

The choice E. NOTA means that none of the other answers are correct. Good luck!

1. Assign each day of the week a value such that Monday = 1, Tuesday = 2, Wednesday = 3, etc. Let n be today's value. What is n^2 ?

A. 6 B. 25 C. 36 D. 49 E. NOTA

2. Which of the following is a proper example of distribution?

A. $2(2 + 3) = (2 + 2) + (2 + 3)$ B. $2(2 + 3) = (2 + 2) \times (2 + 3)$
C. $2(2 + 3) = 22 + 23$ D. $2(2 + 3) = 2 \times 2 + 2 \times 3$ E. NOTA

3. You are playing The Game. You lose The Game whenever you think about The Game. However, after each loss, there is a 30-minute grace period in which you cannot lose The Game. What is the maximum number of times you could lose The Game during a 75-minute test?

A. 1 B. 2 C. 3 D. 4 E. NOTA

4. Which of the following is the complete prime factorization of 36?

A. 4×9 B. 2×18 C. $2^2 \times 9$ D. $2^2 \times 3^2$ E. NOTA

5. What is the slope of the line containing the points (2, 3) and (5, 9)?

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

6. Pratik's failboat has several holes in it. It takes on water at a rate of 7 gallons per minute, and when it has accumulated 252 gallons of water it immediately explodes. If he sets sail with no water on board, how many minutes will it take until the failboat explodes?

A. 0.6 B. $1.\bar{6}$ C. 10 D. 36 E. NOTA

7. Simplify: $\frac{2\frac{1}{6}}{6\frac{1}{6}}$.

A. $\frac{1}{3}$ B. $\frac{13}{36}$ C. $\frac{13}{37}$ D. $\frac{21}{61}$ E. NOTA

8. In any right triangle, the sum of the squares of the lengths of the legs is equal to the square of the length of the hypotenuse. This is known as the _____ Theorem.

A. Euclidean B. Fundamental C. Geometric D. Pythagorean E. NOTA

9. If $|2x + 1| = -5$, what is x ? Note that $|a|$ is the distance from a to 0 on a number line.
- A. 2 B. -3 C. 2, -3 D. no solutions E. NOTA
10. Solve for x : $2x + 5 = 3 - x$.
- A. -2 B. $-\frac{2}{3}$ C. $\frac{2}{3}$ D. 4 E. NOTA
11. Let k be the answer to this question. What is $5k - 4$?
- A. 1 B. 4 C. 5 D. not enough info E. NOTA
12. Evaluate the sum $1 + 2 + 3 + 4 + 5 + \cdots + 20$.
- A. 190 B. 210 C. 400 D. 420 E. NOTA
13. Hannah keeps a record of all of her race times. She notes that in her last 2 km race, she finished in 10 minutes. What was her average speed for this race in **meters per second**? (Note: 1 km = 1000 meters)
- A. $\frac{3}{10}$ m/s B. $\frac{10}{3}$ m/s C. 12 m/s D. 2000 m/s E. NOTA
14. Fully simplify $\sqrt{432}$.
- A. $36\sqrt{12}$ B. $4\sqrt{27}$ C. $12\sqrt{2}$ D. $12\sqrt{3}$ E. NOTA
15. Using the proper order of operations, evaluate $-2^2 + 2 + 2 \div 2$.
- A. -2 B. -1 C. 6 D. 7 E. NOTA
16. Rationalize the denominator and simplify: $\frac{\sqrt{2}}{\sqrt{10} - \sqrt{5}}$. Hint: $\frac{1}{\sqrt{a} - \sqrt{b}} = \left(\frac{1}{\sqrt{a} - \sqrt{b}}\right) \left(\frac{\sqrt{a} + \sqrt{b}}{\sqrt{a} + \sqrt{b}}\right)$.
- A. $\frac{2\sqrt{5} + \sqrt{10}}{5}$ B. $\frac{4\sqrt{5}}{5}$ C. $\frac{4\sqrt{5} + \sqrt{10}}{5}$ D. $\frac{2\sqrt{5} - \sqrt{10}}{15}$ E. NOTA
17. Evaluate $1 + 1$.
- A. 0 B. 1 C. 2 D. 3 E. NOTA

18. Patrick has written the integers 0 through 9 on 10 sheets of paper which and placed them into a hat. He randomly selects one piece of paper out of the hat. What is the probability that it contains a prime number?

- A. $\frac{3}{10}$ B. $\frac{2}{5}$ C. $\frac{1}{2}$ D. $\frac{3}{5}$ E. NOTA

19. Which of the following are rational numbers?

- I. $\frac{1}{2}$ II. $\frac{\pi}{4}$ III. $\frac{1.67}{3}$ IV. 1

- A. I and IV only B. I, III, and IV only
C. I, II, and III only D. I, II, III, and IV E. NOTA

20. Which of the following ordered pairs, if any, is a solution to the system of inequalities:

$$\begin{aligned}y &\geq x - 1 \\x &\leq 3 - y\end{aligned}$$

- A. $(-1, 1)$ B. $(2, 4)$ C. $(-3, 9)$ D. $(4, 16)$ E. NOTA

21. Find the point of intersection between the line $y = x + 1$ and the curve $y = x^2 + x + 1$.

Hint: Approach this problem just as if you were finding the intersection of two lines; that is, set $y = y$.

- A. $(1, 2)$ B. $(2, 3)$ C. $(3, 4)$ D. $(4, 5)$ E. NOTA

22. Dhyan, who loves Statistics, finds that the probability of rain on any given day is $\frac{1}{4}$. This value is equivalent to:

- A. 0.25% B. 4% C. 25% D. 50% E. NOTA

23. Let μ , α , and Θ be positive integers such that $(\mu)(\alpha)(\Theta) = 3$. What is $\mu + \alpha + \Theta$?

- A. 3 B. 4 C. 5 D. 6 E. NOTA

24. Let $\zeta(x, y) = xy + x + y + 1$. What is y if $\zeta(1, y) = 3$?

- A. 0.5 B. 1 C. 1.5 D. 3 E. NOTA

25. The DDK machine inputs two numbers, a and b , and outputs the value $\left(\frac{a^2}{b} + \frac{b^2}{a}\right)$. If the DDK machine is given $a = 3$ and $b = 4$, what will it output?

- A. $\frac{25}{12}$ B. $\frac{25}{7}$ C. 7 D. $\frac{91}{12}$ E. NOTA

26. In the following map of the midwestern United States, each state must be colored such that it is not the same color as any state which it touches. What is the minimum number of colors necessary to do this?



- A. 2 B. 3 C. 4 D. 5 E. NOTA
27. I'm guessing it has been more than 30 minutes since question 3—have you lost The Game yet? Eli and Pratik make an ongoing addition to The Game: each time Eli loses, he will pay Pratik \$3 and each time Pratik loses, he will pay Eli \$5. Eli loses The Game once every 5 hours, while Pratik loses The Game once every 8 hours. In the long run, who will profit from this addition to The Game?
- A. Eli B. Pratik E. NOTA
28. A circle has circumference x cm and area x cm². What is the radius of this circle? Hint: The circumference and area of a circle are $2\pi r$ and πr^2 , respectively, where r is the radius.
- A. 1 cm B. 2 cm C. π cm D. 4 cm E. NOTA
29. A perfect number is a number such that the sum of its positive integer factors other than itself is equal to the number. Which of the following is a perfect number?
- A. 8 B. 12 C. 24 D. 28 E. NOTA
30. You are on a game show in which there are three doors. Hidden behind two of these doors are goats, and behind the third is a car. You wish to maximize your chances of winning the car. You choose a door, at which point the host opens one of the other two doors, revealing a goat. You are now given a choice: switch to the other unopened door, or keep your door. Which should you do?
- A. Switch B. Keep C. Either E. NOTA