

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

1. Compute:

$$|78 + (-92)| * 7 + 19$$

- (A) 1209                      (B) 117                      (C) -79                      (D) 32                      (E) NOTA

2. Dylan wants to watch YouTube, but Freedom is blocking him with a four-digit numerical code. He has to enter the correct combination of digits to continue watching YouTube. Dylan only remembers some clues to the code. He knows that the first digit is twice the last digit, both the first and third digits are prime numbers, and that the factorial of the third digit is equivalent to the second digit. What is the correct code that Dylan needs to type in order for him to watch YouTube?

- (A) 2231                      (B) 8224                      (C) 5220                      (D) 7634                      (E) NOTA

3. Given the equation:

$$72(36 + 42) = 72(36) + 72(42)$$

Which property does it represent?

- (A) Distributive Property  
 (B) Commutative Property of Multiplication  
 (C) Identity Property  
 (D) Commutative Property of Addition  
 (E) NOTA

4. Given that  $i = \sqrt{-1}$ , evaluate  $i^{2^6} + 3(3!)$

- (A) 4                      (B)  $3 + i$                       (C) 2                      (D)  $3 - i$                       (E) NOTA

5. Farzan is fiddling around with some numbers and accidentally creates Pascal's Triangle. Assuming 1 is the 0th row, what is the product of the sum of the numbers in the third, fifth, and sixth rows?

- (A) 8192                      (B) 32768                      (C) 16384                      (D) 2605                      (E) NOTA

6. Rohan wants the longest line to fit in his circle. Given that his circle has an area of  $256\pi$ , what is the length of the longest line that can fit inside his circle?

- (A) 16                      (B) 4                      (C) 32                      (D) 8                      (E) NOTA

7. Find the sum of the integral factors of 2020.

- (A) 4284                      (B) 2264                      (C) 4163                      (D) 2263                      (E) NOTA

8. Harshil is extremely hungry on a particular day. He decides that he wants the best food he can buy. While he is looking for a good place to buy food from, he thinks to himself: how many ways can the letters in the phrase "FASTFOOD" be arranged? Answer this question so that Harshil can order his fast food and take care of his hunger.

- (A) 40320                      (B) 10080                      (C) 5040                      (D) 20160                      (E) NOTA

9. What is the slope of the line perpendicular to the line containing points (-3, 12) and (-10, -9)?

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

10. Simplify  $\frac{(16a^4b^5c)(5a^2b^3c^{-3})}{(10a^{-2}b^{-4}c^2)}$
- (A)  $8a^4b^4$  (B)  $16b^{12}c^4$  (C)  $16a^8c^2$  (D)  $8a^8b^{12}c^{-4}$  (E) NOTA
11. Shreyas' silly goat is tied to the corner of a rectangular barn with length 20 and width 10. What is the maximum possible grazing area for the goat assuming the rope he is tied with is 10 units in length? Assume the goat is not able to graze inside the barn. Express your answer in terms of  $\pi$ .
- (A)  $100\pi$  (B)  $75\pi$  (C)  $50\pi$  (D)  $80\pi$  (E) NOTA
12. Find the sum of the tens and ones digit in the number  $7^{2020}$
- (A) 13 (B) 7 (C) 1 (D) 9 (E) NOTA
13. Find the sum of the 7th: prime number, triangular number and Fibonacci number, assuming 1 is NOT a prime number. Hint: the first three triangular numbers are 1, 3, and 6, and the first three terms of the Fibonacci sequence are 1 and 1.
- (A) 51 (B) 60 (C) 58 (D) 54 (E) NOTA
14. Find the sum of the mean, median, mode, and range of the given set:
- $\{1, 14, 4, 29, 30, 19, 17, 15, 4, 7\}$
- (A) 61.5 (B) 61 (C) 60 (D) 60.5 (E) NOTA
15. Shreyas takes 8 hours to finish a job and Harshil takes 4 hours to finish the same job. How many hours will it take if both cooperate on the job?
- (A)  $\frac{8}{3}$  (B) 2 (C) 2.5 (D)  $\frac{7}{3}$  (E) NOTA
16. There is a circle with diameter  $\sqrt{8}$  inscribed within an equilateral triangle inscribed within another larger circle. Find the area of the larger circle that is not included within the triangle.
- (A)  $8\pi - 12\sqrt{3}$  (B)  $8\pi - 6\sqrt{3}$  (C)  $4\pi - 12\sqrt{3}$  (D)  $4\pi - 6\sqrt{3}$  (E) NOTA
17. At Rocking High School, there are 100 students. 54 take chemistry, 50 take physics, and 50 take biology. There are 21 people who take chemistry and physics, 23 people who take chemistry and biology, and 13 people who take physics and biology. There are also 2 students who take all three subjects. How many students don't take any of the three subjects?
- (A) 11 (B) 2 (C) 7 (D) 1 (E) NOTA
18. If I have a 75 foot ladder leaning against a wall such that the distance from the bottom of the wall to the point where the ladder meets the wall is 72 feet, what is the distance between the bottom of the ladder and the bottom of the wall? (Assume the ground and the wall form a  $90^\circ$  angle).
- (A) 7 feet (B) 6 feet (C) 21 feet (D) 15 feet (E) NOTA
19. Given two lines,  $y = 3x + 2$  and  $y = 2.5x + 7$ , find the intersection point of the given lines.
- (A) (5, 17) (B) (10, 32) (C) (4, 17) (D) (12, 37) (E) NOTA
20. Find the greatest common factor of  $4!$ ,  $16!$ ,  $32!$ , and  $64!$ .
- (A) 24 (B) 12 (C) 36 (D) 24000 (E) NOTA

21. Dylan is addicted to eating socks but he is very particular about the color. He has 10 red socks, 21 blue socks, 5 yellow socks, 6 green socks, and 8 purple socks. However, on any given day he has an equal chance of wanting to eat a different color sock. Everyday he picks out only 1 sock at random with replacement. Find the probability that on a given day, he wants to eat a purple sock but gets unlucky and selects the wrong color, and then the next day he wants to eat a yellow sock and gets his wish.
- (A)  $\frac{4}{6125}$  (B)  $\frac{8}{49}$  (C)  $\frac{21}{6250}$  (D)  $\frac{1}{3}$  (E) NOTA
22. Evaluate:  $(27^{\frac{1}{3}} - 8^{\frac{1}{3}}) + (7^{\frac{1}{4}} * 7^{\frac{3}{4}})$
- (A) 8 (B)  $1 + 7^{\frac{3}{16}}$  (C) 4 (D) 2 (E) NOTA
23. Valorant is a 5v5 player base game that was recently released. The purpose of this game is to win an objective, which is planting a spike. Each round, you get a certain amount of coins and you can save the coins each round to get better gear for the following round. If you lose, you earn less coins but if you win, you get more coins. Let's say you start off at 500 coins. If you lose, you get 1200 coins, but if you win, you get 2000 coins. For each person you defeat, you get 200 coins. If you don't buy any gear the first round and the second round, what's the greatest possible amount of coins you can get in the third round?
- (A) 5500 coins (B) 5000 coins (C) 6500 coins (D) 6000 coins (E) NOTA
24. Given that  $A\#B = (\frac{A+B}{3}) * (A + B)$
- Compute  $7\#5$ .
- (A) 144 (B) 72 (C) 48 (D) 36 (E) NOTA
25. Justin went to China for vacation during the summer. One day, he was checking the temperature for the day, realizing that it's in Celsius. He sees that it is  $36^{\circ}\text{C}$ . Help Justin convert the temperature over to Fahrenheit. What's  $36^{\circ}\text{C}$  in Fahrenheit? (Hint:  $F = \frac{9}{5}C + 32$ )
- (A)  $36^{\circ}\text{F}$  (B)  $92.4^{\circ}\text{C}$  (C)  $64.8^{\circ}\text{F}$  (D)  $96.8^{\circ}\text{C}$  (E) NOTA
26. Justin and 7 friends are eating lunch on a circular table. How many distinct ways can Justin and his friends be arranged around the table?
- (A) 720 (B) 5040 (C) 40320 (D) 8 (E) NOTA
27. Which of the following statements are true:
- The quadratic formula is  $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
  - The first 7 numbers of  $\pi$  is 3.141592
  - Whole numbers start with 1
- (A) i only (B) i and ii (C) ii and iii (D) ii only (E) NOTA
28. Dylan and Farzan love friendly competition. They're having another competition at the end of the semester to see who has the highest average test scores in History. If Dylan test scores are 92, 98, 105, 76, and 84, and Farzan test scores are 103, 78, 92, 88, 90, what's the positive difference between Dylan and Farzan's average test scores?
- (A) 0.8 (B) 1.8 (C) 2.0 (D) 4.0 (E) NOTA
29. Nicholas went to a hot dog station to find many options he can choose from, from 7 different types of buns to 31 different types of sausage and 15 different types of toppings. He can choose up to 3 toppings on his hot dog if he wants. How many different combinations is it possible for Nicholas to choose from?
- (A) 3255 (B) 98735 (C) 124992 (D) 124775 (E) NOTA

30. There's a 24-hour digital clock on Shreyas' desk, because he can't read time on an analog clock fast enough. If it is 6:00 PM right now, how long will it be until 3:25 PM?
- (A) 2 hours and 35 minutes
  - (B) 9 hours and 25 minutes
  - (C) 14 hours and 35 minutes
  - (D) 21 hours and 25 minutes
  - (E) NOTA