LINEAR EQUATIONS

WHAT WE HAVE LEARNT ....

1. Write the LHS and RHS of $5x - 3 = 12$.

2. Write a statement for each of the following:
   (a) $x + 7 = 8$
   (b) $2y - 3 = 11$
   (c) $\frac{m}{3} - \frac{1}{2} + 2 = 5$

3. Solve :
   (a) $x + \frac{1}{2} = 3\frac{1}{2}$
   (b) $4x - 7 = 17$
   (c) $\frac{2y}{3} + 2 = 4$

4. Write T for true and F for false statements :
   (a) An equation has two sides, separated by the sign of equality.
   (b) An equation in which the highest power of the variable is 1, is called a linear equation
   (c) $2x + y = 7$ is a linear equation in one variable.
   (d) The solution to the equation $\frac{x}{7} - 4 = 1$ is $x = 28$.

SOLUTIONS

(1) $LHS = 5x - 3$; $RHS = 12$

(2) (a) The sum of x and 7 is 8

(b) 3 subtracted from two times of y is 11

(c) Half subtracted from the sum of Two and one-third of m is five.

(3) (a) $x + \frac{1}{2} = 3\frac{1}{2}$

$\Rightarrow x = \frac{7}{2} - \frac{1}{2}$

$= \frac{7-1}{2} = \frac{6}{2}$

$= 3$

(b) $4x - 7 = 17$

$4x = 17 + 7$

$x = \frac{24}{4}$

$= 6$

(c) $\frac{2y}{3} + 2 = 4$

$\Rightarrow \frac{2y}{3} = 4 - 2 = 2$

$\Rightarrow 2y = 2 \times 3 = 6$

$\Rightarrow y = \frac{6}{2} = 3$

(4) (a) T, $\boxed{LHS = RHS}$

(b) T, Example: $2x^1 + 3 = 0$

(c) F, This linear equation has Two variables x and y.

(d) F, $\frac{x}{7} - 4 = 1$

$\therefore \frac{x}{7} = 1 + 4 = 5$

$\therefore x = 7 \times 5 = 35 \neq 28$

EXERCISE 7.1

1. Which of the following are linear equations in one variable?

(i) $9x = 10$ (ii) $3x^2 = 14$ (iii) $2x + 3y = 6$ (iv) $14x + 6 = 8$

(v) $6x^2 - x = 20$ (vi) $p^2 + p = 2$ (vii) $2x^2 + 3x = 6$ (viii) $\frac{x}{4} + 1 = 6$

(ix) $3(x - y) = 1$ (x) $\frac{x}{2} + \frac{x}{4} = 9$ (xi) $14x + 6 = 15y - 2$

Solution: (i) $9x = 10$, degree $= 1$, Variable $= x$

(iv) $14x + 6 = 8$, degree $= 1$, Variable $= x$

(viii) $\frac{x}{4} + 1 = 6$, degree $= 1$, Variable $= x$

(x) $\frac{x}{2} + \frac{x}{4} = 9$, degree $= 1$, Variable $=$

2. Write an equation for each of the following statements :

(i) Thrice a number is 48.
(ii) 2 times of a number added to 9 gives 13.
(iii) 6 more than one fourth a number is 12.
(iv) Twice a number subtracted from 18 gives 0.
(v) $\frac{1}{9}$ th of twice a number is 18.
(vi) Sum of twice a number and one fourth the number is 81.
(vii) 8 times a number is 16 more than 8.
(viii) $\frac{1}{2}$ less than twice a number is 3.
(ix) 2 more than twice a number is 11.
(x) The difference between a number and one third the number is 36.
(xi) 8 less than one fourth a number is 1.
(xii) 3 more than 3 times a number is 27.
(xiii) 4 times the sum of a number and 2 is 24.
(xiv) One-half of a number is 0.
(xv) The age of Mr. Roy is 10 more than 3 times his daughter's age and he is 40 years old.

[HOTS]

Solutions:

(i) $3x = 48$

(ii) $9 + 2x = 13$

(iii) $\frac{x}{4} + 6 = 12$

(iv) $18 - 2x = 0$

(v) $\frac{1}{9}(2x) = 18$

(vi) $2x + \frac{x}{4} = 81$

(vii) $8x = 8 + 16$

(viii) $2x - \frac{1}{2} = 3$

(ix) $2x + 2 = 11$

(x) $y - \frac{y}{3} = 36$

(xi) $\frac{y}{4} - 8 = 1$

(xii) $3z + 3 = 27$

$$(xiii) \quad 4(z+2) = 24$$
$$(xiv) \quad \frac{z}{2} = 0$$
$$(xv) \quad 3x + 10 = 40$$

3. Write the following equations in statement form :

(i) $p + 4 = 15$ (ii) $m - 7 = 3$ (iii) $2m = 7$ (iv) $\frac{m}{5} = 3$

(v) $\frac{3m}{5} = 6$ (vi) $3p + 4 = 25$ (vii) $4p - 2 = 18$ (viii) $\frac{p}{2} + 2 = 8$

Solution :

i) the Sum of p and 4 is 15

ii) 7 subtracted from m is 3

iii) Twice a number m is 7

iv) one- fifth of a number m is 3

v) three - fifth of a number m is 6

vi) three times a number p when added to 4 gives 25.

vii) Two subtracted from four times a number p is 18

viii) 2 more than half of a number p is 8.

EXERCISE 7.2

1. Solve the equations by trial and error method :

(i) $x + 7 = 11$

(ii) $14 - x = 6$

(iii) $4x = 36$

(iv) $3x = \dfrac{15}{2}$

(v) $7x = 1$

(vi) $\dfrac{5x}{2} = 50$

Solution : (i) $x + 7 = 11$

Value of x	LHS
0	$0 + 7 = 7$
1	$1 + 7 = 8$
2	$2 + 7 = 9$
3	$3 + 7 = 10$
4	$4 + 7 = 11 \longrightarrow$ RHS

∴ for $x = 4$, LHS = RHS = 11

∴ $x = 4$ is the solution of the equation.

(ii) $14 - x = 6$

Value of x	LHS
5	$14 - 5 = 9$
6	$14 - 6 = 8$
7	$14 - 7 = 7$
8	$14 - 8 = 6$

∴ for $x = 8$,
LHS = RHS = 6.
∴ $x = 8$ is the solution of the equation.

iii, $4x = 36$

Value of x	LHS
6	$4 \times 6 = 24$
7	$4 \times 7 = 28$
8	$4 \times 8 = 32$
9	$4 \times 9 = 36$

since
LHS = RHS = 36
for $x = 9$,
solution for
the equation is
$x = 9$

iv, $3x = \frac{15}{2}$

x	LHS
$\frac{1}{2}$	$3 \times \frac{1}{2} = \frac{3}{2}$
$\frac{3}{2}$	$3 \times \frac{3}{2} = \frac{9}{2}$
$\frac{5}{2}$	$3 \times \frac{5}{2} = \frac{15}{2}$

∴ for $x = \frac{5}{2}$
LHS $= \frac{15}{2} = $ RHS
∴ $x = \frac{5}{2}$ as the
solution for
the equation.

v, $7x = 1$

x	
$\frac{1}{3}$	$7 \times \frac{1}{3} = \frac{7}{3}$
$\frac{1}{4}$	$7 \times \frac{1}{4} = \frac{7}{4}$
$\frac{1}{6}$	$7 \times \frac{1}{6} = \frac{7}{6}$
$\frac{1}{7}$	$7 \times \frac{1}{7} = 1$

∴ for $x = \frac{1}{7}$
LHS $= 1 = $ RHS
∴ $x = \frac{1}{7}$ as the
solution for the
equation.

vi, $\quad \dfrac{5x}{2} = 50$

x	LHS
10	$\dfrac{5 \times 10}{2} = 25$
15	$\dfrac{5 \times 15}{2} = \dfrac{75}{2}$
20	$\dfrac{5 \times 20}{2} = 50$

∴ for $x = 20$
LHS $= 50 =$ RHS
∴ $x = 20$ is the solution for the equation

2. Check whether the value given in the brackets is a solution to the given equation or not:

(i) $n + 5 = 19$ $(n = 1)$ (ii) $7n + 5 = 19$ $(n = -2)$ (iii) $4n + 5 = 19$ $(n = 2)$

(iv) $4p - 3 = 13$ $(p = 1)$ (v) $4p - 3 = 13$ $(p = -4)$ (vi) $4p - 3 = 13$ $(p = 0)$

Solutions: (i) $n + 5 = 19$ $(n = 1)$

LHS $= 1 + 5 = 6 \neq 19 =$ RHS

∴ for $n = 1$, LHS $\neq$ RHS

∴ $n = 1$, is not a solution.

(ii) $7n + 5 = 19$ $(n = -2)$

LHS $= 7(-2) + 5 = -14 + 5 = -9 \neq 19$

∴ for $n = -2$, LHS $\neq$ RHS.

Hence $n = -2$ is not a solution.

(iii) $4n + 5 = 19$ $(n = 2)$

LHS $= 4(2) + 5 = 8 + 5 = 13 \neq 19$

for $n = 2$, LHS $= 13 \neq$ RHS

∴ $n = 2$, is not a solution.

iv) $4p - 3 = 13 \ (p = 1)$

$\text{LHS} = 4(1) - 3 = 4 - 3 = 1 \neq 13.$

for $p = 1$, $\text{LHS} = 1 \neq \text{RHS}$.

∴ $p = 1$, is not a solution.

v) $4p - 3 = 13 \ (p = -4)$

$\text{LHS} = 4(-4) - 3 = -16 - 3 = -19 \neq 13.$

for $p = -4$, $\text{LHS} = -19 \neq \text{RHS}$

∴ $p = -4$, is not a solution.

vi) $4p - 3 = 13 \ (p = 0)$

$\text{LHS} = 4(0) - 3 = 0 - 3 = -3 \neq 13.$

for $p = 0$, $\text{LHS} = -3 \neq \text{RHS}$.

∴ $p = 0$, is not a solution.

3. Solve for x and verify your result :

(i) $3x + 4 = 7$

(ii) $6x - 5 = 2x + 11$

(iii) $3(2x - 1) = 5(x - 1)$

(iv) $3x + 4(x - 2) = 3(x - 4) + 2$

(v) $x - (4 - x) = 3(x - 4) - 4$ [Hots]

(vi) $3(2x + 1) - 4(x - 2) = 0$ [Hots]

Solution : i) $\underline{3x + 4 = 7}$

$\Rightarrow 3x = 7 - 4$ (Transposing 4 from LHS to RHS)

$\Rightarrow 3x = 3$

$\Rightarrow x = \dfrac{3}{3}$ (Dividing both sides by 2)

$\Rightarrow x = 1$

Verification:

$$LHS = 3x + 4 = 3(1) + 4 = 3 + 4 = 7$$

$$\therefore LHS = 7 = RHS$$

Hence Verified.

ii, $6x - 5 = 2x + 11$

$\implies 6x = 2x + 11 + 5$ (Transporting -5 from LHS to RHS)

$\implies 6x - 2x = 16$ (Transporting 2x from RHS to LHS)

$\implies 4x = 16$

$\implies x = \dfrac{16}{4}$ (Dividing both sides by 4)

$\implies x = 4$ (Solution)

Verification:

$$LHS = 6x - 5 = 6(4) - 5 = 24 - 5 = 19$$

$$RHS = 2x + 11 = 2(4) + 11 = 8 + 11 = 19$$

$$\therefore RHS = 19 = LHS$$

Hence Verified

iii, $3(2x - 1) = 5(x - 1)$

$\implies 6x - 3 = 5x - 5$ (Removing the brackets)

$\implies 6x - 5x = -5 + 3$ (Transporting 5x to LHS) and -3 to RHS

$\implies x = -2$ (Solution)

Verification :

$$LHS = 3(2x-1) = 3(2(-2)-1) = 3(-4-1)$$
$$= 3(-5) = -15$$
$$RHS = 5(x-1) = 5(-2-1) = 5(-3)$$
$$= -15$$

∴ $LHS = -15 = RHS$

Hence verified.

(iv) $3x + 4(x-2) = 3(x-4) + 2$

$\Rightarrow 3x + 4x - 8 = 3x - 12 + 2$ (Removing the brackets.)

$\Rightarrow 7x - 8 = 3x - 10$

$\Rightarrow 7x - 3x = -10 + 8$ (Transporting $3x$ to LHS and -8 to RHS)

$\Rightarrow 4x = -2$

$\Rightarrow x = \dfrac{-2}{4} = \dfrac{-1}{2}$ (Dividing both sides by 4)

Verification :

$$LHS = 3x + 4(x-2) = 3\left(\dfrac{-1}{2}\right) + 4\left(\dfrac{-1}{2} - 2\right)$$
$$= \dfrac{-3}{2} + 4\left(\dfrac{-5}{2}\right) = \dfrac{-3}{2} + 2(-5)$$
$$= \dfrac{-3}{2} - 10 = \dfrac{-3-20}{2} = \dfrac{-23}{2}$$

$$RHS = 3(x-4) + 2 = 3\left(\dfrac{-1}{2} - 4\right) + 2$$
$$= 3\left(\dfrac{-9}{2}\right) + 2 = \dfrac{-27}{2} + 2 = \dfrac{-27+4}{2}$$
$$= \dfrac{-23}{2}$$

∴ $LHS = \dfrac{-23}{2} = RHS$

Hence verified.

N, $x - (4-x) = 3(x-4) - 4$

$\Rightarrow x - 4 + x = 3x - 12 - 4$ (Removing the brackets)

$\Rightarrow 2x - 4 = 3x - 16$

$\Rightarrow 16 - 4 = 3x - 2x$ (Transporting $2x$ to RHS and -16 to LHS)

$\Rightarrow 12 = x$ (Solution)

Verification :

LHS $= x - (4-x) = 12 - (4-12)$

$= 12 - (-8) = 12 + 8 = 20$

RHS $= 3(x-4) - 4 = 3(12-4) - 4$

$= 3(8) - 4 = 24 - 4 = 20$

$\therefore$ LHS $= 20 =$ RHS

Hence Verified.

VI, $3(2x+1) - 4(x-2) = 0$

$\Rightarrow 6x + 3 - 4x + 8 = 0$ (Removing the brackets)

$\Rightarrow (6x - 4x) + (3+8) = 0$

$\Rightarrow 2x + 11 = 0$

$\Rightarrow 2x = -11 + 0$ (Transporting 11 to RHS)

$\Rightarrow x = \frac{-11}{2}$ (Dividing both sides by 2)

$\Rightarrow x = \frac{-11}{2}$ (Solution)

Verification :

$$LHS = 3(2x+1) - 4(x-2)$$
$$= 3(2(-\tfrac{11}{2})+1) - 4(-\tfrac{11}{2}-2)$$
$$= 3(-11+1) - 4(-\tfrac{15}{2})$$
$$= 3(-10) - 2(-15)$$
$$= -30 + 30 = 0 = RHS$$

- Hence Verified.

Solve :

4. $\dfrac{7x}{10} - 4 = 10$

5. $\dfrac{x}{2} - \dfrac{x}{4} = 2$

6. $3(2x + 4) - 4(x - 1) = -8$

7. $4x + 5(2 - x) = 3x - 2$

8. $x = 3x + \dfrac{4}{5}$

9. $7x - 15 = 6(x + 2)$

10. $6(1 - 3x) + 2(2x - 3) = 0$

11. $2x - (3x + 10) = 4x - 35$

12. $36 = 9 + 3(4t + 1)$

13. $15y - 2(4y - 1) = 2(3y - 1)$ [Hots]

14. $\dfrac{2p}{3} + 4 = 3p - 17$

15. $\dfrac{2m}{3} - \dfrac{m}{4} = 10$

16. $6(1 - 4x) - 2(1 + 3x) = 64$

17. $\dfrac{1}{4}x + \dfrac{1}{6}x = \dfrac{1}{2}x + \dfrac{3}{4}$ [Hots]

18. $0.3x + 0.4 = 0.28x + 1.16$ [Hots]

19. $2x - 3(4x + 1) = 7$

20. $25 = \dfrac{3x}{10} + 1$

Solution : (4.) $\dfrac{7x}{10} - 4 = 10$

$\Rightarrow \dfrac{7x}{10} = 10 + 4$ (Transporting -4 to RHS)

$\Rightarrow \dfrac{7x}{10} = 14$

$\Rightarrow 7x = 14 \times 10$ (multiplying both sides by 10)

$\Rightarrow x = \dfrac{14 \times 10}{7}$ (Dividing both sides by 7)

$\Rightarrow x = 20$ (Solution)

5). $\frac{x}{2} - \frac{x}{4} = 2$

LCM of 2 and 4 is 4

∴ multiplying both sides of the equation by 4 we get

$$\Rightarrow 4 \times \left(\frac{x}{2} - \frac{x}{4}\right) = 4 \times 2$$

$$\Rightarrow \frac{4x}{2} - \frac{4x}{4} = 8 \text{ (Removing the bracket)}$$

$$\Rightarrow 2x - x = 8$$

$$\Rightarrow x = 8 \text{ (Solution)}$$

6). $3(2x+4) - 4(x-1) = -8$

$$\Rightarrow 6x + 12 - 4x + 4 = -8 \text{ (Removing the brackets)}$$

$$\Rightarrow (6x - 4x) + (12 + 4) = -8$$

$$\Rightarrow 2x + 16 = -8$$

$$\Rightarrow 2x = -16 - 8 \text{ (Transporting 16 to RHS)}$$

$$\Rightarrow 2x = -24$$

$$\Rightarrow x = \frac{-24}{2} \text{ (Dividing both sides by 2)}$$

$$\Rightarrow x = -12 \text{ (Solution)}.$$

7) $4x + 5(2-x) = 3x - 2$

$$\Rightarrow 4x + 10 - 5x = 3x - 2 \text{ (Removing the bracket)}$$

$$\Rightarrow (4x - 5x) + 10 = 3x - 2$$

$$\Rightarrow \quad -x + 10 = 3x - 2$$

$$\Rightarrow \quad -x - 3x = -2 - 10 \quad (\text{Transporting } 3x \text{ to LHS and } 10 \text{ to RHS})$$

$$\Rightarrow \quad -4x = -12$$

$$\Rightarrow \quad x = \frac{-12}{-4} \quad (\text{Dividing both sides by } -4)$$

$$\Rightarrow \quad x = 3 \quad (\text{Solution})$$

(8). $\quad x = 3x + \frac{4}{5}$

$$\Rightarrow \quad x - 3x = \frac{4}{5} \quad (\text{Transporting } 3x \text{ to LHS})$$

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

$$\Rightarrow \quad x = \frac{4}{5 \times (-2)} \quad (\text{Dividing both sides by } -2)$$

$$\Rightarrow \quad x = \frac{-2}{5} \quad (\text{Solution})$$

(9). $\quad 7x - 15 = 6(x + 2)$

$$\Rightarrow \quad 7x - 15 = 6x + 12 \quad (\text{Removing the bracket})$$

$$\Rightarrow \quad 7x - 6x = 12 + 15 \quad (\text{Transporting } 6x \text{ to LHS and } -15 \text{ to RHS})$$

$$\Rightarrow \quad x = 27 \quad (\text{Solution})$$

(10) $\quad 6(1 - 3x) + 2(2x - 3) = 0$

$$6 - 18x + 4x - 6 = 0 \quad (\text{Removing the brackets})$$

$$\Rightarrow (6-6) + (4x - 18x) = 0$$
$$\Rightarrow 0 + (-14x) = 0$$
$$\Rightarrow -14x = 0$$
$$\Rightarrow x = \frac{0}{-14} \quad (\text{Dividing both sides by } -14)$$
$$\Rightarrow x = 0 \ (\text{Solution})$$

ill) $2x - (3x + 10) = 4x - 35$
$$\Rightarrow 2x - 3x - 10 = 4x - 35 \quad (\text{Removing the bracket})$$
$$\Rightarrow 2x - 3x - 4x = 10 - 35 \quad (\text{Transporting } 4x \text{ to LHS and } -10 \text{ to RHS})$$
$$\Rightarrow -5x = -25$$
$$\Rightarrow x = \frac{-25}{-5} \quad (\text{Dividing both sides by } -5)$$
$$\Rightarrow x = 5 \ (\text{Solution})$$

12) $36 = 9 + 3(4t + 1)$
$$\Rightarrow 36 = 9 + 12t + 3 \quad (\text{Removing the bracket})$$
$$\Rightarrow 36 - 9 - 3 = 12t \quad (\text{Transporting } 9 \text{ and } 3 \text{ to LHS})$$
$$\Rightarrow 24 = 12t$$
$$\Rightarrow t = \frac{24}{12} = 2 \quad (\text{Dividing both sides by } 12)$$

13)
$$15y - 2(4y-1) = 2(3y-1)$$

$\Rightarrow 15y - 8y + 2 = 6y - 2$ (Removing brackets both sides)

$\Rightarrow 15y - 8y - 6y = -2 - 2$ (Transporting $6y$ to LHS and 2 to RHS)

$\Rightarrow y = -4$ (Solution)

14)
$$\frac{2p}{3} + 4 = 3p - 17$$

$\Rightarrow 2p + (4 \times 3) = (3p \times 3) - (17 \times 3)$ (Multiplying all terms by 3)

$\Rightarrow 2p + 12 = 9p - 51$

$\Rightarrow 2p - 9p = -12 - 51$ (Transporting $9p$ to LHS and 12 to RHS)

$\Rightarrow -7p = -63$

$\Rightarrow p = \frac{-63}{-7} = 9$ (Dividing both sides by -7)

$\Rightarrow p = 9$ (Solution)

15)
$$\frac{2m}{3} - \frac{m}{4} = 10 \quad (LCM \text{ of } 3 \text{ and } 4 = 12)$$

∴ Multiplying both sides by 12

$$\left(12 \times \frac{2m}{3}\right) - \left(12 \times \frac{m}{4}\right) = 12 \times 10$$

$\Rightarrow (4 \times 2m) - (3 \times m) = 120$

$\Rightarrow 8m - 3m = 120$

$$\Rightarrow \quad 5m = 120$$

$$\Rightarrow \quad m = \frac{120}{5} \text{ (Dividing both sides}$$
$$\text{by } 5\text{)}$$

$$\Rightarrow \quad m = 24 \text{ (Solution)}.$$

(16) $6(1-4x) - 2(1+3x) = 64$

$$\Rightarrow 6 - 24x - 2 - 6x = 64 \text{ (Removing the}$$
$$\text{brackets)}$$

$$\Rightarrow -24x - 6x = 64 - 6 + 2 \text{ (Transporting}$$
$$6 \text{ and } -2 \text{ to RHS)}$$

$$\Rightarrow \quad -30x = 60$$

$$\Rightarrow \quad x = \frac{60}{-30} \text{ (Dividing both sides}$$
$$\text{by } -30\text{)}$$

$$\Rightarrow \quad x = -2 \text{ (Solution)}.$$

(17) $\frac{1}{4}x + \frac{1}{6}x = \frac{1}{2}x + \frac{3}{4}$

LCM of $4, 6, 2 = 12$.

$\therefore$ multiply both sides by 12

$$\left(12 \times \frac{1}{4}x\right) + \left(12 \times \frac{1}{6}x\right) = \left(12 \times \frac{1}{2}x\right) + \left(12 \times \frac{3}{4}\right)$$

$$\Rightarrow \quad 3x + 2x = 6x + 9$$

$$\Rightarrow \quad 3x + 2x - 6x = 9 \text{ (Transporting } 6x \text{ to}$$
$$\text{LHS}$$

$$\Rightarrow \quad -x = 9$$

$$\Rightarrow \quad x = \frac{9}{-1} = -9 \text{ (Dividing both}$$
$$\text{sides by } -1\text{)}$$

18) $0.3x + 0.4 = 0.28x + 1.16$

$\Rightarrow \dfrac{3x}{10} + \dfrac{4}{10} = \dfrac{28}{100}x + \dfrac{116}{100}$

LCM of 10 and 100 = 100

∴ Multiplying both sides by 100

$\left(100 \times \dfrac{3x}{10}\right) + \left(100 \times \dfrac{4}{10}\right) = \left(100 \times \dfrac{28x}{100}\right) + \left(100 \times \dfrac{116}{100}\right)$

$\Rightarrow (10 \times 3x) + (10 \times 4) = 28x + 116$

$\Rightarrow 30x + 40 = 28x + 116$

$\Rightarrow 30x - 28x = 116 - 40$ (Transporting 28x to LHS and 40 to RHS)

$\Rightarrow 2x = 76$

$\Rightarrow x = \dfrac{76}{2}$ (Dividing both sides by 2.)

$\Rightarrow x = 38$ (Solution)

19) $2x - 3(4x+1) = 7$

$\Rightarrow 2x - 12x - 3 = 7$ (Removing the Bracket)

$\Rightarrow 2x - 12x = 7 + 3$ (Transporting -3 to RHS)

$\Rightarrow -10x = 10$

$\Rightarrow x = \dfrac{10}{-10}$ (Dividing both sides by -10)

$\Rightarrow x = -1$ (Solution)

20.
$$25 = \frac{3x}{10} + 1$$

Multiplying both sides by 10, we get

$$250 = 3x + 10$$
$$\Rightarrow 250 - 10 = 3x \quad \text{(shifting 10 to LHS)}$$
$$\Rightarrow 240 = 3x$$
$$x = \frac{240}{3} \quad \text{(Dividing both sides by 3)}$$
$$\Rightarrow x = 80 \text{ (Solution)}$$

EXERCISE 7.3

1. 14 added to a number gives 96. Find the number.

Solution: Let the number be x

According to question: $x + 14 = 96$
$$\Rightarrow x = 96 - 14 \text{ (14 Transported to RHS)}$$
$$\Rightarrow x = 82 \text{ (Solution)}$$
$$\therefore \text{ The number} = x = 82$$

2. 26 subtracted from 3 times a number gives 19. Find the number.

Solution: Let the number be x

then 3 times the number $= 3x$

According to question: $3x - 26 = 19$
$$\Rightarrow 3x = 19 + 26 \text{ (Transporting } -26 \text{ to RHS)}$$

$$\Rightarrow 3x = 45$$
$$\Rightarrow x = \frac{45}{3} \text{ (Dividing both sides by 3)}$$
$$\Rightarrow x = 15$$

$\therefore$ The number $= x = 15$

3. The sum of two consecutive natural numbers is 283. Find the numbers.

Solution: Suppose the consecutive natural numbers are x and $x+1$

Then,
$$x + (x+1) = 283$$
$$\Rightarrow x + x + 1 = 283$$
$$\Rightarrow 2x = 283 - 1 \text{ (Transporting 1 to RHS)}$$
$$\Rightarrow 2x = 282$$
$$\Rightarrow x = \frac{282}{2} \text{ (Dividing both sides by 2)}$$
$$\Rightarrow x = 141 \text{ (Solution)}$$
$$\Rightarrow x + 1 = 141 + 1 = 142$$

$\therefore$ the required numbers are 141 and 142.

4. If one natural number is 4 times another and their sum is 65, find the numbers.

Solution: Suppose one natural number $= x$

Then, another natural number $= 4x$

$$\text{Sum} = 65$$
$$\therefore x + 4x = 65$$
$$\Rightarrow 5x = 65$$