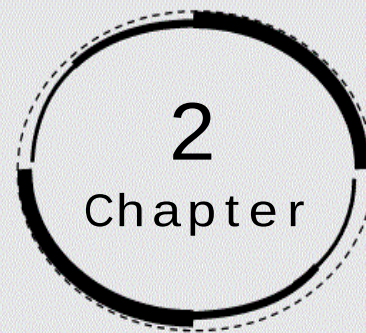


linear equations in one variable



Exercise 2.3

1. Solve and check result: $3x = 2x + 18$

Ans: $3x = 2x + 18$

On Transposing $2x$ to L.H.S, we obtain

$$3x - 2x = 18$$

$$x = 18$$

$$\text{L.H.S} = 3x = 3 \times 18 = 54$$

$$\text{R.H.S} = 2x + 18 = 2 \times 18 + 18 = 36 + 18 = 54$$

$$\text{L.H.S.} = \text{R.H.S.}$$

Hence, the result obtained above is correct.

2. Solve and check result: $5t - 3 = 3t - 5$

Ans: $5t - 3 = 3t - 5$

On Transposing $3t$ to L.H.S and -3 to R.H.S, we obtain

$$5t - 3 = -5 - (-3)$$

$$2t = -2$$

On dividing both sides by 2, we obtain

$$t = -1$$

$$\text{L.H.S} = 5t - 3 = 5 \times (-1) - 3 = -8$$

$$\text{R.H.S} = 3t - 5 = 3 \times (-1) - 5 = -3 - 5 = -8$$

$$\text{L.H.S.} = \text{R.H.S.}$$

Hence, the result obtained above is correct.

3. Solve and check result: $5x + 9 = 5 + 3x$

Ans: $5x + 9 = 5 + 3x$

On Transposing $3x$ to L.H.S and 9 to R.H.S, we obtain

$$5x - 3x = 5 - 9$$

$$2x = -4$$

On dividing both sides by 2, we obtain

$$x = -2$$

$$\text{L.H.S} = 5x + 9 = 5 \times (-2) + 9 = -10 + 9 = -1$$

$$\text{R.H.S} = 5 + 3x = 5 + 3 \times (-2) = 5 - 6 = -1$$

$$\text{L.H.S.} = \text{R.H.S.}$$

Hence, the result obtained above is correct.

4. Solve and check result: $4z + 3 = 6 + 2z$

Ans: $4z + 3 = 6 + 2z$

On Transposing $2z$ to L.H.S and 3 to R.H.S, we obtain

$$4z - 2z = 6 - 3$$

$$2z = 3$$

Dividing both sides by 2 , we obtain

$$\text{L.H.S} = 4z + 3 = 4 \times \left(\frac{3}{2}\right) + 3 = 6 + 3 = 9$$

$$\text{R.H.S} = 6 + 2z = 6 + 2 \times \left(\frac{3}{2}\right) = 6 + 3 = 9$$

$$\text{L.H.S.} = \text{R.H.S.}$$

Hence, the result obtained above is correct.

5. Solve and check result: $2x - 1 = 14 - x$

Ans: $2x - 1 = 14 - x$

Transposing x to L.H.S and 1 to R.H.S, we obtain

$$2x + x = 14 + 1$$

$$3x = 15$$

Dividing both sides by 3 , we obtain

$$x = 5$$

$$\text{L.H.S} = 2x - 1 = 2 \times (5) - 1 = 10 - 1 = 9$$

$$\text{R.H.S} = 14 - x = 14 - 5 = 9$$

$$\text{L.H.S.} = \text{R.H.S.}$$

Hence, the result obtained above is correct.

6. Solve and check result: $8x + 4 = 3(x - 1) + 7$

Ans: $8x + 4 = 3(x - 1) + 7$

$$8x + 4 = 3x - 3 + 7$$

Transposing $3x$ to L.H.S and 4 to R.H.S, we obtain

$$8x - 3x = -3 + 7 - 4$$

$$5x = -7 + 7$$

$$x = 0$$

$$\text{L.H.S} = 8x + 4 = 8 \times (0) + 4 = 4$$

$$\text{R.H.S} = 3(x - 1) + 7 = 3(0 - 1) + 7 = -3 + 7 = 4$$

$$\text{L.H.S.} = \text{R.H.S.}$$

Hence, the result obtained above is correct.

7. Solve and check result: $x = \frac{4}{5}(x + 10)$

Ans: $x = \frac{4}{5}(x + 10)$

Multiplying both sides by 5, we obtain

$$5x = 4(x + 10)$$

$$5x = 4x + 40$$

Transposing $4x$ to L.H.S, we obtain

$$5x = 4x + 40$$

$$x = 40$$

$$\text{L.H.S} = x = 40$$

$$\text{R.H.S} = \frac{4}{5}(x + 10) = \frac{4}{5}(40 + 10) = \frac{4}{5} \times 50 = 40$$

$$\text{L.H.S.} = \text{R.H.S.}$$

Hence, the result obtained above is correct.

8. Solve and check result: $\frac{2x}{3} + 1 = \frac{7x}{15} + 3$

Ans: $\frac{2x}{3} + 1 = \frac{7x}{15} + 3$

Transposing $\frac{7x}{15}$ to L.H.S and 1 to R.H.S, we obtain

$$\frac{2x}{3} - \frac{7x}{15} = 3 - 1$$

$$\frac{5 \times 2x - 7x}{15} = 2$$

$$\frac{3x}{15} = 2$$

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

Multiplying both sides by 5, we obtain

$$x = 10$$

$$\text{L.H.S} = \frac{2x}{3} + 1 = \frac{2 \times 10}{3} + 1 = \frac{2 \times 10 + 1 \times 3}{3} = \frac{23}{3}$$

$$\text{R.H.S} = \frac{7x}{15} + 3 = \frac{7 \times 10}{15} + 3 = \frac{7 \times 2}{3} + 3 = \frac{14}{3} + 3 = \frac{14 + 3 \times 3}{3} = \frac{23}{3}$$

$$\text{L.H.S.} = \text{R.H.S.}$$

Hence, the result obtained above is correct.

9. Solve and check result: $2y + \frac{5}{3} = \frac{26}{3} - y$

Ans: $2y + \frac{5}{3} = \frac{26}{3} - y$

Transposing y to L.H.S and $\frac{5}{3}$ to R.H.S, we obtain

$$2y + y = \frac{26}{3} - \frac{5}{3}$$

$$3y = \frac{21}{3} = 7$$

Dividing both sides by 3, we obtain

$$y = \frac{7}{3}$$

$$\text{L.H.S} = 2y + \frac{5}{3} = 2 \times \frac{7}{3} + \frac{5}{3} = \frac{14}{3} + \frac{5}{3} = \frac{19}{3}$$

$$\text{R.H.S} = \frac{26}{3} - y = \frac{26}{3} - \frac{7}{3} = \frac{19}{3}$$

L.H.S. = R.H.S. Hence, the result obtained above is correct.

10. Solve and check result: $3m = 5m - \frac{8}{5}$

Ans: $3m = 5m - \frac{8}{5}$

Transposing $5m$ to L.H.S, we obtain

$$3m - 5m = -\frac{8}{5}$$

$$-2m = -\frac{8}{5}$$

Dividing both sides by -2 , we obtain

$$m = \frac{4}{5}$$

$$\text{L.H.S} = 3m = 3 \times \frac{4}{5} = \frac{12}{5}$$

$$\text{R.H.S} = 5m - \frac{8}{5} = 5 \times \frac{4}{5} - \frac{8}{5} = \frac{12}{5}$$

L.H.S. = R.H.S.

Hence, the result obtained above is correct.

Exercise 2.5

1. Solve the linear equation $\frac{x}{2} - \frac{1}{5} = \frac{x}{3} + \frac{1}{4}$

Ans: $\frac{x}{2} - \frac{1}{5} = \frac{x}{3} + \frac{1}{4}$

L.C.M. of the denominators, 2,3,4,and 5, is.

Multiplying both sides by 60, we obtain

$$60\left(\frac{x}{2} - \frac{1}{5}\right) = 60\left(\frac{x}{3} + \frac{1}{4}\right)$$

$$\Rightarrow 30x - 12 = 20x + 15 \text{ (Opening the brackets)}$$

$$\Rightarrow 30x - 20x = 15 + 12$$

$$\Rightarrow 10x = 27$$

$$\Rightarrow x = \frac{27}{10}$$

2. Solve the linear equation $\frac{n}{2} - \frac{3n}{4} + \frac{5n}{6} = 21$

Ans: $\frac{n}{2} - \frac{3n}{4} + \frac{5n}{6} = 21$

L.C.M. of the denominators, 2,4, and 6 is 12.

Multiplying both sides by 12, we obtain

$$6n - 9n + 10n = 252$$

$$\Rightarrow 7n = 252$$

$$\Rightarrow n = \frac{252}{7}$$

$$\Rightarrow n = 36$$

3. Solve the linear equation $x + 7 - \frac{8x}{3} = \frac{17}{6} - \frac{5x}{2}$

Ans: $x + 7 - \frac{8x}{3} = \frac{17}{6} - \frac{5x}{2}$

L.C.M. of the denominators, 2,3, and 6, is 6.

Multiplying both sides by 6, we obtain

$$6x + 42 - 16x = 17 - 15x$$

Simplifying,

$$\Rightarrow 6x - 16x + 15x = 17 - 42$$

$$\Rightarrow 5x = -25$$

$$\Rightarrow x = \frac{-25}{5}$$

$$\Rightarrow x = -5$$

4. Solve the linear equation $\frac{x-5}{3} = \frac{x-3}{5}$

Ans: $\frac{x-5}{3} = \frac{x-3}{5}$

L.C.M. of the denominators, 3 and 5, is 15.

Multiplying both sides by 15, we obtain

$$5(x-5) = 3(x-3)$$

$$\Rightarrow 5x - 25 = 3x - 9 \text{ (Opening the brackets)}$$

Simplifying,

$$\Rightarrow 5x - 3x = 25 - 9$$

$$\Rightarrow 2x = 16$$

$$\Rightarrow x = \frac{16}{2}$$

$$\Rightarrow x = 8$$

5. Solve the linear equation $\frac{3t-2}{4} - \frac{2t+3}{3} = \frac{2}{3} - t$

Ans: $\frac{3t-2}{4} - \frac{2t+3}{3} = \frac{2}{3} - t$

L.C.M. of the denominators, 3 and 4, is 12.

Multiplying both sides by 12, we obtain

$$3(3t-2) - 4(2t+3) = 8 - 12t$$

$$\Rightarrow 9t - 6 - 8t - 12 = 8 - 12t \text{ (Opening the brackets)}$$

Simplifying,

$$\Rightarrow 9t - 8t + 12t = 8 + 6 + 12$$

$$\Rightarrow 13t = 26$$

$$\Rightarrow t = \frac{26}{13}$$

$$\Rightarrow t = 2$$

6. Solve the linear equation $m - \frac{m-1}{2} = 1 - \frac{m-2}{3}$

Ans: $m - \frac{m-1}{2} = 1 - \frac{m-2}{3}$

L.C.M. of the denominators, 2 and 3, is 6.

Multiplying both sides by 6, we obtain

$$6m - 3(m - 1) = 6 - 2(m - 2)$$

$$\Rightarrow 6m - 3m + 3 = 6 - 2m + 4 \text{ (Opening the brackets)}$$

Simplifying,

$$\Rightarrow 6m - 3m + 2m = 6 + 4 - 3$$

$$\Rightarrow 5m = 7$$

$$\Rightarrow m = \frac{7}{5}$$

7. Simplify and solve the linear equation $3(t - 3) = 5(2t + 1)$

Ans: $3(t - 3) = 5(2t + 1)$

$$\Rightarrow 3t - 9 = 10t + 5 \text{ (Opening the brackets)}$$

$$\Rightarrow -9 - 5 = 10t - 3t$$

Simplifying,

$$\Rightarrow -14 = 7t$$

$$\Rightarrow t = \frac{-14}{7}$$

$$\Rightarrow t = -2$$

8. Simplify and solve the linear equation $15(y - 4) - 2(y - 9) + 5(y + 6) = 0$

Ans: $15(y - 4) - 2(y - 9) + 5(y + 6) = 0$

$$\Rightarrow 15y - 60 - 2y + 18 + 5y + 30 = 0 \text{ (Opening the brackets)}$$

$$\Rightarrow 18y - 12 = 0$$

Simplifying,

$$\Rightarrow 18y = 12$$

$$\Rightarrow y = \frac{12}{18} = \frac{2}{3}$$

9. Simplify and solve the linear equation

$$3(5z - 7) - 2(9z - 11) = 4(8z - 13) - 17$$

Ans: $3(5z - 7) - 2(9z - 11) = 4(8z - 13) - 17$

$$\Rightarrow 15z - 21 - 18z + 22 = 32z - 52 - 17 \text{ (Opening the brackets)}$$

Simplifying,

$$\Rightarrow -3z + 1 = 32z - 69$$

$$\Rightarrow -3z - 32z = -69 - 1$$

$$\Rightarrow -35z = -70$$

$$\Rightarrow z = \frac{70}{35} = 2$$

10. Simplify and solve the linear equation $0.25(4f - 3) = 0.05(10f - 9)$

Ans: $0.25(4f - 3) = 0.05(10f - 9)$

$$\frac{1}{4}(4f - 3) = \frac{1}{20}(10f - 9)$$

Multiplying both sides by 20 , we obtain

$$5(4f - 3) = 10f - 9$$

$$\Rightarrow 20f - 15 = 10f - 9 \text{ (Opening the brackets)}$$

Simplifying,

$$\Rightarrow 20f - 10f = -9 + 15$$

$$\Rightarrow 10f = 6$$

$$\Rightarrow f = \frac{3}{5} = 0.6$$