Exercise 2.5

Question 1:

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

Answer 1:

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

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

To check:

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

$\Rightarrow \quad \frac{27}{10\times 2}-\frac{1}{5}=\frac{27}{10\times 3}+\frac{1}{4} \Rightarrow \frac{27}{20}-\frac{1}{5}=\frac{9}{10}+\frac{1}{4} \Rightarrow \frac{27-4}{20}=\frac{18+5}{20} \Rightarrow \frac{23}{20}=\frac{23}{20}$

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

Therefore, it is correct.

Question 2:

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

Answer 2:

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

$\Rightarrow \frac{6n-9n+10n}{12}=21 \quad \Rightarrow \frac{7n}{12}=21 \quad \Rightarrow n=\frac{21\times 12}{7} \quad \Rightarrow n=36$

To check:

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

$\Rightarrow \quad \frac{36}{2}-\frac{3\times 36}{4}+\frac{5\times 36}{6}=21 \quad \Rightarrow 18-27+30=21 \quad \Rightarrow 21=21$

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

Therefore, it is correct.

Question 3:

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

Answer 3:

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

$\Rightarrow \quad \frac{x}{1}-\frac{8x}{3}+\frac{5x}{2}=\frac{17}{6}-\frac{7}{1} \quad \Rightarrow \frac{6x-16x+15x}{6}=\frac{17-42}{6}$

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

To check:

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

$$\Rightarrow \quad -5+7-\frac{8\times(-5)}{3}=\frac{17}{6}-\frac{5\times(-5)}{2} \quad \Rightarrow 2+\frac{40}{3}=\frac{17}{6}+\frac{25}{2}$$

$$\Rightarrow \quad \frac{6+40}{3}=\frac{17+75}{6} \quad \Rightarrow \frac{46}{3}=\frac{92}{6} \quad \Rightarrow \frac{46}{3}=\frac{46}{3}$$

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

Therefore, it is correct.

Question 4:

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

Answer 4:

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

$$\Rightarrow \quad 5\times(x-5)=3(x-3) \quad \Rightarrow 5x-25=3x-9$$

$$\Rightarrow \quad 5x-3x=-9+25 \quad \Rightarrow 2x=16 \quad \Rightarrow x=\frac{16}{2}=8$$

To check:

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

$$\Rightarrow \quad \frac{8-5}{3}=\frac{8-3}{5} \quad \Rightarrow \frac{3}{3}=\frac{5}{5} \quad \Rightarrow 1=1$$

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

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:

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

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

$$\Rightarrow \quad \frac{9t-6-8t-12+12t}{12}=\frac{2}{3} \quad \Rightarrow \frac{13t-18}{12}=\frac{2}{3}$$

$$\Rightarrow \quad 3\times(13t-18)=2\times12 \quad \Rightarrow 39t-54=24 \quad \Rightarrow 39t=24+54$$

$$\Rightarrow \quad 39t=78 \quad \Rightarrow t=\frac{78}{39}=2$$

To check:

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

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

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

$\Rightarrow \quad \frac{3-7}{3}=\frac{-4}{3} \quad \Rightarrow \frac{-4}{3}=\frac{-4}{3}$

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

Question 6:

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

Answer 6:

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

$\Rightarrow \quad \frac{m}{1}-\frac{m-1}{2}+\frac{m-2}{3}=1 \quad \Rightarrow \frac{6m-3(m-1)+2(m-2)}{6}=1$

$\Rightarrow \quad \frac{6m-3m+3+2m-4}{6}=1 \quad \Rightarrow \frac{5m-1}{6}=1 \quad \Rightarrow 5m-1=6$

$\Rightarrow \quad 5m=6+1 \quad \Rightarrow 5m=7 \quad \Rightarrow m=\frac{7}{5}$

To check:

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

$\Rightarrow \quad \frac{7}{5}-\frac{\frac{7}{5}-1}{2}=1-\frac{\frac{7}{5}-2}{3} \quad \Rightarrow \frac{7}{5}-\frac{\frac{7-5}{5}}{2}=1-\frac{\frac{7-10}{5}}{3} \quad \Rightarrow \frac{7}{5}-\frac{2}{5\times 2}=1-\frac{-3}{5\times 3}$

$\Rightarrow \quad \frac{7}{5}-\frac{1}{5}=1+\frac{1}{5} \quad \Rightarrow \frac{7-1}{5}=\frac{5+1}{5} \quad \Rightarrow \frac{6}{5}=\frac{6}{5}$

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

Therefore, it is correct.

Question 7:

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

Answer 7:

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

$\Rightarrow \quad 3t-9=10t+5 \quad \Rightarrow 3t-10t=5+9 \quad \Rightarrow -7t=14$

$\Rightarrow \quad t=\frac{14}{-7} \quad \Rightarrow t=-2$

To check:

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

$\Rightarrow \quad 3(-2-3)=5\{2\times(-2)+1\} \quad \Rightarrow 3\times -5=5(-4+1) \quad \Rightarrow -15=5\times(-3)$

$\Rightarrow \quad -15=-15 \quad \Rightarrow$ L.H.S. = R. H. S.

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:

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

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

To check:

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

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

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

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

$\Rightarrow \quad -50+50=0 \quad \Rightarrow 0=0 \quad \Rightarrow$ L.H.S. = 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:

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

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

To check:

$3(5z-7)-2(9z-11)=4(8z-13)-17 \Rightarrow 3(5\times2-7)-2(9\times2-11)=4(8\times2-13)-17$

$\Rightarrow \quad 3(10-7)-2(18-11)=4(16-13)-17 \quad \Rightarrow 3\times3-2\times7=4\times3-17$

$\Rightarrow \quad 9-14=12-17 \quad \Rightarrow -5=-5 \quad \Rightarrow$ L.H.S. = 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:

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

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

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

To check:

$0.25(4f-3)=0.05(10f-9) \quad \Rightarrow 0.25(4\times0.6-3)=0.05(10\times0.6-9)$

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

$\Rightarrow \quad -0.150=-0.150 \quad \Rightarrow$ L.H.S. = R. H. S.

Therefore, it is correct.