

NOTA denotes None Of The Above

1. Solve for x : $e^{\ln(x+3)} + 3e^{\ln 2} = e^{\ln(3x+1)}$
A. ± 4 B. -4 C. 4 D. 5.5 E. NOTA
2. Solve for a : $3^a(16) = 144$
A. ± 2 B. -2 C. 2 D. 3 E. NOTA
3. Evaluate $\sum_{i=4}^{51} (7x-12)$
A. 8319 B. 8648 C. 8664 D. 9016 E. NOTA
4. Find the sum of all elements in the inverse of the following matrix.
$$\begin{bmatrix} -3 & -2 & 7 \\ 2 & 0 & 8 \\ 3 & 5 & -2 \end{bmatrix}$$

A. $\frac{-14}{481}$ B. $\frac{-12}{134}$ C. $\frac{-11}{481}$ D. $\frac{49}{134}$ E. NOTA
5. Find the vertex of the parabola $y = x^2 + 4x$.
A. $(3,21)$ B. $(-3,-21)$ C. $(2, -4)$ D. $(-2,-4)$ E. NOTA
6. Solve for x to the nearest hundredth. $2.5 = \sqrt{x+2} + \sqrt{x+2} + \sqrt{x+2} \dots$
A. 1.75 B. 2.50 C. 6.25 D. 0.50 E. NOTA
7. What is the units digit of $13^{12} - 11$?
A. 0 B. 1 C. 2 D. 5 E. NOTA
8. What is the coefficient of the fifth term in the expansion of $(3x - 4y)^{10}$?
A. -16796160 C. 62705664 E. NOTA
B. 39191040 D. 69672960
9. Find the sum of the entries in the 8^{th} row of Pascal's triangle. Assume the row containing only the entry $[1]$ is considered row 1.
A. 64 B. 128 C. 254 D. 256 E. NOTA

10. Solve the system, then find $x + y + z$.

$$\begin{aligned}x + 2y + z &= 8 \\x - y + 3z &= 10 \\2x + y &= 6\end{aligned}$$

- A. $\frac{20}{3}$ B. $\frac{7}{3}$ C. $\frac{4}{3}$ D. 3 E. NOTA

11. Find the area of the figure bounded by the graph of $f(x) = -|x + 5| + 5$ and the x-axis (above the x-axis).

- A. 12.5 B. 25 C. 50 D. 51 E. NOTA

12. Which of the following is the beginning of a Fibonacci sequence?

- A. 1,2,5,8,11,17 B. 1,3,5,9,15,22 C. 1,1,2,3,5,8
D. 1,4,8,12,16,20 E. NOTA

13. Find the characteristic of $\log 317$.

- A. .0511 B. 2 C. 317 D. 2.5011 E. NOTA

14. Find the area of a triangle with vertices at points A, B, and C. The points are A(2,-3), B(4,8) and C(7,4).

- A. $\frac{41}{2}$ B. $\frac{-41}{2}$ C. 41 D. -41 E. NOTA

15. If $f(x) = 4x^2 - x$ and $g(x) = x^2 - 4x$ find $f(g(x))$.

- A. $4x^4 - 32x^3 + 63x^2 + 4x$
B. $4x^4 - 32x^3 + 15x^2 + 4x$
C. $4x^4 + 32x^3 - 15x^2 + 4x$
D. $4x^2 - 32x^3 + 63x^2 - 4x$
E. NOTA

16. Find the sum of the coefficients of the binomial expansion of $(3a^2 - 4b^4)^2$.

- A. -7 B. -1 C. 1 D. 4 E. NOTA

17. If $f(x) = f(x-4) + x^2$ and $f(2) = 24$ then find $f(10)$.

- A. 60 B. 106 C. 160 D. 1060 E. NOTA

18. Find the area of the ellipse with the following equation.

$$\frac{x^2}{36} + \frac{y^2}{16} = 1$$

- A. 18π B. 24π C. 25π D. 36π E. NOTA

19. Find the sum of the infinite geometric series: $r + r^2 + r^3 + r^4 \dots$ (assuming $|r| < 1$)

- A. r B. $\frac{r}{1-r}$ C. $\frac{r}{r-1}$ D. infinity E. NOTA

20. A fair six sided die is rolled and a fair two sided coin is flipped. What is the probability that the number on the die is 1 or 3 and the coin shows heads?

- A. $\frac{1}{6}$ B. $\frac{1}{3}$ C. $\frac{1}{2}$ D. $\frac{5}{6}$ E. NOTA

21. Alex has \$1,000 saved for college in a tin can under his bed. If he wants to have at least \$10,000 in 5 years, and he invests his money in an account that is compounded continuously, what is the minimum percent interest that he must invest his money?

- A. 20% B. 46% C. 69% D. 92% E. NOTA

22. Solve for all the solutions of the following system.

$$\begin{aligned} 5x^2 + y^2 &= 30 \\ y^2 - 16 &= 9x^2 \end{aligned}$$

- A. (1, -5) B. (1, -5), (-1, -5) C. $(\pm 1, \pm 5)$ D. no solutions
E. NOTA

23. If $\log_5 9765625 = x$ and $\log_6 2176782336 = y$. Find $x \cdot y$

- A. 110 B. 100 C. 120 D. 212 E. NOTA

24. In a geometric series, the first term is 6 and the common ratio is 2. Which term has a value of 1536?

- A. 7 B. 8 C. 9 D. 10 E. NOTA

25. Find the sum of the real-valued solutions of $(3^x)^{(x-1)} = 729$.

- A. -2 B. -1 C. 1 D. 3 E. NOTA

26. What is the remainder when you divide $x^4 + 6x^3 + 12x^2 + 8x$ by $(x + 2)$?

- A. 0 B. 1 C. 51 D. 52 E. NOTA

27. If $\log 2 = a$ and $\log 3 = b$ then find $\log 192$ in terms of a and b

- A. $6a^2b$ B. $a + 6b$ C. $6a$ D. $6a + b$ E. NOTA

28. Find the coordinates of the focus of the parabola with a given equation:

$$x^2 - 12y - 4x - 32 = 0$$

- A. (2, -3) B. (2, 0) C. (2, -6) D. (0, 0) E. NOTA

29. Find the determinant of the transpose of the following matrix.

$$\begin{bmatrix} 2 & 1 & -7 \\ 3 & -5 & 6 \\ 0 & 8 & 3 \end{bmatrix}$$

- A. -303 B. -33 C. 303 D. -31 E. NOTA

30. Simplify $[3.1] + [\pi] - [-e] + [3^7]$ assuming $[]$ denotes the greatest integer function:

- A. 2190 B. 2191 C. 2193 D. 2196 E. NOTA