

Linear Equations in One Variable: Exercise 2.5

Solve the following linear equations.

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

Sol. Given equation: $\frac{x}{2} - \frac{1}{5} = \frac{x}{3} + \frac{1}{4}$

Taking all the variable terms in left side and constant term in right side,

$$\begin{aligned}\frac{x}{2} - \frac{x}{3} &= \frac{1}{4} + \frac{1}{5} \\ \frac{3x - 2x}{6} &= \frac{5 + 4}{20} \\ \frac{x}{6} &= \frac{9}{20} \\ x &= \frac{9 \times 6}{20} \\ x &= \frac{27}{10}\end{aligned}$$

Q.2 $\frac{n}{2} - \frac{3n}{4} + \frac{5n}{6} = 21$

Sol. Given equation: $\frac{n}{2} - \frac{3n}{4} + \frac{5n}{6} = 21$

$$\begin{aligned}\frac{6n - 9n + 10n}{6} &= 21 \\ \frac{7n}{12} &= 21 \\ n &= \frac{21 \times 12}{7} \\ n &= 36\end{aligned}$$

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

Sol. Given equation: $x + 7 - \frac{8x}{3} = \frac{17}{6} - \frac{5x}{2}$

Taking all the variable terms in left side and constant term in right side,

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

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

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

$$x = -5$$

$$\text{Q.4 } \frac{x-5}{3} = \frac{x-3}{5}$$

$$\text{Sol. Given equation: } \frac{x-5}{3} = \frac{x-3}{5}$$

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

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

Taking all the variable terms in left side and constant term in right side,

$$5x - 3x = -9 + 25$$

$$2x = 16$$

$$x = 16/2 = 8$$

$$\text{Q.5 } \frac{3t-2}{4} - \frac{2t+3}{3} = \frac{2}{3} - t$$

$$\text{Sol. Given Equation: } \frac{3t-2}{4} - \frac{2t+3}{3} = \frac{2}{3} - t$$

Taking all the variable terms in left side and constant term in right side,

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

$$\frac{3(3t-2) - 4(2t+3) + 12t}{4} = \frac{2}{3}$$

$$\frac{9t - 6 - 8t - 12 + 12t}{4} = \frac{2}{3}$$

$$\frac{13t - 18}{12} = \frac{2}{3}$$

By cross multiply,

$$39t - 54 = 24$$

Now take the constant term in right hand side,

$$39t = 24 + 54$$

$$39t = 78$$

$$t = 78/39$$

$$t = 2$$

Q.6 $m - \frac{m-1}{2} + \frac{m-2}{3} = 1$

Sol. Given equation: $m - \frac{m-1}{2} + \frac{m-2}{3} = 1$

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

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

$$5m-1 = 6$$

Now take the constant term in right hand side,

$$5m = 6+1$$

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

Simplify and solve the following linear equations.

Q.7 $3(t-3) = 5(2t+1)$

Sol. Given Equation: $3(t-3) = 5(2t+1)$

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

Taking all the variable terms in left side and constant term in right side,

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

$$-7t = 14$$

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

$$t = -2$$

Q.8 $15(y-4) - 2(y-9) + 5(y+6) = 0$

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

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

$$18y - 12 = 0$$

Taking all the variable terms in left side and constant term in right side,

$$18y = 12$$

$$y = \frac{12}{18}$$

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

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

Sol. Given equation: $3(5z-7) - 2(9z-11) = 4(8z-13) - 17$

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

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

Taking all the variable terms in left side and constant term in right side,

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

$$-35z = -70$$

$$z = \frac{-70}{-35}$$

$$z = 2$$

Q.10 $0.25(4f - 3) = 0.05(10f - 9)$

Sol. Given equation: $0.25(4f - 3) = 0.05(10f - 9)$

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

Taking all the variable terms in left side and constant term in right side,

$$1.00f - 0.50f = -0.45 + 0.75$$

$$0.50f = 0.3$$

$$f = \frac{0.30}{0.50}$$

$$f = 0.6$$