# Linear Inequations

Linear Equation : Equation in 'x'
    with highest power of $x \to$ '1'

General form: $a \underline{x^1} + b = 0$    $[ax^1 + bx^0] = 0$

$3x - 8 = 1 \longrightarrow$ L.E in one variable

$2x - 3y = 4 \longrightarrow$ LE in two variable

Equation ( Equate kona)

Quadratic Equation: Highest power of $x$ is '2'

$$ax^2 + bx^1 + cx^0 = 0$$

General form: $ax^2 + bx^1 + c = 0$

Cubic Equation: Highest power of $x$ is '3'.

General form: $ax^3 + bx^2 + cx^1 + dx^0 = 0$

Inequation: Jab kuch compare kr rhe

Tejasee                Samkit

$\hookrightarrow$ '=' $\rightarrow$    equation

$\hookrightarrow$ '>' $\;\rangle$
                    $\Big\}\rightarrow$ inequation
$\hookrightarrow$ '<' $\;\rangle$

Ex:

$$3x - 8 = 1$$

$$3x = 1 + 8$$

$$3x = 9$$

$$x = \frac{9}{3}$$

$$\boxed{x = 3}$$

$$3x - 8 > 1$$

$$3x > 1 + 8$$

$$3x > 9$$

$$x > \frac{9}{3}$$

$$\boxed{x > 3}$$

(i)

$$5x - 7 < 6 + 2x$$

$$5x - 2x < 6 + 7$$

$$3x < 13$$

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

(ii)

$$\frac{3}{2}x \leq 6 + x$$

$$3x \leq 2(6 + x)$$

$$3x \leq 12 + 2x$$

$$3x - 2x \leq 12$$

$$\boxed{x \leq 12}$$

(iii) $\frac{4x}{7} - 8 > 5 - 2x$

$$\frac{4x}{7} > 5 - 2x + 8$$

$$\frac{4x}{7} > 13 - 2x$$

$$4x > 7(13 - 2x)$$

$$4x > 91 - 14x$$

$$4x + 14x > 91$$

$$18x > 91$$

$$x > \frac{91}{18}$$

(iv)

$$6x - \frac{3}{4} \geqslant 5 + x$$

$$6x - x \geqslant \frac{5}{1} + \frac{3}{4}$$

$$5x \geqslant \frac{23}{4}$$

$$x \geqslant \frac{23}{4} \times \frac{1}{5}$$

$$\boxed{x \geqslant \frac{23}{20}}$$

$$6x - \frac{3}{4} \geqslant 5 + x$$

$$6x \geqslant 5 + x + \frac{3}{4}$$

$$6x - x - 5 \geqslant \frac{3}{4}$$

$$5x - 5 \geqslant \frac{3}{4}$$

$$4(5x - 5) \geqslant 3$$

$$20x - 20 \geqslant 3$$

$$20x \geqslant 23$$

$$x \geqslant \frac{23}{20}$$

Replacement set :

1,2 - - - - - N

$x < 30 \rightarrow$ Solution set

$\rightarrow$ For $\underline{x < 5}$

N : 1,2,3 - - - - $\infty$ $\rightarrow$ $(x \in N : x < 5) = \{1,2,3,4\}$

W : 0,1,2,3 - - - - $\infty$ $\rightarrow$ $(x \in W : x < 5) = \{0,1,2,3,4\}$

I : $-\infty$ - - - $-1,0,1$ - - - $\infty \rightarrow$ $(x \in I : x < 5) = \{ - - - -1,0,1,2,3,4\}$

Replacement set
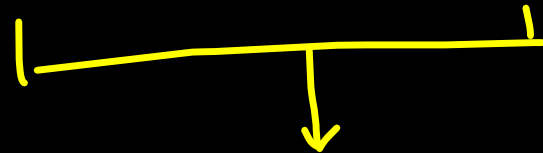
Solution set

(1) $2x - 7 < 4$ , $x \in \{1, 2, 3, 4, 5, 6, 7\}$

$\hookrightarrow$ Replacement set

$2x - 7 < 4$

$2x < 4 + 7$

$2x < 11$

$x < \dfrac{11}{2}$

$x < 5.5$ $\therefore$ $x = \{1, 2, 3, 4, 5\} \longrightarrow$ Solution set