

**2009 Vestavia Hills High School  
Mathematics Tournament  
Pre-Algebra Written Examination**

1. What is the sum  $1122210_3 + 678_9$  when written in base 10?  
 A. 969                      B. 1566                      C. 1766                      D. 1122888                      E. NOTA
2. If the first four number of an arithmetic sequence are 13, 18, 23 and 28, then what is the sum of the first ten numbers in the sequence?  
 A. 290                      B. 350                      C. 355                      D. 365                      E. NOTA
3. If  $A$  is the number of days in a non-leap year and  $B = 7 + (21 - 4) \times 9$ , what is  $\frac{A+B}{A-B}$ ?  
 A. 4                      B.  $\frac{105}{41}$                       C.  $\frac{105}{52}$                       D.  $\frac{523}{204}$                       E. NOTA
4. One million seconds is closest to:  
 A. 1 day                      B. 12 days                      C. 1 month                      D. 12 months                      E. 1 year
5. Joann and Daniel are preparing apple pies. Joann can prepare a pie in 2 hours and Daniel can prepare a pie of the same size in 3 hours. How many hours would it take Joann and Daniel to prepare a pie if they work together?  
 A.  $\frac{5}{6}$                       B. 1                      C.  $\frac{6}{5}$                       D. 5                      E. NOTA
6. The sum of the digits of a two-digit number add up to 7. The product of the two numbers is 10. Which of the following could be the square root of this two-digit number?  
 A. 4                      B. 5                      C. 6                      D. 8                      E. NOTA
7. What is 12.5% of  $\frac{2}{11}$  of 352?  
 A. 4                      B. 8                      C. 400                      D. 800                      E. NOTA
8. Somebody stole Theo's backpack. He knows it was one of the five members of the J-Squad: Johnny, Jackson, Josephine, Jennifer, and Bryce. If the remainder after the product of the second and fifth prime numbers is divided by the second perfect number is equivalent to the number of letters in the thief's name, who stole the backpack?  
 A. Johnny                      B. Josephine                      C. Jennifer                      D. Jackson                      E. Bryce
9. Given the set  $\{7, 4, 9, 11, 3, 5, 9\}$ , find the product of the mean, median, and mode.  
 A. 432                      B. 528                      C.  $\frac{4752}{7}$                       D. 3024                      E. NOTA
10. How many 30's must Brett add together to get a sum equal to  $30^3$ ?  
 A. 30                      B. 60                      C. 90                      D. 900                      E. NOTA
11. If Valentina has a prized pyramidal vase with an open base, how much water would she need to pour into it if she wanted it completely filled? It has a rectangular base with a length of 2 feet and width of 6 inches, and it has a height of 3 feet. All answers are in cubic feet.  
 A. 1                      B. 3                      C. 12                      D. 36                      E. NOTA



12. Find  $A + B$  if  $A$  = the number of distinct arrangements of the letters in STHANAM and  $B$  = the number of distinct arrangement of the letters in CHAO.
- A. 1799      B. 1214      C. 2520      D. 2544      E. NOTA
13. Let  $\bullet Y$  be the number of days in year  $Y$ . What is the value of  $\bullet 2006 + \bullet 2007 + \bullet 2008 + \bullet 2009$ ?
- A. 1460      B. 1461      C. 1462      D. 1463      E. NOTA
14. If Norman and Lisa Fu go on a date at Mr. Chen's, and Norman makes Lisa pay for both of them, how much change will she receive from two \$20 bills if Lisa's meal costs \$8.90, Norman's costs \$15.81, and sales tax is 9%? (Round to the nearest penny.)
- A. \$2.22      B. \$13.07      C. \$26.93      D. \$37.78      E. NOTA
15. The graph of  $2x - 4y = 16$  has the same  $x$ -intercept as:
- A.  $4x - 2y = 16$       B.  $2x + 4y = 16$       C.  $4y - 2x = 16$       D.  $2y + 4x = 16$   
E. NOTA
16. What is the product of the least common multiple and the greatest common divisor of 21 and 6?
- A. 126      B. 132      C. 136      D. 140      E. NOTA
17. If four Tilers equal one Meghana and seven Meghanas equal three Sunnys, how many Tilers equal one Sunny?
- A. 3      B. 7      C. 9      D.  $\frac{28}{3}$       E. NOTA
18. In the alphametic  $FUN + ON + THE = RUN$ , each letter stands for a different digit so that  $FUN$ ,  $THE$ , and  $RUN$  are three-digit numbers and  $ON$  is a two-digit number. If  $N = 1$ ,  $O = 5$ ,  $U = 7$ ,  $F = 2$ , and  $T = 3$ , what is the value of  $R$ ?
- A. 6      B. 7      C. 8      D. 9      E. NOTA
19. If a book, starting on page 1, has 477 digits used for numbers, how many pages are in this book?
- A. 162      B. 195      C. 206      D. 225      E. NOTA
20. Jai and Senthil ordered a square pizza whose area was the same as the area of a square in which the sum of the squares of the four sides plus the sum of the squares of the two diagonals is 400. Find the area of the pizza.
- A. 30      B. 50      C. 150      D. 200      E. NOTA
21. Today, Jin rode 20% further than she rode on Sunday, in 20% less time than Sunday's ride took. Her speed today was what percent of her speed on Sunday?
- A. 60      B. 70      C. 150      D. 1775      E. NOTA
22. Find the slope of the line that contains the points  $(c, c + 3)$  and  $(d, d + 3)$ .
- A.  $d - c + 6$       B.  $\frac{d - c + 6}{d - c}$       C. 1      D.  $\frac{d - c}{d - c + 6}$       E. NOTA



23. Find  $0.\overline{465} + 0.\overline{750}$ .

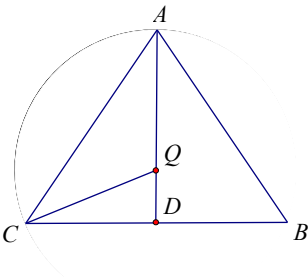
- A.  $\frac{111}{65}$       B.  $\frac{45}{37}$       C.  $\frac{243}{200}$       D.  $\frac{250}{111}$       E. NOTA

24. Which of the following numbers is smaller than its reciprocal?

- A.  $\frac{2008}{2009}$       B.  $\frac{2009}{2008}$       C.  $1\frac{1}{3}$       D.  $-\frac{2}{3}$       E. NOTA

25. Find the area of the shaded region if  $CQ = 5$ ,  $AD = 8$ , and  $CB = 8$ .  
 $Q$  is the center of the circle and  $D$  is the midpoint of  $\overline{BC}$ .

- A.  $24\pi - 18$       B.  $18\pi + 4$       C.  $16\pi - 18$   
D.  $25\pi - 24$       E. NOTA

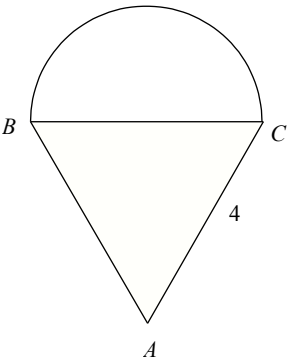


**PLEASE WRITE YOUR NAME, COMPLETE SCHOOL NAME, AND TIE-BREAKER ANSWERS ON THE BACK OF THE SCANTRON FORM. DENOTE EACH TIE-BREAKER AS T1, T2, AND T3.**

TB1. Simplify  $\sqrt{x} + \sqrt{4x} + \sqrt{9x}$ .

TB2. A cross-section of a snow cone is shown.  $\triangle ABC$  is equilateral. A semicircle is attached to  $\overline{BC}$ . Find the perimeter of the cross-section.

TB3. Multiply and simplify  $(\sqrt{x} + 3\sqrt{y})^2$ .



**YOU MAY KEEP THIS COPY OF THE EXAM.**