

### EXERCISE 8.1

1. (i) The sum of 4 times  $x$  and 7 is 16.  
 $4x + 7 = 16$   
 (ii) 5 subtracted from 3 times a number  $x$  gives 7.  
 $3x - 5 = 7$   
 (iii) One-third of  $p$  is 2 more than 5.

$$\frac{p}{3} = 5 + 2$$

- (iv) One fourth of a number  $x$  added to 6 gives 9.

$$\frac{x}{4} + 6 = 9$$

- (v) The number  $a$  divided by 6 gives 5.

$$\frac{a}{6} = 5$$

- (vi) 4 subtracted from one-fourth of  $p$  gives 6.

$$\frac{p}{4} - 4 = 6$$

2. (i)  $p + 6 = 11$ , ( $p = 5$ )

$$\begin{aligned} \text{L.H.S} &= p + 6 \\ &= 5 + 6 \\ &= 11 = \text{R.H.S} \end{aligned}$$

Hence, L.H.S = R.H.S

**Yes**, the given value of  $p$  is the solution of given equation.

- (ii)  $4x + 9 = 12$ , ( $x = 2$ )

$$\begin{aligned} \text{L.H.S} &= 4x + 9 \\ &= 4 \times 2 + 9 = 8 + 9 \\ &= 17 \end{aligned}$$

$$\text{L.H.S} \neq \text{R.H.S}$$

**No**, the given value of  $x$  is not the solution of given equation.

- (iii)  $5x - 3 = 12$ , ( $x = 3$ )

$$\begin{aligned} \text{L.H.S} &= 5x - 3 \\ &= 5 \times 3 - 3 \\ &= 15 - 3 \\ &= 12 \end{aligned}$$

Hence, L.H.S = R.H.S

**Yes**, the given value of  $x$  is the solution of given equation.

- (iv)  $2x + 3 = 17$ , ( $x = 7$ )

$$\begin{aligned} \text{L.H.S} &= 2x + 3 \\ &= 2 \times 7 + 3 \\ &= 14 + 3 \\ &= 17 \end{aligned}$$

Hence, L.H.S = R.H.S

**Yes**, the given value of  $x$  is the solution of given equation.

$$\begin{aligned} \text{(v)} \quad 7x - 2 &= 11, (x = 2) \\ \text{L.H.S} &= 7x - 2 \\ &= 7 \times 2 - 2 \\ &= 14 - 2 \\ &= 12 \end{aligned}$$

Hence, L.H.S  $\neq$  R.H.S

**No**, the given value of  $x$  is not the solution of given equation.

$$\begin{aligned} \text{(vi)} \quad 3x + 9 &= 8, (x = -1) \\ \text{L.H.S} &= 3x + 9 \\ &= 3 \times (-1) + 9 \\ &= -3 + 9 = 6 \end{aligned}$$

Hence, L.H.S  $\neq$  R.H.S

**No**, the given value of  $x$  is not the solution of given equation.

3. (i)  $3x + 2 = 14$

The given equation is  $3x + 2 = 14$ .

$$\begin{array}{rcl} \text{L.H.S} & & = \text{R.H.S} \\ 3x + 2 & & = 14 \end{array}$$

$$\text{If } x = 0, \quad 3 \times 0 + 2 = 0 + 2 = 2 \quad \neq 14$$

$$\text{If } x = 1, \quad 3 \times 1 + 2 = 3 + 2 = 5 \quad \neq 14$$

$$\text{If } x = 2, \quad 3 \times 2 + 2 = 6 + 2 = 8 \quad \neq 14$$

$$\text{If } x = 3, \quad 3 \times 3 + 2 = 9 + 2 = 11 \quad \neq 14$$

$$\text{If } x = 4, \quad 3 \times 4 + 2 = 12 + 2 = 14 \quad \neq 14$$

Thus, for  $x = 4$ , L.H.S = R.H.S

Hence,  $x = 4$  is the solution of given equation.

- (ii)  $5m + 2 = 12$

The given equation is  $5m + 2 = 12$ .

$$\begin{array}{rcl} \text{L.H.S} & & = \text{R.H.S} \\ 5m + 2 & & = 12 \end{array}$$

$$\text{If } m = 0, \quad 5 \times 0 + 2 = 0 + 2 = 2 \quad \neq 12$$

$$\text{If } m = 1, \quad 5 \times 1 + 2 = 5 + 2 = 7 \quad \neq 12$$

$$\text{If } m = 2, \quad 5 \times 2 + 2 = 10 + 2 = 12 \quad = 12$$

Thus, for  $m = 2$ , L.H.S = R.H.S

Hence,  $m = 2$ , is the solution of given equation.

- (iii)  $\frac{2m}{5} = 2$

The given equation is  $\frac{2m}{5} = 2$ .

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

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

$$\text{If } m = 0, \quad \frac{2 \times 0}{5} = 0 \quad \neq 2$$

$$\text{If } m = 1, \quad \frac{2 \times 1}{5} = \frac{2}{5} \quad \neq 2$$

$$\text{If } m = 2, \quad \frac{2 \times 2}{5} = \frac{4}{5} \quad \neq 2$$

$$\text{If } m = 3, \quad \frac{2 \times 3}{5} = \frac{6}{5} \quad \neq 2$$

$$\text{If } m = 4, \quad \frac{2 \times 4}{5} = \frac{8}{5} \quad \neq 2$$

$$\text{If } m = 5, \quad \frac{2 \times 5}{5} = \frac{10}{5} = 2 = 2$$

Thus, for  $m = 5$ , L.H.S = R.H.S

Hence,  $m = 5$  is the solution of given equation.

(iv)  $4x - 1 = 7$

The given equation is  $4x - 1 = 7$ .

	L.H.S	= R.H.S
	$4x - 1$	$= 7$
If $x = 0$ ,	$4 \times 0 - 1 = 0 - 1 = -1$	$\neq 7$
If $x = 1$ ,	$4 \times 1 - 1 = 4 - 1 = 3$	$\neq 7$
If $x = 2$ ,	$4 \times 2 - 1 = 8 - 1 = 7$	$= 7$

Thus, for  $x = 2$ , L.H.S = R.H.S

Hence,  $x = 2$  is the solution of given equation.

(v)  $3x + 4 = 19$

The given equation is  $3x + 4 = 19$ .

	L.H.S	= R.H.S
	$3x + 4$	$= 19$
If $x = 0$ ,	$3 \times 0 + 4 = 0 + 4 = 4$	$\neq 19$
If $x = 1$ ,	$3 \times 1 + 4 = 3 + 4 = 7$	$\neq 19$
If $x = 2$ ,	$3 \times 2 + 4 = 6 + 4 = 10$	$\neq 19$
If $x = 3$ ,	$3 \times 3 + 4 = 9 + 4 = 13$	$\neq 19$
If $x = 4$ ,	$3 \times 4 + 4 = 12 + 4 = 16$	$\neq 19$
If $x = 5$ ,	$3 \times 5 + 4 = 15 + 4 = 19$	$= 19$

Thus, for  $x = 5$ , L.H.S = R.H.S

Hence,  $x = 5$  is the solution of given equation.

(vi)  $\frac{x}{2} + 6 = 9$

The given equation is  $\frac{x}{2} + 6 = 9$ .

	L.H.S	= R.H.S
	$\frac{x}{2} + 6$	$= 14$
If $x = 0$ ,	$\frac{0}{2} + 6 = 6$	$\neq 9$
If $x = 1$ ,	$\frac{1}{2} + 6 = 6\frac{1}{2}$	$\neq 9$
If $x = 2$ ,	$\frac{2}{2} + 6 = 1 + 6 = 7$	$\neq 9$
If $x = 3$ ,	$\frac{3}{2} + 6 = 7\frac{1}{2}$	$\neq 9$
If $x = 4$ ,	$\frac{4}{2} + 6 = 2 + 6 = 8$	$\neq 9$

$$\text{If } x = 5, \quad \frac{5}{2} + 6 = 8\frac{1}{2} \quad \neq 9$$

$$\text{If } x = 6, \quad \frac{6}{2} + 6 = 3 + 6 = 9 = 9$$

Thus, for  $x = 6$ , L.H.S = R.H.S

Hence,  $x = 6$  is the solution of given equation.

(vii)  $2m - 7 = 1$

The given equation is  $2m - 7 = 1$ .

	L.H.S	= R.H.S
	$2m - 1$	$= 1$
If $m = 0$ ,	$2 \times 0 - 7 = -7$	$\neq 1$
If $m = 1$ ,	$2 \times 1 - 7 = -5$	$\neq 1$
If $m = 2$ ,	$2 \times 2 - 7 = -3$	$\neq 1$
If $m = 3$ ,	$2 \times 3 - 7 = -1$	$\neq 1$
If $m = 4$ ,	$2 \times 4 - 7 = 1$	$= 1$

Thus, for  $m = 4$ , L.H.S = R.H.S

Hence,  $m = 4$  is the solution of given equation.

(viii)  $2p - 4 = 6$

The given equation is  $2p - 4 = 6$ .

	L.H.S	= R.H.S
	$2p - 2$	$= 6$
If $p = 0$ ,	$2 \times 0 - 4 = 0 - 4 = -4$	$\neq 6$
If $p = 1$ ,	$2 \times 1 - 4 = 2 - 4 = -2$	$\neq 6$
If $p = 2$ ,	$2 \times 2 - 4 = 4 - 4 = 0$	$\neq 6$
If $p = 3$ ,	$2 \times 3 - 4 = 6 - 4 = 2$	$\neq 6$
If $p = 4$ ,	$2 \times 4 - 4 = 8 - 4 = 4$	$\neq 6$
If $p = 5$ ,	$2 \times 5 - 4 = 10 - 4 = 6$	$= 6$

Thus, for  $p = 5$ , L.H.S = R.H.S

Hence,  $p = 5$  is the solution of given equation.

(ix)  $2x - 3 = 11$

The given equation is  $2x - 3 = 11$ .

	L.H.S	= R.H.S
	$2x - 3$	$= 11$
If $x = 0$ ,	$2 \times 0 - 3 = 0 - 3 = -3$	$\neq 11$
If $x = 1$ ,	$2 \times 1 - 3 = 2 - 3 = -1$	$\neq 11$
If $x = 2$ ,	$2 \times 2 - 3 = 4 - 3 = 1$	$\neq 11$
If $x = 3$ ,	$2 \times 3 - 3 = 6 - 3 = 3$	$\neq 11$
If $x = 4$ ,	$2 \times 4 - 3 = 8 - 3 = 5$	$\neq 11$
If $x = 5$ ,	$2 \times 5 - 3 = 10 - 3 = 7$	$\neq 11$
If $x = 6$ ,	$2 \times 6 - 3 = 12 - 3 = 9$	$\neq 11$
If $x = 7$ ,	$2 \times 7 - 3 = 14 - 3 = 11$	$= 11$

Thus, for  $x = 7$ , L.H.S = R.H.S

Hence,  $x = 7$  is the solution of given equation.

(x)  $2x - 3 = 5$

The given equation is  $2x - 3 = 5$ .

	L.H.S	= R.H.S
	$2x - 3$	$= 5$
If $x = 0$ ,	$2 \times 0 - 3 = 0 - 3 = -3$	$\neq 5$
If $x = 1$ ,	$2 \times 1 - 3 = 2 - 3 = -1$	$\neq 5$
If $x = 2$ ,	$2 \times 2 - 3 = 4 - 3 = 1$	$\neq 5$
If $x = 3$ ,	$2 \times 3 - 3 = 6 - 3 = 3$	$\neq 5$
If $x = 4$ ,	$2 \times 4 - 3 = 8 - 3 = 5$	$= 5$

Thus, for  $x = 4$ , L.H.S = R.H.S

Hence,  $x = 4$  is the solution of given equation.

4. (i)  $2x = 16$   
 "Twice a number is 6."  
 (ii)  $3(x + 6) = 30$   
 "Three times sum of a number and 6 is equals 30."  
 (iii)  $x + 4 = 11$   
 "4 added to a number gives 11."  
 (iv)  $7p + 7 = 70$   
 "Seven more than seven times a number is seventy."

(v)  $\frac{3}{4}x = 6$

"Three fourth of a number is 6."

(vi)  $3m - 4 = 17$

"4 less than 3 times a number is seventeen."

5. (i)  $x - 6 = 11$   
 $x - 6 + 6 = 11 + 6$  (Adding 6 to both sides)  
 $\Rightarrow x = 17$

**To check:** For  $x = 17$ ,

$$\text{L.H.S} = x - 6 = 17 - 6 = 11$$

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

Hence,  $x = 17$ , is the solution of given equation.

(ii)  $2x - 3 = 13$

$$\Rightarrow 2x - 3 + 3 = 13 + 3$$

(Adding 3 to both sides)

$$\Rightarrow 2x = 16$$

$$\Rightarrow \frac{2x}{2} = \frac{16}{2}$$

(Dividing both sides by 2)

$$\Rightarrow x = 8$$

**To check:** For  $x = 8$ ,

$$\text{L.H.S} = 2x - 3 = 2 \times 8 - 3 = 16 - 3 = 13$$

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

Hence,  $x = 8$ , is the solution of given equation.

(iii)  $12p - 12 = 36$

$$\Rightarrow 12p - 12 + 12 = 36 + 12$$

(Adding 12 to both sides)

$$\Rightarrow 12p = 48$$

$$\Rightarrow \frac{12p}{12} = \frac{48}{12}$$

(Dividing both sides by 12)

$$\Rightarrow p = 4$$

**To check:** For  $p = 4$ ,

$$\text{L.H.S} = 12p - 12 = 12 \times 4 - 12$$

$$= 48 - 12$$

$$= 36$$

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

Hence,  $p = 4$ , is the solution of given equation.

(iv)  $\frac{3x}{2} = 9$

$$\Rightarrow \frac{3x}{2} \times 2 = 9 \times 2$$

(Multiplying both sides by 2)

$$\Rightarrow 3x = 18$$

$$\Rightarrow \frac{3x}{3} = \frac{18}{3}$$

(Dividing both sides by 3)

$$\Rightarrow x = 6$$

**To check:** For  $x = 6$ ,

$$\text{L.H.S} = \frac{3x}{2} = \frac{3 \times 6}{2} = \frac{18}{2} = 9 = \text{R.H.S}$$

Thus, L.H.S = R.H.S

Hence,  $x = 6$ , is the solution of given equation.

(v)  $5x + 3 = 13$

$$\Rightarrow 5x + 3 - 3 = 13 - 3$$

(Subtracting 3 from both sides)

$$\Rightarrow 5x = 10$$

$$\Rightarrow \frac{5x}{5} = \frac{10}{5}$$

(Dividing both sides by 5)

$$\Rightarrow x = 2$$

**To check:** For  $x = 2$ ,

$$\text{L.H.S} = 5x + 3 = 5 \times 2 + 3 = 10 + 3 = 13$$

Thus, L.H.S = R.H.S

Hence,  $x = 2$ , is the solution of given equation.

(vi)  $\frac{1}{2}x + 9 = 14$

$$\Rightarrow \frac{1}{2}x + 9 - 9 = 14 - 9$$

(Subtracting 9 from both sides)

$$\Rightarrow \frac{1}{2}x = 5$$

$$\Rightarrow \frac{1}{2}x \times 2 = 5 \times 2$$

(Multiplying both sides by 2)

$$\Rightarrow x = 10$$

**To check:** For  $x = 10$

$$\text{L.H.S} = \frac{1}{2}x + 9$$

$$= \frac{1}{2} \times 10 + 9$$

$$= 5 + 9$$

$$= 14$$

Thus, L.H.S = R.H.S

Hence,  $x = 10$ , is the solution of given equation.

(vii)  $y - \frac{13}{2} = 6$

$$\Rightarrow y - \frac{13}{2} + \frac{13}{2} = 6 + \frac{13}{2}$$

(Adding  $\frac{13}{2}$  to both sides)

$$\Rightarrow y = \frac{25}{2}$$

**To check:** For  $y = \frac{25}{2}$

$$\text{L.H.S} = y - \frac{13}{2} = \frac{25}{2} - \frac{13}{2} = \frac{12}{2} = 6$$

Thus, L.H.S = R.H.S

Hence,  $y = \frac{25}{2}$ , is the solution of given equation.

$$\begin{aligned} \text{(viii)} \quad 3x - 4 &= 8 - x \\ \Rightarrow 3x - 4 + x &= 8 - x + x && \text{(Adding } x \text{ to both sides)} \\ \Rightarrow 4x - 4 &= 8 \\ \Rightarrow 4x - 4 + 4 &= 8 + 4 && \text{(Adding 4 to both sides)} \\ \Rightarrow 4x &= 12 \\ \Rightarrow \frac{4x}{4} &= \frac{12}{4} && \text{(Dividing both sides by 4)} \\ \Rightarrow x &= 3 \end{aligned}$$

**To check:** For  $x = 3$ ,  
L.H.S =  $3x - 4$   
 $= 3 \times 3 - 4 = 9 - 4 = 5$   
R.H.S =  $8 - x = 8 - 3 = 5$

Thus, L.H.S = R.H.S

Hence,  $x = 3$ , is the solution of given equation.

$$\begin{aligned} \text{(ix)} \quad \frac{x}{5} + 1 &= 4 \\ \Rightarrow \frac{x}{5} + 1 - 1 &= 4 - 1 && \text{(Subtracting 1 from both sides)} \\ \Rightarrow \frac{x}{5} &= 3 \\ \Rightarrow \frac{x}{5} \times 5 &= 3 \times 5 \text{ (Multiplying both sides by 5)} \\ \Rightarrow x &= 15 \end{aligned}$$

**To check:** For  $x = 15$ ,  
L.H.S =  $\frac{x}{5} + 1 = \frac{15}{5} + 1$   
 $= 3 + 1$   
 $= 4$

Thus, L.H.S = R.H.S

Hence,  $x = 15$ , is the solution of given equation.

$$\begin{aligned} \text{(x)} \quad \frac{x}{2} + \frac{x}{3} &= 1 \\ \Rightarrow \frac{3 \times x + 2 \times x}{6} &= 1 \quad \text{(L.C.M of 2 and 3 is 6)} \\ \Rightarrow \frac{3x + 2x}{6} &= 1 \\ \Rightarrow \frac{5x}{6} &= 1 \\ \Rightarrow \frac{5x}{6} \times 6 &= 1 \times 6 \text{ (Multiplying both sides by 6)} \\ \Rightarrow 5x &= 6 \\ \Rightarrow \frac{5x}{5} &= \frac{6}{5} \quad \text{(Dividing both sides by 5)} \end{aligned}$$

$$\Rightarrow x = \frac{6}{5}$$

**To check:** For  $x = \frac{6}{5}$

$$\begin{aligned} \text{L.H.S} &= \frac{x}{2} + \frac{x}{3} = \frac{5x}{6} \\ &= \frac{5}{6} \times \frac{6}{5} \\ &= 1 \end{aligned}$$

Thus, L.H.S = R.H.S

Hence,  $x = \frac{6}{5}$ , is the solution of given equation.

$$\begin{aligned} \text{(xi)} \quad 3(x + 7) &= 42 \\ \Rightarrow \frac{3(x + 7)}{3} &= \frac{42}{3} && \text{(Dividing both sides by 3)} \\ \Rightarrow x + 7 &= 14 \\ \Rightarrow x + 7 - 7 &= 14 - 7 && \text{(Subtracting 7 from both sides)} \\ \Rightarrow x &= 7 \end{aligned}$$

**To check:** For  $x = 7$ ,  
L.H.S =  $3(x + 7) = 3(7 + 7)$   
 $= 3 \times 14$   
 $= 42$

Thus, L.H.S = R.H.S

Hence,  $x = 7$ , is the solution of given equation.

$$\begin{aligned} \text{(xii)} \quad 5x - 3 &= x + 17 \\ \Rightarrow 5x - 3 + 3 &= x + 17 + 3 && \text{(Adding 3 to both sides)} \\ \Rightarrow 5x &= x + 20 \\ \Rightarrow 5x - x &= x + 20 - x && \text{(Subtracting } x \text{ from both sides)} \\ \Rightarrow 4x &= 20 \\ \Rightarrow \frac{4x}{4} &= \frac{20}{4} \quad \text{(Dividing both sides by 4)} \\ \Rightarrow x &= 5 \end{aligned}$$

**To check:** For  $x = 5$ ,  
L.H.S =  $5x - 3$   
 $= 5 \times 5 - 3$   
 $= 25 - 3$   
 $= 22$   
L.H.S = 22  
R.H.S =  $x + 17 = 5 + 17 = 22$

Thus, L.H.S = R.H.S

Hence,  $x = 5$ , is the solution of given equation.

$$\text{(xiii)} \quad 2x - \frac{1}{2} = -\frac{1}{3}$$

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

(Adding  $\frac{1}{2}$  to both sides)

$$\Rightarrow 2x = \frac{1}{6}$$

$$\Rightarrow \frac{2x}{2} = \frac{1}{6 \times 2} \quad (\text{Dividing both sides by 2})$$

$$\Rightarrow x = \frac{1}{12}$$

**To check:** For  $x = \frac{1}{12}$

$$\text{L.H.S} = 2x - \frac{1}{2} = 2 \times \frac{1}{12} - \frac{1}{2} = \frac{1}{6} - \frac{1}{2} = -\frac{1}{3}$$

$$= 14$$

Thus, L.H.S = R.H.S

Hence,  $x = \frac{1}{12}$ , is the solution of given equation.

(xiv)  $4(x - 2) = 12$

$$\Rightarrow \frac{4(x - 2)}{4} = \frac{12}{4} \quad (\text{Dividing both sides by 4})$$

$$\Rightarrow x - 2 = 3$$

$$\Rightarrow x - 2 + 2 = 3 + 2 \quad (\text{Adding 2 to both sides})$$

$$\Rightarrow x = 5$$

**To check:** For  $x = 5$ ,

$$4(x - 2) = 4(5 - 2)$$

$$= 4 \times 3$$

$$= 12$$

Thus, L.H.S = R.H.S  
Hence,  $x = 5$ , is the solution of given equation.

(xv)  $\frac{x}{4} = \frac{9}{8}$

$$\Rightarrow \frac{x}{4} \times 4 = \frac{9}{8} \times 4 \quad (\text{Multiplying both sides by 4})$$

$$\Rightarrow x = \frac{9}{2}$$

(xvi)  $2y - \frac{2}{3} = -\frac{1}{2}$

$$\Rightarrow 2y - \frac{2}{3} + \frac{2}{3} = -\frac{1}{2} + \frac{2}{3}$$

(Adding  $\frac{2}{3}$  to both sides)

$$\Rightarrow 2y = \frac{1}{6}$$

$$\Rightarrow \frac{2y}{2} = \frac{1}{6 \times 2} \quad (\text{Dividing both sides by 2})$$

$$\Rightarrow y = \frac{1}{12}$$

**To check:** For  $y = \frac{1}{12}$

$$\text{L.H.S} = 2y - \frac{2}{3} = 2 \times \frac{1}{12} - \frac{2}{3}$$

$$= \frac{1}{6} - \frac{2}{3}$$

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

Thus, L.H.S = R.H.S

Hence,  $y = \frac{1}{12}$ , is the solution of given equation.

(xvii)  $3(x + 2) - 2(x - 1) = 11$

$$\Rightarrow 3x + 6 - 2x + 2 = 11$$

$$\Rightarrow x + 8 = 11$$

$$\Rightarrow x + 8 - 8 = 11 - 8$$

(Subtracting 8 from both sides)

$$\Rightarrow x = 3$$

**To check:** For  $x = 3$

$$\text{L.H.S} = x + 8$$

$$= 3 + 8$$

$$= 11$$

Thus, L.H.S = R.H.S  
Hence,  $x = 3$ , is the solution of given equation.

(xviii)  $\frac{x - 3}{5} - 1 = 2$

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

(Adding 1 to both sides)

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

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

(Multiplying both sides by 5)

$$\Rightarrow x - 3 = 15$$

$$\Rightarrow x - 3 + 3 = 15 + 3 \quad (\text{Adding 3 to both sides})$$

$$\Rightarrow x = 18$$

**To check:** For  $x = 18$ ,

$$\text{L.H.S} = \frac{x - 3}{5} - 1$$

$$= \frac{18 - 3}{5} - 1$$

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

$$= 3 - 1 = 2$$

Thus, L.H.S = R.H.S  
Hence,  $x = 18$ , is the solution of given equation.

## Exercise 8.2

$$(xix) \quad \frac{1}{2} - 3x = 0$$

$$\Rightarrow \frac{1}{2} - 3x - \frac{1}{2} = 0 - \frac{1}{2}$$

(Subtracting  $\frac{1}{2}$  from both sides)

$$\Rightarrow -3x = -\frac{1}{2}$$

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

(Dividing both sides by  $-3$ )

$$\Rightarrow x = \frac{1}{6}$$

**To check:** For  $x = \frac{1}{6}$

$$\begin{aligned} \text{L.H.S} &= \frac{1}{2} - 3x \\ &= \frac{1}{2} - 3 \times \frac{1}{6} = \frac{1}{2} - \frac{1}{2} = 0 \\ &= 0 \end{aligned}$$

Thus, L.H.S = R.H.S

Hence,  $x = \frac{1}{6}$ , is the solution of given equation.

$$(xx) \quad 12 = \frac{2x}{3} - 6$$

$$\text{or } \frac{2x}{3} - 6 = 12$$

$$\frac{2x}{3} - 6 + 6 = 12 + 6 \quad (\text{Adding } 6 \text{ to both sides})$$

$$\Rightarrow \frac{2x}{3} = 18$$

$$\Rightarrow \frac{2x}{3} \times 3 = 18 \times 3$$

(Multiplying both sides by 3)

$$\Rightarrow 2x = 54$$

$$\Rightarrow \frac{2x}{2} = \frac{54}{2} \quad (\text{Dividing both sides by } 2)$$

$$\Rightarrow x = 27$$

**To check:** For  $x = 27$

$$\begin{aligned} \text{R.H.S} &= \frac{2x}{3} - 6 \\ &= \frac{2 \times 27}{3} - 6 \\ &= 18 - 6 = 12 \end{aligned}$$

Thus, L.H.S = R.H.S

Hence,  $x = 27$ , is the solution of given equation.

$$1. \quad 2x - 3 = 6$$

$$\Rightarrow 2x = 6 + 3 \quad (\text{Transposing } -3 \text{ to R.H.S})$$

$$\Rightarrow 2x = 9$$

$$\Rightarrow \frac{2x}{2} = \frac{9}{2} \quad (\text{Dividing both sides by } 2)$$

$$\boxed{x = \frac{9}{2}}$$

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

$$\Rightarrow \frac{3x}{2} = 4 + 5 \quad (\text{Transposing } -5 \text{ to R.H.S})$$

$$\Rightarrow \frac{3x}{2} = 9$$

$$\Rightarrow \frac{3x}{2} \times 2 = 9 \times 2$$

(Multiplying both sides by 2)

$$\Rightarrow 3x = 18$$

$$\Rightarrow \frac{3x}{3} = \frac{18}{3} \quad (\text{Dividing both sides by } 3)$$

$$\boxed{x = 6}$$

$$3. \quad \frac{2}{3}x = \frac{8}{9}$$

$$\Rightarrow \frac{2}{3}x \times 3 = \frac{8}{9} \times 3$$

(Multiplying both sides by 3)

$$\Rightarrow 2x = \frac{8}{3}$$

$$\Rightarrow \frac{2x}{2} = \frac{8}{2 \times 3}$$

(Dividing both sides by 2)

$$\boxed{x = \frac{4}{3}}$$

$$4. \quad \frac{a}{2} + 3 = 5$$

$$\Rightarrow \frac{a}{2} = 5 - 3$$

(Transposing +3 to R.H.S)

$$\Rightarrow \frac{a}{2} = 2$$

$$\Rightarrow \frac{a}{2} \times 2 = 2 \times 2$$

(Multiplying both sides by 2)

$$\boxed{a = 4}$$

$$5. \quad 3(x - 5) = -21$$

$$\Rightarrow \frac{3(x - 5)}{3} = \frac{-21}{3} \quad (\text{Dividing both sides by } 3)$$

$$\Rightarrow x - 5 = -7$$

$$\Rightarrow x = -7 + 5$$

(Transposing  $-5$  to R.H.S)

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

6.  $\frac{x}{4} + 9 = 5$

$$\Rightarrow \frac{x}{4} = 5 - 9 \quad (\text{Transposing } +9 \text{ to R.H.S})$$

$$\Rightarrow \frac{x}{4} = -4$$

$$\Rightarrow \frac{x}{4} \times 4 = -4 \times 4$$

(Multiplying both sides by 4)

$$\boxed{x = -16}$$

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

or  $21x - 3 = 4x + 6$

$$\Rightarrow 21x = 4x + 6 + 3$$

(Transposing  $-3$  to R.H.S)

$$\Rightarrow 21x = 4x + 9$$

$$\Rightarrow 21x - 4x = 9 \quad (\text{Transposing } 4x \text{ to L.H.S})$$

$$\Rightarrow 17x = 9$$

$$\frac{17x}{17} = \frac{9}{17}$$

(Dividing both sides by 17)

$$\boxed{x = \frac{9}{17}}$$

8.  $\frac{3}{4}(x - 2) = x - 1$

or  $\frac{3}{4}x - \frac{3}{4} \times 2 = x - 1$

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

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

(Transposing  $-\frac{3}{2}$  to R.H.S)

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

$$\Rightarrow \frac{3}{4}x - x = \frac{1}{2} \quad (\text{Transposing } x \text{ to L.H.S})$$

$$\Rightarrow -\frac{1}{4}x = \frac{1}{2}$$

$$\Rightarrow -\frac{1}{4}x \times (-4) = \frac{1}{2} \times (-4)$$

(Multiplying both sides by  $-4$ )

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

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

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

(Transposing  $-\frac{1}{3}$  to R.H.S)

$$\Rightarrow x - \frac{x}{4} = \frac{7}{3} + \frac{x}{4}$$

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

(Transposing  $\frac{x}{4}$  to L.H.S)

$$\Rightarrow \frac{x}{2} = \frac{7}{3}$$

$$\Rightarrow \frac{x}{2} \times 2 = \frac{7}{3} \times 2$$

(Multiplying both sides by 2)

$$\boxed{x = \frac{14}{3}}$$

10.  $\frac{2x-1}{3} - 1 = \frac{x-2}{3}$

$$\Rightarrow \frac{2x-1-3}{3} = \frac{x-2}{3}$$

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

$$\Rightarrow \frac{2x-4}{3} \times 3 = \frac{x-2}{3} \times 3$$

(Multiplying both sides by 3)

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

$$\Rightarrow 2x = x - 2 + 4 \quad (\text{Transposing } -4 \text{ to R.H.S})$$

$$\Rightarrow 2x = x + 2$$

$$\Rightarrow 2x - x = 2 \quad (\text{Transposing } x \text{ to L.H.S})$$

$$\boxed{x = 2}$$

11.  $6 + 5(a - 1) = 36$

$$\Rightarrow 5(a - 1) = 36 - 6$$

(Transposing 6 to R.H.S)

$$\Rightarrow 5(a - 1) = 30$$

$$\Rightarrow \frac{5(a-1)}{5} = \frac{30}{5}$$

(Dividing both sides by 5)

$$\Rightarrow a - 1 = 6$$

$$\Rightarrow a = 6 + 1$$

(Transposing  $-1$  to R.H.S)

$$\boxed{a = 7}$$

$$12. -3(x+2) = 9$$

$$\Rightarrow \frac{-3(x+2)}{(-3)} = \frac{9}{(-3)}$$

(Dividing both sides by  $-3$ )

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

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

(Transposing  $+2$  to R.H.S)

$$\boxed{x = -5}$$

$$13. \frac{x}{3} + \frac{x}{4} = 42$$

$$\Rightarrow \frac{4x+3x}{12} = 42 \quad (\text{L.C.M of 3 and 4 is 12})$$

$$\Rightarrow \frac{7x}{12} = 42$$

$$\Rightarrow \frac{7x}{12} \times 12 = 42 \times 12$$

(Multiplying both sides by 12)

$$\Rightarrow 7x = 504$$

$$\Rightarrow \frac{7x}{7} = \frac{504}{7}$$

(Dividing both sides by 7)

$$\boxed{x = 72}$$

$$14. 5 + \frac{1}{3}x = 2x$$

or  $2x = 5 + \frac{x}{3}$

$$\Rightarrow 2x - \frac{x}{3} = 5 \quad (\text{Transposing } \frac{x}{3} \text{ to L.H.S})$$

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

$$\Rightarrow \frac{5x}{3} \times 3 = 5 \times 3$$

(Multiplying both sides by 3)

$$\Rightarrow 5x = 15$$

$$\Rightarrow \frac{5x}{5} = \frac{15}{5}$$

(Dividing both sides by 5)

$$\boxed{x = 3}$$

$$15. \frac{x-3}{2} - 4 = 9$$

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

(Transposing  $-4$  to R.H.S)

$$\Rightarrow \frac{x-3}{2} = 13$$

$$\Rightarrow \frac{x-3}{2} \times 2 = 13 \times 2$$

(Multiplying both sides by 2)

$$\Rightarrow x - 3 = 26$$

$$\Rightarrow x = 26 + 3$$

(Transposing  $-3$  to R.H.S)

$$\boxed{x = 29}$$

$$16. 13 = 2(x-5) - 2$$

or  $2(x-5) - 2 = 13$

$$\Rightarrow 2(x-5) = 13 + 2$$

(Transposing  $-2$  to R.H.S)

$$\Rightarrow 2(x-5) = 15$$

$$\Rightarrow \frac{2(x-5)}{2} = \frac{15}{2}$$

(Dividing both sides by 2)

$$\Rightarrow x - 5 = \frac{15}{2}$$

$$\Rightarrow x = \frac{15}{2} + 5$$

(Transposing  $-5$  to R.H.S)

$$\boxed{x = \frac{25}{2}}$$

$$17. \frac{4-x}{3} = 6$$

$$\Rightarrow \frac{4-x}{3} \times 3 = 6 \times 3$$

(Multiplying both sides by 3)

$$\Rightarrow 4 - x = 18$$

$$\Rightarrow -x = 18 - 4$$

(Transposing 4 to R.H.S)

$$\Rightarrow -x = 14$$

$$\boxed{x = -14}$$

$$18. 2x - 3 = \frac{1}{3}x + \frac{1}{3}$$

$$\Rightarrow 2x = \frac{x}{3} + \frac{1}{3} + 3$$

(Transposing  $-3$  to R.H.S)

$$\Rightarrow 2x = \frac{x}{3} + \frac{10}{3}$$

$$\Rightarrow 2x - \frac{x}{3} = \frac{10}{3} \quad (\text{Transposing } \frac{x}{3} \text{ to L.H.S})$$

$$\Rightarrow \frac{5x}{3} = \frac{10}{3}$$

$$\Rightarrow \frac{5x}{3} \times 3 = \frac{10}{3} \times 3$$

(Multiplying both sides by 3)

$$\Rightarrow 5x = 10$$

$$\Rightarrow \frac{5x}{5} = \frac{10}{5} \quad (\text{Dividing both sides by 5})$$

$$\boxed{x = 2}$$



$$19. \quad 15 + \frac{1}{2}p = 3p$$

$$\text{or} \quad 3p = 15 + \frac{p}{2}$$

$$\Rightarrow \quad 3p - \frac{p}{2} = 15 \quad (\text{Transposing } + \frac{p}{2} \text{ to L.H.S})$$

$$\Rightarrow \quad \frac{5p}{2} = 15$$

$$\Rightarrow \quad \frac{5p}{2} \times 2 = 15 \times 2$$

(Multiplying both sides by 2)

$$\Rightarrow \quad 5p = 30$$

$$\Rightarrow \quad \frac{5p}{5} = \frac{30}{5} \quad (\text{Dividing both sides by 5})$$

$$\boxed{p = 6}$$

$$20. \quad \frac{y-6}{2} = \frac{3-2y}{5}$$

$$\Rightarrow \quad \frac{y-6}{2} \times 2 = \frac{3-2y}{5} \times 2$$

(Multiplying both sides by 2)

$$\Rightarrow \quad (y-6) = \frac{2(3-2y)}{5}$$

$$\Rightarrow \quad 5(y-6) = \frac{2(3-2y)}{5} \times 5$$

(Multiplying both sides by 5)

$$\Rightarrow \quad 5(y-6) = 2(3-2y)$$

$$\Rightarrow \quad 5y - 30 = 6 - 4y$$

$$\Rightarrow \quad 5y = 6 - 4y + 30$$

(Transposing -30 to R.H.S)

$$\Rightarrow \quad 5y = -4y + 36$$

$$\Rightarrow \quad 5y + 4y = 36$$

(Transposing -4y to L.H.S)

$$\Rightarrow \quad 9y = 36$$

$$\Rightarrow \quad \frac{9y}{9} = \frac{36}{9} \quad (\text{Dividing both sides by 9})$$

$$\boxed{y = 4}$$

### EXERCISE 8.3

1. Let the number be  $x$  therefore,

$$3x + 15 = 42$$

$$\Rightarrow \quad 3x = 42 - 15$$

(Transposing +15 to R.H.S)

$$\Rightarrow \quad 3x = 27$$

$$\Rightarrow \quad \frac{3x}{3} = \frac{27}{3} \quad (\text{Dividing both sides by 3})$$

$$x = 9$$

Hence, the required number is 9.

2. Let the number be  $x$ . Therefore,

$$2x - 13 = 19$$

$$\Rightarrow \quad 2x = 19 + 13$$

(Transposing -13 to R.H.S)

$$\Rightarrow \quad 2x = 32$$

$$\Rightarrow \quad \frac{2x}{2} = \frac{32}{2} \quad (\text{Dividing both sides by 2})$$

$$\Rightarrow \quad x = 16$$

Hence, the required number is 16.

3. Let the base angles of an isoscales triangle be  $x$ ,

Therefore,

$$50^\circ + x + x = 180^\circ$$

$$\Rightarrow \quad 50^\circ + 2x = 180^\circ$$

$$\Rightarrow \quad 2x = 180^\circ - 50^\circ$$

$$\Rightarrow \quad 2x = 130^\circ$$

$$\Rightarrow \quad x = \frac{130^\circ}{2} = 65^\circ$$

Hence, the base angles are  $65^\circ$ .

4. Let the Gagan's age be  $x$  years.

Therefore,

$$2x + 5 = 45$$

$$\Rightarrow \quad 2x = 45 - 5$$

(Transposing +5 to R.H.S)

$$\Rightarrow \quad 2x = 40$$

$$\Rightarrow \quad \frac{2x}{2} = \frac{40}{2} \quad (\text{Dividing both sides by 2})$$

$$\Rightarrow \quad x = 20 \text{ years}$$

Hence, Gagan's age is 20 years.

5. Let the present age of the son be  $x$ .

Therefore, his father's age =  $3x$

After 15 years,

The age of son =  $(x + 15)$  years

and the age of his father =  $(3x + 15)$  years

Now, According to given condition,

$$2(x + 15) = 3x + 15$$

$$\Rightarrow \quad 2x + 30 = 3x + 15$$

$$\Rightarrow \quad 2x = 3x + 15 - 30$$

(Transposing +30 to R.H.S)

$$\Rightarrow \quad 2x = 3x - 15$$

$$\Rightarrow \quad 2x - 3x = -15$$

(Transposing of +3x to L.H.S)

$$\Rightarrow \quad -x = -15$$

$$\Rightarrow \quad x = 15$$

Hence, son's age = 15 years, and

father's age = 45 years

6. Let the three consecutive even numbers be  $(x + 2)$ ,

$(x + 4)$  and  $(x + 6)$ . Therefore,

According to give condition,

$$(x + 2) + (x + 4) + (x + 6) = 276$$

$$\Rightarrow \quad 3x + 12 = 276$$

$$\begin{aligned} \Rightarrow 3x &= 276 - 12 && \text{(Transposing + 12 to R.H.S)} \\ \Rightarrow 3x &= 264 \\ \Rightarrow \frac{3x}{3} &= \frac{264}{3} && \text{(Dividing both sides by 3)} \\ \Rightarrow x &= 88 \end{aligned}$$

Hence, the three consecutive even numbers are 90, 92 and 94.

7. Let the number be  $x$ . Therefore,  
According to condition,

$$\begin{aligned} \frac{1}{3}x - \frac{1}{5}x &= 6 \\ \Rightarrow \frac{5x - 3x}{15} &= 6 \\ \Rightarrow \frac{2x}{15} &= 6 \\ \Rightarrow \frac{2x}{15} \times 15 &= 6 \times 15 && \text{(Multiplying both sides by 15)} \\ \Rightarrow 2x &= 90 \\ \Rightarrow \frac{2x}{2} &= \frac{90}{2} && \text{(Dividing both sides by 2)} \\ \Rightarrow x &= 45 \end{aligned}$$

Hence, the required number is 45.

8. Let the third side of a triangle be  $x$ . Therefore,  
second side =  $2x$

Now, the perimeter of a triangle = sum of the length of three sides.

$$\begin{aligned} \Rightarrow 18 &= 6 + 2x + x \\ \Rightarrow 3x &= 18 - 6 \\ \Rightarrow \frac{3x}{3} &= \frac{12}{3} && \text{(Dividing both sides by 3)} \\ \Rightarrow x &= 4 \end{aligned}$$

Hence, the sides of a triangle are 6 cm, 4 cm and 8 cm.

9. Let the four consecutive even numbers be  $(x + 2)$ ,  $(x + 4)$ ,  $(x + 6)$  and  $(x + 8)$ . Therefore,

According to given condition

$$\begin{aligned} (x + 2) + (x + 4) + (x + 6) + (x + 8) &= 156 \\ \Rightarrow 4x + 20 &= 156 \\ \Rightarrow 4x &= 156 - 20 && \text{(Transposing + 20 to R.H.S)} \\ \Rightarrow 4x &= 136 \\ \Rightarrow \frac{4x}{4} &= \frac{136}{4} && \text{(Dividing both sides by 4)} \\ \Rightarrow x &= 34 \end{aligned}$$

Hence, the four consecutive even numbers are 36, 38, 40 and 42.

10. Let the son's age be  $x$  year. Therefore, his father's age =  $(x + 40)$  years

After 5 years,

The son's age =  $(x + 5)$  years

The father's age =  $x + 40 + 5 = (x + 45)$  years

Now, according to given condition,

$$\begin{aligned} 3(x + 5) &= x + 45 \\ \Rightarrow 3x + 15 &= x + 45 \\ \Rightarrow 3x &= x + 45 - 15 && \text{(Transposing + 15 to R.H.S)} \\ \Rightarrow 3x - x &= 30 && \text{(Transposing + x to L.H.S)} \\ \Rightarrow 2x &= 30 \\ \Rightarrow \frac{2x}{2} &= \frac{30}{2} && \text{(Dividing both sides by 2)} \\ \Rightarrow x &= 15 \end{aligned}$$

Hence, son's age = 15 years, and

Father's age =  $15 + 40 = 55$  years

11. Let the Anil's present age be  $x$  years,

Therefore, father's age =  $(54 - x)$  years

Six year before,

Anil's age =  $(x - 6)$  years

Father's age =  $(54 - x) - 6 = (48 - x)$  years

Now, According to given condition,

$$\begin{aligned} 6(x - 6) &= (48 - x) \\ \Rightarrow 6x - 36 &= 48 - x \\ \Rightarrow 6x &= 48 - x + 36 && \text{(Transposing - 36 to R.H.S)} \\ \Rightarrow 6x &= 84 - x \\ \Rightarrow 6x + x &= 84 && \text{(Transposing - x to L.H.S)} \\ \Rightarrow 7x &= 84 \\ \Rightarrow \frac{7x}{7} &= \frac{84}{7} && \text{(Dividing both sides by 7)} \\ \Rightarrow x &= 12 \end{aligned}$$

Hence, Anil's age = 12 years

Father's age =  $54 - 12 = 42$  years

12. Let the number be  $x$ .

Therefore, according to condition

$$\begin{aligned} \frac{(x + 11)}{7} &= 9 \\ \Rightarrow \frac{x + 11}{7} \times 7 &= 9 \times 7 && \text{(Multiplying both sides by 7)} \\ \Rightarrow x + 11 &= 63 \\ \Rightarrow x + 11 - 11 &= 63 - 11 && \text{(Subtracting 11 from both sides)} \\ \Rightarrow x &= 52 \end{aligned}$$

Hence, the required number is 52.

13. Let Varad score runs be  $x$ .

Therefore, Rishabh scored runs =  $3x$

According to given condition,

$$\begin{aligned}x + 3x &= 192 \\ \Rightarrow 4x &= 192 \\ \Rightarrow \frac{4x}{4} &= \frac{192}{4} \text{ (Dividing both sides by 4)} \\ \Rightarrow x &= 48\end{aligned}$$

Hence, Varad score runs = 48

and Rishabh scored runs = 144

14. Let the number be  $x$ . Therefore,

$$\begin{aligned}\frac{1}{4}x &= 6 + 5 \\ \Rightarrow \frac{x}{4} &= 11 \\ \Rightarrow x &= 44\end{aligned}$$

Hence, the required number is 44.

15. Let the Priyanka have number of apple be  $x$ .

Therefore,

$$\begin{aligned}65 - 3x &= 14 \\ \Rightarrow -3x &= 14 - 65 \\ &\text{(Transposing + 65 to R.H.S)} \\ \Rightarrow -3x &= -51 \\ \Rightarrow \frac{-3x}{-3} &= \frac{-51}{-3} \\ &\text{(Dividing both sides by - 3)} \\ \Rightarrow x &= 17\end{aligned}$$

Hence, Priyanka have 17 apples.

### MULTIPLE CHOICE QUESTIONS

1. Let the number be  $x$ .

Then,

$$\begin{aligned}3x - 7 &= 8 \\ \Rightarrow 3x &= 8 + 7 \text{ (Transposing - 7 to R.H.S)} \\ \Rightarrow 3x &= 15 \\ \Rightarrow x &= 5\end{aligned}$$

Thus, the number is 5.

Hence, option (d) is correct.

2. Let the number be  $x$ .

Then,

$$\begin{aligned}3x + 7 &= 22 \\ \Rightarrow 3x &= 22 - 7 \\ &\text{(Transposing + 7 to R.H.S)} \\ \Rightarrow 3x &= 15 \\ \Rightarrow x &= 5\end{aligned}$$

Thus, the number is 5.

Hence, option (a) is correct.

3. Let the number be  $x$ .

Then,

$$3x + 5 = \frac{23}{4}$$

$$\Rightarrow 3x = \frac{23}{4} - 5$$

$$\Rightarrow 3x = \frac{3}{4}$$

$$\Rightarrow x = \frac{1}{4}$$

Thus, the required number is  $\frac{1}{4}$ .

Hence, option (b) is correct.

4. Let the required number be  $x$ .

Then,

$$\begin{aligned}x + \frac{2}{3}x &= 65 \\ \Rightarrow \frac{3x + 2x}{3} &= 65\end{aligned}$$

$$\Rightarrow \frac{5x}{3} = 65$$

$$\Rightarrow 5x = 65 \times 3$$

$$\Rightarrow 5x = 195$$

$$\Rightarrow x = \frac{195}{5} = 39$$

Thus, the required number is 39.

Hence, option (c) is correct.

5. Let the number be  $x$ .

Then,

$$x - \frac{2}{3}x = 20$$

$$\Rightarrow \frac{x}{3} = 20$$

$$\Rightarrow x = 20 \times 3$$

$$\Rightarrow x = 60$$

Thus, the required number is 60.

Hence, option (b) is correct.

6. Let the number be  $x$ .

Then,

$$3x - x = 48$$

$$\Rightarrow 2x = 48$$

$$\Rightarrow x = \frac{48}{2} = 24$$

Thus, the required number is 24.

Hence, option (a) is correct.

7.  $2y + 3 = 7$

$$\Rightarrow 2y = 7 - 3 \text{ (Transposing + 3 to R.H.S)}$$

$$\Rightarrow 2y = 4$$

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

Hence, option (b) is correct.

8.  $2x - 3 = 9$

$\Rightarrow 2x = 9 + 3$

$\Rightarrow 2x = 12$

$\Rightarrow x = \frac{12}{2} = 6$

Hence, option (a) is correct.

9.  $2x + \frac{x}{2} = 20$

$\Rightarrow \frac{5x}{2} = 20$

$\Rightarrow 5x = 20 \times 2$

$\Rightarrow 5x = 40$

$\Rightarrow x = \frac{40}{5} = 8$

Hence, option (b) is correct.

10. Let the number be  $x$ .

Then,

$\frac{x}{6} = 4$

$\Rightarrow x = 4 \times 6 = 24$

Thus, the required number is 24.

Hence, option (c) is correct.

11. Let the two consecutive odd numbers be  $(2x + 1)$  and  $(2x + 3)$ .

Therefore,

$(2x + 1) + (2x + 3) = 40$

$\Rightarrow 4x + 4 = 40$

$\Rightarrow 4x = 40 - 4$

(Transposing + 4 to R.H.S)

$\Rightarrow 4x = 36$

$\Rightarrow x = \frac{36}{4} = 9$

Thus, two consecutive odd numbers are 19 and 21.

The smaller odd number is 19.

Hence, option (a) is correct.

12. Let the number be  $x$ .

Then,

$2x + 9 = 33$

$\Rightarrow 2x = 33 - 9$

(Transposing + 9 to R.H.S)

$\Rightarrow 2x = 24$

$\Rightarrow x = \frac{24}{2} = 12$

Thus, the required number is 12.

Hence, option (b) is correct.

13. Let the number be  $x$ .

Then,

$3x + 2 = 17$

$\Rightarrow 3x = 17 - 2$

(Transposing + 2 to R.H.S)

$\Rightarrow 3x = 15$

$\Rightarrow x = \frac{15}{3} = 5$

Thus, the required number is 5.

Hence, option (d) is correct.

14. Let the number be  $x$ .

Then,

$\frac{2}{5}x + 2 = 8$

$\Rightarrow \frac{2}{5}x = 8 - 2$  (Transposing + 2 to R.H.S)

$\Rightarrow \frac{2}{5}x = 6$

$\Rightarrow 2x = 6 \times 5$

$\Rightarrow x = \frac{30}{2} = 15$

Thus, the required number is 15.

Hence, option (b) is correct.

15. Let the number be  $x$ .

Then,

$5x + 6 = 46$

$\Rightarrow 5x = 46 - 6$

$\Rightarrow 5x = 40$

$\Rightarrow x = \frac{40}{5} = 8$

Thus, the number is 8.

Hence, option (a) is correct.

16.  $4p - 10 = -2$

$\Rightarrow 4p = -2 + 10$

$\Rightarrow 4p = 8$

$\Rightarrow p = \frac{8}{4} = 2$

Hence, option (c) is correct.

## MENTAL MATHS CORNER

Fill in the blank:

1. Let the number be  $x$ .

Then,

$x + \frac{x}{2} = 39$

$\Rightarrow \frac{3x}{2} = 39$

$\Rightarrow 3x = 39 \times 2$

$\Rightarrow x = \frac{39 \times 2}{3} = 26$

Hence, A number which when added to its half gives 39. The number is 26.

## REVIEW EXERCISE

2.  $\frac{5p-1}{2} = 7$

$$\Rightarrow 5p - 1 = 7 \times 2$$

$$\Rightarrow 5p - 1 = 14$$

$$\Rightarrow 5p = 14 + 1$$

(Transposing - 1 to R.H.S.)

$$\Rightarrow p = \frac{15}{5} = 3$$

Hence,

If  $\frac{5p-1}{2} = 7$ , then the value of  $p$  is **3**.

3.  $15 - k = k - 15$

$$\Rightarrow 15 + 15 = k + k$$

$$\Rightarrow 2k = 30$$

$$\Rightarrow k = \frac{30}{2} = 15$$

Hence,

The value of  $k$  to make the statement  $15 - k = k - 15$  true is **15**.

4.  $\frac{2x+3}{5} = \frac{7}{2}$

$$\Rightarrow 2(2x + 3) = 35$$

$$\Rightarrow 4x + 6 = 35$$

$$\Rightarrow 4x = 35 - 6 = 22$$

$$\Rightarrow x = \frac{29}{4}$$

Thus,

If  $\frac{2x+3}{5} = \frac{7}{2}$ , then the value of  $x$  is  $\frac{29}{4}$ .

5.  $\frac{11x+3}{4} = 9$

$$\Rightarrow 11x + 3 = 36$$

$$\Rightarrow 11x = 36$$

$$\Rightarrow 11x = 36 - 3$$

(Transposing + 3 to R.H.S.)

$$\Rightarrow 11x = 33$$

$$\Rightarrow x = 3$$

Hence,

If  $\frac{11x+3}{4} = 9$ , then its root is **3**.

6. If  $\frac{3-x}{2} = 0$ , then the value of  $x$  is **3**.

7. If  $\frac{15}{x} = 5$ , then the value of  $x$  is **3**.

1. (i) The given equation is  $\frac{m}{3} = 2$ .

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

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

$$\text{If } m = 0, \frac{0}{3} = 0 \neq 2$$

$$\text{If } m = 1, \frac{1}{3} = \frac{1}{3} \neq 2$$

$$\text{If } m = 2, \frac{2}{3} = \frac{2}{3} \neq 2$$

$$\text{If } m = 3, \frac{3}{3} = 1 \neq 2$$

$$\text{If } m = 4, \frac{4}{3} = 1\frac{1}{3} \neq 2$$

$$\text{If } m = 5, \frac{5}{3} = 1\frac{2}{3} \neq 2$$

$$\text{If } m = 6, \frac{6}{3} = 2 = 2$$

Thus, for  $m = 6$ , L.H.S = R.H.S

Hence,  $m = 6$  is the solution of given equation.

(ii) The given equation is  $p + 12 = 12$ .

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

$$p + 9 = 12$$

$$\text{If } p = 0, 0 + 9 = 9 \neq 12$$

$$\text{If } p = 1, 1 + 9 = 10 \neq 12$$

$$\text{If } p = 2, 2 + 9 = 11 \neq 12$$

$$\text{If } p = 3, 3 + 9 = 12 = 12$$

Thus, for  $p = 3$ , L.H.S = R.H.S

Hence,  $p = 3$  is the solution of given equation.

(iii)  $3p - 4 = 14$

The given equation is  $3p - 4 = 14$ .

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

$$3p - 4 = 14$$

$$\text{If } p = 0, 3 \times 0 - 4 = -4 \neq 14$$

$$\text{If } p = 1, 3 \times 1 - 4 = 3 - 4 = -1 \neq 14$$

$$\text{If } p = 2, 3 \times 2 - 4 = 6 - 4 = 2 \neq 14$$

$$\text{If } p = 3, 3 \times 3 - 4 = 9 - 4 = 5 \neq 14$$

$$\text{If } p = 4, 3 \times 4 - 4 = 12 - 4 = 8 \neq 14$$

$$\text{If } p = 5, 3 \times 5 - 4 = 15 - 4 = 11 \neq 14$$

$$\text{If } p = 6, 3 \times 6 - 4 = 18 - 4 = 14 = 14$$

Thus, for  $p = 6$ , L.H.S = R.H.S

Hence,  $p = 6$  is the solution of given equation.

$$(iv) \frac{x}{3} + 5 = 7$$

	L.H.S	= R.H.S
	$\frac{x}{3} + 5$	$= 7$
If $x = 0$ ,	$\frac{0}{3} + 5 = 5$	$\neq 7$
If $x = 1$ ,	$\frac{1}{3} + 5 = \frac{16}{3}$	$\neq 7$
If $x = 2$ ,	$\frac{2}{3} + 5 = \frac{17}{3}$	$\neq 7$
If $x = 3$ ,	$\frac{3}{3} + 5 = 6$	$\neq 7$
If $x = 4$ ,	$\frac{4}{3} + 5 = \frac{19}{3}$	$\neq 7$
If $x = 5$ ,	$\frac{5}{3} + 5 = \frac{20}{3}$	$\neq 7$
If $x = 6$ ,	$\frac{6}{3} + 5 = 7$	$= 7$

Thus, for  $x = 6$ , L.H.S = R.H.S

Hence,  $x = 6$  is the solution of given equation.

$$(v) 2x - 3 = 9$$

	L.H.S	= R.H.S
	$2x - 3$	$= 9$
If $x = 0$ ,	$2 \times 0 - 3 = -3$	$\neq 9$
If $x = 1$ ,	$2 \times 1 - 3 = 2 - 3 = -1$	$\neq 9$
If $x = 2$ ,	$2 \times 2 - 3 = 4 - 3 = 1$	$\neq 9$
If $x = 3$ ,	$2 \times 3 - 3 = 6 - 3 = 3$	$\neq 9$
If $x = 4$ ,	$2 \times 4 - 3 = 8 - 3 = 5$	$\neq 9$
If $x = 5$ ,	$2 \times 5 - 3 = 10 - 3 = 7$	$\neq 9$
If $x = 6$ ,	$2 \times 6 - 3 = 12 - 3 = 9$	$= 9$

Thus, for  $x = 6$ , L.H.S = R.H.S

Hence,  $x = 6$  is the solution of given equation.

$$2. (i) 5m - 3 = 22, (m = 5)$$

$$\begin{aligned} \text{L.H.S} &= 5m - 3 \\ &= 5 \times 5 - 3 \\ &= 25 - 3 = 22 \end{aligned}$$

Hence, L.H.S = R.H.S

Yes,  $m = 5$  is the solution of given equation.

$$(ii) x - 7 = -2, (x = 9)$$

$$\text{L.H.S} = x - 7 = 9 - 7 = 2$$

Thus, L.H.S  $\neq$  R.H.S

No,  $x = 9$  is not the solution of given equation.

$$(iii) \frac{1}{2}x - \frac{1}{3}x = 4, (x = 24)$$

$$\begin{aligned} \text{L.H.S} &= \frac{1}{2} \times 24 - \frac{1}{3} \times 24 \\ &= 12 - 8 \\ &= 4 \end{aligned}$$

L.H.S = R.H.S

Yes,  $x = 24$ , is the solution of given equation.

$$3. (i) 2x - 2 = \frac{1}{5} - x$$

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

(Transposing  $-x$  to L.H.S)

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

(Transposing  $-2$  to R.H.S)

$$\Rightarrow 3x = \frac{11}{5}$$

$$\Rightarrow \frac{3x}{3} = \frac{11}{5 \times 3} \quad (\text{Dividing both sides by 3})$$

$$\Rightarrow x = \frac{11}{15}$$

**To check:** For  $x = \frac{11}{15}$

$$\text{L.H.S} = 2 \times \frac{11}{15} - 2$$

$$= \frac{22}{15} - 2$$

$$= \frac{-8}{15}$$

$$\text{R.H.S} = \frac{1}{15} - \frac{11}{15}$$

$$= \frac{3 - 11}{15} = \frac{-8}{15}$$

Thus, L.H.S = R.H.S

Hence,  $x = \frac{11}{15}$  is the solution of given equation.

$$(ii) \frac{4}{5}x - 4 = \frac{3x}{4}$$

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

(Subtracting  $\frac{3x}{4}$  from both sides)

$$\Rightarrow \frac{16x - 15x}{20} - 4 = 0$$

$$\Rightarrow \frac{x}{20} = 4$$

$$\Rightarrow x = 80$$

**To check:** For  $x = 80$

$$\begin{aligned} \text{L.H.S} &= \frac{4}{5} \times 80 - 4 \\ &= 64 - 4 = 60 \end{aligned}$$

$$\text{R.H.S} = \frac{3 \times 80}{4} = 60$$

Thus, L.H.S = R.H.S

Hence,  $x = 80$ , is the solution of given equation.

$$(iii) \frac{x-3}{5} + 1 = -2$$

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

(Transposing + 1 to R.H.S)

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

$$\Rightarrow x - 3 = -3 \times 5$$

$$\Rightarrow x - 3 = -15$$

$$\Rightarrow x = -15 + 3$$

(Transposing - 3 to R.H.S)

$$\Rightarrow x = -12$$

**To check:** For  $x = -12$

$$\begin{aligned} \text{L.H.S} &= \frac{-12-3}{5} + 1 = -\frac{15}{5} + 1 \\ &= -3 + 1 = -2 \end{aligned}$$

Thus, L.H.S = R.H.S

Hence,  $x = -12$ , is the solution of given equation.

$$(iv) 14 = \frac{7x}{5} - 7$$

$$\text{or } \frac{7x}{5} - 7 = 14$$

$$\Rightarrow \frac{7x}{5} - 7 + 7 = 14 + 7$$

(Adding 7 to both sides)

$$\Rightarrow \frac{7x}{5} = 21$$

$$\Rightarrow \frac{7x}{5} \times 5 = 21 \times 5$$

$$\Rightarrow 7x = 105$$

$$\Rightarrow x = \frac{105}{7} = 15$$

**To check:** For  $x = 15$

$$\begin{aligned} \text{R.H.S} &= \frac{7 \times 15}{5} - 7 \\ &= 21 - 7 = 14 \end{aligned}$$

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

Hence,  $x = 15$ , is the solution of given equation.

$$(v) 4(3x - 5) - 5(2x - 4) = 10$$

$$\Rightarrow 12x - 20 - 10x + 20 = 10$$

$$\Rightarrow 2x = 10$$

$$\Rightarrow x = 5$$

**To check:** For  $x = 5$

$$\begin{aligned} \text{L.H.S} &= 4(3 \times 5 - 5) - 5(2 \times 5 - 4) \\ &= 4 \times 10 - 5 \times 6 \\ &= 40 - 30 = 10 \end{aligned}$$

Hence,  $x = 5$ , is the solution of given equation.

$$(vi) \frac{2x-5}{2} = 2x-7$$

$$2x - 5 = 4x - 14$$

$$\Rightarrow 2x - 4x = -14 + 5$$

$$\Rightarrow -2x = -9$$

$$\Rightarrow x = \frac{9}{2}$$

**To check:** For  $x = \frac{9}{2}$

$$\text{L.H.S} = \frac{2x-5}{2} = \frac{2 \times \frac{9}{2} - 5}{2}$$

$$= \frac{9-5}{2} = \frac{4}{2} = 2$$

$$\text{R.H.S} = 2x - 7$$

$$= 2 \times \frac{9}{2} - 7 = 9 - 7 = 2$$

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

Hence,  $x = \frac{9}{2}$ , is the solution of given equation.

4. Let the first number be  $x$ .

Then, second number =  $30 - x$

Now, according to condition,

$$x - (30 - x) = 4$$

$$\Rightarrow x - 30 + x = 4$$

$$\Rightarrow 2x - 30 = 4$$

$$\Rightarrow 2x = 4 + 30$$

(Transposing - 30 to R.H.S.)

$$\Rightarrow 2x = 34$$

$$\Rightarrow x = \frac{34}{2} = 17$$

Hence, The number are 17 and 13.

5. Let the first number be  $x$ .

Therefore,

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

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

$$\begin{aligned} \Rightarrow \quad \frac{x}{5} - \frac{x}{4} &= \frac{1}{5} - \frac{3}{1} \\ \Rightarrow \quad \frac{4x - 5x}{20} &= \frac{1 - 15}{5} \\ \Rightarrow \quad \frac{-x}{20} &= -\frac{14}{5} \\ \Rightarrow \quad x &= \frac{14 \times 20}{5} = 56 \end{aligned}$$

Hence, The required number is 56.

6. Let the number be  $x$ .

Therefore,

$$\begin{aligned} \Rightarrow \quad 8x + 23 &= 119 \\ \Rightarrow \quad 8x &= 119 - 23 \\ &\quad \text{(Transposing +23 to R.H.S.)} \\ \Rightarrow \quad 8x &= 96 \\ \Rightarrow \quad x &= \frac{96}{8} \\ \Rightarrow \quad x &= 12 \end{aligned}$$

Hence, The required number is 12.

7. Let three consecutive even numbers be  $(x + 2)$ ,  $(x + 4)$  and  $(x + 6)$ .

Therefore,

$$\begin{aligned} (x + 2) + (x + 4) + (x + 6) &= 66 \\ \Rightarrow \quad 3x + 12 &= 66 \\ \Rightarrow \quad 3x &= 66 - 12 \\ \Rightarrow \quad 3x &= 54 \\ \Rightarrow \quad x &= \frac{54}{3} = 18 \end{aligned}$$

Hence, The three consecutive even numbers are 20, 22 and 24.

8. Let the age of the son be  $x$  years.

Therefore, his father's age =  $(60 - x)$  years

After 14 years,

Son's age =  $(x + 14)$  years

Father's age =  $(60 - x) + 14 = (74 - x)$  years

Now, according to given condition

$$\begin{aligned} 3(x + 14) &= 74 - x \\ \Rightarrow \quad 3x + 42 &= 74 - x \\ \Rightarrow \quad 3x + x &= 74 - 42 \\ \Rightarrow \quad 2x &= 32 \\ \Rightarrow \quad x &= \frac{32}{2} = 16 \text{ years} \end{aligned}$$

Hence, son's present age = 16 years, and

Father's present age =  $60 - 16 = 44$  years

9. Let the cost of a chair be ₹ $x$ .

Then, the cost of a table = ₹ $(x + 30)$

Now, according to given condition,

$$5 \times (x + 30) + 2x = ₹990$$

$$\begin{aligned} \Rightarrow \quad 5x + 150 + 2x &= 990 \\ \Rightarrow \quad 7x &= 990 - 150 \\ \Rightarrow \quad 7x &= 840 \\ \Rightarrow \quad x &= \frac{840}{7} \\ \Rightarrow \quad &= 120 \end{aligned}$$

Hence, the cost of a chair is ₹ 120 and cost of a table is ₹ 150.

10. Let the denominator of a fraction be  $x$ .

Then, numerator =  $x - 3$

$$\text{Now, } \frac{(x - 3) + 1}{x + 1} = \frac{2}{3}$$

$$\begin{aligned} \Rightarrow \quad \frac{x - 2}{x + 1} &= \frac{2}{3} \\ \Rightarrow \quad 3(x - 2) &= 2(x + 1) \\ \Rightarrow \quad 3x - 6 &= 2x + 2 \\ \Rightarrow \quad 3x - 2x &= 2 + 6 \\ \Rightarrow \quad x &= 8 \end{aligned}$$

Hence, the required fractions is  $\frac{5}{8}$ .

11. Let  $x$  be the age of Sarita's cousin. Then the age of Sarita is  $x - 14$  years.

After 5 years,

Age of cousin =  $(x + 5)$  years

Age of Sarita =  $(x - 14) + 5$   
=  $(x - 9)$  years

Now, according to given condition,

$$(x - 9) : (x + 5) = 2 : 3$$

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

$$\Rightarrow \quad 3(x - 9) = 2(x + 5)$$

(By cross-multiplication)

$$\Rightarrow \quad 3x - 27 = 2x + 10$$

$$\Rightarrow \quad 3x - 2x = 10 + 27$$

$$\Rightarrow \quad x = 37$$

Hence, The age of cousin = 37 years

The age of Sarita = 23 years

12. Let the third side of a triangle be  $x$ .

Therefore, equal sides will be  $2x - 3$ .

Now, perimeter of a triangle = sum of all the three sides

$$\Rightarrow \quad 69 = x + (2x - 3) + (2x - 3)$$

$$\Rightarrow \quad 5x - 6 = 69$$

$$\Rightarrow \quad 5x = 69 + 6$$

$$\Rightarrow \quad 5x = 75$$

$$\Rightarrow \quad x = 15 \text{ cm}$$

Hence, length of sides of a triangle are 15, 27 and 27.



## HOTS QUESTIONS

1. Let  $x$  be number of five-rupee coins.

Therefore, number of two rupee coins =  $3x$

Now, according to given conditions,

$$\text{₹}(x \times 5) + \text{₹}(3x \times 2) = \text{₹}220$$

$$\Rightarrow 5x + 6x = 220$$

$$\Rightarrow 11x = 220$$

$$\Rightarrow x = \frac{220}{11} = 20$$

Hence, number of 5-rupee coins = 20

and number of 2-rupee coins = 60

2. Let the denominator be  $x$ .

Then, numerator is  $x - 7$ .

Therefore, the fraction number =  $\frac{x-7}{x}$

Now, according to given conditions,

$$\Rightarrow \frac{x-5}{x+9} = \frac{x-7}{x}$$

$$\Rightarrow x(x-5) = (x+9)(x-7)$$

(By cross multiplication)

$$\Rightarrow x^2 - 5x = x^2 + 2x - 63$$

(Cancelling  $x^2$  from both sides)

$$\Rightarrow -5x = 2x - 63$$

$$\Rightarrow 2x + 5x = 63$$

$$\Rightarrow 7x = 63$$

$$\Rightarrow x = \frac{63}{7} = 9$$

Hence, The required fraction number is  $\frac{2}{9}$ .

3. Let the present age of Ajeet be  $x$  years.

Therefore, the present age of Ajay =  $(40 - x)$  year.

After 10 years,

Ajeet's age =  $(x + 10)$  year

Ajay's age =  $(40 - x) + 10$

=  $(50 - x)$  years

Now, according to given conditions,

$$x + 10 = 2(50 - x)$$

$$\Rightarrow x + 10 = 100 - 2x$$

$$\Rightarrow x + 2x = 100 - 10$$

$$\Rightarrow 3x = 90$$

$$\Rightarrow x = \frac{90}{3} = 30$$

Hence, Age of Ajeet = 30 years

Age of Ajay = 10 years.

## VALUE BASED QUESTION SUMMATIVE ASSESSMENT

Let the property of Mr. Mathews be  $x$ .

Since, Mr. Mathews gave his daughter and son equal part of the property. *i.e.*,  $\frac{1}{4}$  th to each.

$$\begin{aligned} \therefore \text{Left part of property} &= x - \left( \frac{x}{4} + \frac{x}{4} \right) \\ &= \left( x - \frac{x}{2} \right) = \frac{x}{2} \end{aligned}$$

Now, he gave  $\frac{1}{3}$ rd of remaining part of property to charity *i.e.*,  $\frac{1}{3} \times \frac{x}{2} = \frac{x}{6}$ .

And rest part of his property he gave to his wife *i.e.*,  $\frac{x}{2} - \frac{x}{6} = \frac{x}{3}$ .

Since, the charity amount is ₹ 1,00,000.

$$\therefore \frac{x}{6} = ₹ 1,00,000 \Rightarrow x = ₹ 6,00,000.$$

Thus, total amount property = ₹ 6,00,000

$$\begin{aligned} \text{Hence, Mr. Mathews's wife get} &= ₹ \left( \frac{6,00,000}{3} \right) \\ &= ₹ 2,00,000. \end{aligned}$$

"Value of sharing ... helping others ... being charitable"