Solution of A Linear Equation

Solution: A value of the variable which when substituted for the variable in an equation, makes L.H.S. = R.H.S. is said to satisfy the equation and is called a solution or a root of the equation.

Rules for Solving Linear Equations in One Variable:

Rule–1 Same quantity (number) can be added to both sides of an equation without changing the equality.

Rule–2 Same quantity can be subtracted from both sides of an equation without changing the equality.

Rule–3 Both sides of an equation may be multiplied by the same non–zero number without changing the equality.

Rule–4 Both sides of an equation may be divided by the same non–zero number without changing the equality.

Solving Equations having Variable Terms on One Side and Number(s) on the Other Side:

Ex.1 Solve the equation: $\frac{x}{5} + 11 = \frac{1}{15}$ and check the result.

We have, $\frac{x}{5} + 11 = \frac{1}{15}$

$\frac{x}{5} + 11 - 11 = \frac{1}{15} - 11$

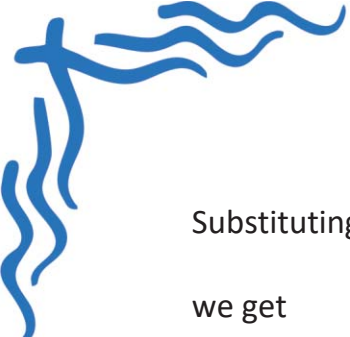[Subtracting 11 from both sides]

$= \frac{x}{5} = \frac{1}{15} - 11$

$= \frac{x}{5} = \frac{1-165}{15}$

$= \frac{x}{5} = -\frac{164}{15}$

$= 5 \times \frac{x}{5} = 5 \times -\frac{164}{15}$

$= x = -\frac{164}{3}$

Thus, $x = -\frac{164}{3}$ is the solution of the given equation.

Substituting x = $-\frac{164}{3}$ in the given equation,

we get

L.H.S. = $\frac{x}{5}$ + 11

= $-\frac{164}{3} \times \frac{1}{5}$ + 11 = $-\frac{164}{15}$ + 11

= $\frac{164+165}{15}$ = $\frac{1}{15}$ and,

R.H.S. = $\frac{1}{15}$

L.H.S. = R.H.S. for x = $-\frac{164}{3}$

Hence, x = $-\frac{164}{3}$ is the solution of the given equation.

Ex.2 Solve: $\frac{x}{2} - \frac{x}{3}$ = 8

Sol. We have, $\frac{x}{2} - \frac{x}{3}$ = 8

LCM of denominators 2 and 3 on L.H.S. is 6. Multiplying both sides by 6, we get

= 3x − 2x = 6 × 8

= x = 48

Substituting x = 48 in the given equation, we get

L.H.S. = $\frac{x}{2} - \frac{x}{3} = \frac{48}{2} - \frac{48}{3}$ = 24 − 16 = 8 and,

R.H.S. = 8

∴ L.H.S. = R.H.S. for x = 48

Hence, x = 48 is the solution of the given equation.