For all questions, answer choice (E) NOTA means that none of the given answers is correct. Also, for this test, $0^0 = 1$. Good Luck!

1. What is the number of distinct arrangements of the word POKEMONGO?
   (A) 362880 (B) 181440 (C) 120960 (D) 81000 (E) NOTA

2. Let A stand for an angle of a triangle, and S stand for a side of a triangle. Which of the following is NOT a way to prove triangle congruency?
   (A) AAS (B) SSS (C) ASA (D) SSA (E) NOTA

3. Simplify $\sqrt{2+\sqrt{2+\sqrt{2+\ldots}}}$
   (A) 2 (B) 4 (C) 3 (D) $2\sqrt{2}$ (E) NOTA

4. What is the sum of the real solutions of $(x^2+4x+4)^{x+2} = 1$?
   (A) -6 (B) -4 (C) -5 (D) -3 (E) NOTA

5. How many edges does a polyhedron with 120 faces and 62 vertices have? If you are wondering, this polyhedron is called a disdyakis triacontahedron.
   (A) 180 (B) 182 (C) 184 (D) 186 (E) NOTA

6. Let x be directly proportional to y and inversely proportional to the square of z. If x is 3 when y is 7 and z is 4, what is y when z is 5 and x is 2?
   (A) $\frac{48}{7}$ (B) $\frac{60}{7}$ (C) $\frac{175}{24}$ (D) $\frac{175}{36}$ (E) NOTA

7. Nihar is playing darts on a square dartboard defined by 4 lines: $y = 0$, $y = 5$, $x = 0$, and $x = 5$. To score a point, Nihar has to hit the dartboard above the line $y = 2x$. If Nihar throws 3 darts, what is the probability that he scores 2 or more points?
   (A) $\frac{1}{2}$ (B) $\frac{1}{4}$ (C) $\frac{3}{8}$ (D) $\frac{5}{32}$ (E) NOTA

8. What is the shortest distance between the point $(12, 5)$ and the line $y = 5x + 17$?
   (A) $\frac{36\sqrt{26}}{13}$ (B) $\frac{72\sqrt{26}}{13}$ (C) $\frac{72\sqrt{13}}{13}$ (D) $\frac{48\sqrt{13}}{13}$ (E) NOTA

9. How many trailing zeroes does 2016! have?
   (A) 500 (B) 502 (C) 504 (D) 506 (E) NOTA

10. What is the units digit of $2016^{2016} + 2015^{2015} + 3^{12345} + 7^{54321}$?
    (A) 5 (B) 3 (C) 1 (D) 7 (E) NOTA

11. What is $\sin(30°)\cos(60°)\tan(45°)$?
    (A) $\frac{3}{4}$ (B) $\frac{1}{4}$ (C) $\frac{\sqrt{3}}{4}$ (D) $\frac{\sqrt{2}}{8}$ (E) NOTA

12. If $x + y = 10$ and $x^2 + y^2 = 50$, what is $x^3 + y^3$?
    (A) 100 (B) 150 (C) 200 (D) 250 (E) NOTA

13. Which of these 4 points is NOT on Euler's line?
    (A) Incenter (B) Circumcenter (C) Orthocenter (D) Centroid (E) NOTA

14. Find the sum of the two abscissas and 2 times both of the ordinates of the intersection of the following equations:

$$y = x^2 + 4x - 2$$
$$y = 3x + 4$$

(A) 4 (B) 5 (C) 6 (D) 7 (E) NOTA

15. What is the converse of the inverse of the contrapositive of the statement, "If you are a nerd, then you play Pokemon GO."?
(A) "If you aren't a nerd, then you don't play Pokemon GO."
(B) "If you don't play Pokemon GO, then you aren't a nerd."
(C) "If you are a nerd, then you play Pokemon GO."
(D) "If you play Pokemon GO, then you are a nerd."
(E) NOTA

16. Find the remainder when $5x^6 + 7x^5 - x^4 + 12x^3 - 4x^2 + 6$ is divided by $x - 1$.
(A) -13 (B) 20 (C) 25 (D) 30 (E) NOTA

17. Compute the area of the convex polygon with vertices at the points $(0, 0)$, $(3, 4)$, $(2, 7)$, $(-3, 5)$, and $(-6, 1)$.
(A) 71 (B) $\frac{71}{2}$ (C) $\frac{21}{2}$ (D) $-\frac{21}{2}$ (E) NOTA

18. The operation & is defined as $a\&b = \frac{a^2}{b} + \frac{b^2}{a}$. Find $(1\&3) \cdot (4\&2)$.
(A) 84 (B) 87 (C) 80 (D) 86 (E) NOTA

19. What is the sum of the elements of the first 12 rows of Pascal's Triangle if the first row has 1 element?
(A) 8191 (B) 4095 (C) 8190 (D) 4094 (E) NOTA

20. If you are picking letters from a bag that has the letters A-J in it with replacement, what is the expected number of times you would need to draw a letter before you have picked one of each letter?
(A) 10 (B) $\frac{275}{7}$ (C) $\frac{9901}{252}$ (D) $\frac{4951}{126}$ (E) NOTA

21. What is the sum of the coefficients of the expansion of $(w + 3x + 7y - 9z)^6$?
(A) 1 (B) 2 (C) 64 (D) 729 (E) NOTA

22. Find the determinant of the following matrix: $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 2 & 1 & 0 & 3 \\ 3 & 5 & 2 & 1 \\ 9 & 3 & 7 & 4 \end{bmatrix}$.
(A) 88 (B) -88 (C) 86 (D) -86 (E) NOTA

23. Mr. Harrington leaves his house to go walk in a forest. He leaves his house and walks 6 miles west, 10 miles north, $4\sqrt{2}$ miles southeast at a 45° angle, 10 miles west, and 3 miles north. How far away is he from his house? All answers are given in miles.
(A) 15 (B) 20 (C) $\sqrt{215}$ (D) $5\sqrt{10}$ (E) NOTA

24. What is the sum of this sequence: $\frac{1}{2}, \frac{1}{3}, \frac{1}{6}, \frac{1}{6}, \frac{1}{18}, \frac{1}{12} \ldots$
(A) 1 (B) $\frac{17}{12}$ (C) 2 (D) $\frac{31}{12}$ (E) NOTA

25. Find $\frac{1}{2}+\frac{2}{4}+\frac{3}{8}+\frac{4}{16}+\frac{5}{32}+\ldots$
(A) 2 (B) e (C) 3 (D) π (E) NOTA

26. Solve for x: $\log_2 x+\log_4 x+\log_{16} x+\log_{256} x+\ldots=6$.
(A) 2 (B) 4 (C) 8 (D) 16 (E) NOTA

27. Suppose $\sqrt{A}+\sqrt{B}=\sqrt{8+\sqrt{60}}$. Find A^2+B^2.
(A) 30 (B) 64 (C) 60 (D) 34 (E) NOTA

28. How many positive integral factors does 2016 have?
(A) 36 (B) 72 (C) 3 (D) 8 (E) NOTA

29. What is the distance between the foci of the conic section $x^2+4y^2-2x+16y=15$?
(A) $2\sqrt{3}$ (B) $4\sqrt{3}$ (C) $2\sqrt{6}$ (D) $4\sqrt{6}$ (E) NOTA

30. What is $3+\cfrac{4}{3+\cfrac{4}{3+\cfrac{4}{\ldots}}}$?
(A) $\frac{3}{4}$ (B) $\frac{4}{3}$ (C) 3 (D) 4 (E) NOTA