

1. AND, NOT, OR number line questions as well as Venn diagrams.
2. Rational Equations & Inequalities: restrictions, solve: cross multiply or multiply by LCD. For inequalities plot restrictions and roots on a number line and test regions for solution.
3. Radical Equations & Inequalities: isolate radical, square both sides, solve and check answers for radical equations. For radical inequalities check roots on a number line for solution.
4. Absolute Value Equations & Inequalities: Solving by algebra take the positive and negative of one side and solve the equation. For inequalities do the same as an equality and check regions on a number line.

***Note: For radicals and absolute value inequalities, use common sense. Look at the inequality. i.e., Radicals and Absolute value equations and inequalities can never be less than zero.

Part A: Solve the following using algebra.

1) $\frac{x+2}{x-3} = \frac{x}{4} \quad \underline{x \neq 3}$

$$4x+8 = x^2-3x$$

$$0 = x^2-7x-8$$

$$0 = (x-8)(x+1)$$

$$\therefore x = 8, -1$$

2) $\frac{x+1}{x-2} - \frac{x-1}{x+2} = 2 \quad \underline{x \neq \pm 2}$

$$(x+1)(x+2) - (x-1)(x-2) = 2(x^2-4)$$

$$x^2+3x+2 - (x^2-3x+2) = 2x^2-8$$

$$6x = 2x^2-8$$

$$0 = 2x^2-6x-8$$

$$0 = 2(x^2-3x-4)$$

$$0 = 2(x-4)(x+1)$$

$$\therefore \underline{x = 4, -1}$$

3) $\frac{-1}{1-x} + \frac{4}{x+2} \geq 1 \quad \underline{x \neq 1, -2}$

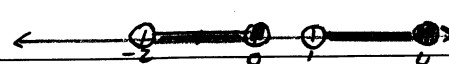
$$\frac{1}{x-1} + \frac{4}{x+2} \geq 1$$

$$x+2 + 4(x-1) \geq (x-1)(x+2)$$

$$x+2+4x-4 \geq x^2+x-2$$

$$0 \geq x^2-4x$$

$$0 \geq x(x-4)$$



Test (x=2)

$$1+1 \geq 1$$

$$2 \geq 1$$

(TRUE)

4) $\frac{3x}{x+1} < \frac{x+2}{x} \quad \underline{x \neq -1, 0} \quad \text{Test } x=1$

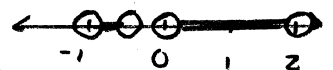
$$3x^2 < x^2+3x+2$$

$$2x^2-3x-2 < 0$$

$$(2x+1)(x-2) < 0$$

$$\therefore x < -\frac{1}{2} > 2$$

$$\frac{3}{2} < \frac{3}{1} \quad (\tau)$$



$$\therefore -1 < x < \frac{1}{2}$$

$$\text{or } 0 < x < 2$$

5) $\sqrt{x+1}+3=5$

$$\sqrt{x+1} = 2$$

$$x+1 = 4$$

$$x = 3 \checkmark$$

$$\therefore -2 < x \leq 0 \text{ \& \#} 1 < x \leq 4$$

$$\text{\& \# } x \geq -1$$

6) $x = 2 + \sqrt{x+10}$

$$x-2 = \sqrt{x+10}$$

$$x^2-4x+4 = x+10$$

$$x^2-5x-6 = 0$$

$$(x-6)(x+1) = 0$$

$$x = 6, -1 \text{ excluded}$$

$$\therefore x = 6$$

① $x+10 \geq 0$

$$x \geq -10$$

② $x-2 \geq 0$

$$x \geq 2$$

$$7) \sqrt{x-1} - \sqrt{5-x} > 0$$

$$\begin{aligned} x &\geq 1 \text{ \& \;} 5-x > 0 \\ -x &> -5 \\ x &\leq 5 \end{aligned}$$

$$\sqrt{x-1} > \sqrt{5-x}$$

$$x-1 > 5-x$$

$$2x > 6 \quad x > 3$$

$$\therefore \underline{3 < x \leq 5}$$

$$9) |x-4| = 2x+1$$

$$\textcircled{1} x-4 \geq 0 \text{ Sol'n}$$

$$x \geq 4 \quad x-4 = 2x+1$$

~~5=x extraneous~~

$$\textcircled{2} x-4 < 0 \text{ Sol'n}$$

$$x < 4$$

$$-x+4 = 2x+1$$

$$-3x = -3$$

$$x = 1 \checkmark$$

$$11) |x-2| \leq 5$$

$$\textcircled{2} x-2 < 0$$

$$x < 2$$

$$\textcircled{1} x-2 \geq 0 \text{ Sol'n}$$

$$x \geq 2$$

$$x \leq 7$$

$$\text{Sol'n } x+2 \leq 5$$

$$-x \leq 3$$

$$x \geq -3$$

$$\therefore \underline{-3 \leq x \leq 7}$$

Part B: Graphing Calculator questions.

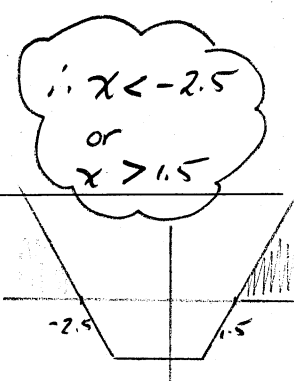
$$1) \sqrt{4x+5} - \sqrt{2x-1} = 2$$

$$x \geq -5/4 \text{ \& \;} x \geq 1/2$$

$$x = 1 \text{ \& \;} 5$$

$$2) |x+2| + |x-1| > 4$$

$$x = -2.5 \text{ \& \;} 1.5$$



$$3) \sqrt{x-2} < \frac{x}{x-3}$$

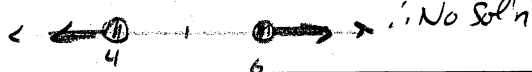
$$x \neq 3 \text{ \& \;} x \geq 2$$

$$3 < x < 6$$

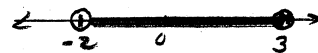
Part C: AND, NOT, OR and Venn.

1) Show the solution for each of the following on a number line.

a) $x \leq 4$ and $x \geq 6$



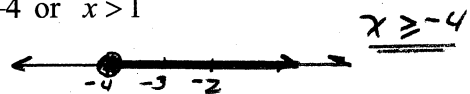
b) $x \leq 3$ and $x > -2$



c) $x < -6$ or $x > -4$



d) $x \geq -4$ or $x > 1$



2. At a board game tournament, 100 people played Monopoly, Scrabble and Trivial Pursuit (or some combination of).

Use the following information to calculate:

How many people played only one game? 71

- 5 played all 3 games
- 7 played Monopoly and Trivial Pursuit
- 11 played Scrabble and Trivial Pursuit
- 21 played Monopoly and Scrabble
- 48 played Monopoly
- 76 played Monopoly or Scrabble
- 75 played Scrabble or Trivial Pursuit

