Pre-Algebra Exam
Vestavia Hills High School Math Tournament
2014

1. If $A=6!$, $B=$ the probability of getting one head and then one tail on two flips of a fair coin, and $C=2\☺5$, where $x\☺y=2x-y$, find $\frac{AB}{C}$.

A. 720 B. −360 C. 180 D. −180 E. NOTA

2. Find the mean of the mean and the mode of 8, 5, 8, 10, 7, 4, 16, 6, 8, 5, 4, 3.

A. 6 B. 5.5 C. 7.5 D. 8 E. NOTA

3. There are 50 students on math team. Twenty know geometry, 22 know trig, 17 know precalculus, and seven don't know anything. If only Jin, Lin Lin, and Charles know everything, four know only geometry and trig, and five know only trig and precal, how many know geometry and precal?

A. 4 B. 1 C. 5 D. 7 E. NOTA

4. Simplify: $\frac{2\sqrt{2}\left(2\sqrt{2}+2\sqrt{2}\right)}{16}$.

A. $\frac{\sqrt{2}}{2}$ B. $\frac{1}{2}$ C. 1 D. 4 E. NOTA

5. The sum of the first one million prime numbers is N. Without knowing the value of N, one can determine that the ones digit of N cannot be:

A. 1 B. 9 C. 3 D. 2 E. 7

6. If $\delta(n)=$ the sum of the first n terms of the Fibonacci sequence (which begins with 1, 1...) and $\☺(n)=10^n-1$, find $\frac{\delta(16)-\delta(15)+12}{\☺(3)}+2012$.

A. 2013 B. 2014 C. 2015 D. 2016 E. NOTA

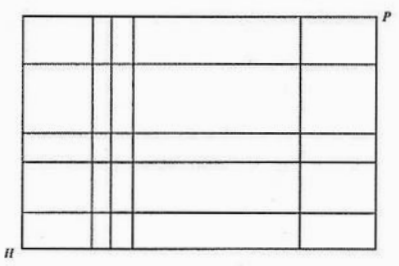
7. Find the base 9 representation of the sum of 1260_8 and 40_9.

A. 1300 B. 884 C. 724 D. 84 E. NOTA

8. Find the measure of the smaller angle (in degrees) formed between the hour hand and minute hand of a clock at 3:27.

A. 117 B. 127 C. 63.5 D. 68.5 E. NOTA

9. In how many ways can Shirley (H) get to Spencer (P) if she can only move up and to the right?



A. 256 B. 242 C. 504
D. 252 E. NOTA

10. In Justin's pond, there are three one-fish, five two-fish, six red fish, and six blue fish. If Justin is fishing in his pond and a fish randomly bites, what is the probability that Justin catches a one-fish? Assume that Justin is guaranteed a catch.

A. 0.15 B. 0.25 C. 0.125 D. 0.2 E. NOTA

11. Find the area of the triangle with vertices (0, 5), (1, 7), and (5, 2).

A. 7.5 B. 7.25 C. 6.5 D. 7 E. NOTA

12. If Fred is taller than George, Hermione is shorter than Harry, Ron is taller than Fred, and Hermione is taller than George, who is the shortest person in this group?

A. Ron B. George C. Hermione D. Harry E. NOTA

13. Mrs. Bartowski bought five dresses that were on sale for 60% off. She had a coupon that took off an additional 20% after the sale. If the sales tax for the location was 8%, and the original price for each dress was \$60, what was the total final cost?

A. \$103.68 B. \$160 C. \$90 D. \$24 E. NOTA

14. If 8 fops equals 28 lops, 15 bops equals 27 cops, seven lops equals nine cops, and 16 fops equals 104 mops, how many cops is equal to 25 bops?

A. 45 B. 7 C. 35 D. 9 E. NOTA

15. A regular, convex polygon with each exterior angle measuring 60 degrees has side length 6. What is its area?

A. $54\sqrt{3}$ B. $27\sqrt{3}$ C. $9\sqrt{3}$ D. $36\sqrt{3}$ E. NOTA

16. What is the mean of the first 100 natural numbers?

A. 100 B. 50 C. 50.5 D. 1 E. NOTA

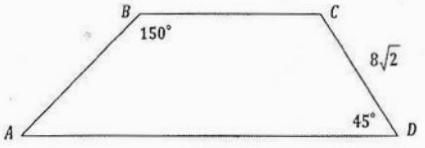
17. Which of the following numbers has the least value?

A. $11-2\sqrt{30}$ B. $5\sqrt{2}-7$ C. $13-2\sqrt{42}$ D. $17-12\sqrt{2}$ E. 1

18. In a group of 31 people, how many different handshakes will occur if each person shakes hands only once with everyone else?

A. 15×30 B. 15×31 C. 30×30 D. 30×31 E. NOTA

19. Find the area of the trapezoid, given that the length of $\overline{BC}$ is twice the height.



A. $144\sqrt{3}$ B. $160+32\sqrt{3}$ C. 192

D. $120+24\sqrt{3}$ E. NOTA

20. How many distinct arrangements are there of the letters in VESTAPALOOZA?

A. 79,833,600 B. 332,640 C. 39,916,800 D. 3,326,400 E. NOTA

21. Find the measure (in degrees) of one interior angle of a regular icosagon.

A. 1620 B. 360 C. 3240 D. 162 E. NOTA

22. Find the value of x if $3x+4y=4$ and $2x+6y=1$.

A. -0.5 B. 2 C. 4 D. 8 E. NOTA

23. Evaluate $\left(x^x\right)^{\left(x^x\right)}$ at $x=2$.

A. 16 B. 256 C. 1024 D. 64 E. NOTA

24. If P is 40% of 360 and Q is 360% of 720, what is the ratio $P:Q$?

A. $\frac{48}{865}$ B. $\frac{1}{18}$ C. $\frac{5}{9}$ D. $\frac{144}{2593}$ E. NOTA

25. How many terms are in the expansion of $\left(10x+23407\right)^{1001}$?

A. 1002 B. 2500 C. 3704 D. 1001 E. NOTA

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

T1. Evaluate $\frac{-4(-6)-(3)(2)^3}{-12-\sqrt{144}+5}$.

T2. .37sirekaerbeitsihtotrewsnaehT

T3. Find the exact value of $1+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{2+\ldots}}}}$.

You may keep your copy of the exam.