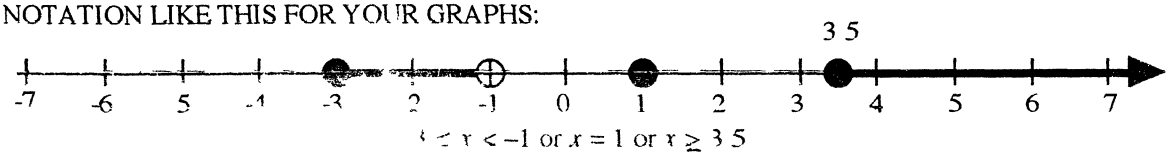
ROUND I: Graphing on the number line - inequalities, absolute value

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



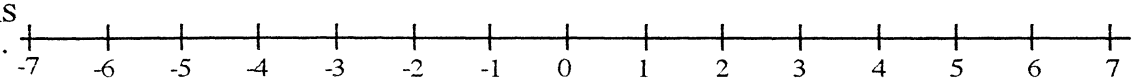
1. $-18 < 3x - 5 < 10$ for even positive integers only.

2. $\left|2 + \frac{n}{2}\right| \le 1$

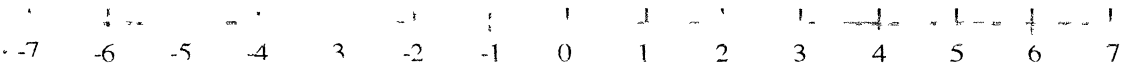
3. $2 \le |x - 1| < 5$

ANSWERS

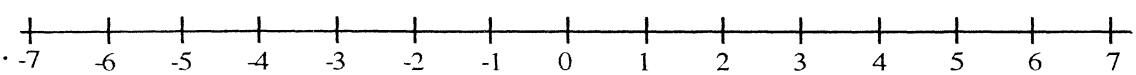
(1 pt.) 1.



(2 pts) 2.



(3 pts) 3.



Bromfield, Shepherd Hill, Westborough

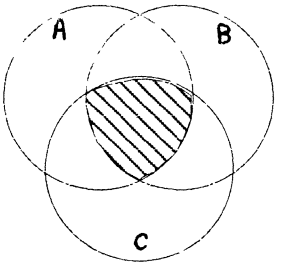
ROUND II: Set theory

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

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. Between 1933 and 1995 there were 11 presidents of the U.S.A. and 14 vice presidents. If 9 of the vice presidents were never presidents, how many of the presidents were never vice presidents?

2. In the Venn diagram at the right, region A represents the set of all numbers of the form $2m$, region B represents all numbers of the form n^2, and region C represents all numbers of the form 10^k, where m, n, and k, are positive integers. What is the smallest number in the shaded region?



3. Let $U = \{x: 0 \le x \le 10,\ x \text{ real}\}, A = \{x: x > 2\}, B = \{x: 3 \le x \le 7\}$, and $C = \{x: 2 \le x \le 6\}$.
Find the total length of the set $(A \cap \overline{B}) \cup C$

ANSWERS
(1 pt.) 1._____

(2 pts) 2._____

(3 pts) 3._____

Algonquin, Hopedale, Worcester Academy

ROUND III: Operators on numerical fractions, decimals, percents, and percentage word problems.

THE ANSWERS TO 1. AND 3. MUST BE IN SIMPLEST EXACT FORM

1. Being a bit health conscious, you read the label on your peanut butter jar and find that one serving of "low fat" peanut butter contains 9 grams of fat and that this represents 15% of the RDA of fat. How much is the RDA of fat?

2. Two containers, one holding 6 liters of a 44% solution of salt and the other with 9.5 liters of a 30% salt solution are mixed. To the nearest .01%, what is the % salt in the mix?

3. Susan spends $\frac{1}{3}$ of her monthly income on rent and $\frac{1}{4}$ of the remainder on food. After food and rent she spends $\frac{1}{6}$ of what's left on clothing. The she spends $\frac{1}{5}$ of what's left on entertainment. When she puts $\frac{1}{2}$ of the remainder into her savings account and sends off $200 for a car payment, nothing is left. What is her monthly income?

ANSWERS

(1 pt.) 1. _____ grams

(2 pts) 2. _____

(3 pts) 3. $ _____

Bromfield, Shrewsbury, Worcester Academy

ROUND IV: Techniques of counting and probability

ALL ANSWERS MUST BE EXPRESSED AS SINGLE POSITIVE INTEGERS OR REDUCED FRACTIONS

1. It is time for Mr. Sullivan's annual turtle race. Seven of his students have entered one turtle each in this competition. Only first, second, and third place ribbons will be awarded. Assuming no ties, in how many ways can the three ribbons be awarded?

2. How many 4 digit whole numbers are there such that the leftmost digit is odd, the second digit is even, and all four digits are different?

3. A circular spinner contains 8 equal sectors each labeled with one of 1, 2, 3, or 4. Find the probability that an even number is spun if:
   – there are twice as many chances to spin a 3 as a 2
   – the number 4 is used most often as a label
   – the number 2 is used least often as a label
   – two numbers are used the same number of times.

   You may answer either with a reduced fraction or as a whole number percent.

ANSWERS

(1 pt.) 1._____

(2 pts) 2._____

(3 pts) 3._____

Algonquin, Bromfield, Hudson, Doherty

TEAM ROUND: Topics of previous rounds and open

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

1. Graph the solution to $|x+3|+2x<0$ You must show relevant coordinates.

2. Let $U=\{1,2,3,4,5,6,7,8,9\}, A=\{1,2,3,4,5\}, B=\{3,5,6,7,8,9\}$ and $C=\{2,4,6,8\}$.
Specify by a list $[\overline{(A\cup C)}\cup(A\cap B)]\cap\overline{C}$

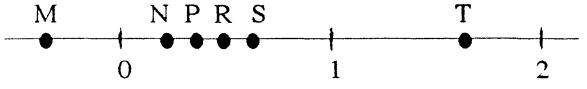
3. A sweater is marked down 40%. The store holds a special 1-day sale which reduces the sale price by 60%. What % markdown of the original price does this represent?

4. A walker starts at 1 and takes 3 steps forward and 1 backward to get to 3. Then he takes 3 steps forward and 1 backward to get to 5, etc. Using this repeated method, how many steps does it take him starting from 1 to first step on position 100?

5. A fireman stood on the middle rung of a ladder, went up 3 rungs, was forced down 5 rungs, and eventually went up 7 rungs to extinguish the fire. The firefighter then climbed the remaining 6 rungs to the top of the ladder. How many rungs are there on the entire ladder?

6. Find the sum of the mean, median, and mode of this data: 3, 6, 17, 5, 5, 6, 2, 6, 4.

7. If the numbers represented by points R and P are multiplied, which point on the number line bests represents their product?



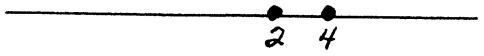
8. If $x=-666$, evaluate $\big|\,|x|-x\big|-x\big|$

Jan. 7, 1998 WOCOMAL FRESHMAN MEET ANSWERS

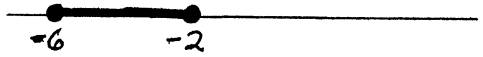
ROUND I

line graphs

1 pt 1.



2 pts 2.



3 pts 3.

ROUND II

Sets

1 pt 1. 6

2 pts 2. 100

3 pts 3. 7

ROUND III

fract.
dec.
%

1 pt 1. 60 grams

2 pts 2. 35.42 %

3 pts 3. $1200

ROUND IV

counting
probab.

1 pt 1. 210

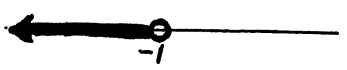
2 pts 2. 1400

3 pts 3. $\frac{1}{2}$ OR 50%

TEAM ROUND

3 pts each

1.



2. {3, 5, 7, 9} any order

3. 76%

4. 195

5. 23

6. 17

7. N

8. 1998