

NOTA means "none of these answers"

3
 1. Find the distance from point A(8,-6) to the line $3x + 2 = 4y$.

- A. $\frac{2}{5}$ B. $\frac{23}{5}$ C. 5 D. 10 E. NOTA

2. Find the circumference of the circle with the equation: $x^2 + y^2 - 12x + 6y - 36 = 0$.

- A. 12π B. 18π C. 81π D. 162π E. NOTA

3. Find the equation of the line tangent to the circle at the point (2,5).

- A. $x + 2y = 12$ B. $2x - y = -1$ C. $2x - y = 9$
 D. $2x - y = 6$ E. NOTA

4. Solve for x: $7 - 3x < 2x + 6 < 8 - 4x$

- A. $\{x \mid x < -1\}$ B. $\{x \mid x > 5 \text{ or } x < 3\}$ C. $\left\{x \mid \frac{1}{5} < x < \frac{1}{3}\right\}$
 D. $\{x \mid x < -1 \text{ or } x < 1\}$ E. NOTA

5. Solve for x: $x = 1 + \sqrt{5 + \sqrt{5 + \sqrt{5 + \dots}}}$

- A. $\left\{\frac{3 + \sqrt{21}}{2}, \frac{3 - \sqrt{21}}{2}\right\}$ B. $\left\{\frac{1 + \sqrt{21}}{2}, \frac{1 - \sqrt{21}}{2}\right\}$ C. $\left\{\frac{1 + \sqrt{21}}{2}\right\}$
 D. $\left\{\frac{3 + \sqrt{21}}{2}\right\}$ E. NOTA

11. Which of the following is an example of a homogeneous system of equations?

A. $\begin{cases} 2x + 3y = 0 \\ 5x - 2y = 0 \end{cases}$

B. $\begin{cases} 6x - 3y = 9 \\ 4x - 2y = 6 \end{cases}$

C. $\begin{cases} x + y = 1 \\ x - z = 3 \\ y + z = 2 \end{cases}$

D. $\begin{cases} x = -3 \\ y = 2 \\ z = 5 \end{cases}$

E. NOTA

12. A square with a side of length 64 cm is cut into four smaller squares. Each of these four squares is cut into four smaller squares. Continue this pattern for a total of six cuttings. Using only the smallest squares cut, find the sum of the perimeters of all of these smallest squares.

- A. 10 cm B. 164 cm C. 8192 cm D. 16384 cm E. NOTA

13. Solve for x: $\sqrt{12x} + 2\sqrt{18x} - 3\sqrt{9x} = -6\sqrt{4x} + 3\sqrt{8x} + \sqrt{9x} + \sqrt{32}$

- A. $\frac{16}{9}$ B. 2 C. $\frac{8}{3}$ D. $\frac{16}{3}$ E. NOTA

14. Solve for x: $\sqrt{2x + 1} - \sqrt{x - 1} = \sqrt{x + 2}$

- A. $\{0, 1\}$ B. $\{1\}$ C. $\{1, -2\}$ D. $\left\{1, -\frac{3}{2}\right\}$ E. NOTA

15. Find the fourth term in the expression: $(3rs - 2t^2)^8$

- A. $-108,864r^5s^5t^6$ B. $-4838r^3s^3t^{10}$ C. $336r^5s^5t^6$
 D. $-336r^5s^5t^6$ E. NOTA

16. Raul just graduated from high school. His uncle said he would give him five cents next year, ten cents the following year, twenty cents the year after that, forty cents four years from now and so fourth for a total of twenty years. How much money will his uncle have given him after twenty years?

- A. \$36.05 B. \$10,485.75 C. \$26,214.45 D. \$52,428.75 E. NOTA

17. Which of the following is a parabola with its vertex located at $(-2, 4)$ and latus rectum endpoints with coordinates $(0, 0)$ and $(0, 8)$?

- A. $y^2 - 16x - 16y = 0$ B. $x^2 - 16x - 16y = 0$ C. $y^2 - 8x - 8y = 0$
 D. $x^2 - 8x - 8y = 0$ E. NOTA

18. Find the integer solution for n if $\frac{(n + 3)! \cdot (n - 1)! \cdot (n - 3)!}{(n - 2)! \cdot (n + 2)! \cdot n!} = \frac{3}{8}$?

- A. $\left\{-\frac{4}{3}, 6\right\}$ B. $\{-2\}$ C. $\{3, 5\}$
 D. $\{10\}$ E. NOTA

19. Solve for n such that $\binom{n}{6} = 7 \cdot \binom{n}{7}$

- A. 6 B. 7 C. 8 D. 9 E. NOTA

20. Change 3023_4 to its equivalent in base 6.

- A. 203_6 B. 5055_6 C. 535_6 D. 21551_6 E. NOTA

21. How many different distinguishable arrangements are there for the letters in BANANA .

- A. 60 B. 90 C. 120 D. 360 E. NOTA

22. Solve for x: $\log_3 \left(9^{\frac{1}{5}} \right) = \log_x \left(16^{\frac{1}{5}} \right)$

- A. 2 B. 4 C. 8 D. 16 E. NOTA

23. Solve for x: $\log_7 (x^2 + x) = \log_7 (12)$

- A. { 3 } B. { 3, -4 } C. { 11, 12 } D. $\left\{ \frac{11}{2} \right\}$ E. NOTA

24. Quadrilateral ABCD is inscribed in circle P. Points E, F, G, and H are the midpoints of sides AB, BC, CD, and AD respectively. If AC = 20, BD = 12 and HF = 14, find EG.

- A. 8 B. $2\sqrt{19}$ C. $2\sqrt{34}$ D. $2\sqrt{223}$ E. NOTA

25. A circle with radius 4 is circumscribed about an equilateral triangle, a dodecagon, and an octagon. Find the product of the areas of the circle and octagon less the product of the areas of the dodecagon and the equilateral triangle.

- A. $192\sqrt{3} - 512\pi\sqrt{2}$ B. $512\pi\sqrt{2} - 576\sqrt{3}$ C. $576\sqrt{3} - 256\pi\sqrt{2}$
 D. $512\pi\sqrt{2} - 192\sqrt{3}$ E. NOTA

26. Ana wants to bake apple pie and pecan pie for an after school bake sale. An apple pie requires three cups of flour and one cup of corn syrup. A pecan pie requires two cups of flour and two cups of corn syrup. Ana has twelve cups of flour and eight cups of corn syrup on hand. She is not going to the store to get more supplies. She makes two dollar per pecan pie and five dollar per apple pie. How many pies of each type can she bake to make the most money?

- A. 0 pecan, 4 apple B. 3 pecan, 2 apple C. 3 pecan, 3 apple
 D. 8 apple, 0 pecan E. NOTA

27. Find the coordinates of the focus for the conic section with equation: $2x^2 + x + y - 2 = 0$.

A. $\left(-\frac{1}{4}, \frac{17}{8}\right)$

B. $\left(-1, \frac{17}{8}\right)$

C. $\left(-\frac{1}{4}, 2\right)$

D. $(1, -1)$

E. NOTA

28. Find the length of the radius of a circle with an area equal to the area of an ellipse with equation:

$$9x^2 + 16y^2 + 18x = 64y + 71$$

A. 1

B. $2\sqrt{3}$

C. 12

D. $9\sqrt{2}$

E. NOTA

29. Add the difference of the roots in equation P to the difference of the roots in equation Q.

P: $5n^2 + 3n + 1 = 0$

Q: $3y^2 - 7y + 5 = 0$

A. 0

B. $\frac{2i\sqrt{11}}{15}$

C. $\frac{11i\sqrt{11}}{30}$

D. $\frac{6i\sqrt{29} + 5i\sqrt{109}}{30}$

E. NOTA

30. Find the number of integer solutions to the following inequality: $3y^2 - 2y + 21 \geq 4y^2 + 2y$

A. 4

B. 5

C. 10

D. 11

E. NOTA