



SpeedLabs

MATHS

CBSE 8th

TEEVRA EDUTECH PVT. LTD.

Linear Equation

Exercise-2.5

Q.1 Solve the following linear equations, $\frac{x}{2} - \frac{1}{5} = \frac{x}{3} + \frac{1}{4}$.

Sol: The given linear equation is

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

$$\Rightarrow \frac{x}{2} - \frac{x}{3} = \frac{1}{4} + \frac{1}{5} \quad \left(\text{Transposing } \frac{x}{3} \text{ to L. H. S. and } \frac{1}{5} \text{ to R. H. S.} \right)$$

$$\Rightarrow \frac{3x - 2x}{6} = \frac{5 + 4}{20} \Rightarrow \frac{x}{6} = \frac{9}{20}$$

$$\Rightarrow \frac{x}{6} = \frac{9}{20}$$

$$\Rightarrow \frac{x \times 6}{6} = \frac{9 \times 6}{20} \quad \left(\text{Multiplying both sides by 6} \right)$$

$$\text{or } x = \frac{27}{10}$$

For checking:

On putting $x = \frac{27}{10}$ in L.H.S. and R.H.S. of the given equation,

$$\text{L.H.S.} = \frac{x}{2} - \frac{1}{5} = \frac{27}{2 \times 10} - \frac{1}{5} = \frac{27}{20} - \frac{1}{5} = \frac{27-4}{20} = \frac{23}{20}$$

$$\text{R.H.S.} = \frac{x}{3} + \frac{1}{4} = \frac{27}{3 \times 10} + \frac{1}{4} = \frac{9}{10} + \frac{1}{4} = \frac{18+5}{20} = \frac{23}{20}$$

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

Hence, the value of $x = \frac{27}{10}$ is the required solution.

Q.2 Solve the following linear equations, $\frac{n}{2} - \frac{3n}{4} + \frac{5n}{6} = 21$.

Sol: The given linear equation is $\frac{n}{2} - \frac{3n}{4} + \frac{5n}{6} = 21$

$$\frac{6n - 9n + 10n}{12} = 21 \quad \left(\text{L.C.M. of 2, 4 and 6 is 12} \right)$$

$$\Rightarrow \frac{7n}{12} = \frac{21}{1}$$

$$\Rightarrow 7n = 21 \times 12 \quad (\text{By cross multiplication})$$

$$\Rightarrow \frac{7n}{7} = \frac{21 \times 12}{7} \quad (\text{Dividing both sides by 7})$$

$$\text{or } n = 36$$

For checking:

On putting $n = 36$ in L.H.S. of the given equation,

$$\text{L.H.S.} = \frac{n}{2} - \frac{3n}{4} + \frac{5n}{6}$$

$$= \frac{36}{2} - \frac{3 \times 36}{4} + \frac{5 \times 36}{6}$$

$$= 18 - 3 \times 9 + 5 \times 6$$

$$= 18 - 27 + 30 = 21 = \text{R.H.S.}$$

Hence, the value of $n = 36$ is the required solution.

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

Sol: The given linear equation is

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

$$\Rightarrow \frac{x}{1} - \frac{8x}{3} + \frac{5x}{2} = \frac{17}{6} - \frac{7}{1} \quad \left(\text{Tranposing } \frac{5x}{2} \text{ to L. H. S. and } 7 \text{ to R. H. S.} \right)$$

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

$$\Rightarrow \left(\frac{21x - 16x}{6} \right) = \frac{-25}{6}$$

$$\Rightarrow \frac{5x}{6} = \frac{-25}{6}$$

$$\Rightarrow 5x \times 6 = 6 \times -25 \quad (\text{By cross multiplication})$$

$$\Rightarrow 30x = -150$$

$$\Rightarrow x = \frac{-150}{30} \quad (\text{Dividing both sides by 30})$$

$$\text{or } x = -5$$

For checking:

On putting, $x = -5$ in L.H.S. and R.H.S. of the given equation,

$$\text{L.H.S.} = x + 7 - \frac{8x}{3} = -5 + 7 - \frac{8 \times (-5)}{3} = 2 + \frac{40}{3} = \frac{6+40}{3} = \frac{46}{3}$$

$$\text{R.H.S.} = \frac{17}{6} - \frac{5x}{2} = \frac{17}{6} - \frac{5 \times (-5)}{2} = \frac{17}{6} + \frac{25}{2} = \frac{17+75}{6} = \frac{92}{6}$$

$$= \frac{46}{3} = \text{L.H.S.}$$

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

Hence, the value of $x = -5$ is the required solution.

Q.4 Solve the following linear equations, $\frac{x-5}{3} = \frac{x-3}{5}$.

Sol: The given linear equation is

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

$$\Rightarrow 5 \times (x-5) = 3 \times (x-3) \quad (\text{By cross multiplication})$$

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

$$\Rightarrow 5x - 3x = -9 + 25 \quad (\text{Transposing } 3x \text{ to L.H.S. and } 25 \text{ to R.H.S.})$$

$$\Rightarrow 2x = 16$$

$$\Rightarrow x = \frac{16}{2} \quad (\text{Dividing by } 2 \text{ on both sides})$$

or $x = 8 \Rightarrow$ For checking

On putting $x = 8$ in L.H.S. and R.H.S. of the given equation,

$$\text{L.H.S.} = \frac{x-5}{3} = \frac{8-5}{3} = \frac{3}{3} = 1$$

$$\text{R.H.S.} = \frac{x-3}{5} = \frac{8-3}{5} = \frac{5}{5} = 1$$

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

Hence, the value of $x = 8$ is the required solution.

Q.5 Solve the following linear equations, $\frac{3t-2}{4} - \frac{2t+3}{3} = \frac{2}{3} - t$.

Sol: The given linear equation is

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

$$\Rightarrow \frac{3(3t-2)-4(2t+3)}{12} = \frac{2-3t}{3} \quad (\text{L.C.M. of 4 and 3 is 12})$$

$$\Rightarrow \frac{9t-6-8t-12}{12} = \frac{2-3t}{3}$$

$$\Rightarrow \frac{t-18}{12} = \frac{2-3t}{3}$$

$$\Rightarrow t-18 = 12 \times \frac{(2-3t)}{3} = 4(2-3t) \quad (\text{Multiplication both sides by 12})$$

$$\Rightarrow t-18 = 8-12t$$

$$\Rightarrow t+12t = 8+18 \quad (\text{Transposing } 12t \text{ to L.H.S. and } 18 \text{ to R.H.S.})$$

$$\Rightarrow 13t = 26$$

$$\Rightarrow t = \frac{26}{13} \quad (\text{Dividing both sides by 13})$$

$$\text{or } t = 2$$

For checking;

On putting $t = 2$ in L.H.S. and R.H.S. of the given equation,

$$\text{L.H.S.} = \frac{3t-2}{4} - \frac{2t+3}{3} = \frac{3 \times 2 - 2}{4} - \frac{2 \times 2 + 3}{3}$$

$$= \frac{6-2}{4} - \frac{4+3}{3} = \frac{4}{4} - \frac{7}{3}$$

$$= 1 - \frac{7}{3} = \frac{3-7}{3} = \frac{-4}{3}$$

$$\text{R.H.S.} = \frac{2}{3} - t = \frac{2}{3} - \frac{2}{1}$$

$$= \frac{2-6}{3} = \frac{-4}{3}$$

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

Hence, the value of $t = 2$ is the required solution.

Q.6 Solve the following linear equations, $m - \frac{m-1}{2} = 1 - \frac{m-2}{3}$.

Sol: The given linear equation is

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

$$\Rightarrow \frac{m}{1} - \frac{m-1}{2} + \frac{m-2}{3} = 1 \quad \left(\text{Tranposing } \frac{m-2}{3} \text{ to R. H. S.} \right)$$

$$\Rightarrow \frac{6m-3(m-1)+ 2(m-2)}{6} = 1 \quad (\text{L.C.M. of 1, 2 and 3 is 6})$$

$$\Rightarrow \frac{6m-3m+3+2m-4}{6} = 1$$

$$\Rightarrow \frac{5m-1}{6} = 1$$

$$\Rightarrow 5m - 1 = 6 \quad (\text{Multiplying both sides by 6})$$

$$\Rightarrow 5m = 6 + 1 \quad (\text{Transposing 1 to R.H.S.})$$

$$\Rightarrow 5m = 7$$

$$\Rightarrow m = \frac{7}{5} \quad (\text{Dividing both sides by 5})$$

For checking:

On putting $m = \frac{7}{5}$ in L.H.S. and R.H.S. of the given equation,

$$\text{L.H.S.} = m - \frac{m-1}{2} = \frac{7}{5} - \frac{\frac{7}{5}-1}{2} = \frac{7}{5} - \frac{\frac{7}{5}-\frac{5}{5}}{2} = \frac{7}{5} - \frac{\frac{7-5}{5}}{2}$$

$$= \frac{7}{5} - \frac{\frac{2}{5}}{2} = \frac{7}{5} - \frac{2}{5 \times 2} = \frac{7}{5} - \frac{1}{5} = \frac{7-1}{5} = \frac{6}{5}$$

$$\text{R.H.S.} = 1 - \frac{m-2}{3} = 1 - \frac{\frac{7}{5}-2}{3}$$

$$= 1 - \frac{\frac{7-10}{5}}{3} = 1 - \frac{\left(\frac{-3}{5}\right)}{3}$$

$$= 1 + \frac{3}{5 \times 3} = 1 + \frac{1}{5} = \frac{5+1}{5} = \frac{6}{5}$$

\Rightarrow L.H.S. = R.H.S.

Hence, the value of $m = \frac{7}{5}$ is the required solution.

Q.7 Simplify and solve the following linear equations, $3(t - 3) = 5(2t + 1)$.

Sol: The given linear equation is $3(t-3) = 5(2t + 1)$

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

$$\Rightarrow 3t - 10t = 9 + 5 \text{ (Transposing 9 to R.H.S. and } 10t \text{ to L.H.S.)}$$

$$\Rightarrow -7t = 14$$

$$\Rightarrow t = \frac{14}{-7} \text{ (Dividing both sides by } -7)$$

$$\text{Or } t = -2$$

For checking:

$$\text{L.H.S.} = 3(t - 3) = 3(-2 - 3) = 3(-5) = -15$$

$$\text{R.H.S.} = 5(2t + 1) = 5\{2 \times (-2) + 1\} = 5\{-4 + 1\} = 5(-3) = -15$$

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

Hence, $t = -2$ is the required solution.

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

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

$$\Rightarrow 15y - 60 - 2y + 18 + 5y + 30 = 0$$

$$\Rightarrow 15y + 5y - 2y - 60 + 30 + 18 = 0$$

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

$$\Rightarrow 18y = 12 \text{ (Transposing 12 to R.H.S.)}$$

$$\Rightarrow y = \frac{12}{18} \text{ (Dividing both sides by 18)}$$

$$\text{or } y = \frac{2}{3}$$

For checking:

On putting $y = \frac{2}{3}$ in L.H.S. of the given equation,

$$\text{L.H.S.} = 15(y - 4) - 2(y - 9) + 5(y + 6)$$

$$= 15\left(\frac{2}{3} - 4\right) - 2\left(\frac{2}{3} - 9\right) + 5\left(\frac{2}{3} + 6\right)$$

$$\begin{aligned}
&= 15 \left(\frac{2-12}{3} \right) - 2 \left(\frac{2-27}{3} \right) + 5 \left(\frac{2+18}{3} \right) \\
&= 15 \times \left(\frac{-10}{3} \right) - 2 \times \left(\frac{-25}{3} \right) + 5 \times \left(\frac{20}{3} \right) \\
&= \frac{(-150)}{3} + \frac{50}{3} + \frac{100}{3} = \frac{-150+50+100}{3} \\
&= \frac{-150+150}{3} = \frac{0}{3} = 0 = \text{R. H. S.}
\end{aligned}$$

Hence, $y = \frac{2}{3}$ is the required solution.

Q.9: Simplify and solve the following linear equations, $3(5z - 7) - 2(9z - 11) = 4(8z - 13) - 17$.

Sol: The given linear equation is $3(5z - 7) - 2(9z - 11) = 4(8z - 13) - 17$

$$\Rightarrow 15z - 21 - 18z + 22 = 32z - 52 - 17$$

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

$$\Rightarrow -3z - 32z = -69 - 1 \text{ (Transposing 1 to R.H.S. and 32z to L.H.S.)}$$

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

$$\Rightarrow z = \frac{-70}{-35} \text{ (Dividing both sides by -35)}$$

$$\text{Or } z = 2$$

For checking:

On putting $z = 2$ in L.H.S. and R.H.S. of the given equation,

$$\text{L.H.S.} = 3(5z - 7) - 2(9z - 11)$$

$$= 3(5 \times 2 - 7) - 2(9 \times 2 - 11)$$

$$= 3(10 - 7) - 2(18 - 11) = 3 \times 3 - 2 \times 7$$

$$= 9 - 14 = -5$$

$$\text{R.H.S.} = 4(8z - 13) - 17 = 4(8 \times 2 - 13) - 17$$

$$= 4(16 - 13) - 17$$

$$= 4 \times 3 - 17 = 12 - 17 = -5$$

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

Hence, $Z = 2$ is the required solution.

Q.10 Simplify and solve the following linear equations, $0.25(4f - 3) = 0.05(10f - 9)$.

Sol: The given equation is $0.25(4f - 3) = 0.05(10f - 9)$

$$\Rightarrow 1.00f - 0.75 = 0.50f - 0.45$$

$$\Rightarrow 1.00f - 0.50f = -0.45 + 0.75 \text{ (Transposing } 0.50f \text{ to L.H.S. and } 0.75 \text{ to R.H.S.)}$$

$$\Rightarrow 0.50f = 0.3$$

$$\Rightarrow f = \frac{0.3}{0.50} \text{ (Dividing both sides by } 0.50\text{.)}$$

$$\Rightarrow \text{or } f = 0.6$$

For checking:

On putting $f = 0.6$ in L.H.S. and R.H.S. of the given equation,

$$\text{L.H.S.} = 0.25(4f - 3) = 0.25(4 \times 0.6 - 3)$$

$$= 0.25(2.4 - 3) = 0.25 \times (-0.6) = -0.150$$

$$\text{R.H.S.} = 0.05(10f - 9) = 0.05(10 \times 0.6 - 9)$$

$$= 0.05 \times (6.0 - 9) = 0.05 \times -3 = -0.15$$

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

Hence, $f = 0.6$ is the required solution.