

Name: _____ School: _____

1. Given the system of linear equations $5x + 2y = 11$

$$x - 3y = 9$$

What is the value of $2x + 5y$?

- A. 21 B. -14 C. 7 **D. -4** E. 4

2. Given the quadratic equation $y = -5x^2 + 30x + 7$, what is the maximum value of y ?

- A. -37 **B. 52** C. -52 D. 7 E. 30

3. How many prime numbers are between 50 and 100 ?

- A. 14 B. 13 C. 12 D. 11 **E. 10**

4. What are the coordinates of the x intercept of the rational function

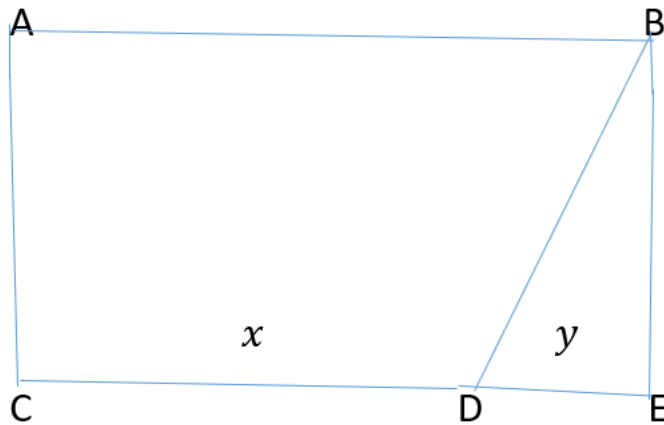
$$f(x) = \frac{10-2x}{x-6} ?$$

- A. (6,0) B. (0,6) **C. (5,0)** D. (0,5) E. (5,6)

Name: _____ School: _____

5. In the figure below the area of the trapezoid ABCD is 90. Also AB is 12, BE is 9, CD is x and DE is y . Find the value of $2x + 3y$.

- A. 12 B. 9 C. 60 **D. 28** E. 36



6. Solve $3bx + 9 = 4(3x - b) + 2$ for x .

- A. $-\frac{4b-7}{3b-12}$ **B. $-\frac{4b+7}{3b+12}$** C. $-\frac{4b-7}{3b+12}$ D. $\frac{4b+7}{12-3b}$ E. None of these

7. Two cards are drawn, without replacement, from a standard deck of playing cards. Find the probability that both are red.

- A. $1/4$ B. $1/26$ C. $2/51$ **D. $25/102$** E. $101/102$

8. How many six digit multiples of 5 can be formed from the digits 1, 2, 3, 4, 5, and 6 using each of the digits exactly one time?

- A. 21 B. 32 C. 36 D. 64 **E. 120**

Name: _____ School: _____

9. There are 93 sixth graders and 108 seventh graders entering a raffle. In each grade, the number of dog owners is twice the number of students who do not own a dog. What is the probability that a seventh grader who does not own a dog wins the raffle? Express your answer as a common fraction.

A. 12/67 B. 12/31 C. 36/67 D. 1/3 E. 24/67

10. If $f(x) = -4x - 5$ and $g(x) = 3 - x$, what is $g(-4) + f(1)$?

A. 7 B. -2 C. -9 D. -10 E. None of the above

11. $f(x) = 2x + 4$ and $g(x) = 3x^2 - 1$

Find the ***product function***: $(fg)(x) = f(x)g(x)$

A. $6x^4 + 12x^3 - 4x^2 - 8x$ B. $-6x^3 + 12x^2 + 2x - 4$

C. $5x^2 - 18x + 20$ D. $6x^3 + 12x^2 - 2x - 4$

E. None of the above

12. Simplify $\sqrt{-108}$

A. $3i\sqrt{6}$ B. $3i\sqrt{20}$ C. $6i\sqrt{3}$ D. $20i\sqrt{3}$ E. None of the above

Name: _____ School: _____

13. What is the value of x that satisfies the equation $\frac{1}{x} - \frac{3}{x+2} = 0$

- A. $\frac{1}{3}$ B. -5 C. 5 D. -1 **E. 1**

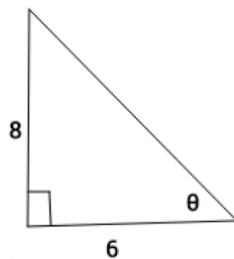
14. If $X = 3$ and $Y = -3$, which of expressions is the largest.

- A. X^Y** B. Y^X C. XY D. $X+Y$ E. $\frac{X}{Y}$

15. Convert -45° to radians

- A. $-\frac{\pi}{3}$ B. $-\frac{5\pi}{3}$ **C. $-\frac{\pi}{4}$** D. $-\pi$ E. None of the above

16. Use the triangle below to find $\sin(\theta)$



- A. $\frac{4}{5}$** B. $\frac{5}{4}$ C. $\frac{2}{4}$ D. $\frac{5}{2}$ E. None of the above

Name: _____ School: _____

17. Find the length of the arc of a circle of diameter 12 meters subtended by the central angle of 63° .

A. 7.348m B. 6.5973m C. 10.555m D. 4.2317m

E. None of the above

18. Find the measure of an angle satisfying the following conditions:
Six times the complement of an angle is five less than the supplement of the angle.

A. 25° B. 26° C. 71° D. 73°

E. None of the above

19. A company manufactures six-sided cubed dice in large quantities and ships them to other gaming companies. The manufacturer uses cube-shaped cardboard boxes to use for shipping. If it takes 512 dice to fill the volume of the box, then determine how many dice are touching at least 1 face of the cardboard box.

A. 256 B. 296 C. 384 D. 512 E. None of the above

20. Suppose that the angle between the minute hand and hour hand of a clock is 60 degrees. If the minute hand is 12 inches long and the hour hand is 9 inches long, then what is the distance in inches between the tip ends of the hands?

A. $3\sqrt{13}$ B. $5\sqrt{3}$ C. 15 D. 21 E. None of the above

Name: _____ School: _____

21. An equilateral triangle is inscribed in a circle of radius 1 with one vertex at the bottom of the circle. What is the area that lies inside the circle and above the triangle?

- A. π B. $\frac{\pi - \sqrt{3}}{2}$ C. $\frac{\pi}{3} - \frac{\sqrt{3}}{4}$ D. $3 - \sqrt{2}$
 E. None of the above

22. What is the smallest positive solution (in radians) of the following equation?

$$2\sin^2\theta + 5\cos\theta = 4$$

- A. $\frac{\pi}{6}$ B. $\frac{\pi}{2}$ C. $\frac{\pi}{12}$ D. π E. None of the above

23. One of the solution of the equation $4(10^{2x}) - 4(10^x) - 1 = 0$ is

- A. $\log 2 - \log(1 + \sqrt{2})$ B. $\log(1 + \sqrt{2}) - \log 2$ C. $\log(1 + \sqrt{2}) + \log 2$
 D. $\log 2(\log(1 + \sqrt{2}))$ E. None of the above

24. Write the following expression as an algebraic expression in term of x .

$$\cos\left(\sin^{-1}\frac{x}{\sqrt{x^2+64}}\right).$$

- A. $\frac{8}{\sqrt{x^2+64}}$ B. $\frac{x}{\sqrt{x^2+64}}$ C. $\frac{8}{\sqrt{x^2-64}}$ D. $\frac{8}{x}$

E. None of the above

Name: _____ School: _____

25. The expression $\log_2 \sqrt[5]{\frac{x^4}{y^3}}$ is equivalent to:

A. $\frac{12}{5} [4\log_2 x + 3\log_2 y]$ B. $\log_2 x - \frac{1}{3}\log_2 y$ C. $\frac{1}{5} [4\log_2 x - 3\log_2 y]$

D. $\frac{1}{5} [\log_2 x - \log_2 y]$ E. None of the above

26. Simplify $(\sec^2 \theta - \tan^2 \theta)^7 + (\sin^2 \theta + \cos^2 \theta + 1)^7$

A. 14 B. 18 C. 256 D. 129 E. None of the above

27. How many different words can be formed using the letters in “asurams”?

A. 5040 B. 1260 C. 720 D. 120 E. None of the above

28. Find the sixth term a_6 of the sequence defined by the recurrence relations and initial conditions.

$$a_n = 2a_{n-1} - 1, a_1 = 2.$$

A. 9 B. 17 C. 33 D. 65 E. None of the above

Name: _____ School: _____

29. Ownership of dogs is very popular in five villages of Obowo: Amuzi, Alike, Avutu, Ehume, and Umunachi. Suppose it is determined that for every 6 persons in each of these villages, there is one dog. If the following represents the population of the villages:

Amuzi: 42051

Alije: 30555

Avutu: 22108

Ehume: 16241

Umunachi: 12019

How many dogs do we have in these villages combined?

- A. 20495 B. 7008 C. 5092 D. 20543 E. None of the above

30. Suppose a and b are positive integers and

$$(a + b)^2 = 47$$

$$(a - b)^2 = 31$$

What is $2ab$?

- A. 64 B. 32 C. 8 D. 78 E. None of the above

Name: _____ School: _____

31. Dr. Joe Johnson raises and sells specimens for experiment. On November 3, 2022, he has 30 scorpions, 31 spiders, and 32 crickets. All the animals are healthy. What is the sum of the heads and legs of the animals Dr. Johnson has on November 3?

- A. 93 B. 680 **C. 773** D. 224 E. None of the above

32. Write 7524 as a product of prime.

- A. $(2)(3^4)(19)$ B. $(2)(3^4)(11)(13)$ C. $(2)(3^4)(13)(19)$
D. $(2^2)(3^2)(11)(19)$ E. None of the above.

33. In the equation $\sqrt{k+3} - x = 0$, if $x = 9$, what is the value of k ?

- A. 0 B. 81 C. 84 **D. 78** E. None of the above

34. Which of the following is equivalent to $27^{\frac{3}{4}}$?

- A. $18^{\sqrt[4]{9}}$ **B. $9^{\sqrt[4]{3}}$** C. $\sqrt[4]{243}$ D. $9^{\sqrt[4]{12}}$ E. None of the above

35. If $3(a+b) = 7$, what is $(a+b)^2 - 3$?

- A. $\frac{17}{9}$ B. $\frac{7}{3}$ C. $\frac{9}{7}$ **D. $\frac{22}{9}$** E. None of the above

Name: _____ School: _____

36. The solution of the equation below has the solution (x, y) . What is the value of x ?

$$\frac{1}{2}y = 8$$

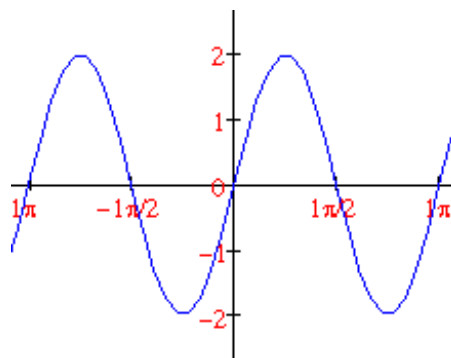
$$x - \frac{1}{8}y = 2$$

- A. 6 **B. 4** C. 7 D. 2 E. None of the above

37. Mpette is an astute hunter. He goes hunting for birds at Egbeghere. On one big tree are 85 healthy birds, that is, all the birds can fly. Mpette shoots on the birds and kills x of them. How many birds remain on the tree?

- A. 82 B. $85-x$ C. $85+x$ **D. 0** E. None of the above

38. Which of the following functions describe the following graph



- A. $y = 2 \sin(2x)$** B. $y = 2 \sin(x)$ C. $y = 2 \cos(2x)$ D. $y = \sin\left(\frac{1}{2}x\right)$

Name: _____ School: _____

39. Suppose

$$x = y^2$$

$$2x + 6 = 2(y + 3)$$

If (x, y) is a solution of the system of the equations and $y > 0$, what is xy^2 ?

- A. 11 **B. 1** C. 871 D. 44 E. None of the above

40. State the inverse of the following statement.

If you studied, then you could pass the test.

- A. If you studied, then you could not pass the test.
B. If you did not study, then you could pass the test.
C. If you did not study, then you could not pass the test.
D. If you could pass the test, then you studied.
E. None of the above