Linear Equations in One Variable: Exercise 2.3

Solve the following equations and check your results.

Q.1 $3x = 2x + 18$

Sol. **Given equation:** $3x = 2x + 18$

Now transposing $2x$ from RHS to LHS,

$$3x - 2x = 18$$
$$x = 18$$

Verification: For verification put $x = 18$ in the given equation,

$$3x = 2x + 18$$
$$3 \times 18 = 2 \times 18 + 18$$
$$54 = 36 + 18$$
$$54 = 54$$

From above, LHS = RHS

Therefore, the obtained result $x = 18$ is correct.

Q.2 $5t - 3 = 3t - 5$

Sol. **Given equation:** $5t - 3 = 3t - 5$

Now, transposing $3t$ from RHS to LHS and -3 from LHS to RHS,

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

On dividing both the sides of the equation by 2,

$$t = -1$$

Verification: For verification put $t = -1$ in the given equation,

$$5t - 3 = 3t - 5$$
$$5 \times (-1) - 3 = 3 \times (-1) - 5$$
$$-5 - 3 = -3 - 5$$
$$-8 = -8$$

From above, LHS = RHS

Therefore, the obtained result $t = -1$ is correct.

Q.3 $5x + 9 = 5 + 3x$

Sol. **Given equation:** $5x + 9 = 5 + 3x$

Now, transposing $3x$ from RHS to LHS and 9 from LHS to RHS

$$5x - 3x = 5 - 9$$
$$2x = -4$$

On dividing both the sides of the equation by 2,

$$\frac{2x}{2} = -2$$
$$x = -2$$

Verification: For verification put $x = -2$ in the given equation,

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

From above, LHS = RHS

Therefore, the obtained result $x = -2$ is correct.

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

Sol. **Given equation:** $4z + 3 = 6 + 2z$

Now, transposing $2z$ from RHS to LHS and 3 from LHS to RHS,

$$4z - 2z = 6 - 3$$
$$2z = 3$$

On dividing by 2 on both the sides of the equation,

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

Verification: For verification put $z = \frac{3}{2}$ in the given equation,

$$4z + 3 = 6 + 2z$$
$$4 \times (\frac{3}{2}) + 3 = 6 + 2 \times (\frac{3}{2})$$
$$6 + 3 = 6 + 3$$
$$9 = 9$$

From above, LHS = RHS

Therefore, the obtained result $z = \frac{3}{2}$ is correct.

Q.5 $2x - 1 = 14 - x$

Sol. **Given equation:** $2x - 1 = 14 - x$

Now, transposing x from RHS to LHS and 1 from LHS to RHS,

$$2x + x = 14 + 1$$
$$3x = 15$$

On, dividing by 3 on both the sides of the equation,

$$x = 5$$

Verification: For verification put $x = 5$ in the given equation,

$$2x - 1 = 14 - x$$
$$2 \times (5) - 1 = 10 - 1$$
$$10 - 1 = 9$$
$$9 = 9$$

From above, LHS = RHS

Therefore, the obtained result $x = 5$ is correct.

Q.6 $8x + 4 = 3(x - 1) + 7$

Sol. **Given equation:** $8x + 4 = 3(x - 1) + 7$

$$8x + 4 = 3x - 3 + 7$$

Now, transposing $3x$ from RHS to LHS and 4 from LHS to RHS,

$$8x - 3x = -3 + 7 - 4$$
$$5x = -7 + 7$$
$$x = 0$$

Verification: For verification put $x = 0$ in the given equation,

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

From above, LHS = RHS

Therefore, the obtained result $x = 0$ is correct.

Q.7 $x = \frac{4}{5}(x + 10)$

Sol. **Given equation:** $x = \frac{4}{5}(x + 10)$

Now, on multiplying by 5 on both the sides of the equation,

$$5x = 4(x + 10)$$
$$5x = 4x + 40$$

On transposing 4x from RHS to LHS,

$$5x - 4x = 40$$
$$x = 40$$

Verification: For verification put x = 40 in the given equation,

$$x = \frac{4}{5}(x + 10)$$
$$40 = \frac{4}{5}(40 + 10)$$
$$40 = \frac{4}{5} \times 50$$
$$40 = 40$$

From above, LHS = RHS

Therefore, the obtained result x = 40 is correct.

Q.8 $\frac{2x}{3} + 1 = \frac{7x}{15} + 3$

Sol. **Given equation:** $\frac{2x}{3} + 1 = \frac{7x}{15} + 3$

Now, transposing $\frac{7x}{15}$ from RHS to LHS and 1 from LHS to RHS,

$$\frac{2x}{3} - \frac{7x}{15} = 3 - 1$$
$$\frac{5 \times 2x - 7x}{15} = 2$$
$$\frac{3x}{15} = 2$$
$$\frac{x}{5} = 2$$

On multiplying by 5 on both the sides of the equation,

$$x = 10$$

Verification: For verification put x = 10 in the given equation,

$$\frac{2x}{3} + 1 = \frac{7x}{15} + 3$$
$$\frac{2x10}{3} + 1 = \frac{7 \times 10}{15} + 3$$

$$\frac{20+1\times 3}{3}=\frac{70+45}{15}$$

$$\frac{23}{3}=\frac{115}{15}$$

$$\frac{23}{3}=\frac{23}{3}$$

From above, LHS = RHS
Therefore, the obtained result x = 10 is correct.

Q.9 $2y+\frac{5}{3}=\frac{26}{3}-y$

Sol. **Given equation:** $2y+\frac{5}{3}=\frac{26}{3}-y$

Now, transposing y from RHS to LHS and $\frac{5}{3}$ from LHS to RHS,

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

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

$$3y=\frac{21}{3}$$

On dividing by 3 on both the sides of the equation,

$$y=\frac{7}{3}$$

Verification: For verification put $y=\frac{7}{3}$ in the given equation,

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

$$2x\left(\frac{7}{3}\right)+\frac{5}{3}=\frac{26}{3}-\frac{7}{3}$$

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

$$\frac{19}{3}=\frac{19}{3}$$

From above, LHS = RHS

Therefore, the obtained result $y=\frac{7}{3}$ is correct.

Q.10 $3m = 5m - \frac{8}{5}$

Sol. **Given equation:** $3m = 5m - \frac{8}{5}$

Now, transposing $5m$ from RHS to LHS,

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

$$-2m = -\frac{8}{5}$$

On dividing by -2 on both the sides,

$$m = \frac{4}{5}$$

Verification: For verification put $m = \frac{4}{5}$ in the given equation,

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

$$3x\frac{4}{5} = 5x\frac{4}{5} - \frac{8}{5}$$

$$\frac{12}{5} = 4 - \frac{8}{5}$$

$$\frac{12}{5} = \frac{20 - 8}{5}$$

$$\frac{12}{5} = \frac{12}{5}$$

From above, LHS = RHS

Therefore, the obtained result $m = \frac{4}{5}$ is correct.