ACT Post-TEST: 11th Graders

Since there are 25 questions you get 35 minutes. Do your best! Place the CAPITAL LETTER in the box provided.

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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. The expression $(3x - 4y^2)(3x + 4y^2)$ is equivalent to:

   A. $9x^2 - 16y^4$
   B. $9x^2 - 8y^4$
   C. $9x^2 + 16y^4$
   D. $6x^2 - 16y^4$
   E. $6x^2 - 8y^4$

2. In the school cafeteria, students choose their lunch from 3 sandwiches, 3 soups, 4 salads, and 2 drinks. How many different lunches are possible for a student who chooses exactly 1 sandwich, 1 soup, 1 salad, and 1 drink?

   F. 2
   G. 4
   H. 12
   J. 36
   K. 72

3. For 2 consecutive integers, the result of adding the smaller integer and triple the larger integer is 79. What are the 2 integers?

A. 18, 19
B. 19, 20
C. 20, 21
D. 26, 27
E. 39, 40

4. If $3^x = 54$, then which of the following must be true?

F. $1 < x < 2$
G. $2 < x < 3$
H. $3 < x < 4$
J. $4 < x < 5$
K. $5 < x$

5. Four points, A, B, C, and D, lie on a circle having a circumference of 15 units. B is 2 units counterclockwise from A. C is 5 units clockwise from A. D is 7 units clockwise from A and 8 units counterclockwise from A. What is the order of the points, starting with A and going clockwise around the circle?

A. A, B, C, D
B. A, B, D, C
C. A, C, B, D
D. A, C, D, B
E. A, D, C, B

6. A group of cells grows in number as described by the equation $y = 16(2)^t$, where t represents the number of days and y represents the number of cells. According to this formula, how many cells will be in the group at the end of the first 5 days?

F. 80
G. 160
H. 400
J. 512
K. 1,280

7. The dimensions of the right triangle shown below are given in feet. What is sin θ?

A. $\frac{a}{b}$

B. $\frac{a}{c}$

C. $\frac{b}{c}$

D. $\frac{b}{a}$

E. $\frac{c}{a}$
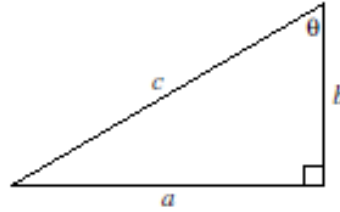
8. In a basketball passing drill, 5 basketball players stand evenly spaced around a circle. The player with the ball (the passer) passes it to another player (the receiver). The receiver cannot be the player to the passer's immediate right or left and cannot be the player who last passed the ball. A designated player begins the drill as the first passer. This player will be the receiver for the first time on which pass of the ball?

F. 4th

G. 5th

H. 6th

J. 10th

K. 24th

9. The expression $-8x^3(7x^6 - 3x^5)$ is equivalent to:

A. $-56x^9 + 24x^8$

B. $-56x^9 - 24x^8$

C. $-56x^{18} + 24x^{15}$

D. $-56x^{18} - 24x^{15}$

E. $-32x^4$

10. $-3|-6 + 8| = ?$

F. -42

G. -6

H. -1

J. 6

K. 42

11. As part of a motion lesson, students observed a cart rolling at a constant rate along a straight line. As shown in the chart below, they recorded the distance, y feet, of the cart from a reference point at 1-second intervals from t = 0 seconds to t = 5 seconds.

t	0	1	2	3	4	5
y	14	19	24	29	34	39

Which of the following equations represents this data?

A. $y = t + 14$
B. $y = 5t + 9$
C. $y = 5t + 14$
D. $y = 14t + 5$
E. $y = 19t$

12. For ΔFGH, shown below, which of the following is an expression for y in terms of x?
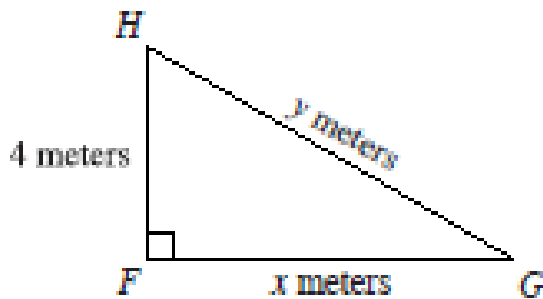
F. $x + 4$
G. $\sqrt{x^2 + 4}$
H. $\sqrt{x^2 + 8}$
J. $\sqrt{x^2 - 16}$
K. $\sqrt{x^2 + 16}$

13. The graph of $y = -5x^2 + 9$ passes through (1, 2a) in the standard (x, y) coordinate plane. What is the value of a?

A. 2
B. 4
C. 7
D. -1
E. -8

14. A particular circle in the standard (x, y) coordinate plane has an equation of $(x - 5)^2 + y^2 = 38$. What are the radius of the circle, in coordinate units, and the coordinates of the center of the circle?
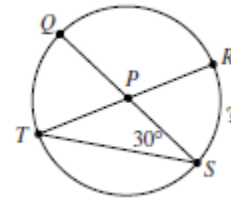
	Radius	Center
F.	$\sqrt{38}$	(5, 0)
G.	19	(5, 0)
H.	38	(5, 0)
J.	$\sqrt{38}$	(-5, 0)
K.	19	(-5, 0)

15. What is the surface area, in square inches of an 8-inch cube

A. 512
B. 384
C. 320
D. 256
E. 192

16. In the circle shown below, chords $\overline{TR}$ and $\overline{QS}$ intersect at P, which is the center of the circle, and the measure of ∠PST is 30°. What is the degree measure of minor arc $\widehat{RS}$?

F. 30°
G. 45°
H. 60°
J. 90°
K. Cannot be determined from the given information

17. The *determinant* of a matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ equals ad – bc. What must be the value of x for the matrix $\begin{bmatrix} x & 8 \\ x & x \end{bmatrix}$ to have a determinant of -16?

A. -4
B. -2
C. $-\frac{8}{5}$
D. $\frac{8}{3}$
E. 4

Marcia makes and sells handcrafted picture frames in 2 sizes: small and large. It takes her 2 hours to make a small frame and 3 hours to make a large frame. The shaded triangular region shown below is the graph of a system of inequalities representing weekly constraints Marcia has in making the frames. For making and selling s small frames and l large frames, Marcia makes a profit of 30s + 70l dollars. Marcia sells all the frames she makes.
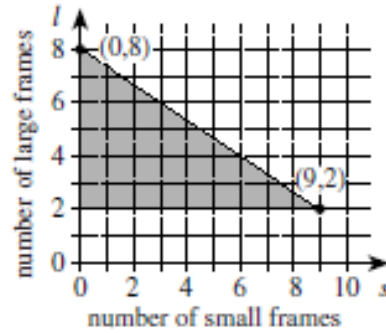
18. The weekly constraint represented by the horizontal line segment containing (9, 2) means that each week Marcia makes a minimum of :

F. 2 large frames.
G. 9 large frames
H. 2 small frames.
J. 9 small frames.
K. 11 small frames.

19. For every hour that Marcia spends making frames in the second week of December each year, she donates $3 from that week's profit to a local charity. This year, Marcia made 4 large frames and 2 small frames in that week. Which of the following is closest to the percent of that week's profit Marcia donated to the charity?

A. 6%
B. 12%
C. 14%
D. 16%
E. 19%

20. What is the maximum profit Marcia can earn from the picture frames she makes in 1 week?

F. $410
G. $460
H. $540
J. $560
K. $690

21. A formula for finding the value, A dollars, of P dollars invested at i% interest compounded annually for n years is $A = P(1 + 0.01i)^n$. Which of the following is an expression for P in terms of I, n, and A?

A. $A - 0.01i^n$

B. $A + 0.01i^n$

C. $\left(\frac{A}{1+0.01i}\right)^n$

D. $\frac{A}{(1-0.01i)^n}$

E. $\frac{A}{(1+0.01i)^n}$

22. If x and y are real numbers such that x > 1 and y < -1, then which of the following inequalities *must* be true?

F. $\frac{x}{y} > 1$

G. $|x|^2 > |y|$

H. $\frac{x}{3} - 5 > \frac{y}{3} - 5$

J. $x^2 + 1 > y^2 + 1$

K. $x^{-2} > y^{-2}$

23. What is the sum of the first 4 terms of the arithmetic sequence in which the 6th term is 8 and the 10th term is 13?

A. 10.5

B. 14.5

C. 18

D. 21.25

E. 39.5

24. The solution set of which of the following equations is the set of real numbers that are 5 units from -3?

F. $|x + 3| = 5$
G. $|x - 3| = 5$
H. $|x + 5| = 3$
J. $|x - 5| = 3$
K. $|x + 5| = -3$

25. The length of a rectangle with area 54 square centimeters is 9 centimeters. What is the perimeter of the rectangle, in centimeters?

A. 6
B. 12
C. 15
D. 24
E. 30