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. Which of the following expressions is equivalent to the expression below?

$$-7(5a - b) + 3(-8b + a)$$

A. $-38a - 31b$
B. $-34a - 25b$
C. $-34a - 17b$
D. $-32a - 25b$
E. $-32a - 17b$

2. For Bill's birthday party, his parents will pay \$35 for the cake plus \$15 per person for catering expenses. They will spend *at most* a total of \$300 for his party. The greatest integer in the solution set of one of the following inequalities gives the maximum number of people, p, who can attend the party. Which one?

F. $p + 50 \geq 300$
G. $p(15p + 35) \geq 300$
H. $(35 + 15)p \leq 300$
J. $15p \leq 300$
K. $15p + 35 \leq 300$

3. The number 312.8 is 34% of x. What is the value of x rounded to the nearest whole number?

A. 9
B. 11
C. 106
D. 920
E. 10,635

4. For $\overleftrightarrow{RT}$ shown below, point S is on $\overline{RT}$, the length of $\overline{RS}$ is 8 cm, and the length of $\overline{ST}$ is 18 cm. What is the distance, in centimeters, between T and the midpoint of $\overline{RS}$?

F. 13
G. 17
H. 18
J. 22
K. 26

DO YOUR FIGURING HERE.

5. A certain committee is composed of 9 juniors and 11 seniors. Two different members of the committee will be randomly selected for 2 different leadership roles. Given that the 1st member who will be selected is a senior, what is the probability that the 2nd member who will be selected is a junior?

A. $\frac{9}{19}$

B. $\frac{9}{20}$

C. $\frac{10}{19}$

D. $\frac{10}{20}$

E. $\frac{11}{20}$

6. What is the least common multiple of 60, 70, and 90 ?

F. 60
G. 220
H. 630
J. 1,260
K. 378,000

7. The Newton High School girls' softball team currently has a record of 8 wins, 5 losses, and 0 ties. What is the *least* number of its remaining 10 games the team must win to finish the season winning *more than* 50% of all the team's games?

A. 3
B. 4
C. 5
D. 6
E. 7

8. For what value of x is $2(x - 12) + x = 24$ true?

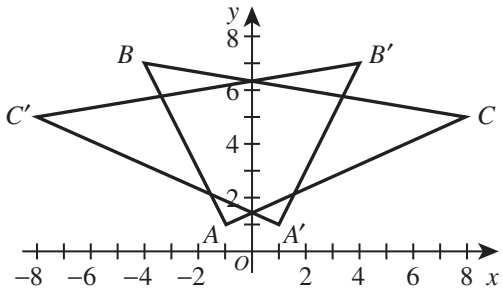
F. 0
G. 4
H. 12
J. 16
K. 24

9. The principal of Lowe High School (LHS) authorized a study to estimate the percent of the LHS student population that will attend a 4-year college after graduation. LHS students in honors courses were asked about their postgraduation plans, and their responses were recorded. Students in other courses were NOT included in the study. Which of the following phrases best describes the principal's study?

A. Randomized census
B. Randomized experiment
C. Nonrandomized experiment
D. Randomized sample survey
E. Nonrandomized sample survey

DO YOUR FIGURING HERE.

10. Triangles $\triangle ABC$ and $\triangle A'B'C'$ are graphed in the standard (x,y) coordinate plane below.



Triangle $\triangle A'B'C'$ is the image of $\triangle ABC$ under one of the following transformations. Which one?

F. 90° clockwise rotation about the origin
G. 90° counterclockwise rotation about the origin
H. Horizontal translation
J. Reflection across the x-axis
K. Reflection across the y-axis

11. Banu will build a fence around a rectangular 30-foot-by-25-foot play area. Given that fencing costs \$4.05 per foot, how much will the fencing cost for Banu to completely surround the play area?

A. \$445.50
B. \$344.25
C. \$324.00
D. \$268.00
E. \$222.75

12. The diagonal of a rectangular flat television screen is 26.0 inches. The width of the screen is 22.7 inches, and the height of the screen is 10.0 inches less than the width of the screen. Which of the following is closest to the area, in square inches, of the television screen?

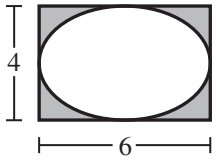
F. 144
G. 165
H. 288
J. 330
K. 590

13. For all $a \neq 0$, $\frac{a^8}{a^4}$ is equivalent to:

A. 1
B. a^2
C. a^4
D. a^{12}
E. a^{32}

DO YOUR FIGURING HERE.

14. An ellipse with a major axis of length 6 inches and a minor axis of length 4 inches is inscribed in a rectangle, as shown below. The region inside the rectangle but outside the ellipse is shaded. What is the area, in square inches, of the shaded region?



(Note: The area, A, of any ellipse can be found by the formula $A = \pi ab$ where a is $\frac{1}{2}$ the length of the major axis and b is $\frac{1}{2}$ the length of the minor axis.)

F. $24 - 24\pi$
G. $24 - 12\pi$
H. $24 - 6\pi$
J. 6π
K. $24 + 6\pi$

15. Given $2x - \sqrt{3} = 6$, what is the value of x ?

A. $3 - \frac{\sqrt{3}}{2}$

B. $3 - \sqrt{3}$

C. $3 + \frac{\sqrt{3}}{2}$

D. $3 + \sqrt{3}$

E. $4 + \sqrt{3}$

16. What is the largest possible product for 2 even integers whose sum is 18 ?

F. 11
G. 19
H. 77
J. 80
K. 81

17. Juanita walked from her home to the bakery, first walking 0.3 miles due east and then 0.4 miles due north. What is the straight-line distance, in miles, from the bakery to Juanita's home?

A. 0.1
B. 0.2
C. 0.3
D. 0.5
E. 0.7

DO YOUR FIGURING HERE.

18. $\begin{bmatrix} 10 & -13 \\ -8 & 11 \end{bmatrix} - \begin{bmatrix} -9 & -17 \\ -8 & 14 \end{bmatrix} = ?$

F. $\begin{bmatrix} -3 & 26 \\ 3 & -6 \end{bmatrix}$

G. $\begin{bmatrix} 1 & -30 \\ -16 & -3 \end{bmatrix}$

H. $\begin{bmatrix} 1 & -30 \\ -16 & 25 \end{bmatrix}$

J. $\begin{bmatrix} 2 & -2 \\ 17 & 3 \end{bmatrix}$

K. $\begin{bmatrix} 19 & 4 \\ 0 & -3 \end{bmatrix}$

19. The line with equation $2x + 5y = 9$ is graphed in the standard (x,y) coordinate plane. What is the slope of the line?

A. $-\frac{5}{2}$

B. $-\frac{2}{5}$

C. $\frac{2}{5}$

D. $\frac{5}{2}$

E. 2

20. Yolanda is calculating the weekly payroll for her small business. One employee earns \$7.20 per hour and has worked 4 days this week: $9\frac{1}{4}$ hours the first day, 8 hours the second day, $6\frac{3}{4}$ hours the third day, and $7\frac{1}{2}$ hours the fourth day. Which of the following is the employee's pay for this week, before any deductions are made?

F. \$226.80
G. \$225.00
H. \$219.60
J. \$131.40
K. \$ 38.70

21. What is the (x,y) solution, if one exists, to the system of equations $y = 2x + 6$ and $6x + 12 = 3y$?

A. (−3,0)
B. (−2,0)
C. (0,4)
D. (0,6)
E. There is no solution to this system.