



Mathematics-9
Unit 7 – Exercise 7.3

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Q1 Solve the following inequalities

(i) $-4 < 3x + 5 < 8$ (K.B)+(U.B)
(SWL 2014, MTN 2015)

Solution:

$$\begin{aligned} -4 < 3x + 5 < 8 \\ -4 < 3x + 5 \quad \text{and} \quad 3x + 5 < 8 \\ -4 - 5 < 3x \quad \quad 3x < 8 - 5 \\ -9 < 3x \quad \quad 3x < 3 \\ \frac{-9}{3} < x \quad \quad x < \frac{3}{3} \\ -3 < x \quad \quad x < 1 \\ -3 < x < 1 \end{aligned}$$

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

(ii) $-5 \leq \frac{4-3x}{2} < 1$ (SWL 2014) (A.B)

Solution:

$$\begin{aligned} -5 \leq \frac{4-3x}{2} < 1 \\ -5 \leq \frac{4-3x}{2} \quad \text{and} \quad \frac{4-3x}{2} < 1 \\ -10 \leq 4-3x \quad \quad 4-3x < 2 \\ 3x-10 \leq 4 \quad \quad -3x < 2-4 \\ 3x \leq 4+10 \quad \quad -3x < -2 \\ 3x \leq 14 \quad \quad x > \frac{-2}{-3} \\ x \leq \frac{14}{3} \quad \quad x > \frac{2}{3} \\ \frac{2}{3} < x \\ \frac{2}{3} < x \leq \frac{14}{3} \end{aligned}$$

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

(iii) $-6 < \frac{x-2}{4} < 6$ (A.B)

Solution:

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

$$-6 < \frac{x-2}{4} \rightarrow (i) \quad \text{and} \quad \frac{x-2}{4} < 6 \rightarrow (ii)$$

$$(i) \Rightarrow -6 < \frac{x-2}{4}$$

$$-24 < x-2$$

$$-24+2 < x$$

$$-22 < x$$

and

$$(ii) \Rightarrow \frac{x-2}{4} < 6$$

$$x-2 < 24$$

$$x < 24+2$$

$$x < 26$$

$$-22 < x < 26$$

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

(iv) $3 \geq \frac{7-x}{2} \geq 1$ (A.B)

Solution:

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

$$3 \geq \frac{7-x}{2} \rightarrow (i) \quad \text{and} \quad \frac{7-x}{2} \geq 1 \rightarrow (ii)$$

$$(i) \Rightarrow 3 \geq \frac{7-x}{2}$$

$$6 \geq 7-x$$

$$6-7 \geq -x$$

$$-1 \geq -x$$

Negative sign change the symbols

$$1 \leq x$$

$$(ii) \Rightarrow \frac{7-x}{2} \geq 1$$

Unit - 7

Linear Equations and Inequalities

$$7 - x \geq 2$$

$$-x \geq 2 - 7$$

$$-x \geq -5$$

$$x \leq 5$$

$$1 \leq x \leq 5$$

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

(v) $3x - 10 \leq 5 < x + 3$ (A.B)

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) $-3 \leq \frac{x-4}{-5} < 4$ (A.B)

Solution:

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

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

$$-3 \times -5 \geq x - 4 \quad x - 4 > 4(-5)$$

$$15 \geq x - 4 \quad x > -20 + 4$$

$$15 + 4 \geq x \quad x > -16$$

$$19 \geq x \quad -16 < x$$

$$x \leq 19$$

$$-16 < x \leq 19$$

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

(vii) $1 - 2x < 5 - x \leq 25 - 6x$ (A.B)

Solution:

$$1 - 2x < 5 - x \leq 25 - 6x$$

$$1 - 2x < 5 - x \quad \text{and} \quad 5 - x \leq 25 - 6x$$

$$1 - 5 < 2x - x \quad -x + 6x \leq 25 - 5$$

$$-4 < x \quad 5x \leq 20$$

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

$$x \leq 4$$

$$-4 < x \leq 4$$

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

(viii) $3x - 2 < 2x + 1 < 4x + 17$ (A.B)

Solution:

$$3x - 2 < 2x + 1 < 4x + 17$$

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

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

$$x < 1 + 2 \quad -2x < 16$$

$$x < 3 \quad x > \frac{16}{-2}$$

$$x > -8$$

$$-8 < x$$

$$-8 < x < 3$$

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