

## Exercise 7.3

**Q1) Solve the following inequalities.**

**(i)**  $3x + 1 < 5x - 4$

**Solution:**  $3x + 1 < 5x - 4$

$$3x < 5x - 4 - 1$$

$$3x - 5x < -5$$

$$-2x < -5$$

**Case-I** When negative is eliminated from both sides of inequality the symbol will be change.

**Case-II** When negative is transferred from variable to constant side, symbol will also change.

$$x > \frac{-5}{-2}$$

$$x > \frac{5}{2}$$

$$\text{Solution Set} = \left\{ x \mid x > \frac{5}{2} \right\}$$

**(ii)**  $4x - 10.3 \leq 21x - 1.8$

**Solution:**  $4x - 10.3 \leq 21x - 1.8$

$$4x - 21x \leq -8.5 + 10.3$$

$$-17x \leq 8.5$$

When negative value is shifted to other side its symbol changes.

$$x \geq \frac{8.5}{-17}$$

$$x \geq -\frac{8.5}{17}$$

$$x \geq -0.5$$

$$\text{Solution Set} = \{x \mid x \geq -0.5\}$$

**(iii)**  $4 - \frac{1}{2}x \geq -7 + \frac{1}{4}x$

**Solution:**  $4 - \frac{1}{2}x \geq -7 + \frac{1}{4}x$

$$-\frac{1}{2}x - \frac{1}{4} \geq -7 - 4$$

$$\frac{-2x - x}{4} \geq -11$$

$$-3x \geq -44$$

When negative value is shifted the symbol changes

$$x \leq \frac{-44}{-3}$$

$$x \leq \frac{44}{3}$$

$$\text{Solution Set} = \left\{ x \mid x \leq \frac{44}{3} \right\}$$

**(iv)**  $x - 2(5 - 2x) \geq 6x - 3\frac{1}{2}$

**Solution:**  $x - 2(5 - 2x) \geq 6x - 3\frac{1}{2}$

$$x - 10 + 4x \geq 6x - \frac{7}{2}$$

$$5x - 6x \geq -\frac{7}{2} + 10$$

$$-1x \geq \frac{-7 + 20}{2}$$

$$-x \geq -\frac{13}{2}$$

When negative is shifted other side symbol changes

$$x \leq \frac{13}{-1 \times 2}$$

$$x \leq -\frac{13}{2}$$

$$x \leq -6.5$$

$$\text{Solution Set} = \{x \mid x \leq -6.5\}$$

**(v)**  $\frac{3x+2}{9} - \frac{2x+1}{3} > -1$

**Solution:**  $\frac{3x+2}{9} - \frac{2x+1}{3} > -1$

$$\frac{3x+2-3(2x+1)}{9} > -1$$

$$3x+2-6x-3 > -9$$

$$-3x > -9+1$$

$$-3x > -8$$

Negative value is shifted to other side its symbols changes

$$x < \frac{-8}{-3}$$

$$x < \frac{8}{3}$$

$$\text{Solution Set} = \left\{ x \mid x < \frac{8}{3} \right\}$$

$$(vi) \quad 3(2x+1) - 2(2x+5) < 5(3x-2)$$

$$\text{Solution: } 3(2x+1) - 2(2x+5) < 5(3x-2)$$

$$6x+3-4x-10 < 15x-10$$

$$2x-7-15x < -10$$

$$-13x < -10+7$$

$$-13x < -3$$

The value is negative when shifted to other side it changes its symbols

$$x > \frac{-3}{-13}$$

$$x > \frac{3}{13}$$

$$\text{Solution Set} = \left\{ x \mid x > \frac{3}{13} \right\}$$

$$(vii) \quad 3(x-1) - (x-2) > -2(x+4)$$

$$\text{Solution: } 3(x-1) - (x-2) > -2(x+4)$$

$$3x-3-x+2 > -2x-8$$

$$2x-1 > -2x-8$$

$$2x+2x > -8+1$$

$$4x > -7$$

$$x > \frac{-7}{4}$$

$$\text{Solution Set} = \left\{ x \mid x > \frac{-7}{4} \right\}$$

$$(viii) \quad 2\frac{2}{3}x + \frac{2}{3}(5x-4) > -\frac{1}{3}(8x+7)$$

$$\text{Solution: } 2\frac{2}{3}x + \frac{2}{3}(5x-4) > -\frac{1}{3}(8x+7)$$

$$\frac{8}{3}x + \frac{10x-8}{3} > -\frac{(8x+7)}{3}$$

$$\frac{8x+10x-8}{3} > -\frac{8x+7}{3}$$

Multiplying both side by 3

$$\cancel{3} \times \frac{18x-8}{\cancel{3}} > -\cancel{3} \times \frac{8x+7}{\cancel{3}}$$

$$18x-8 > -(8x+7)$$

$$18x-8 > -8x-7$$

$$18x+8x > -7+8$$

$$26x > 1$$

$$x > \frac{1}{26}$$

$$\text{Solution Set} = \left\{ x \mid x > \frac{1}{26} \right\}$$

## Q2) Solve the following inequalities

$$(i) \quad -4 < 3x+5 < 8$$

$$\text{Solution: } -4 < 3x+5 < 8$$

$$-4 < 3x+5 \quad \text{and} \quad 3x+5 < 8$$

$$-4-5 < 3x \quad 3x < 8-5$$

$$-9 < 3x \quad 3x < 3$$

$$\frac{-9}{3} < x \quad x < \frac{3}{3}$$

$$-3 < x \quad x < 1$$

$$-3 < x < 1$$

$$\text{Solution Set} = \{x \mid -3 < x < 1\}$$

$$(ii) \quad -5 \leq \frac{4-3x}{2} < 1$$

$$\text{Solution: } -5 \leq \frac{4-3x}{2} < 1$$

$$-5 \leq \frac{4-3x}{2} \quad \text{and} \quad \frac{4-3x}{2} < 1$$

$$-10 \leq 4-3x \quad 4-3x < 2$$

$$3x-10 \leq 4 \quad -3x < 2-4$$

$$3x \leq 4+10 \quad -3x < -2$$

$$3x \leq 14 \quad x > \frac{-2}{-3}$$

$$x \leq \frac{14}{3} \quad x > \frac{2}{3}$$

$$\frac{2}{3} < x$$

$$\frac{2}{3} < x \leq \frac{14}{3}$$

$$\text{Solution Set} = \{x \mid \frac{2}{3} < x \leq \frac{14}{3}\}$$

$$(iii) \quad -6 < \frac{x-2}{4} < 6$$

$$\text{Solution: } -6 < \frac{x-2}{4} < 6$$

$$-6 < \frac{x-2}{4}$$

$$-24 < x-2$$

$$-24+2 < x$$

$$-22 < x$$

and

$$\frac{x-2}{4} < 6$$

$$x-2 < 24$$

$$x < 24+2$$

$$x < 26$$

$$-22 < x < 26$$

$$\text{Solution Set} = \{x \mid -22 < x < 26\}$$

$$(iv) \quad 3 \geq \frac{7-x}{2} \geq 1$$

$$\text{Solution: } 3 \geq \frac{7-x}{2} \geq 1$$

$$3 \geq \frac{7-x}{2}$$

$$6 \geq 7-x$$

$$6-7 \geq -x$$

$$-1 \geq -x$$

Negative sign change the symbols

$$1 \leq x$$

and

$$\frac{7-x}{2} \geq 1$$

$$7-x \geq 2$$

$$-x \geq 2-7$$

$$-x \geq -5$$

$$x \leq 5$$

$$1 \leq x \leq 5$$

$$\text{Solution Set} = \{x \mid 1 \leq x \leq 5\}$$

$$(v) \quad 3x-10 \leq 5 < x+3$$

$$\text{Solution } 3x-10 \leq 5 < x+3$$

$$3x-10 \leq 5 \quad \text{and} \quad 5 < x+3$$

$$3x \leq 5+10 \quad 5-3 < x$$

$$3x \leq 15 \quad 2 < x$$

$$\frac{3x}{3} \leq \frac{15}{3}$$

$$x \leq 5$$

$$2 < x \leq 5$$

$$\text{Solution Set} = \{x \mid 2 < x \leq 5\}$$

$$(vi) \quad -3 \leq \frac{x-4}{-5} < 4$$

$$\text{Solution } -3 \leq \frac{x-4}{-5} < 4$$

$$-3 \leq \frac{x-4}{-5} \quad \text{and} \quad \frac{x-4}{-5} < 4$$

$$-3 \times -5 \geq x-4$$

$$x-4 > 4(-5)$$

$$15 \geq x-4$$

$$x > -20+4$$

$$15+4 \geq x$$

$$x > -16$$

$$19 \geq x$$

$$-16 < x$$

$$x \leq 19$$

$$-16 < x \leq 19$$

$$\text{Solution Set} = \{x \mid -16 < x \leq 19\}$$

$$(vii) \quad 1-2x < 5-x \leq 25-6x$$

$$\text{Solution: } 1-2x < 5-x \leq 25-6x$$

$$1-2x < 5-x \quad \text{and}$$

$$5-x \leq 25-6x$$

$$-x+6x \leq 25-5$$

$$6x-x \leq 20$$

$$1-2x+x < 5$$

$$5x \leq 20$$

$$-x < 5-1$$

$$x \leq \frac{20}{5}$$

$$-x < 4$$

$$x \leq 4$$

Due negative sign

Symbol change

$$-4 < x$$

$$-4 < x \leq 4$$

$$\text{Solution Set} = \{x \mid -4 < x \leq 4\}$$

$$(viii) \quad 3x-2 < 2x+1 < 4x+17$$

$$\text{Solution: } 3x-2 < 2x+1 < 4x+17$$

$$3x-2 < 2x+1$$

$$2x+1 < 4x+17$$

$$3x-2x-2 < +1$$

$$2x-4x < 17-1$$

$$x < 1+2$$

$$-2x < 16$$

$$x < 3$$

$$\begin{aligned}x &> \frac{16}{-2} \\x &> -8 \\-8 &< x\end{aligned}$$

$$-8 < x < 3$$

$$\text{Solution Set} = \{x \mid -8 < x < 3\}$$

**Last Updated: September 2020**

Report any mistake at [freeilm786@gmail.com](mailto:freeilm786@gmail.com)

