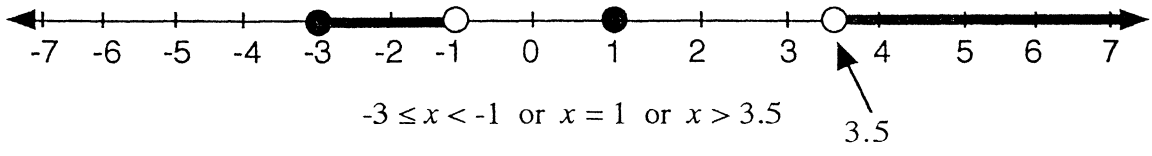
ROUND I: Graphing on the number line — inequalities, absolute value

Draw the graph for each problem on the number line provided.
Specify any non-integer endpoints.

Use notation like this for your graphs:



$-3 \le x < -1$ or $x = 1$ or $x > 3.5$

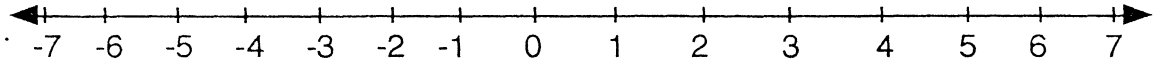
1. $2x - 1 < -5$ or $3x + 2 \ge 5$

2. $\left| 2x - 7 \right| < 7$ For integers only

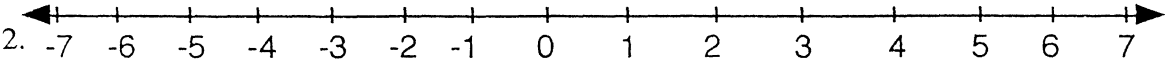
3. $-\left| 2x - 1 \right| \ge -3$

ANSWERS

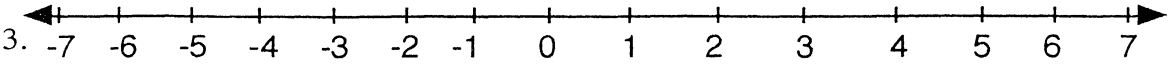
(1 pt.) 1.



(2 pts) 2.



(3 pts) 3.



Doherty, South, Southbridge, Westboro

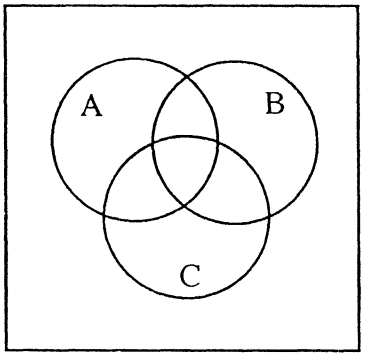
ROUND II: Set Theory

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

1. Given : $A = \{ 0, 4, 8, 12 \}$, $B = \{ 5, 6, 7 \}$, and $C = \{ 2, 4, 6, 8 \}$,
   Find $(A \cap C) \cup B$.

2. On the Venn Diagram like this in the Answer Section shade

$$\overline{([A \cap B] \cup \overline{C}) \cap B}$$

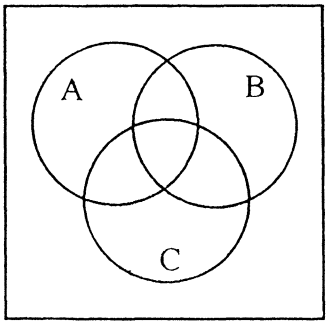


3. In interviews with 50 voters : 12 liked prop 8 and prop 13 ; 18 liked prop 8 but did not like prop 2 ; 4 liked prop 8, prop 13, and prop 2 ; 25 liked prop 8 ; 15 liked prop 13 ; 10 liked prop 2 but not prop 8 or prop 13 ; 1 likes prop 13 and prop 2 but not prop 8. How many did not like any of the three propositions?

ANSWER

(1 pt.) 1. { _____ }

(2 pts) 2.



(3 pts) 3. _____

Bromfield, St. John's, Westboro

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

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. Ann's Dress Shop prices their goods 25% above the wholesale price. If the retail price of a jacket is \$79, what was the wholesale price?

2. By what percent is the area of a square increased when the sides are increased by 30%?

3. If $\frac{3}{5}A = \frac{1}{2}B + \frac{6}{25}C$ and $\frac{1}{5}B + \frac{3}{10}C = \frac{41}{100}A$, then $C = \frac{p}{q}A$.

Find $\frac{p}{q}$ as a reduced fraction.

ANSWERS

(1 pt.) 1. ____\$_____

(2 pts) 2. _____%_____

(3 pts) 3. $\frac{p}{q} =$ _____

ROUND IV : Techniques of counting and probability

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

1. In a bag of colored candies there are 5 red, 8 brown, and 2 yellow left. If you pick one at random what is the probability of not getting a red one?

2. Amy is one of 32 students entered in a tennis tournament. Of the 32, 7 are freshman, 6 are sophomores, 9 are juniors, and 10 are seniors. If Amy is a junior and her first opponent is randomly selected, what is the probablitlity that her first opponent is also a junior?

3. There are 10 freshman and 16 eighth graders in a class. If a committee of 4 must be chosen with two members from each grade, in how many ways can this be done?

ANSWERS

(1 pt.) 1. _____

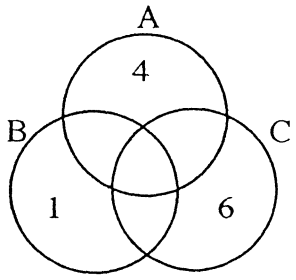
(2 pts) 2. _____

(3 pts) 3. _____

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 set of $|x+3| = 12 - 2x$

2. 

Place exactly one of the numbers 2, 3, 5, and 7 in each of the other four regions formed by sets A, B, and C so that the sum of the numbers in each set is the same. Each number must be used.

3. Your father gives half the money in his pocket to your mother, a fourth of what's left to your brother, and a third of what's then left to your sister. He then splits the remainder equally with you. If you get \$2, how much did your father start with?

4. Suppose that five points in a plane represent towns so that each pair is connected by one road. Starting at a particular town, how many different routes are there so that you visit each other town exactly once?

5. The sum of ten numbers is what percent of the average of those ten numbers?

6. If $-a+b+c+d = x$,
$a-b+c+d = y$,
$a+b-c+d = z$,
and $a+b+c-d = w$,
then $x+y+z+w = kb$. What is the value of k ?

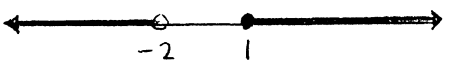
7. On his birthday Euler was 14 years old and his father was 41. Euler noticed that his age was the reverse of his father's age. How many years later will their ages next be reversals of one another?

8. How many integers satisfy this inequality? $53 < |2x-3| \leq 1003$.

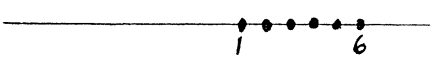
Algonquin, Bromfield, Burncoat, Doherty, Hudson, Shepherd Hill, Shrewsbury, Worcester Academy

Jan[illegible] 10, 1996 [illegible] MEET ANSWERS

ROUND I 1 pt



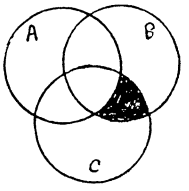
#line graphs 2 pts



3 pts

ROUND II 1 pt 1. $\{4, 5, 6, 7, 8\}$

sets



2 pts 2.

3 pts 3. 12

ROUND III 1 pt 1. $63.20

fract. dec. %

2 pts 2. 69 %

2 pts 3. $\frac{5}{6}$

ROUND IV 1 pt 1. $\frac{2}{3}$

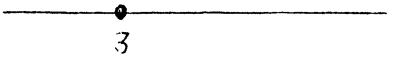
counting prob.

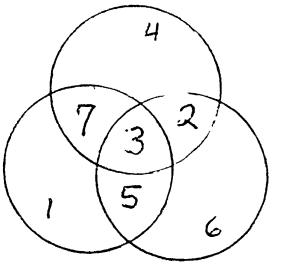
2 pts 2. $\frac{8}{31}$

3 pts 3. 5,400

TEAM ROUND

3 points each

1. 

2. 

3 $16

4. 24

5. 10000%

6. $k = 4$

7 11

8. 950