ROUND I: Algebraic word problems

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. Amy has an equal number of pennies, nickels, dimes, and quarters worth $4.51. How many coins does she have altogether?

2. Tom is x years old; w years ago he was y years old. Represent his age z years from now in terms of w, y, and z.

3. Justin said to Chris, "I'm thinking of two numbers. One number is three times the other and their sum is 8 more than twice the smaller number." What is the least possible number of which Justin was thinking?
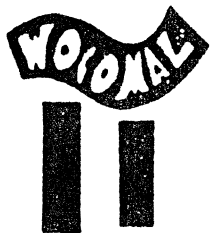
ANSWERS
(1 pt.) 1._____

(2 pts) 2._____

(3 pts) 3._____

Auburn, Hudson, Tahanto

ROUND II: Operations on polynomials

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. Write $(3y^n - 4t^{2n})(3y^n + 4t^{2n})$ as a binomial

2. Simplify $\left[(x + 4)^2 - (4 - x)^2\right]^2$

3. The sum of the two linear factors of $x^2 - 26x + 144$ is subtracted from the sum of the two linear factors of $x^2 - 25x + 144$. What is the value of the result?

ANSWERS
(1 pt.) 1._____

(2 pts) 2._____

(3 pts) 3._____

Holy Name, Hudson, Westborough

ROUND III: Ratio, proportion and variation

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. Suppose that a dripping faucet wastes a cup of water if it drips for three minutes and that the amount of water wasted varies directly as the length of time the faucet drips.
   Find the constant of variation, with units.

2. If a car traveling at 60 mph is moving at 88 feet per second, a car traveling at 75 mph is moving at how many yards per minute?

3. In a certain population $\frac{2}{3}$ of all the men are married, but only $\frac{3}{5}$ of all the women are married.
   What fraction of that population of men and women is single? Assume that all the couples are part of the population.

ANSWERS
(1 pt.) 1._____

(2 pts) 2._____yards/minute

(3 pts) 3._____

Algonquin, Bromfield, Doherty

ROUND IV: Perimeter, area, volume

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. To one side of a square is attached an equilateral triangle, to a second side a regular pentagon, and to a third side a regular hexagon. All the sides have the same length, k. In terms of k what is the perimeter of the resulting figure?

2. Tape 2 inches wide is used to cover a cube 10 inches on each edge. Find the total length of tape needed, in inches, if there is no overlap of the tape.

3. A room in the shape of a rectangular solid has a floor area of 252 square feet. One side wall has an area of 189 sq. ft. One end wall has area 108 sq. ft. There are no doors or windows on either wall. Find the volume of the room.

ANSWERS
(1 pt.) 1._____

(2 pts) 2._____ inches

(3 pts) 3._____ cubic feet

Doherty, Hopedale, St. John's

TEAM ROUND: Topics of previous rounds and open

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM
AND ON THE SEPARATE TEAM ANSWER SHEET   3 points each

1. A child's age increased by three years gives a perfect square. The age decreased by three years gives a square root of that perfect square. What is the child's age?

2. A rectangular lawn has an area represented by $x^2 - 3x - 70$. If the shorter side is 250 feet, find the area in square feet.

3. If x oranges cost the same as y peaches and peaches cost 39 cents each, how many dollars does each orange cost? Your answer may involve x and y.

4. How many non-congruent rectangles with integral side lengths have no more than 25 square units in their area? (A 2 by 3 rectangle is congruent to a 3 by 2 rectangle.)

5. Find the measure of the biggest acute angle shown here if

$$a = \frac{1}{2}b = \frac{1}{4}c$$

(Diagram not to scale)
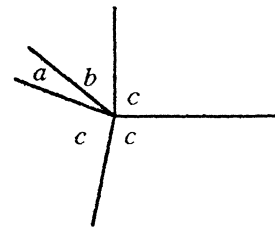
6. The average of A and B is X. The average of C, D, and E is Y. What is the average of A, B, C, D, and E in terms of X and Y?

7. Given: set A = { first 8 prime numbers }
        set B = { first 8 odd positive integers }
   What is the probability that a number randomly chosen from A∪B would also be in A∩B?

8. 150% of $1.\overline{4}$ is $\frac{5}{12}$ of what number?

Algonquin, Assabet Valley, Bromfield, Hopedale, Hudson, Shrewsbury, South, Tahanto

ROUND I   1. 1 pt 44

word
prob   2. 2 pts $W + y + z$

          3. 3 pts -12

ROUND II 1. 1 pt $9y^{2n} - 16t^{4n}$

polys   2. 2 pts $256x^2$

          3. 3 pts 1

ROUND III 1. 1 pt $\frac{1}{3}$ cup/min or 1cup/3min
                    need units

ratio
prop   2. 2 pts 2200
var
          3. 3 pts $\frac{7}{19}$

ROUND IV 1. 1 pt $12k$

perim
area   2. 2 pts 300
vol
          3. 3 pts 2268

TEAM ROUND 3 pts each

1. 1 OR 6 OR BOTH
    (no others)

2. 66,750 sq ft

3. $\frac{39y}{100x}$ OR $\frac{.39y}{x}$

4. 46

5. 72°

6. $\frac{2X + 3Y}{5}$ OR $.4X + .6Y$

7. $\frac{5}{11}$

8. 5.2 OR $5\frac{1}{5}$ OR $\frac{26}{5}$