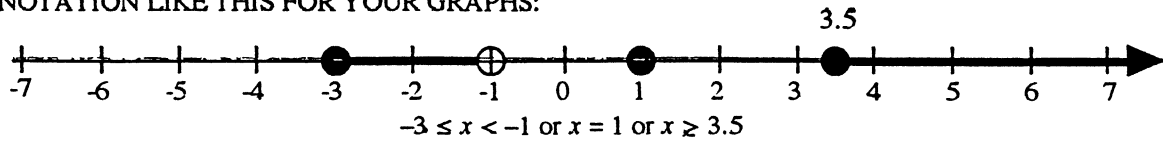ROUND I: Graphing on the number line - inequalities, absolute value

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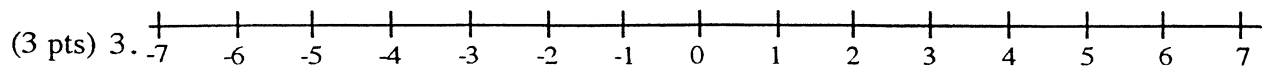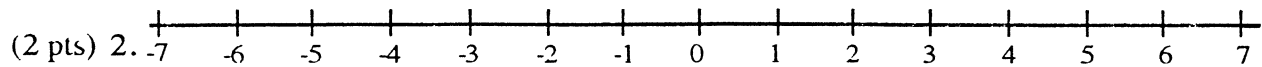USE NOTATION LIKE THIS FOR YOUR GRAPHS:

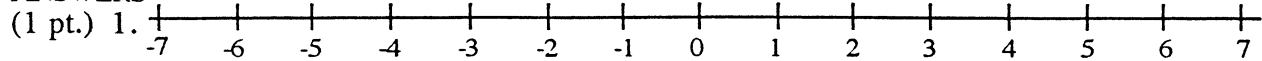$$-3 \le x < -1 \text{ or } x = 1 \text{ or } x \ge 3.5$$

1. $5(1 + |X - 3|) - 5 \le 0$

2. $\left|1 - \dfrac{y}{3}\right| \ge 0.63$

3. $|2z - 1| > 3z + 5$

ANSWERS

(1 pt.) 1.

(2 pts) 2.

(3 pts) 3.
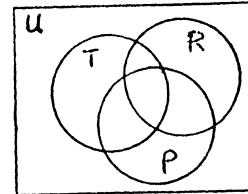

Algonquin, Quaboag, Westborough
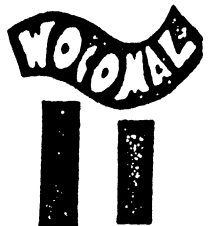
ROUND II: Set theory

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

NOTE: $\overline{A}$ denotes the complement of set A

1. In the Venn diagram like this in the
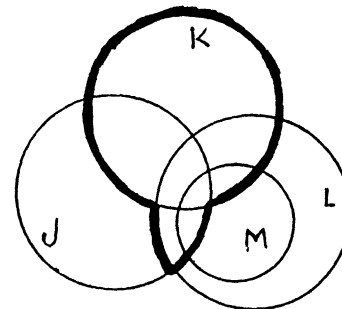   answer space, shade
        $(R \cap T) \cup (R \cap P)$

2. Let R, S, and T be subsets of **U** = { A, B, C, D, E, F }. Specify S by a list
    in alphabetical order if:
        $R \cap R = \varnothing$ $T \cup R = \{F\}$ $S \cup T = U$ $S \cap T = \varnothing$

3. When the elements of these sets are put into
    the Venn diagram, what is the sum of the
    numbers in the thickly outlined region?

        J = {1, 3, 5, 7, 9 }
        K = { -3, -1, 1, 3, 4 }
        L = {1, 2, 3, 4, 5, 6, 7 }
        M = { 3, 4, 5, 6, 7 }

ANSWERS

(1 pt) 1.

(2 pts) 2. $S = \{$ $\}$

(3 pts) 3. _____

Algonquin, Quaboag, Tahanto
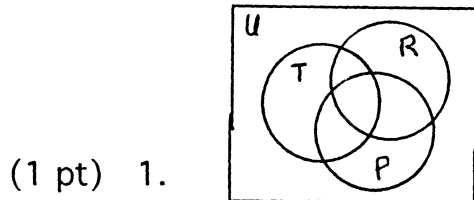
ROUND III: Operations on numerical fractions, decimals, percents, and
word problems

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. Find $.\overline{1} + .\overline{23} + .\overline{45} - .\overline{67} - .\overline{89}$ as a decimal, repeating if appropriate.

2. The original price of a TV set allowed for a profit of 30% of the cost. The new price is $195, an increase of 25%. What was the dealer's cost?

3. There were 72 adult women in Smalltown. 3/5 of adults were men. 1/4 of the men were over 6 ft tall. 1/9 of the women were over 6 ft tall. 2/9 of those men over 6 ft tall were over 6 ft 5 in tall. 1/4 of the women over 6 ft tall were over 6 ft 5 in tall.   What fraction of the entire adult population were not over 6 ft 5 in tall?

ANSWERS

(1 pt)   1. _____

(2 pts) 2. $_____

(3 pts) 3. _____

Quaboag, Westborough

ROUND IV: Techniques of counting and probability

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. Two ordinary dice are rolled. What is the probability that the numbers are the same? Write your answer as a reduced fraction.

2. Twelve points lie on a circle. How many inscribed triangles can be drawn having any three of these points as vertices?

3. A pair of octahedral, 8-sided, dice have the sides numbered 1 through 8. Find the probability that the product of the two numbers on the sides that land face up exceeds 36. Write your answer as a reduced fraction.

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. _____

Algonquin, Quaboag, Westborough

TEAM ROUND: Topics of previous rounds and open   3 points each

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM and on the separate
team answer sheet

1. Graph the solution to $\dfrac{4-x}{5}-\dfrac{7+3x}{2}\le -2-\dfrac{1+11x}{10}$. You must show relevant
   coordinates.

2. Write $(A\cap \overline{B})\cup B$ in simplest form.

3. Find the exact value of $\dfrac{\dfrac{1}{2}+\dfrac{1}{2}\left(\dfrac{1}{2}+\left(\dfrac{1}{2}+\dfrac{1}{2}\left(\dfrac{1}{2}\right)\right)\right)}{\dfrac{1}{2}-\dfrac{1}{2}\left(-\dfrac{1}{2}-\left(\dfrac{1}{2}-\dfrac{1}{2}\left(-\dfrac{1}{2}\right)\right)\right)}$.

4. In how many ways can 3 identical diamonds, 4 identical rubies, and 5
   different other gems be arranged in a row in a display case?   Write
   your answer as an integer.

5. A teacher is forming committees out of her class of 30 children. The
   committees may be composed of 4, 5, 7, or 8 children.   Find:
   a) the least number of committees that she can form so that every
       child will be on exactly one committee.
   b) the greatest number of committees so that every child will be on
       exactly one committee.

6. To develop a roll of film, a store charges 75 cents per roll and19 cents
   per print. Let n = the number of prints developed and f(n) = cost in
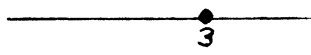   dollars of developing a roll of film with n prints.   Write a formula for
   f(n).

7. I have twice as many nickels as dimes. If the value of my nickels is $N,
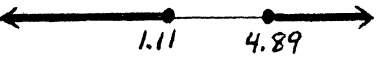   find the value of my dimes, in terms of N.

8. Solve $\dfrac{3}{5x}-\dfrac{1}{2x}=1$.
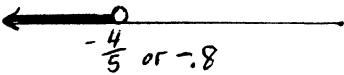
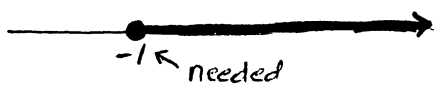Bancroft, Bromfield, Quaboag, Shrewsbury, South, Tahanto, Westborough

ROUND I   1 pt   1.

3

 # line graphs   2 pts   2.

1.11   4.89

} *need these numbers*

3 pts   3.

$-\frac{4}{5}$ or $-.8$

ROUND II

sets

1 pt   1.

2 pts   2. $\{A, B, C, D, E\}$ *must have this order*

3 pts   3.   *16*

ROUND III   1 pt   1. $-0.\overline{7}$ $-.\overline{7}$ OK

fract dec. %   2 pts   2. $120

3 pts   3. $\dfrac{43}{45}$

ROUND IV   1 pt   1. $\dfrac{1}{6}$

counting prob.   2 pts   2.   *220*

↖ *must have these fractions* ↙

3 pts   3. $\dfrac{5}{32}$

TEAM ROUND   3 pts each

1.

-1 ← *needed*

2. $A \cup B$ or $B \cup A$

3.   1

4.   3,326,400

5.   a)   4   b)   7   *need both*

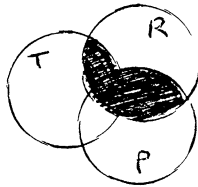6. $.75 + .19\,n$

7. $N

8. $\dfrac{1}{10}$ or $.1$