

Important Instructions for this Test:

Good luck, have fun, and as always: "NOTA" stands for "None of These Answers is correct."

1. Evaluate $(2x^3 - 3x^2) - (2x - 1)$, for $x = -3$.

- A: -76 B: -20 C: -22 D: -74 E: NOTA

2. Solve for p : $-\frac{5}{3} + \frac{7p}{4} = \frac{1}{2}\left(\frac{14p}{3} + 1\right) - \frac{5p}{4}$

- A:
- $\frac{13}{4}$
- B:
- $-\frac{7}{4}$
- C:
- $-\frac{13}{2}$
- D:
- $\frac{17}{2}$
- E: NOTA

3. Solve the following equation for the indicated variable. Solve $\frac{c}{a} = \frac{d}{r}$ for a .

- A:
- $a = \frac{cd}{r}$
- B:
- $a = \frac{d}{cr}$
- C:
- $a = \frac{cr}{d}$
- D:
- $a = \frac{cd}{r}$
- E: NOTA

4. Find the sum of the integer solutions to the following compound inequality:

$$k + \frac{1}{2} > -\frac{7}{6} \text{ and } \frac{5}{3}k + \frac{7}{5} \leq \frac{12}{5}$$

- A: 2 B: -1 C: -3 D:
- $-\frac{16}{15}$
- E: NOTA

5. Simplify the following exponential expression using only positive exponents in the final simplified version. Find the sum of the exponents on the variables after the expression is completely simplified.

$$\left(\frac{a^{-2}b^2c^{-1} \cdot ab^3}{a^3b^3c^2}\right)^2$$

- A: 18 B: 9 C: 16 D: 8 E: NOTA

6. Nine ml of a salt water solution was mixed with 6 ml of pure water to make a 24% salt water solution. Find the percent concentration of the first solution (the 9 ml of the salt water solution)?

- A: 30% B: 35% C: 40% D: 45% E: NOTA

7. A freight train left the Orlando station and traveled north. Four hours later, a passenger train left the same station traveling at 75 km/h in an attempt to catch up. After traveling for eight hours, the passenger train finally caught up. What was the average speed of the freight train?

- A: 40 km/h B: 45 km/h C: 47 km/h D: 50 km/h E: NOTA

8. Bill and Ted are both thinking of their favorite two-digit integers. For Bill's integer, the sum of the digits of the two-digit integer is 10 and reversing its digits increases the value of the integer by 18. For Ted's integer, the sum of the digits is 8 and reversing the digits decreases the value of the integer by 36. What is the product of Bill's favorite integer and Ted's favorite integer?

- A: 1664 B: 3968 C: 1196 D: 2584 E: NOTA

Please Use the Following Information to Answer Questions 9 to 10:

Consider the following two functions:

$$f(x) = 2x^2 - 1 \quad \text{and} \quad g(x) = |-x + 2|$$

9. Find $\frac{f(-3) - g(-2)}{g(5) + f(-1)}$.

- A: $\frac{13}{4}$ B: $\frac{21}{4}$ C: $-\frac{21}{2}$ D: $-\frac{13}{2}$ E: NOTA

10. Find $f(g(f(g(f(-2))))))$.

- A: 49 B: 4417 C: 2209 D: 47 E: NOTA

11. Find the value of $\frac{B}{C}$ such that the line with the equation $2y - Bx = C$ is perpendicular to the line with the equation $x = 2$.

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

12. After leaving school, suppose you drive 2 miles north, 3 miles east, 4 miles south, 1 mile west, and finally, 1 mile north to get home. If you were able to walk directly from the school to your home in a straight line, what is the distance between your home and the school?

- A: 2 miles B: $\sqrt{7}$ miles C: $\sqrt{5}$ miles D: $2\sqrt{2}$ miles E: NOTA

13. Solve the equation for the indicated variable. Solve $\frac{a+b}{c-d} = \frac{d-a}{b+c}$ for a.

A: $a = \frac{cd - bc - b^2 - d^2}{b - d + 2c}$

B: $a = \frac{-b^2 - d^2}{b + 2c}$

C: $a = \frac{c-d}{b+c}$

D: $a = \frac{b^2 - d^2 + c}{2b - d + 2c}$

- E: NOTA

14. What is the sum of the coefficients of the x^3 term and the x^2 term in the expansion of the expression $(2x - 5)^4$?

- A: 760 B: 440 C: -400 D: 600 E: NOTA

15. Simplify the following algebraic expression until you have an expression of the form x^{ma+b} :

$$\frac{x(x^{2a-3})^{-1}}{(x^{-a+2})(x^{5a})}$$

What is the exponent $(ma + b)$ in the simplified expression?

- A: $6a + 6$ B: $-3a + 1$ C: $4a - 3$ D: $-6a + 2$ E: NOTA

16. Solve the equation $||| |x - 3| - 1| - 1| - 1| = 0$. What is the sum of all the solutions to this absolute value equation?

- A: 4 B: 6 C: 12 D: 16 E: NOTA

17. Which of the following is not a factor of either of the following two polynomials?

$$9x^2 + 38x + 89 \quad \text{and} \quad x^2 + 68x - 32$$

- A: $(9x + 2)$ B: $(9x - 4)$ C: $(x + 4)$ D: $(x - 8)$ E: NOTA

18. The following 4-term polynomial $81x^2 - 108xy + 36y^2 - 25$ can be factored into two trinomials of the form $(Ax + By + C)(Ax + By - C)$. What is the sum of $A + B + C$?

- A: 8 B: 20 C: -2 D: 14 E: NOTA

19. Solve the equation $-4x(2x) - 9(-x + 7) = -x(12x - 5)$. The solutions are $x = a$ and $x = b$, where $a > b$. What is the value of $4a + 2b$?

- A: 23 B: 11 C: 5 D: 10 E: NOTA

20. Jim's school is selling tickets to a choral performance. On the first day of ticket sales the school sold 8 adult tickets and 11 student tickets for a total of \$111. The school took in \$151 on the second day by selling 13 adult tickets and 12 student tickets. If Jim wants to bring his family consisting of 2 adults (including Jim) and 3 students to the performance, how much would that cost?

- A: \$29 B: \$31 C: \$26 D: \$24 E: NOTA

21. Suppose we define two operations on real numbers as follows:

$$A\&B = A^2 + B^2 \quad \text{and} \quad X\#Y = 4X - 3Y$$

What is the value of $[4\#(1\&(3\#6))]$?

- A: 72 B: 105 C: -84 D: -95 E: NOTA

22. How many of the following statements are always true?

- i) The sum of 2 irrational numbers is always irrational.
- ii) The product of 2 irrational numbers is always irrational.
- iii) Any real number that is expressed using a decimal point is not a rational number.

A: 0 B: 1 C: 2 D: 3 E: NOTA

23. Find the slope of the line containing the points $(\frac{27}{4}, \frac{3^5}{9})$ and $(3!, 0!)$.

A: 1 B: $\frac{27}{26}$ C: $\frac{26}{29}$ D: $\frac{27}{29}$ E: NOTA

24. Find the value of k such that the line represented by the equation $2(ky - 3) = \frac{1}{2}(kx - 6y + 4)$ has a slope of $\frac{3}{2}$.

A: $-\frac{5}{9}$ B: $-\frac{9}{5}$ C: $-\frac{13}{5}$ D: $-\frac{5}{13}$ E: NOTA

25. Using the scoring system of 5 points for a correct answer, 1 point for a blank answer, and 0 points for an incorrect answer; what is the sum of the top 5 unattainable point totals you could earn for a 20-question test that is scored in this manner?

A: 475 B: 471 C: 485 D: 481 E: NOTA

26. What is the product of the slope and the y coordinate of the y-intercept of the line passing through the points $(2\pi, 3)$ and $(-4\pi, 6)$?

A: $\frac{4}{\pi}$ B: 4π C: $-\frac{2}{\pi}$ D: -2π E: NOTA

27. Find the sum of 3 consecutive even integers such that the sum of the smaller two integers is 150% of the largest integer.

A: 24 B: 30 C: 36 D: 42 E: NOTA

28. What is the sum of the first 50 positive multiples of 7?

A: 8,925 B: 8,750 C: 17,500 D: 17,850 E: NOTA

29. If $a^2 + b^2 = 500$ and $a - b = 20$. What is the value of the product ab ?

A: 200 B: 150 C: 100 D: 50 E: NOTA

30. For the last question, you deserve an easy one! What is the product of $(x \cdot x)$ and $(x + x)$?

A: $2x^3$ B: $2x^2$ C: x^4 D: x^3 E: NOTA