in which he works 47 hours?

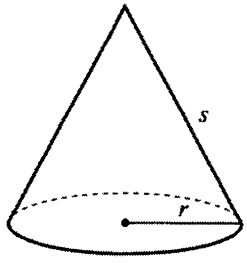
   A. \$470.00
   B. \$493.50
   C. \$505.00
   D. \$540.50
   E. \$705.00

4. $3x^9 \cdot 5x^9$ is equivalent to:

   F. $8x^{18}$
   G. $8x^{81}$
   H. $15x^9$
   J. $15x^{18}$
   K. $15x^{81}$

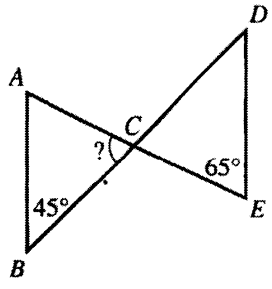
DO YOUR FIGURING HERE.

5. The total surface area, T, of any right circular cone with a radius r and a slant height s, such as the cone shown below, can be determined by using the formula $T = \pi r^2 + \pi rs$. If a cone has a 3-inch radius and a 5-inch slant height, what is its total surface area, in square inches?



A. 18π
B. 24π
C. 40π
D. 75π
E. 135π

6. In the figure below, C lies on both $\overline{AE}$ and $\overline{BD}$, $\overline{AB}$ and $\overline{DE}$ are parallel and congruent, and 2 angle measures are given. What is the measure of $\angle ACB$?



F. 55°
G. 57.5°
H. 65°
J. 67.5°
K. 70°

7. What is the least common denominator of the fractions $\frac{4}{35}$, $\frac{1}{28}$, and $\frac{3}{8}$?

A. 40
B. 280
C. 980
D. 1,120
E. 7,840

8. Which of the following polynomial equations has solutions -2 and 5 ?

F. $(x - 5)(x + 2)^2 = 0$
G. $(x - 3)(x + 3)^2 = 0$
H. $(x + 3)(x - 3)^2 = 0$
J. $(x + 5)(x - 2)^2 = 0$
K. $(x + 5)(x + 2)^2 = 0$

DO YOUR FIGURING HERE.

9. The combined length of 3 pieces of a board is 60 inches. The lengths of the pieces are in the ratio 3:5:7. What is the length, in inches, of the longest piece?

A. 4
B. 12
C. 15
D. 20
E. 28

10. Zoe programs her calculator to evaluate a linear function, but she doesn't say what the function is. When 9 is entered, the calculator displays the value 6. When 12 is entered, the calculator displays the value 8. Which of the following expressions represents what the calculator will display when any number, n, is entered?

F. $\frac{2}{3}n$

G. $\frac{3}{2}n$

H. $n - 3$

J. $n - 4$

K. $\frac{3}{2}n - \frac{15}{2}$

11. Points $C(2,5)$ and $D(8,11)$ lie in the standard (x,y) coordinate plane. What is the midpoint of $\overline{CD}$?

A. (3,8)
B. (5,6)
C. (5,8)
D. (6,6)
E. (6,8)

12. A rectangular box that is $\frac{1}{9}$ foot deep, 1 foot wide, and 1 foot long has a volume of how many cubic feet?

F. $\frac{1}{9}$

G. 1

H. $2\frac{1}{9}$

J. 9

K. 81

DO YOUR FIGURING HERE.

13. Which of the following expressions is equal to $(3x^2 - 4x - 5) - (-x^2 + 6x + 7)$ for all real values of x ?

A. $2x^2 - 10x - 12$
B. $2x^2 - 10x + 2$
C. $4x^2 - 10x - 12$
D. $4x^2 - 10x + 2$
E. $4x^2 + 2x + 2$

14. For all positive integers a, let E represent the sentence "a is even" and let P represent the sentence "a is prime." When $a = 22$, which of the following statements is true?

F. Both E and P are true.
G. If E is true, then P is true.
H. E is true and P is false.
J. P is true and E is false.
K. Both E and P are false.

15. $|6(-7) + 4(8)| = ?$

A. −144
B. −10
C. 10
D. 74
E. 144

16. In the standard (x,y) coordinate plane, what is the slope of the line $11x + 6y = 3$?

F. -11
G. $-\frac{11}{6}$
H. $\frac{11}{3}$
J. 3
K. 11

17. A function g is defined as $g(x,y,z) = 4xy - 3xz^2$. What is $g(2,4,-3)$?

A. −22
B. −4
C. 8
D. 68
E. 86

DO YOUR FIGURING HERE.

Use the following information to answer questions 18–21.

A family plans to remodel their kitchen. They have a total budget of $45,000 to cover expenses in 6 categories. Not all the budget has been assigned. The budget amounts that have been assigned are shown in the table below.

Expense category	Budget amount
Appliances	$ 4,000
Cabinets	$ 9,000
Flooring	$ 5,000
Lighting	$ 3,000
Labor	?
Other	?
Total budget	$45,000

18. In a circle graph illustrating the 6 budget amounts in the table, what should be the measure of the central angle of the Flooring sector?

F. 24°
G. 32°
H. 40°
J. 45°
K. 72°

19. The amount budgeted for Appliances is the sum of the prices of 5 appliances—1 refrigerator, 1 dishwasher, 1 built-in cooktop, and 2 ovens (1 conventional and 1 microwave). What is the average price per appliance?

A. $ 800
B. $1,000
C. $1,250
D. $1,800
E. $2,250

20. Suppose a bar graph will be constructed illustrating the amounts of the assigned expenses. The length of the bar for Lighting should be what fraction of the length of the bar for Cabinets?

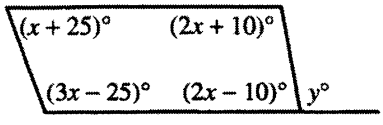
F. $\frac{1}{15}$
G. $\frac{1}{5}$
H. $\frac{1}{3}$
J. $\frac{3}{5}$
K. $\frac{3}{4}$

DO YOUR FIGURING HERE.

21. Which of the following percents is closest to the percent of the total budget that remains to be assigned?

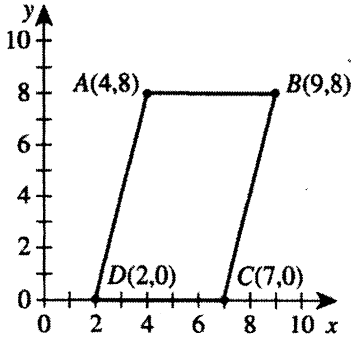
A. 21%
B. 24%
C. 40%
D. 47%
E. 53%

22. In the figure below, 5 angle measures are given. The angle marked with a measure of $y°$ is an exterior angle. What is the value of y ?



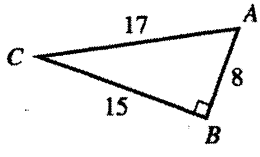
F. 22.5
G. 45
H. 80
J. 100
K. 145

23. What is the area, in square coordinate units, of parallelogram $ABCD$ shown in the standard (x,y) coordinate plane below?



A. 14
B. 16
C. 28
D. 40
E. 45

24. Right triangle $\triangle ABC$ is shown below. The side lengths are given in centimeters. What is tan C ?



F. $\frac{8}{17}$
G. $\frac{8}{15}$
H. $\frac{15}{17}$
J. $\frac{15}{8}$
K. $\frac{17}{8}$

DO YOUR FIGURING HERE.

25. The system of equations below has 1 solution (a,b). What is the value of b ?

$$3a - 5b = 22$$
$$a + 3b = -2$$

A. -4
B. -2
C. 4
D. 9
E. 20

26. For his job delivering pizzas, Albert uses his own car and buys his own gas. He joined the local gas station's Frequent Fueler program that earns him points toward free gas each time he buys gas. Points are earned according to the following chart.

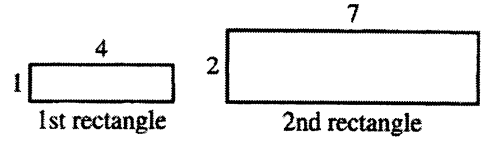
Frequent Fueler Program:

Sign up for the program, earn	50 points
Buy 1 gallon regular, earn	3 points
Buy 1 gallon premium, earn	4 points

At the end of his first month in the program, he received a statement showing that he had 545 points (including 50 points he received for signing up) and had purchased a total of 135 gallons of gas. To find how many gallons of premium he had purchased, he solved a system of equations with r representing the number of gallons of regular and p representing the number of gallons of premium. One equation in his system was $r + p = 135$. Which of the following could have been his other equation?

F. $3r + 4p = 495$
G. $3r + 4p = 595$
H. $4r + 3p = 495$
J. $4r + 3p = 545$
K. $4r + 3p = 595$

27. The first 2 rectangles of a sequence of rectangles are shown below. The 1st rectangle is 4 inches long and 1 inch wide. The dimensions of the 2nd rectangle, and of each successive rectangle after the 2nd, are determined by continuing the following pattern: the length is 3 inches longer than the length of the previous rectangle, and the width is 1 inch longer than the width of the previous rectangle. What is the perimeter, in inches, of the 6th rectangle in the sequence?



A. 24
B. 40
C. 50
D. 56
E. 60

DO YOUR FIGURING HERE.

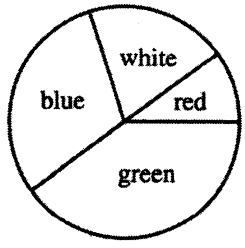
28. Which of the expressions below is a factor of the polynomial $2x^3 + x^2 - 6x$?

I. x
II. $2x + 3$
III. $x - 2$

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

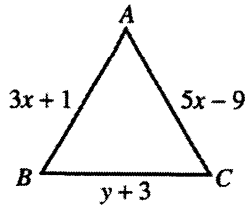
29. Shown below, a circular dartboard has 4 sectors (red, white, blue, and green) whose areas are in the ratio of 1:2:3:4, respectively. Brad will throw 1 dart at the dartboard, and it will hit the dartboard at a random point contained in 1 of the sectors. What is the probability that the sector the dart hits is NOT the blue sector?

A. $\frac{3}{10}$
B. $\frac{4}{10}$
C. $\frac{5}{10}$
D. $\frac{6}{10}$
E. $\frac{7}{10}$



30. The dimensions of equilateral triangle $\triangle ABC$ are given in centimeters in the figure below. What is the value of y ?

F. 2
G. 5
H. 8
J. 13
K. 16



31. For right triangle $\triangle LMN$ below, $\cos L = \frac{7}{16}$. What is $\sin N$?

A. $\frac{7}{9}$
B. $\frac{7}{\sqrt{207}}$
C. $\frac{7}{16}$
D. $\frac{9}{\sqrt{207}}$
E. $\frac{9}{16}$