

Ch-22 - Simple Linear Equations

$$(2x + 3 = x + 4) \text{ - Equation}$$

It is a linear equation because its highest power is 1.

$$\begin{array}{l} \text{LHS} \qquad \text{RHS} \\ 2x + 3^2 = x + 4 \\ \Rightarrow 2x - x = 4 - 3^2 \\ \Rightarrow x = 4 - 3 \times 3 \\ \qquad = 4 - 9 \\ \qquad = -5 \end{array}$$

$$\Rightarrow x = -5$$

$$\Rightarrow x = -5 \longrightarrow \text{Linear equation.}$$

$$\begin{array}{l} x^2 + 5 = x^2 + x + 2 \\ \Rightarrow x^2 + 5 - x^2 - x - 2 \\ \Rightarrow (5 - 2) - x \\ \Rightarrow 3 - x = 0 \longrightarrow \text{Highest Power} = 1 \\ \therefore \text{Linear equation.} \end{array}$$

Linear equation :- It represents a line.

Rules for Solving a Linear Equation

$$x + 5 = 3$$

Find the value of x

$$x + 5 = 3$$

$$\Rightarrow x + \cancel{5} - \cancel{5} = 3 - 5$$

$$\Rightarrow x = -2$$

Check

$$\text{LHS} = x + 5$$

$$\Rightarrow -2 + 5 = 3$$

$$= \text{RHS}$$

$$x - 5 = 2$$

$$\Rightarrow x - \cancel{5} + \cancel{5} = 2 + 5$$

$$\Rightarrow x = 2 + 5 = 7$$

$$3x = 5$$

$$\Rightarrow \frac{3x}{3} = \frac{5}{3} = x = \frac{5}{3}$$

$$\frac{x}{3} = 5$$

$$\Rightarrow \cancel{3} \times \frac{x}{\cancel{3}} = 5 \times 3$$

$$\Rightarrow x = 15$$

Ex-22(A)

i) $x + 2 = 6$

$$\Rightarrow x + 2 - 2 = 6 - 2$$

$$\Rightarrow x = 4$$

vi) $b + 2.5 = 4.2$

$$\Rightarrow b + 2.5 - 2.5 = 4.2 - 2.5$$

$$\Rightarrow b = 1.7$$

ii) $x + 6 = 2$

$$\Rightarrow x + 6 - 6 = 2 - 6$$

$$\Rightarrow x = -4$$

vii) $p + 4.6 = 8.5$

$$\Rightarrow p + 4.6 - 4.6 = 8.5 - 4.6$$

$$\Rightarrow p = 3.9$$

iii) $y + 8 = 5$

$$\Rightarrow y + 8 - 8 = 5 - 8$$

$$\Rightarrow y = -3$$

viii) $y + 3.2 = -6.5$

$$\Rightarrow y + 3.2 - 3.2 = -6.5 - 3.2$$

$$\Rightarrow y = -9.7$$

iv) $x + 4 = -3$

$$\Rightarrow x + 4 - 4 = -3 - 4$$

$$\Rightarrow x = -7$$

ix) $a + 8.9 = 12.6$

$$\Rightarrow a + 8.9 - 8.9 = 12.6 - 8.9$$

$$\Rightarrow a = 3.7$$

v) $y + 2 = -8$

$$\Rightarrow y + 2 - 2 = -8 - 2$$

$$\Rightarrow y = -10$$

x) $x + 2\frac{1}{3} = 5$

$$\Rightarrow x + \frac{7}{3} - \frac{7}{3} = 5 - \frac{7}{3}$$

x) $x + 2\frac{1}{3} = 5$

Solⁿ $\Rightarrow x + \frac{7}{3} - \frac{7}{3} = 5 - \frac{7}{3}$
 $\Rightarrow x = \frac{15}{3} - \frac{7}{3} = x = \frac{8}{3} = 2\frac{2}{3}$

ii) $m - 2 = -5$

$\Rightarrow m - 2 + 2 = -5 + 2$
 $\Rightarrow m = -3$

xii) $z + 2 = 4\frac{1}{5}$

Solⁿ $\Rightarrow z + 2 - 2 = 21 - 2$
 $\Rightarrow z = \frac{21 - 10}{5} = \frac{11}{5}$
 $\Rightarrow z = \frac{11}{5} = z = 2\frac{1}{5}$

iii) $b - 5 = 7$

$\Rightarrow b - 5 + 5 = 7 + 5$
 $\Rightarrow b = 12$

xiii) $m + 3\frac{1}{2} = 4\frac{1}{4}$

Solⁿ $\Rightarrow m + \frac{7}{2} - \frac{7}{2} = \frac{17}{4} - \frac{7}{2}$
 $\Rightarrow m = \frac{17}{4} - \frac{14}{4} = m = \frac{3}{4}$

iv) $a - 2.5 = -4$

$\Rightarrow a - 2.5 + 2.5 = -4 + 2.5$
 $\Rightarrow a = -1.5$

xiv) $x + 2 = 1\frac{1}{4}$

Solⁿ $\Rightarrow x + 2 - 2 = \frac{5}{4} - \frac{2}{1}$
 $\Rightarrow x = \frac{5}{4} - \frac{8}{4} = \frac{-3}{4}$

v) $y - 3\frac{1}{2} = 6$

$\Rightarrow y - \frac{7}{2} + \frac{7}{2} = \frac{6}{1} + \frac{7}{2}$
 $\Rightarrow y = \frac{12}{2} + \frac{7}{2} = \frac{19}{2} = 9\frac{1}{2}$

vi) $z - 2\frac{1}{3} = -6$

$\Rightarrow z - \frac{7}{3} + \frac{7}{3} = -6 + \frac{7}{3}$
 $\Rightarrow z = \frac{-18}{3} + \frac{7}{3} = \frac{-11}{3} = -3\frac{2}{3}$

xv) $y + 5\frac{1}{3} = 4$

Solⁿ $\Rightarrow y + \frac{16}{3} - \frac{16}{3} = 4 - \frac{16}{3}$
 $\Rightarrow y = \frac{12}{3} - \frac{16}{3} = \frac{-4}{3}$
 $\Rightarrow y = -1\frac{1}{3}$

vii) $p - 5.4 = 2.7$

$\Rightarrow p - 5.4 + 5.4 = 2.7 + 5.4$
 $\Rightarrow p = 8.1$

xvi) $a + 3\frac{1}{5} = 1\frac{1}{2}$

Solⁿ $\Rightarrow a + \frac{16}{5} - \frac{16}{5} = \frac{3}{2} - \frac{16}{5}$
 $\Rightarrow a = \frac{15}{10} - \frac{32}{10} = \frac{-17}{10} = a = -1\frac{7}{10}$

viii) $x - 1.5 = -4.9$

$\Rightarrow x - 1.5 + 1.5 = -4.9 + 1.5$
 $\Rightarrow x = -3.4$

xvii) $x - 3 = 2$

Solⁿ $\Rightarrow x - 3 + 3 = 2 + 3$
 $\Rightarrow x = 5$

ix) $n - 4 = -4\frac{1}{5}$

$\Rightarrow n - 4 + 4 = -\frac{21}{5} + 4$
 $\Rightarrow n = \frac{-21 + 20}{5} = \frac{-1}{5}$
 $\Rightarrow n = -\frac{1}{5}$

$$3) i) 3x = 12$$

$$\text{Sol} \Rightarrow \frac{3x}{3} = \frac{12}{3}$$

$$\Rightarrow x = 4$$

$$ii) 2y = 9$$

$$\text{Sol} \Rightarrow \frac{2y}{2} = \frac{9}{2}$$

$$\Rightarrow y = 4.5$$

$$iii) 5z = 8.5$$

$$\text{Sol} \Rightarrow \frac{5z}{5} = \frac{8.5}{5}$$

$$\Rightarrow z = 1.7$$

$$iv) 2.5m = 7.5$$

$$\text{Sol} \Rightarrow \frac{2.5m}{2.5} = \frac{7.5}{2.5}$$

$$\Rightarrow m = 3$$

$$v) 3.2p = 16$$

$$\text{Sol} \Rightarrow \frac{3.2p}{3.2} = \frac{16}{3.2}$$

$$\Rightarrow p = 5$$

$$vi) 2a = 4.6$$

$$\text{Sol} \Rightarrow \frac{2a}{2} = \frac{4.6}{2}$$

$$\Rightarrow a = 2.3$$

$$4) i) \frac{x}{2} = 5$$

$$\text{Sol} \Rightarrow \frac{x}{2} \times 2 = 5 \times 2$$

$$\Rightarrow x = 10$$

$$ii) \frac{y}{3} = -2$$

$$\text{Sol} \Rightarrow \frac{y}{3} \times 3 = -2 \times 3$$

$$\Rightarrow y = -6$$

$$iii) \frac{a}{5} = -15$$

$$\text{Sol} \Rightarrow \frac{a}{5} \times 5 = -15 \times 5$$

$$\Rightarrow a = -75$$

$$i) \frac{z}{4} = 3\frac{1}{4}$$

$$\text{Sol} \Rightarrow \frac{z}{4} \times 4 = 3\frac{1}{4} \times 4 = \frac{13}{1} \times \frac{4}{4}$$

$$\Rightarrow z = 13$$

$$v) \frac{m}{6} = 2\frac{1}{2}$$

$$\text{Sol} \Rightarrow \frac{m}{6} \times 6 = 2\frac{1}{2} \times 6 = 5 \times 3 = 15$$

$$\Rightarrow m = 15$$

$$vi) \frac{n}{7} = -2.8$$

$$\text{Sol} \Rightarrow \frac{n}{7} \times 7 = -2.8 \times 7$$

$$\Rightarrow n = -19.6$$

$$5) i) -2x = 8$$

$$\text{Sol} \Rightarrow \frac{-2x}{-2} = \frac{8}{-2}$$

$$\Rightarrow x = -4$$

$$ii) -3.5y = 14$$

$$\text{Sol} \Rightarrow \frac{-3.5y}{-3.5} = \frac{14}{-3.5}$$

$$\Rightarrow y = -4$$

$$iii) -5z = 4$$

$$\text{Sol} \Rightarrow \frac{-5z}{-5} = \frac{4}{-5}$$

$$\Rightarrow z = -0.8$$

$$iv) -5 = a + 3$$

$$\text{Sol} \Rightarrow a + 3 = -5$$

$$\Rightarrow a + 3 - 3 = -5 - 3$$

$$\Rightarrow a = -8$$

v) $2 = p + 5$

Sol $\Rightarrow p + 5 = 2$

$\Rightarrow p + 5 - 5 = 2 - 5$

$\Rightarrow p = -3$

vi) $5 = m - 2.7$

Sol $\Rightarrow m - 2.7 = 4.5$

$\Rightarrow m - 2.7 + 2.7 = 4.5 + 2.7$

$\Rightarrow m = 7.2$

vii) $3\frac{2}{5} = x - 2\frac{1}{3}$

Sol $\Rightarrow x - \frac{7}{3} = \frac{17}{5}$

$\Rightarrow x - \frac{7}{3} + \frac{7}{3} = \frac{17}{5} + \frac{7}{3}$

$\Rightarrow x = \frac{51}{15} + \frac{35}{15}$

$\Rightarrow x = \frac{86}{15}$

$\Rightarrow x = 5\frac{11}{15}$

viii) $5 = m + 3\frac{4}{7}$

Sol $\Rightarrow m + \frac{25}{7} = 5$

$\Rightarrow m + \frac{25}{7} - \frac{25}{7} = 5 - \frac{25}{7}$

$\Rightarrow \frac{35 - 25}{7} = \frac{10}{7}$

$\Rightarrow 1\frac{3}{7}$

$\Rightarrow m = 1\frac{3}{7}$

ix) $2\frac{1}{5} = y + 4$

Sol $\Rightarrow y + 4 = -\frac{11}{5}$

$\Rightarrow y + 4 - 4 = -\frac{11}{5} + 4$

$\Rightarrow y = -\frac{11}{5} + \frac{20}{5}$

$\Rightarrow \frac{9}{5}$

$\Rightarrow 1\frac{4}{5}$

$\Rightarrow y = 1\frac{4}{5}$