

Mathematics

(Chapter - 2) (Linear Equations in One Variable) (Exercise 2.1) (Class - VIII)

Question 1:

Solve the following: $3x = 2x + 18$

Answer 1:

$$3x = 2x + 18$$

$$\Rightarrow 3x - 2x = 18 \quad \Rightarrow x = 18$$

To check: $3x = 2x + 18$

$$\Rightarrow 3 \times 18 = 2 \times 18 + 18 \quad \Rightarrow 54 = 36 + 18$$

$$\Rightarrow 54 = 54 \quad \Rightarrow \text{L.H.S.} = \text{R.H.S.}$$

Hence, it is correct.

Question 2:

Solve the following: $5t - 3 = 3t - 5$

Answer 2:

$$5t - 3 = 3t - 5$$

$$\Rightarrow 5t - 3t = -5 + 3 \quad \Rightarrow 2t = -2 \quad \Rightarrow t = \frac{-2}{2} = -1$$

To check: $5t - 3 = 3t - 5$

$$\Rightarrow 5 \times (-1) - 3 = 3 \times (-1) - 5 \quad \Rightarrow -5 - 3 = -3 - 5 \quad \Rightarrow -8 = -8$$

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

Hence, it is correct.

Question 3:

Solve the following: $5x + 9 = 5 + 3x$

Answer 3:

$$5x + 9 = 5 + 3x$$

$$\Rightarrow 5x - 3x = 5 - 9 \quad \Rightarrow 2x = -4 \quad \Rightarrow x = \frac{-4}{2} = -2$$

To check: $5x + 9 = 5 + 3x$

$$\Rightarrow 5 \times (-2) + 9 = 5 + 3 \times (-2) \quad \Rightarrow -10 + 9 = 5 - 6 \quad \Rightarrow -1 = -1$$

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

Hence, it is correct.

Question 4:

Solve the following: $4z + 3 = 6 + 2z$

Answer 4:

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

$$\Rightarrow 4z - 2z = 6 - 3 \quad \Rightarrow 2z = 3 \quad \Rightarrow z = \frac{3}{2}$$

To check: $4z + 3 = 6 + 2z$

$$\Rightarrow 4 \times \frac{3}{2} + 3 = 6 + 2 \times \frac{3}{2} \quad \Rightarrow 2 \times 3 + 3 = 6 + 3 \quad \Rightarrow 6 + 3 = 9$$

$$\Rightarrow 9 = 9 \quad \Rightarrow \text{L.H.S.} = \text{R.H.S.}$$

Hence, it is correct.

Question 5:

Solve the following: $2x - 1 = 14 - x$

Answer 5:

$$2x - 1 = 14 - x$$

$$\Rightarrow 2x + x = 14 + 1 \quad \Rightarrow 3x = 15 \quad \Rightarrow x = \frac{15}{3} = 5$$

To check: $2x - 1 = 14 - x$

$$\Rightarrow 2 \times 5 - 1 = 14 - 5 \quad \Rightarrow 10 - 1 = 9 \quad \Rightarrow 9 = 9$$

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

Hence, it is correct.

Question 6:

Solve the following: $8x + 4 = 3(x - 1) + 7$

Answer 6:

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

$$\Rightarrow 8x + 4 = 3x - 3 + 7 \quad \Rightarrow 8x - 3x = -3 + 7 - 4 \quad \Rightarrow 5x = 0$$

$$\Rightarrow x = \frac{0}{5} = 0$$

To check:

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

$$\Rightarrow 8 \times 0 + 4 = 3(0 - 1) + 7 \Rightarrow 0 + 4 = 3 \times (-1) + 7 \quad \Rightarrow 4 = -3 + 7$$

$$\Rightarrow 4 = 4 \quad \Rightarrow \text{L.H.S.} = \text{R.H.S.}$$

Hence, it is correct.

Question 7:

Solve the following: $x = \frac{4}{5}(x + 10)$

Answer 7:

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

$$\Rightarrow 5x = 4(x + 10) \quad \Rightarrow 5x = 4x + 40 \quad \Rightarrow 5x - 4x = 40$$

$$\Rightarrow x = 40$$

To check:

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

$$\Rightarrow 40 = \frac{4}{5}(40 + 10)$$

$$\Rightarrow 40 = \frac{4}{5} \times 50 \Rightarrow 40 = 4 \times 10$$

$$\Rightarrow 40 = 40$$

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

Hence, it is correct.

Question 8:

Solve the following: $\frac{2x}{3} + 1 = \frac{7x}{15} + 3$

Answer 8:

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

$$\Rightarrow \frac{2x}{3} - \frac{7x}{15} = 3 - 1 \quad \Rightarrow \frac{10x - 7x}{15} = 2 \quad \Rightarrow 3x = 30 \quad \Rightarrow x = \frac{30}{3} = 10$$

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

$$\Rightarrow \frac{2 \times 10}{3} + 1 = \frac{7 \times 10}{15} + 3 \Rightarrow \frac{20}{3} + 1 = \frac{14}{3} + 3 \Rightarrow \frac{20+3}{3} = \frac{14+9}{3} \Rightarrow \frac{23}{3} = \frac{23}{3}$$

$\Rightarrow$ L.H.S. = R.H.S. Hence, it is correct.

Question 9:

Solve the following: $2y + \frac{5}{3} = \frac{26}{3} - y$

Answer 9:

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

$$\Rightarrow 2y + y = \frac{26}{3} - \frac{5}{3} \quad \Rightarrow 3y = \frac{26-5}{3} \quad \Rightarrow 3y = \frac{21}{3}$$

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

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

$$\Rightarrow 2 \times \frac{7}{3} + \frac{5}{3} = \frac{26}{3} - \frac{7}{3} \Rightarrow \frac{14}{3} + \frac{5}{3} = \frac{26-7}{3} \Rightarrow \frac{14+5}{3} = \frac{26-7}{3}$$

$$\Rightarrow \frac{19}{3} = \frac{19}{3} \quad \Rightarrow \text{L.H.S.} = \text{R.H.S.}$$

Hence, it is correct.

Question 10:

Solve the following: $3m = 5m - \frac{8}{5}$

Answer 10:

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

$$\Rightarrow 3m - 5m = -\frac{8}{5} \quad \Rightarrow -2m = -\frac{8}{5} \quad \Rightarrow m = \frac{-8}{5 \times (-2)} \quad \Rightarrow m = \frac{4}{5}$$

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

$$\Rightarrow 3 \times \frac{4}{5} = 5 \times \frac{4}{5} - \frac{8}{5} \Rightarrow \frac{12}{5} = 4 - \frac{8}{5} \Rightarrow \frac{12}{5} = \frac{20-8}{5} \Rightarrow \frac{12}{5} = \frac{12}{5}$$

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

Hence, it is correct.

Mathematics

(Chapter – 2) (Linear Equations in One Variable) (Exercise 2.2)
(Class – VIII)

Question 1:

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

Answer 1:

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

To check:

$$\begin{aligned}\frac{x}{2} - \frac{1}{5} &= \frac{x}{3} + \frac{1}{4} \\ \Rightarrow \frac{27}{10 \times 2} - \frac{1}{5} &= \frac{27}{10 \times 3} + \frac{1}{4} & \Rightarrow \frac{27}{20} - \frac{1}{5} = \frac{9}{10} + \frac{1}{4} & \Rightarrow \frac{27 - 4}{20} = \frac{18 + 5}{20} & \Rightarrow \frac{23}{20} = \frac{23}{20} \\ \Rightarrow \text{L.H.S.} &= \text{R. H. S.}\end{aligned}$$

Therefore, it is correct.

Question 2:

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

Answer 2:

$$\begin{aligned}\frac{n}{2} - \frac{3n}{4} + \frac{5n}{6} &= 21 \\ \Rightarrow \frac{6n - 9n + 10n}{12} &= 21 & \Rightarrow \frac{7n}{12} = 21 & \Rightarrow n = \frac{21 \times 12}{7} & \Rightarrow n = 36\end{aligned}$$

To check:

$$\begin{aligned}\frac{n}{2} - \frac{3n}{4} + \frac{5n}{6} &= 21 \\ \Rightarrow \frac{36}{2} - \frac{3 \times 36}{4} + \frac{5 \times 36}{6} &= 21 & \Rightarrow 18 - 27 + 30 = 21 & \Rightarrow 21 = 21 \\ \Rightarrow \text{L.H.S.} &= \text{R. H. S.}\end{aligned}$$

Therefore, it is correct.

Question 3:

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

Answer 3:

$$\begin{aligned}x + 7 - \frac{8x}{3} &= \frac{17}{6} - \frac{5x}{2} \\ \Rightarrow \frac{x}{1} - \frac{8x}{3} + \frac{5x}{2} &= \frac{17}{6} - \frac{7}{1} \\ \Rightarrow \frac{6x - 16x + 15x}{6} &= \frac{17 - 42}{6} \\ \Rightarrow \frac{5x}{6} &= \frac{-25}{6} \\ \Rightarrow x &= \frac{-25 \times 6}{6 \times 5} & \Rightarrow x = -5\end{aligned}$$

To check:

$$\begin{aligned}x+7-\frac{8x}{3} &= \frac{17}{6}-\frac{5x}{2} \\ \Rightarrow -5+7-\frac{8 \times (-5)}{3} &= \frac{17}{6}-\frac{5 \times (-5)}{2} \quad \Rightarrow 2+\frac{40}{3} = \frac{17}{6}+\frac{25}{2} \\ \Rightarrow \frac{6+40}{3} &= \frac{17+75}{6} \quad \Rightarrow \frac{46}{3} = \frac{92}{6} \quad \Rightarrow \frac{46}{3} = \frac{46}{3} \\ \Rightarrow \text{L.H.S.} &= \text{R. H. S.}\end{aligned}$$

Therefore, it is correct.

Question 4:

Solve the following linear equation: $\frac{x-5}{3} = \frac{x-3}{5}$

Answer 4:

$$\begin{aligned}\frac{x-5}{3} &= \frac{x-3}{5} \\ \Rightarrow 5 \times (x-5) &= 3(x-3) \quad \Rightarrow 5x-25=3x-9 \\ \Rightarrow 5x-3x &= -9+25 \quad \Rightarrow 2x=16 \quad \Rightarrow x = \frac{16}{2} = 8\end{aligned}$$

To check:

$$\begin{aligned}\frac{x-5}{3} &= \frac{x-3}{5} \\ \Rightarrow \frac{8-5}{3} &= \frac{8-3}{5} \quad \Rightarrow \frac{3}{3} = \frac{5}{5} \quad \Rightarrow 1 = 1 \\ \Rightarrow \text{L.H.S.} &= \text{R. H. S.}\end{aligned}$$

Therefore, it is correct.

Question 5:

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

Answer 5:

$$\begin{aligned}\frac{3t-2}{4} - \frac{2t+3}{3} &= \frac{2}{3} - t \\ \Rightarrow \frac{3t-2}{4} - \frac{2t+3}{3} + t &= \frac{2}{3} \\ \Rightarrow \frac{3(3t-2) - 4(2t+3) + 12t}{12} &= \frac{2}{3} \\ \Rightarrow \frac{9t-6-8t-12+12t}{12} &= \frac{2}{3} \\ \Rightarrow \frac{13t-18}{12} &= \frac{2}{3} \\ \Rightarrow 3 \times (13t-18) &= 2 \times 12 \\ \Rightarrow 39t-54 &= 24 \quad \Rightarrow 39t = 24+54 \\ \Rightarrow 39t &= 78 \quad \Rightarrow t = \frac{78}{39} = 2\end{aligned}$$

To check:

$$\begin{aligned} \frac{3t-2}{4} - \frac{2t+3}{3} &= \frac{2}{3} - t \\ \Rightarrow \frac{3 \times 2 - 2}{4} - \frac{2 \times 2 + 3}{3} &= \frac{2}{3} - 2 \quad \Rightarrow \frac{6-2}{4} - \frac{4+3}{3} = \frac{2-6}{3} \\ \Rightarrow \frac{4}{4} - \frac{7}{3} &= \frac{-4}{3} \quad \Rightarrow \frac{1}{1} - \frac{7}{3} = \frac{-4}{3} \\ \Rightarrow \frac{3-7}{3} &= \frac{-4}{3} \quad \Rightarrow \frac{-4}{3} = \frac{-4}{3} \\ \Rightarrow \text{L.H.S.} &= \text{R. H. S. Therefore, it is correct.} \end{aligned}$$

Question 6:

Solve the following linear equation: $m - \frac{m-1}{2} = 1 - \frac{m-2}{3}$

Answer 6:

$$\begin{aligned} m - \frac{m-1}{2} &= 1 - \frac{m-2}{3} \\ \Rightarrow \frac{m}{1} - \frac{m-1}{2} + \frac{m-2}{3} &= 1 \quad \Rightarrow \frac{6m - 3(m-1) + 2(m-2)}{6} = 1 \\ \Rightarrow \frac{6m - 3m + 3 + 2m - 4}{6} &= 1 \quad \Rightarrow \frac{5m-1}{6} = 1 \quad \Rightarrow 5m-1=6 \\ \Rightarrow 5m &= 6+1 \quad \Rightarrow 5m=7 \quad \Rightarrow m = \frac{7}{5} \end{aligned}$$

To check:

$$\begin{aligned} m - \frac{m-1}{2} &= 1 - \frac{m-2}{3} \\ \Rightarrow \frac{7}{5} - \frac{\frac{7}{5}-1}{2} &= 1 - \frac{\frac{7}{5}-2}{3} \quad \Rightarrow \frac{7}{5} - \frac{\frac{7-5}{5}}{2} = 1 - \frac{\frac{7-10}{5}}{3} \quad \Rightarrow \frac{7}{5} - \frac{2}{5 \times 2} = 1 - \frac{-3}{5 \times 3} \\ \Rightarrow \frac{7}{5} - \frac{1}{5} &= 1 + \frac{1}{5} \quad \Rightarrow \frac{7-1}{5} = \frac{5+1}{5} \quad \Rightarrow \frac{6}{5} = \frac{6}{5} \\ \Rightarrow \text{L.H.S.} &= \text{R. H. S.} \end{aligned}$$

Therefore, it is correct.

Question 7:

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

Answer 7:

$$\begin{aligned} 3(t-3) &= 5(2t+1) \\ \Rightarrow 3t-9 &= 10t+5 \quad \Rightarrow 3t-10t=5+9 \quad \Rightarrow -7t=14 \\ \Rightarrow t &= \frac{14}{-7} \quad \Rightarrow t=-2 \end{aligned}$$

To check:

$$\begin{aligned} 3(t-3) &= 5(2t+1) \\ \Rightarrow 3(-2-3) &= 5\{2 \times (-2) + 1\} \quad \Rightarrow 3 \times -5 = 5(-4+1) \quad \Rightarrow -15 = 5 \times (-3) \\ \Rightarrow -15 &= -15 \quad \Rightarrow \text{L.H.S.} = \text{R. H. S.} \end{aligned}$$

Therefore, it is correct.

Question 8:

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

Answer 8:

$$15(y-4)-2(y-9)+5(y+6)=0 \Rightarrow 15y-60-2y+18+5y+30=0$$

$$\Rightarrow 18y-12=0 \Rightarrow 18y=12 \Rightarrow y=\frac{12}{18} \Rightarrow y=\frac{2}{3}$$

To check:

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

$$\Rightarrow 15\left(\frac{2}{3}-4\right)-2\left(\frac{2}{3}-9\right)+5\left(\frac{2}{3}+6\right)=0 \Rightarrow 15\left(\frac{2-12}{3}\right)-2\left(\frac{2-27}{3}\right)+5\left(\frac{2+18}{3}\right)=0$$

$$\Rightarrow 15 \times \frac{-10}{3} - 2 \times \frac{-25}{3} + 5 \times \frac{20}{3} = 0 \Rightarrow -50 + \frac{50}{3} + \frac{100}{3} = 0$$

$$\Rightarrow -50 + \frac{50+100}{3} = 0 \Rightarrow -50 + \frac{150}{3} = 0$$

$$\Rightarrow -50+50=0 \Rightarrow 0=0 \Rightarrow \text{L.H.S.} = \text{R. H. S.}$$

Therefore, it is correct.

Question 9:

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

Answer 9:

$$3(5z-7)-2(9z-11)=4(8z-13)-17 \Rightarrow 15z-21-18z+22=32z-52-17$$

$$\Rightarrow -3z+1=32z-69 \Rightarrow -3z-32z=-69-1 \Rightarrow -35z=-70 \Rightarrow z=\frac{-70}{-35}=2$$

To check:

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

$$\Rightarrow 3(10-7)-2(18-11)=4(16-13)-17 \Rightarrow 3 \times 3-2 \times 7=4 \times 3-17$$

$$\Rightarrow 9-14=12-17 \Rightarrow -5=-5 \Rightarrow \text{L.H.S.} = \text{R. H. S.}$$

Therefore, it is correct.

Question 10:

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

Answer 10:

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

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

$$\Rightarrow 0.50f=0.3 \Rightarrow f=\frac{0.3}{0.50} \Rightarrow f=0.6$$

To check:

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

$$\Rightarrow 0.25(4 \times 0.6-3)=0.05(10 \times 0.6-9)$$

$$\Rightarrow 0.25(2.4-3)=0.05(6.0-9) \Rightarrow 0.25 \times (-0.6)=0.05 \times (-3)$$

$$\Rightarrow -0.150=-0.150$$

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

Therefore, it is correct.