

ALGEBRA II INDIVIDUAL TEST – WANDO MATH TOURNAMENT 2010

Note – NOTA (choice E) means none of the answers are correct

- If $f(x) = x^3 + 1$ then $f\left(\frac{a}{b}\right)$, $b \neq 0$ equals

A. $\frac{a^3 + b^3}{b^3}$ B. $\frac{a^3 + 1}{b^3}$ C. $\frac{a^3 + 1}{b^3}$ D. $\frac{a^3 + 1}{b}$ E. NOTA
- Simplify $-1 - i^2$

A. -1 B. 0 C. 1 D. 2 E. NOTA
- If $A = 4^{26}$, $B = 16^{12}$, and $C = 8^{20}$ put A, B and C in order.

A. $B > C > A$ B. $C > A > B$ C. $A > C > B$ D. $C > B > A$ E. NOTA
- What is the vertex of the parabola $x + 12y = 2y^2 + 19$?

A. (1,3) B. (3, 1) C. (1, -3) D. (-3, 1) E. NOTA
- When $x^5 + 1$ is divided by $(x + 4)$ what is the remainder?

A. 1025 B. 1025 C. -1023 D. -1025 E. NOTA
- The sum of Jim and Dean's ages is 54. When Jim was one third of his current age, he was 14 years younger than Dean is now. What is the difference between their ages?

A. 8 B. 6 C. 2 D. 4 E. NOTA
- Find the value of $\left(1 + \frac{2}{4}\right)\left(1 + \frac{2}{5}\right)\left(1 + \frac{2}{6}\right)\left(1 + \frac{2}{7}\right) \dots \left(1 + \frac{2}{22}\right)\left(1 + \frac{2}{23}\right)$.

A. 600 B. 30 C. 4.44 D. 3.60 E. NOTA
- The base-10 number 140 is written in base-8 as what?

A. 142_8 B. 241_8 C. 214_8 D. 412_8 E. NOTA

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9. Solve for k if $k - \frac{2}{k - \frac{2}{k - \frac{2}{k - \frac{2}{k - \dots}}}} = 1$

- A. 1 B. 2 C. 4 D. 8 E. NOTA

10. Rationalize the numerator: $\frac{\sqrt{5} + \sqrt{3}}{6}$

- A. $\frac{1}{3\sqrt{5} - 6\sqrt{2}}$ B. $\frac{-1}{3\sqrt{3}}$ C. $\frac{1}{3\sqrt{5} - \sqrt{3}}$ D. $\frac{1}{3\sqrt{3}}$ E. NOTA

11. What is the unit's digit of 23^{2010} ?

- A. 3 B. 1 C. 9 D. 7 E. NOTA

12. Solution A is 12% acid and solution B is 60% acid. How much of solution A should be mixed with solution B to get 24 liters of a solution that is 50% acid?

- A. 5 liters B. 6 liters C. 18 liters D. 19 liters E. NOTA

13. Simplify $\frac{x^{-1} + y^{-1}}{x^{-1}}$

- A. $\frac{1}{y}$ B. $\frac{x}{y}$ C. $\frac{x}{x+y}$ D. $\frac{x}{y} + 1$ E. NOTA

14. How many numbers are in the following sequence: $\frac{7}{2}, 5, \frac{13}{2}, 8, \dots, \frac{79}{2}$?

- A. 24 B. 25 C. 26 D. 27 E. NOTA

15. If $f(x) = 3x + 2$ and $f(g(x)) = g(f(x)) = x$, what is the slope of $g(x)$?

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

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16. Find the y-intercept of $\frac{2}{3}x^{5/2} + \frac{1}{3}x^{1/2} = y - \frac{1}{3}x^4 + 10$

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

17. When the repeating decimal $0.\overline{45}$ is written as a reduced fraction $\frac{a}{b}$, find $a - b$

- A. -54 B. -6 C. 18 D. 54 E. NOTA

18. If the operation \odot is defined by $x \odot y = x^2 - y$. What is the sum of the values of k if $2 \odot k = k \odot 2$?

- A. -1 B. 0 C. 1 D. 6 E. NOTA

19. Every year for her birthday, starting the year she turned one, Brianna's uncle has sent her a card with money in it. The amount of money is equal to her new age in years. If, to date, Brianna has received a total of \$136 for her birthdays, how many years old is she?

- A. 15 B. 16 C. 17 D. 18 E. NOTA

20. What is the area of a circle defined by the equation $4x^2 + 4y^2 - 16x + 4y - 31 = 0$?

- A. $\frac{141\pi}{16}$ B. 12π C. $\frac{\pi\sqrt{141}}{4}$ D. 144π E. NOTA

21. Let $x + y = 1$. Write $\frac{\frac{1}{-x} + 1}{\frac{1}{-x} - x}$ in terms of y , where all expressions are defined

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

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22. Let $g(x) = \frac{x^3 - x^2 - x + 1}{x^2 - 1}$. Which of the following statements are **true**?

- I. The vertical asymptotes are $x = -1$ and $x = 1$
- II. The horizontal asymptote is $y = 0$
- III. The domain is the set of all real numbers except $x = 1$ and $x = -1$
- IV. The graph is identical to the graph of $y = x - 1$
- V. The removable discontinuities are at $(1, 0)$ and $(-1, -2)$

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

23. Simplify: $\left(\frac{2^{1+\sqrt{2}}}{2^{1-\sqrt{2}}}\right)^{\sqrt{2}}$

- A. $2^{\sqrt{2}}$ B. 4 C. 8 D. 16 E. NOTA

24. If $f(x) = b^x$, then $f(c+d) =$

- A. $f(c) + f(d)$ B. $f(c) - f(d)$ C. $f(cd)$ D. $f(c) \cdot f(d)$ E. NOTA

25. Find the sum of A and B: $\frac{B}{x-2} - \frac{A}{x+1} = \frac{2x+8}{x^2-x-2}$

- A. 6 B. 8 C. 2 D. 1 E. NOTA

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Solutions

1. A
2. B
3. B
4. A
5. C
6. B
7. B
8. C
9. E (3)
10. C
11. C
12. A
13. D
14. B
15. C
16. C
17. B
18. A
19. B
20. B
21. A
22. D
23. D
24. D
25. A