December 2, 1992 WOCOMAL VARSITY MEET

ROUND I: Arithmetic - percent, interest, discount, fractions and decimals

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. When Ben's bank paid $6\frac{3}{4}\%$ annual interest, how much interest did $440 earn for half a year?

2. Simplify

$$10 + \cfrac{9}{8 + \cfrac{7}{6 + \cfrac{5}{4 + \cfrac{3}{2+1}}}}$$

3. In a certain school the ratio of boys to girls is 3:2. If 10% of the boys and 30% of the girls sneak out for lunch, what % of the students do not sneak out for lunch?

ANSWERS

(1 pt) 1. $_____

(2 pts) 2. _____

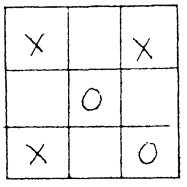
(3 pts) 3. _____ %

Millbury, St. John's, Worcester Academy

December 2, 1992 WOCOMAL VARSITY MEET

ROUND II: Set theory and logic

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. 

Either an X or an O is to be put in each empty square to fill the grid to the left. If each row, column, and diagonal containing three squares must contain at least one X and at least one O, what is the total number of additional X's that must be used to fill the grid?

2. In a sample of 180 people, 119 said that they had seen the movie "Star Wars" and 110 said that they had seen "Return of the Jedi" Thirteen people had not seen either movie. How many of the sample had seen both movies?

3 A post office had only 3¢ and 8¢ stamps. Find the sum, in cents, of the integer amounts of postage from 1¢ through $1.00 inclusive for which an item could not be stamped with exact postage using only 3¢ and 8¢ stamps

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. _____¢

Hudson, St. John's, Shepherd Hill

December 2, 19??

WOCOMAL VARSITY MEET

ROUND III: Algebra 1 - open

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1 If x is 3 less than $\frac{n}{2}$, express n in terms of x

2 A woman bought some plates at a yard sale. Two thirds of them were cracked, half of them were chipped, and one fourth were both cracked and chipped. All but two of the plates were either cracked or chipped or both. How many plates did she buy?

3 If $\frac{5x-11}{2x^2+x-6} = \frac{A}{x+2} - \frac{1}{2x-3}$, find A.

ANSWER:

(1 pt) 1. $n =$ _____

(2 pts) 2. _____ plates

(3 pts) 3. 4

Bromfield, Burncoat, Tantasqua

December 2, 1992 OCOMAL VARSITY MEET

ROUND IV: Sequences and series

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. A six term arithmetic sequence starts with 15 and ends with 50. Find the third term

2. Find c if $\sum_{n=1}^{\infty} c\left(\frac{3}{4}\right)^n = 24$

3 A set of nested squares is drawn inside a square of edge 1 unit. The corners of the next square are the midpoints of the sides of the preceding square. Find the sum of the areas of the first nine squares, starting with the 1 by 1 square.

ANSWERS

(1 pt) 1. _____

(2pts) 2. $c =$ _____

(3 pts) 3. _____

Doherty, Shepherd Hill, Tahanto

December 2, 1992 WOCOMAL VARSITY MEET

ROUND V: Matrix and determinant operations

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1 Evaluate

$$\begin{bmatrix} 2 & -3 & 4 \end{bmatrix} \cdot \begin{bmatrix} -1 & 0 \\ 3 & 6 \\ 1 & -2 \end{bmatrix}$$

2 In the matrix equation $\begin{bmatrix} 3 & 5 \\ 2 & 0 \\ -1 & 4 \end{bmatrix} \cdot \begin{bmatrix} a & b \\ 1 & 1 \end{bmatrix} = \underline{X}$,

the element in the 2nd row 1st column of $\underline{X}$ is 10 and the element in the 2nd row 2nd column of $\underline{X}$ is -8 Determine $\underline{X}$ completely

3 Find a value of x such that the determinant

$$\begin{vmatrix} x+3 & 1 & -2 \\ 3 & -2 & 1 \\ -x & -3 & -1 \end{vmatrix} = 0$$

ANSWERS

(1 pt) 1. $\begin{bmatrix} & \\ & \end{bmatrix}$

(2 pts) 2. $\begin{bmatrix} & \\ & \end{bmatrix}$

(3 pts) 3. $x =$ _____

Bromfield, Hudson, Quaboag

December 2, 1992 WOODMAL VARSITY MEET

TEAM ROUND: Topics of previous rounds and open

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM
AND ON THE SEPARATE TEAM ANSWER SHEET 2 points each

1 A 200% price increase is the same as a 50% price increase followed by a _____% price increase

2 The school band has 100 females and 80 males. The orchestra has 80 females and 100 males. Of the members in both groups 60 are females. Altogether 230 students are in either group or in both. How many males are in the band and not in the orchestra?

3 Solve and round your answer to the nearest hundredth

$$5.2x - 8 = 0.47x - 26.3$$

4. The sequence $a_1, a_2, \ldots$ is defined by a_n is the units digit of the sum of the first n positive integers ($a_1 = 1$). Find the sum of the first 1000 terms of this sequence.

5 Solve for matrix X. $\begin{bmatrix} 7 & 3 \\ 4 & 2 \end{bmatrix} \cdot X + \begin{bmatrix} 3 & 4 \\ -5 & -1 \end{bmatrix} = \begin{bmatrix} 8 & 7 \\ -3 & 3 \end{bmatrix}$

6 An audience of 546 people is seated in rows, with the same number of people in each row. It would take 6 fewer rows if 3 more people were seated in each row. In how many rows are they seated?

7 How many terms would there be in the expansion of $\left[(a+3b)^2(a-3b)^2\right]^2$?

8 A bureau drawer contains 10 brown socks and 8 gray socks, well mixed. A man goes to this drawer in the dark and takes out 2 socks. What is the probability that they will be the same color? Express your answer as a reduced fraction.

9 A positive number is divided by 5 instead of being multiplied by 5. Find the percent error, based on the correct answer.

December 2, 1992

ROUND I
Arith

1. $14.35
2. 11
3. 82%

ROUND II
Sets, logic

1. 2
2. 62
3. 42¢

ROUND III
Alg I

1. $2(x+3)$ OR $2x+6$
2. 24
3. 3

ROUND IV
Seq, Series

1. 29
2. 8
3. $\frac{511}{256}$ OR $1\frac{255}{256}$

ROUND V
Matrix, det

1. $\begin{bmatrix} -7 & -26 \end{bmatrix}$
2. $\begin{bmatrix} 20 & -7 \\ 10 & -8 \\ -1 & 8 \end{bmatrix}$
3. $-\frac{9}{2}$ OR $-4\frac{1}{2}$ OR -4.5

TEAM ROUND

1. 100%
2. 10
3. -3.87
4. 3,500
5. $\begin{bmatrix} 2 & -3 \\ -3 & 8 \end{bmatrix}$
6. 36
7. 5
8. $\frac{73}{153}$
9. 96%