

Pre-Algebra Exam
Vestavia Hills High School Math Tournament
2013

1. Simplify $\sqrt{162}$.

- A. $3\sqrt{72}$ B. $6\sqrt{2}$ C. $9\sqrt{2}$ D. $3\sqrt{6}$ E. NOTA

2. Simplify $\frac{x^{-4}y^5z^{-12}}{y^{-3}x^4z^{-9}}$.

- A. $\frac{y^8}{x^8z^3}$ B. $\frac{y^2}{x^8z^9}$ C. $\frac{y^2}{z^{21}}$ D. $\frac{y^5}{x^8z^3}$ E. NOTA

3. Simplify $16^{\frac{1}{2}}+27^{\frac{1}{3}}+625^{\frac{1}{4}}$.

- A. 12 B. 16 C. 17 D. 13 E. NOTA

4. Triangles ABC and DEF are similar triangles. Find EF if $AB=8, BC=9, AC=10, DF=9$.

- A. $\frac{81}{10}$ B. 10 C. 8 D. $\frac{36}{5}$ E. NOTA

5. Find the area of a regular hexagon with side length 6.

- A. 36 B. 54 C. $36\sqrt{3}$ D. $54\sqrt{3}$ E. NOTA

6. Find (x,y) such that $\begin{cases} 4x+5y=36 \\ 12x+15y=84 \end{cases}$.

- A. (4, 4) B. (2, 4) C. (12, -4) D. no such (x,y) E. NOTA

7. Solve for x : $x=\sqrt{\left\{53+\left[632-\left(5\cdot10^2\right)+\left(-8\right)\left(\frac{1388}{347}\right)-\left(5+\sqrt[3]{125}\right)^2\right]\right\}-\frac{141}{3}}-x$.

- A. $\frac{537}{7}$ B. $-\frac{143}{2}$ C. 2 D. 1 E. NOTA

8. Find the probability of rolling a sum of 7 or greater with two fair, six-sided dice.

- A. $\frac{1}{6}$ B. $\frac{7}{12}$ C. $\frac{5}{6}$ D. $\frac{5}{12}$ E. NOTA

9. Karan goes to dinner at Charles’s Chinese Palace. On the menu are 4 drinks, 3 appetizers, 6 entrees, and 2 desserts. How many different, complete meals could be created from the menu if Karan orders only 1 drink, 1 appetizer, 1 entrée, and 1 dessert?

- A. 15 B. 144 C. 180 D. 108 E. NOTA

10. Mrs. Kaiser has decided to get 63 cats every two weeks. How many days will it take her to have 189 cats if she currently has none?

- A. 3 B. 42 C. 49 D. 21 E. NOTA

11. Which of the following could represent the side lengths of an obtuse triangle?

- A. 4, 3, 3 B. 7, 7, 4 C. 5, 4, 3 D. 4, 4, 3 E. NOTA

12. Find the sum of the solutions to the equation $x^2-7x-8=0$.

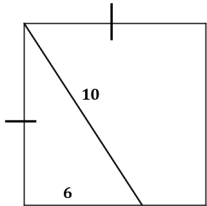
- A. 7 B. -7 C. 9 D. -8 E. NOTA

13. What is the surface area of a sphere with radius 5?

- A. 20π B. 100π C. $\frac{500\pi}{3}$ D. 25π E. NOTA

14. Find the slope of $5y=4x+6$.

- A. $\frac{5}{4}$ B. $\frac{5}{6}$ C. $\frac{6}{5}$ D. $\frac{4}{5}$ E. NOTA

15. While driving home from swim practice, the Whitehursts run over a nail, causing a tire to start leaking. They estimate that the tire is leaking 1 psi every 20 seconds. Assuming that the tire leaks at a constant rate and the initial tire pressure was 36 psi, how long will it take the tire to completely deflate?
- A. 1.8 minutes B. 3.6 minutes C. 12 minutes D. 18 minutes E. NOTA
16. Find $|a^2 - b|$ if a is the solution to $x^2 - 26x + 169$ and b is the 13th term in the Fibonacci sequence (beginning with 1, 1, ...).
- A. 25 B. 64 C. -25 D. 49 E. NOTA
17. Charles and Ankit are playing a game. Charles rolls a fair, six-sided die. If the number is odd, Ankit has to give Shirley a hug. If the number is even, Ankit has to hug a cactus. If the number is a multiple of 3, Ankit has to hug Lynn. What is the probability that Ankit has to hug Shirley and Lynn?
- A. $\frac{1}{6}$ B. $\frac{1}{12}$ C. $\frac{1}{2}$ D. $\frac{1}{3}$ E. NOTA
18. Find the height of an equilateral triangle with a side length of 4.
- A. $\sqrt{3}$ B. 2 C. $2\sqrt{3}$ D. 1 E. NOTA
19. Find the area of the rectangle.
- A. 30
B. 60
C. 64
D. 150
E. NOTA
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20. Find the constant term in the product $(4 - x)(x + 7)(3 + x)$.
- A. 19 B. 84 C. -1 D. 4 E. NOTA
21. Find the sum of the next three terms in the sequence 1, 2, 5, 10, 17,
- A. 38 B. 103 C. 113 D. 63 E. NOTA
22. Find the slope of the line perpendicular to $7x - 2y = 3$.
- A. $-\frac{7}{2}$ B. $\frac{7}{2}$ C. $-\frac{2}{7}$ D. $\frac{2}{7}$ E. NOTA
23. How many terminal zeros are there in the decimal form of $251!$?
- A. 60 B. 73 C. 61 D. 62 E. NOTA
24. Find the number of ways to choose a president, a vice president, a secretary, and a committee of three representatives from 10 people, assuming that each person can only hold one position.
- A. 210 B. 25,200 C. 5040 D. 2520 E. NOTA
25. What is the smaller angle, in degrees, between the hour and minute hands of a clock at 12:30?
- A. 165 B. 180 C. 175 D. 195 E. NOTA

Write your answers to the tiebreakers on the back of your bubble form. Denote each answer as T1, T2, and T3.

T1. What is the value of $9^{-\frac{3}{2}}$?

T2. What is the square root of 7569?

T3. Find $A+B$ if $7358_{16}=A_2=B_4$.

You may keep your copy of the exam.