For all questions, answer choice (E) NOTA means that none of the given answers is correct. Good Luck!

1. Given that $A\&B = (A \cdot B)^{A+B}$, what is the value of 2&1?
(A) 8 (B) 6 (C) 9 (D) 27 (E) NOTA

2. What is the discriminant of: $-10X + X^2 + 24$?
(A) 2 (B) 6 (C) 4 (D) 961 (E) NOTA

3. In how many distinct ways can SARAH be arranged such that the two A's are not next to each other?
(A) 120 (B) 24 (C) 60 (D) 36 (E) NOTA

4. Which of the following lines is perpendicular to the line: $21 - 3y = x$?
(A) $y = -\frac{x}{3} + 10$ (B) $y = 3x + 10$ (C) $y = -3x + 12$ (D) $y = \frac{x}{3} + 5$ (E) NOTA

5. Which property is shown in $A + (B + C) = (A + B) + C$?
(A) Commutative (B) Distributive (C) Additive (D) Associative (E) NOTA

6. Once on a math test, Saniya was asked to find the sum of the first fifty consecutive positive integers. Instead, she found the sum of every positive multiple of three until she reached 100. What is the positive difference between the answer that Saniya got and the actual correct answer?
(A) 1275 (B) 2958 (C) 408 (D) 1683 (E) NOTA

7. Ben is currently failing his math class. His past three test scores have been 55, 67, and 73. His parents told Ben that he won't be able to go to Wild Adventures with Zayn unless his test scores average out to at least 70. What is the least possible score Ben must receive on the next test to be able to go to Wild Adventures with Zayn?
(A) 80 (B) 75 (C) 70 (D) 84 (E) NOTA

8. Ben wasn't able to go to Wild Adventures, because he didn't get an average of 70 or higher, so he hired Kyle as a tutor to teach him. Kyle asks Ben, "If the area of the circle is 100 cm^2, what is the diameter of the circle?" If Ben got the question correct, what was his answer? All the answers are given in cm.
(A) $\frac{10}{\sqrt{\pi}}$ (B) 10 (C) $\frac{10}{\pi}$ (D) $\frac{20\sqrt{\pi}}{\pi}$ (E) NOTA

9. Let X be directly proportional to Y and inversely proportional to Z^2. When $X = 10$, $Y = 12$ and $Z = 5$. What is Z when $X = 10$ and $Y = 24$?
(A) 50 (B) $\frac{24}{5}$ (C) $\frac{125}{6}$ (D) $\sqrt{50}$ (E) NOTA

10. Rationalize the denominator: $\frac{5+\sqrt{2}}{\sqrt{6}+2}$
(A) $\frac{10\sqrt{6}-10+4\sqrt{3}-3\sqrt{2}}{2}$ (B) $\frac{5\sqrt{6}-10+2\sqrt{3}-2\sqrt{2}}{2}$ (C) $\frac{6\sqrt{6}-5+2\sqrt{3}-5\sqrt{2}}{2}$
(D) $\frac{5\sqrt{6}-15+3\sqrt{3}-2\sqrt{2}}{2}$ (E) NOTA

11. Solve for all possible values of x such that $|x + 6| = 7 + 10x$.
(A) $-\frac{1}{9}$ (B) $-\frac{1}{9}, -\frac{13}{11}$ (C) $-\frac{13}{11}$ (D) $\frac{13}{99}$ (E) NOTA

12. What is the smaller angle between the hour and minute hand at 2:19?
(A) 89° (B) 114° (C) 44.5° (D) 54° (E) NOTA

13. Find the inverse of the function $f(x) = 7x + 3$.
(A) $f^{-1}(x) = 3x + 7$ (B) $f^{-1}(x) = 7x - 3$ (C) $f^{-1}(x) = 3 - 7x$ (D) $f^{-1}(x) = \dfrac{x+3}{7}$ (E) NOTA

14. If $f(x) = 5x + 1$ and $g(x) = 9x - 2$, what is $f(g(g(1)))$?
(A) 306 (B) 305 (C) 61 (D) 547 (E) NOTA

15. Anna is walking around in a new neighborhood and is a little confused on how to reach Meit's house. She walks 7 ft. North, 10 ft. East, 60 inches West, and 1 ft. South. What is the shortest distance from where she is now to where she began in feet?
(A) $\sqrt{149}$ (B) $\sqrt{74}$ (C) $\sqrt{61}$ (D) $\sqrt{136}$ (E) NOTA

16. Chanda, the scientist, has a 16 mL solution that is 40% acid. How many milliliters of water should she add to make the solution 20% acid?
(A) 32 (B) $\dfrac{16}{5}$ (C) $\dfrac{24}{5}$ (D) 16 (E) NOTA

17. Anvitha, Saniya, and Sarah are all working together on a project. It takes Anvitha 3 hours, Saniya 4 hours, and Sarah 2 hours to complete the project by themselves. Since Anvitha and Saniya were at the beach together, Sarah decided to do half the project by herself. As soon as Sarah stopped working, Anvitha and Saniya started working on the second half together. How long did the entire project take to complete in hours?
(A) $\dfrac{7}{13}$ (B) $\dfrac{20}{13}$ (C) $\dfrac{19}{6}$ (D) $\dfrac{13}{7}$ (E) NOTA

18. What is the degree of the polynomial: $7^2x^5y^0z^10 + 5^2x^8y^4z^3 + x^2y^3$?
(A) 5 (B) 15 (C) 17 (D) 37 (E) NOTA

19. Ben, Anvitha, Zayn, Anna, Claire, and Sarah are all sitting down around a circular table. If Zayn and Anna don't want to sit next to each other, how many distinct arrangements are there for all 6 of them to sit around the table?
(A) 24 (B) 120 (C) 720 (D) 72 (E) NOTA

20. Which of the following answer choices is equivalent to 1221_3?
(A) 52_5 (B) 220_5 (C) 202_5 (D) 102_5 (E) NOTA

21. Sri and Shivam went to the mall together. At Hollister, there was a huge sale and Sri and Shivam decided to spend all their money. Shivam bought 5 shirts and 2 jeans for 100 dollars. Sri bought 4 shirts and 3 jeans for 108 dollars. If all the shirts cost the same price and all the jeans cost the same price, how much does one shirt cost?
(A) 32 (B) 12 (C) 20 (D) 8 (E) NOTA

22. If $xy = 10$, $yz = 12$, and $xz = 16$, what is xyz?
(A) $8\sqrt{30}$ (B) 1920 (C) 120 (D) 192 (E) NOTA

23. Macauley, Pruthak, and Sid all wanted to see how many students take all of the three languages offered at Rickards High School in junior year. The survey results show that there are 320 students that take at least one language. 120 students are taking Spanish, 125 students are taking French and 155 students are taking Latin. 30 students are taking Spanish and Latin, 40 students are taking Spanish and French, and 20 students are taking French and Latin. Based on the survey, how many students take all three languages?
(A) 250 (B) 30 (C) 40 (D) 10 (E) NOTA

24. If 1 bobo = 3 bobe, and 5 bobe = 2 bobu then how many bobus are in 200 bobo?
(A) 40 (B) 240 (C) 100 (D) 20 (E) NOTA

25. What is $\sqrt{7+\sqrt{7+\sqrt{7+\ldots}}}$?
(A) $\frac{1-\sqrt{29}}{2}$ (B) $\frac{1+\sqrt{29}}{2}$ (C) $\frac{\sqrt{29}}{2}$ (D) $-\frac{\sqrt{29}}{2}$ (E) NOTA

26. What is the distance between the vertex of $y=x^2-4x+3$ and the intersection point of $y=5x+1$ and $y=3x+7$?
(A) $\sqrt{314}$ (B) $\sqrt{226}$ (C) $\sqrt{251}$ (D) $\sqrt{290}$ (E) NOTA

27. How many rectangles can be found in a 4×5 grid?
(A) 21 (B) 150 (C) 130 (D) 120 (E) NOTA

28. Evaluate: $\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\left(1-\frac{1}{5}\right)\left(1-\frac{1}{6}\right)\ldots\left(1-\frac{1}{50}\right)$.
(A) $\frac{3}{4}$ (B) $\frac{1}{2}$ (C) $\frac{1}{4}$ (D) $\frac{2}{3}$ (E) NOTA

29. Given a line segment with end points $(-3,7)$ and $(5,5)$, find the slope of the perpendicular that intersects the given segment.
(A) $-\frac{1}{4}$ (B) -4 (C) $\frac{1}{4}$ (D) 4 (E) NOTA

30. How many factors of 900 are multiples of 3?
(A) 17 (B) 18 (C) 34 (D) 36 (E) NOTA