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

1. What is 2^0?

   (A) 2   (B) 0   (C) 1   (D) Undefined   (E) NOTA

2. If $a = b$ and $b = c$, then $a = c$. This is an example of which property?

   (A) Associative   (B) Transitive   (C) Reflexive   (D) Symmetrical   (E) NOTA

3. What is x if $27^x = 729$?

   (A) $\dfrac{5}{3}$ (B) 2   (C) $\dfrac{7}{3}$ (D) $\dfrac{8}{3}$ (E) NOTA

4. What is the y-intercept of $y = 0$?

   (A) $(1, 0)$ (B) Undefined   (C) $(0, 0)$ (D) $(0, 1)$ (E) NOTA

5. Rationalize: $\dfrac{\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}}$

   (A) $4 + \sqrt{15}$ (B) $\dfrac{1}{4 - \sqrt{15}}$ (C) 1   (D) $4 - \sqrt{15}$ (E) NOTA

6. If $x_1 = -b + \sqrt{b^2 - 4ac}$, $x_2 = -b - \sqrt{b^2 - 4ac}$ and $x_1 = x_2$, what is $\sqrt{b^2 - 4ac}$?

   (A) Impossible to determine   (B) Undefined   (C) 1   (D) -1 (E) NOTA

7. Let $A =$ the slope of a line, and let $B =$ the slope of the line perpendicular to the line with slope A. What is AB?

   (A) 1   (B) -1   (C) 2   (D) 0   (E) NOTA

8. How many roots does $x^5 + 3x^4 - 6x^2 + 2$ have?

   (A) 1   (B) 0   (C) 3   (D) 5   (E) NOTA

9. In the land of Zoomzoom, Zingawats (The inhabitants of Zoomzoom) use a different currency. In their currency, 5 Zingzings are equal to 7 Zongzongs, 3 Zongzongs are equal to 5 Zangzangs, and 2 Zangzangs are equal to 3 Zungzungs. How many Zungzungs can I trade for with 60 Zingzings?

   (A) 105   (B) 210   (C) 155   (D) 200   (E) NOTA

10. Siddarth is a cowboy. He lives on the coordinate point (10, 5). He has been riding his horse Abbey all day. He is tired and wants to get a drink of water. There is a river flowing across the x-axis. His horse Abbey is also tired, so after drinking some water at the river, Siddarth wants to go to the horse stall located at (2,10). What is the shortest distance that Siddarth has to cover to complete his tasks? (All answers are in coordinate units.)

    (A) $\sqrt{89}$ (B) $10 + \sqrt{89}$ (C) $\sqrt{116} + \sqrt{41}$ (D) $5 + \sqrt{164}$ (E) NOTA

11. Alex likes to paint fences on Tuesdays. He paints $\dfrac{1}{3}$ of a fence in one hour. Alex gets help from a painter who is able to paint $\dfrac{3}{7}$ of a fence in one hour. He wants to paint five fences. The painter joins Alex after the third fence is done being painted. How long does it take to get the five fences painted? (All answers are in hours.)

    (A) $\dfrac{93}{8}$ (B) $\dfrac{105}{16}$ (C) $\dfrac{159}{16}$ (D) $\dfrac{93}{16}$ (E) NOTA

12. What curve does the function, $y = x^2 - 6x + 9$ make?

    (A) Circle   (B) Line   (C) Parabola   (D) Point   (E) NOTA

13. At what point(s) do the equations $y = x^2 + 6x + 9$ and $y = -2x - 3$ intersect?

    (A) (0,0)   (B) They do not intersect   (C) (-2,1)   (D) (-6,9) and (-2,1)   (E) NOTA

14. What is 34_5 converted to base 7?

    (A) 95   (B) 25   (C) 35   (D) 19   (E) NOTA

15. Bessie is at a pie eating contest. His appetite grows as he eats. In the first minute he ate one pie. In the second minute he ate two pies. In the third minute he successfully ate four pies. Assuming he continues at such a rate, how many will Bessie in the 10th minute?

    (A) 512   (B) 1024   (C) 1023   (D) 256   (E) NOTA

16. What is $3 + 11 + 19 + \cdots + 59 + 67 + 75$?

    (A) 390   (B) 429   (C) 351   (D) 400   (E) NOTA

17. Professor Chang gave Jenny a math problem. The math problem was: There is a sequence which goes 1, 3, 6, 10, 15, ... What is the 99th term? Jenny needs your help to solve this this problem. What is the correct answer?

    (A) 9900   (B) 4851   (C) 4950   (D) 5050   (E) NOTA

18. Four friends go to Annie's birthday party. The four of them sit at a round table and then they realize that they are sitting in alphabetical order. What is the probability of this happening? Note: None of them have the same name.

    (A) $\dfrac{1}{3}$ (B) $\dfrac{1}{24}$ (C) $\dfrac{1}{6}$ (D) $\dfrac{1}{12}$ (E) NOTA

19. Let $k = x^2$. What is the sum of the least 5 values of k, where x is an integer?

    (A) 55   (B) -55   (C) 15   (D) 91   (E) NOTA

20. Let $g(x) = \dfrac{1}{f(x)}$, $h(x) = \dfrac{1}{g(x)}$, and $f(x) = 2x^2 - 9$. What is $h(x)$ when $f(x) = 3$?

    (A) 9   (B) $\dfrac{1}{9}$ (C) $\dfrac{1}{3}$ (D) 3   (E) NOTA

21. What is the sum of the number of distinct roots and the degree of $x^2 + 30x + 225$?

    (A) 4   (B) 3   (C) 5   (D) 2   (E) NOTA

22. The average of 8 distinct whole numbers is eight. What is the largest one of these numbers can be?

    (A) 64   (B) 43   (C) 36   (D) 57   (E) NOTA

23. Using the digits 1, 2, 3, and 4 all possible 4 digit numbers were made. Each digit was used once per number. What is the sum of all the possible numbers made?

    (A) 66,660   (B) 66,666   (C) 66,060   (D) 666,666   (E) NOTA

24. Ian and Andrew went to go buy chicken nuggets. Chicken nuggets are sold in either boxes of 7 or 12. What is the largest number of chicken nuggets that Ian and Andrew cannot buy?

    (A) 65   (B) 59   (C) 73   (D) 44   (E) NOTA

25. An odd function is a function defined by $f(-x) = -f(x)$. Of the following five functions, how many are odd functions?

    - $f(x) = x^2 + 16$
    - $f(x) = x^3 - x$
    - $f(x) = x^5 + 3x^2$
    - $f(x) = x^2 + 2x - 5$
    - $f(x) = x^7 + 3x^3 - 2$

    (A) 0   (B) 2   (C) 1   (D) 4   (E) NOTA

26. Siddarth and Ryan are playing with a super bouncy ball. Once they drop it, it never stops bouncing. It is dropped from a height of 64 in. and bounces back up to a height of 48 in., 36 in., and so on. What is the total distance the ball travels? (The sum of an infinite geometric series is $\dfrac{a}{1-r}$, where a is the first term and r is the common ratio. (For example: To calculate the sum of $1 + \dfrac{1}{2} + \dfrac{1}{4} + \dfrac{1}{8} + \ldots$, a would be 1 and r would be $\dfrac{1}{2}$.)) (Hint: when you bounce a ball, it goes up the same distance that it falls, so there are two geometric sequences!)

    (A) 448 ft   (B) 256 ft   (C) $21\dfrac{1}{3}$ ft   (D) $37\dfrac{1}{3}$ ft   (E) NOTA

27. Today is Alex's birthday, and as a birthday present the math gods presented him with a question. They asked him: "We have seven consecutive numbers, and we want to divide them into subsets. Each set needs to have at least one number. How many possible subsets can we make?" Alex answered it correctly. What was Alex's answer?

    (A) 7   (B) 128   (C) 129   (D) 127   (E) NOTA

28. Two fair dice are rolled and their sum is added. Let A be the number with the highest probability of being the sum. If three fair dice are rolled, let B be the reciprocal of the probability of their sum being 3. Evaluate $A + B$.

    (A) 223   (B) 222   (C) 221   (D) 224   (E) NOTA

29. Mihir and Matthew are taking a jog towards each other. Meanwhile a fly is flying between them. It flies from one person to another, and once reaches them, the fly turns around and flies toward the other. Mihir runs at 5 miles per hour. Matthew runs at 4 miles per hour. They are 108 miles apart. The fly flies at 7 miles per hour. How much distance does the fly cover between Mihir and Matthew by the time they meet? (All answers are in feet.)

    (A) 12   (B) 84   (C) 36   (D) 108   (E) NOTA

30. Ifrah has a lot of chores to do. She has two tasks:

    Task A: Ifrah's mom has left her to make 10 cuts on a circular pizza. Find the maximuim number of pieces possible that can be made.

    Task B: Ifrah has to solve her brother's homework, which asks to solve for the real value of x that satisfies the equation $x(x + 1)(x + 2) = 6$. What is the answer?

    What is the sum of the answers of each task?

    (A) 56   (B) 57   (C) 55   (D) 47   (E) NOTA