November 5, 1980 WOCOMAL FRESHMAN MEET

ROUND I: ARITHMETIC - ORDER OF OPERATIONS & EVALUATION

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. Evaluate $a + b \div a - ac$ for $a = 2$, $b = -3$, and $c = 5$.

2. What number must be added to $\dfrac{2 - 3 \cdot 6 - (3 - 10 \div 5)}{6 - 3 \div 6 \cdot 2}$ to obtain 8 as an answer?

3. If $c * d = (cd)^3 - cd^2$ and $c \# d = cd^3 - (cd)^2$, find $(\frac{1}{2} * 2) - (-\frac{1}{2} \# -2)$.

ANSWERS: (1 point) 1. _____

(2 points) 2. _____

(3 points) 3. _____

Bromfield, Marlboro, Quaboag

November 5, 1980 WOCOMAL FRESHMAN MEET

ROUND II: LINEAR EQUATIONS

1. Solve for x: $8 - 3\left[5 - (3 - x)\right] = -\left[(x - 2)4 - 4\right]3 + 2.$

2. Find the value of k which eliminates the y-term:
$(ax + by + c) + k(dx + ey + f) = 0.$

3. Solve for x: $2\left[3x - 5(-3 + x)\right] + x = -3\left[2(x + 5) - x\right].$

ANSWERS: (1 point) 1. _____

(2 points) 2. _____

(3 points) 3. _____

Shrewsbury, Tantasqua, Worcester Academy

November 5, 1980 WOCOMAL FRESHMAN MEET

ROUND III: OPEN

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. If a person wanted to engrave a word onto a piece of metal it costs 5 cents for each of the first three letters and each letter following the first three costs an additional cent more than the preceding letter. What would it cost to engrave the word SWORDFISH ?

2. The pages of a book are numbered in the usual manner beginning with page one. If 672 digits are used in numbering them, how many pages does the book contain?

3. A company has a project that takes 600 hours to complete. The company has 12 people and a week (5 working days) at its disposal. This means the workers have to work longer than the normal 40 hour week and have to be paid time and a half for overtime. At $5.80 per hour the overtime pay is considerable. If additional help is hired so that no overtime shall be paid and they each work a 40 hour week,
   (a) how many extra people should be hired?
   (b) how much money would be saved?

ANSWERS: (1 point) 1. _____ cents

(2 points) 2. _____ pages

(1 point) 3.(a) _____ people

(2 points) (b) $ _____

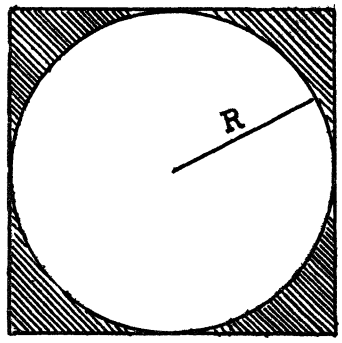
Auburn, Hudson, Hudson Catholic

November 5, 1980 WOCOMAL FRESHMAN MEET

ROUND IV: GEOMETRY - PERIMETER & AREA; VOLUME OF RECTANGULAR SOLIDS

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. If the radius $R = 2x$, find the area of the shaded portion. Leave your answer in terms of π.



2. The number of yards in the length of an emergency landing field is the successor of the number of feet in the width of the field. If the perimeter of the field is 12006 feet, what is its length measured in feet? (Note: The successor of 17 is 18.)

3. A display window in a department store is $1\frac{1}{2}$ times as long as it is wide. If the window is $\frac{1}{4}$ inch thick and has a perimeter of 40 feet, find the volume of the pane of glass.

ANSWERS: (2 points) 1. _____

(2 points) 2. _____

(2 points) 3. _____

Shepherd Hill, Tantasqua

November 5, 1980 WOCOMAL FRESHMAN MEET

TEAM ROUND: NUMBER THEORY, PRIMES, DIVISIBILITY, LCM, GCF, SEQUENCES

ALL ANSWERS MUST BE EXPRESSED IN SIMPLEST FORM. EACH ANSWER TWO POINTS.

1. Find the product of the least common multiple and the greatest common factor of the following: 12, 28, 32. 1. _____

2. Determine the sum of the next three terms in the sequence 1, 2, 6, 15, 31, __, __, __. 2. _____

3. Find the smallest number divisible by all the prime numbers less than 12. 3. _____

4. One bell rings every 10 minutes, another bell rings every 12 minutes. If the bells have just rung together, find the time in minutes until they next ring together. 4. _____

5. If all the counting numbers from 1 to 10 divide X with zero remainder, what is the smallest possible positive value of X? 5. _____

6. If $1 + 2 + 3 + \ldots + n = \frac{n}{2}(n + 1)$, find $2 + 4 + 6 + \ldots + 50$. 6. _____

7. A game is played in which you begin by naming a counting number. Then if the number is even, you take half of it. But if the number is odd, you triple it and add one. This process continues until you obtain a 1.
If you start this sequence at 7, how many <u>other</u> numbers do you find <u>before</u> you get a 1? 7. _____

8. If n! is defined as the product resulting from $n(n - 1)(n - 2) \ldots 1$, (Example $4! = 4 \cdot 3 \cdot 2 \cdot 1 = 24$) what is the highest value of x in 3^x which will make 3^x divisible into 27! ? 8. _____

Auburn, Hudson, Hudson Catholic, Bromfield, Southbridge, Worcester Academy

November 5, 1980 WOCOMAL FRESHMAN MEET ANSWERS

ROUND I

(1 point) 1. $-9\frac{1}{2}$

(2 points) 2. 11.4 or $11\frac{2}{5}$ or $\frac{57}{5}$

(3 points) 3. -4

ROUND II

(1 point) 1. $x = 4$ or $\{4\}$

(2 points) 2. $k = -\frac{b}{e}$

(3 points) 3. $\emptyset$ or $\{\}$ or no solution

ROUND III

(1 point) 1. 66 cents

(2 points) 2. 260 pages

(1 point) 3.(a) 3 people

(2 points) (b) $348

ROUND IV

(2 points) 1. $16x^2 - 4\pi x^2$ or $4x^2(4 - \pi)$

(2 points) 2. 4503 feet or 4503

(2 points) 3. 2 cu. ft. or 3456 cu. in.

TEAM ROUND
(2 points each)

1. 2688

2. 289

3. 2310

4. 60 or
60 minutes

5. 2520

6. 650

7. 15

8. 13