ROUND I: Arithmetic - Order of operations and evaluation of
           algebraic expressions

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1.   Evaluate $x + x \cdot x^x$ if $x = 3$.

2.   Evaluate $(100 - 10 \cdot 3 + 5) + 2^4 \cdot (7+2)$.

3.   Let $a\$b = ab^2 - a^2 b$.

        Evaluate $\dfrac{((x\$y)\$z)}{x\$(y\$z)}$ if $x=2$, $y=3$, and $z=-2$.

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. _____

Bromfield, Doherty, Notre Dame

ROUND II: Algebra 1 — Open

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1 Evaluate $-x^2 + \dfrac{34-x}{x} - 14x$ if $x = -1$

2   Simplify $(x+y)(x-y)^2 + (y^2-x^2)(x-y)$

3   The numerator and denominator of a fraction are integers differing by 16. Find the fraction if its value is more than $\frac{5}{9}$ but less than $\frac{4}{7}$.

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. _____

Marlboro, St.John's, Shrewsbury

ROUND III: Factoring

FACTOR EACH EXPRESSION AS COMPLETELY AS POSSIBLE OVER THE INTEGERS
AND SIMPLIFY EACH FACTOR SO THAT THERE ARE NO PARENTHESES INSIDE
OTHER PARENTHESES IN THE FINAL ANSWER

1. $(2x-1)(x+3) + (x+3)^2$

2. $(x+1)^2 + (x+1) + (x+2)$

3. $x^3 - 2x^2y + y^3$

ANSWERS:

(1 pt) 1. _____

(2 pts) 2. _____
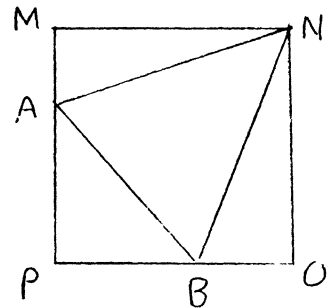
(3 pts) 3. _____

Auburn, Doherty, Marlboro

ROUND IV: Perimeter, area, and volume

ALL ANSWERS MUST BE EXPRESSED IN SIMPLEST EXACT FORM

1. The sides of a triangle have lengths that are consecutive odd integers. Find the longest side if the perimeter is 87.

2. If the largest possible sphere were fit inside a rectangular box with dimensions 3 ft by 4 ft by 5 ft, how much left over room would there be in the box?

3. If MNOP is a square with area 1 sq unit and $\triangle ANB$ is equilateral, find the area of $\triangle ANB$.

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____ ft^3
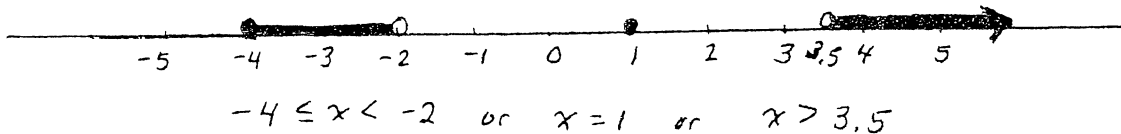
(3 pts) 3. _____

Quaboag, Southbridge, Westboro

ROUND V:　Inequalities and absolute value – answers on number lines

DRAW THE GRAPH FOR EACH PROBLEM ON THE NUMBER LINE PROVIDED.
SPECIFY ANY NONINTEGER ENDPOINTS.
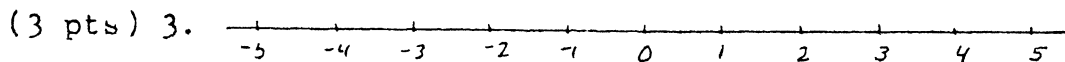
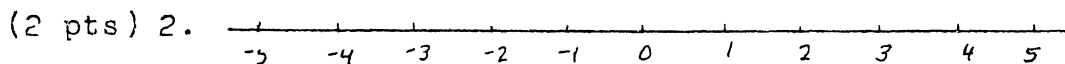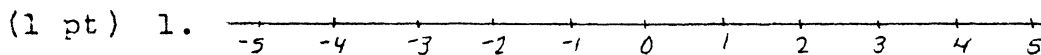USE NOTATION LIKE THIS FOR YOUR GRAPHS.

$$-4 \le x < -2 \quad \text{or} \quad x = 1 \quad \text{or} \quad x > 3.5$$

1.　　　$\dfrac{x}{8} - \dfrac{x-2}{3} \ge \dfrac{x+1}{6} - 1$

2.　　　$1 \le |2x+1| < 3$

3.　　　$x|x| > \dfrac{1}{x}$

ANSWERS

(1 pt)　1.　

(2 pts)　2.　

(3 pts)　3.　

Hudson, Millbury, Notre Dame

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 If $\boxed{x} = \dfrac{1}{x-1}$, evaluate $\left(\dfrac{1}{\boxed{x}}\right)^2 - 2$ if $x = -\dfrac{1}{2}$.

2. In a camp there was enough food to last the campers 60 days. 50 more campers were brought in immediately, but the food supply would now last only 48 days. How many campers were there originally?

3 Factor $(x-2001)^2 + 935(x-2001) + (x-1066)$.

4 An isosceles right triangle has a hypotenuse of 6. Find the circumference of the triangle's inscribed circle.

5. Graph $\left|\dfrac{1}{x}\right| \geq 1$ on a number line. You must specify relevant coordinates.

6. If p and q are positive integers and $p+q < 10$, find the number of different values that the product pq can have.

7 If $g(x)$ represents the reciprocal of x, find all values of x for which $g(x) = g(1) + g(2) + g(3) + g(6)$.

8. How many ways can you give exactly 60¢ change if the only coins you have are 2 quarters, 7 dimes, and 11 nickels?

9. A cube suspended in air has edges of length 5 cm. If a fly lands on a vertex and then walks along only the edges, what is the greatest distance the fly could walk before returning to that vertex and without retracing an edge?

ROUND I Arith

1. 84

2. $\frac{423}{8}$ or $52\frac{7}{8}$

3. $\frac{2}{35}$

ROUND II Alg 1

1. 27

2. 0

3. $\frac{21}{37}$

III Factoring

1. $(x+3)(3x+2)$

2. $(x+2)^2$

3. $(x-y)(x^2-xy-y^2)$

IV Perim, area, vol

1. 31

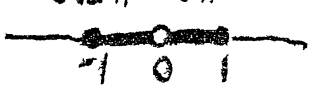2. $60 - \frac{9\pi}{2}$ ft³

3. $2\sqrt{3}-3$

V line graphs, $\leq$, | |

1.

2.

3.

TEAM ROUND

1. $\frac{1}{4}$

2. 200

3. $(x-2000)(x-1066)$

4. $6\pi(\sqrt{2}-1)$ OR $(6\sqrt{2}-6)\pi$ OR $6\sqrt{2}\pi - 6\pi$

5.

6. 16

7. $\frac{1}{2}$

8. 12

9. 40 cm.