

Class – 10th

Topic – Linear Inequations

1. Solve the following inequation and graph the solution on a number line

$$2x - 5 \leq 5x + 4 < 11, \text{ where } x \in \mathbb{I}.$$

[2011]

Solution:

$$2x - 5 \leq 5x + 4 < 11$$

$$2x - 5 \leq 5x + 4 \text{ or } -9 \leq 3x \text{ or } -3 \leq x$$

$$5x + 4 < 11 \text{ or } 5x < 7 \text{ or } x < \frac{7}{5}$$

$$-3 \leq x < \frac{7}{5}$$

Therefore x in $\{-3, -2, -1, 0, 1\}$



2. Given that $x \in \mathbb{I}$, solve the inequation and graph it on a number line:

[2004]

$$3 \geq \frac{x-4}{2} + \frac{x}{3} \geq 2$$

Solution:

$$3 \geq \frac{x-4}{2} + \frac{x}{3} \geq 2$$

$$18 \geq 3(x-4) + 2x \geq 12$$

$$30 \geq 5x \geq 24$$

$$6 \geq x \geq 4.8$$

Therefore $x \in \{5, 6\}$

3. Given $A = \{x: 11x - 5 > 7x + 3, x \in \mathbb{R}\}$, $B = \{x: 18x - 9 \geq 15 + 12x, x \in \mathbb{R}\}$. Find the range of the set $A \cap B$ and represent it on a number line. [2005]

Solution:

$$A: 11x - 5 > 7x + 3$$

$$4x > 8 \text{ or } x > 2$$

$$B: 18x - 9 \geq 15 + 12x$$

$$6x \geq 24 \text{ or } x \geq 4 \Rightarrow A \cap B = \{x: x \geq 4, x \in \mathbb{R}\}$$

4. Solve the given inequation and graph it on a number line:

[2008]

$$2y - 3 < y + 1 \leq 4y + 7, y \in \mathbf{R}.$$

Solution:

$$2y - 3 < y + 1 \leq 4y + 7$$

$$2y - 3 < y + 1 \text{ or } y < 4$$

$$y + 1 \leq 4y + 7 \text{ or } -6 \leq 3y \text{ or } -2 \leq y$$

$$\text{Hence } \{x: -2 \leq y < 4, x \in \mathbf{R}\}$$

5. Solve the given inequation and graph it on a number line: -

[2010]

$$3 < -\frac{1}{2} - \frac{2x}{3} \leq \frac{5}{6}, x \in \mathbf{R}$$

Solution:

$$3 < -\frac{1}{2} - \frac{2x}{3} \leq \frac{5}{6}, x \in \mathbf{R}$$

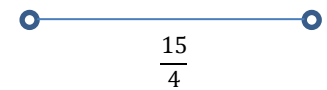
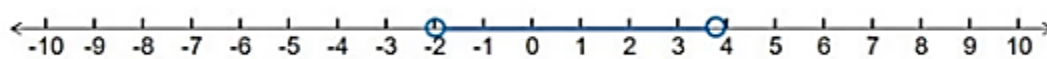
$$-3 < -\frac{1}{2} - \frac{2x}{3} \Rightarrow -18 < -3 - 4x$$

$$4x < 15 \text{ or } x < \frac{15}{4}$$

$$-\frac{1}{2} - \frac{2x}{3} \leq \frac{5}{6} \text{ or } -3 - 4x \leq 5$$

$$-8 \leq 4x \text{ or } -2 \leq x$$

$$\text{Therefore } \{x: -2 \leq x < \frac{15}{4}, x \in \mathbf{R}\}$$



6. Solve the given inequation and graph it on a number line:

[2012]

$$4x - 19 < \frac{3x}{5} - 2 \leq -\frac{2}{5} + x, x \in \mathbf{R}$$

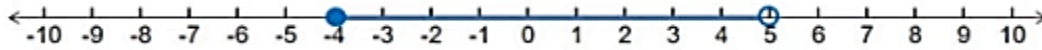
Solution:

$$4x - 19 < \frac{3x}{5} - 2 \leq -\frac{2}{5} + x$$

$$4x - 19 < \frac{3x}{5} - 2 \text{ or } 20x - 95 < 3x - 10 \text{ or } 17x < 85 \text{ or } x < 5$$

$$\frac{3x}{5} - 2 \leq -\frac{2}{5} + x \text{ or } 3x - 10 \leq -2 + 5x \text{ or } -8 \leq 2x \text{ or } -4 \leq x$$

$$\text{Therefore } \{x: -4 \leq x < 5, x \in \mathbf{R}\}$$



7. Solve the given inequation and graph it on a number line:

[2013]

$$-\frac{x}{3} \leq \frac{x}{2} - 1 \frac{1}{3} < \frac{1}{6}, x \in \mathbf{R}$$

Solution:

$$-\frac{x}{3} \leq \frac{x}{2} - 1 \frac{1}{3} < \frac{1}{6}, x \in \mathbf{R}$$

$$-\frac{x}{3} \leq \frac{x}{2} - 1 \frac{1}{3} < \frac{1}{6}$$

$$-2x \leq 3x - 8 < 1 \text{ or } -2x \leq 3x - 8 \text{ or } 8 \leq 5x$$

$$\frac{8}{5} \leq x \text{ or } 3x - 8 < 1 \text{ or } 3x < 9 \text{ or } x < 3$$

$$\text{Therefore } \{x : \frac{8}{5} \leq x < 3, x \in \mathbf{R}\}$$



8. Find the value of x which satisfies the inequation:

[2014]

$$-2 \frac{5}{6} < \frac{1}{2} - \frac{2x}{3} \leq 2, x \in \mathbf{W}$$

Solution:

$$-2 \frac{5}{6} < \frac{1}{2} - \frac{2x}{3} \leq 2$$

$$-\frac{17}{6} < \frac{1}{2} - \frac{2x}{3} \leq 2$$

$$-17 < 3 - 4x \leq 12 \text{ or } -17 < 3 - 4x \text{ or } 4x < 20 \text{ or } x < 5$$

$$3 - 4x \leq 12 \text{ or } -9 \leq 4x \text{ or } -2.25 \leq x$$

$$\text{Therefore } \{x : -2.25 \leq x < 5, x \in \mathbf{W}\}$$

$$x \in \{0, 1, 2, 3, 4\}$$



9. Solve the inequation:

[1999]

$$12 + 1 \frac{5}{6}x \leq 5 + 3x \text{ and } x \in \mathbf{R}$$

Solution:

$$12 + 1\frac{5}{6}x \leq 5 + 3x \Rightarrow 12 + \frac{11}{6}x \leq 5 + 3x$$

$$\Rightarrow 7 \leq \frac{7}{6}x \Rightarrow x \geq 6 \text{ or } \{x: x \in \mathbb{R} \text{ and } x \geq 6\}$$