Mathematics
Simple Equations

NCERT Exercises (Questions-Solutions)

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1. **Complete the last column of the table.**

S. No.	Equation	Value	Say, whether the equation is satisfied. (Yes/No)
(i)	$x + 3 = 0$	$x = 3$	
(ii)	$x + 3 = 0$	$x = 0$	
(iii)	$x + 3 = 0$	$x = -3$	
(iv)	$x - 7 = 1$	$x = 7$	
(v)	$x - 7 = 1$	$x = 8$	
(vi)	$5x = 25$	$x = 0$	
(vii)	$5x = 25$	$x = 5$	
(viii)	$5x = 25$	$x = -5$	
(ix)	$\dfrac{m}{3} = 2$	$m = -6$	
(x)	$\dfrac{m}{3} = 2$	$m = 0$	
(xi)	$\dfrac{m}{3} = 2$	$m = 6$	

Sol.

S. No.	Equation	Value	Say, whether the equation is satisfied. (Yes/No)
(i)	$x + 3 = 0$	$x = 3$	No
(ii)	$x + 3 = 0$	$x = 0$	No
(iii)	$x + 3 = 0$	$x = -3$	Yes
(iv)	$x - 7 = 1$	$x = 7$	No
(v)	$x - 7 = 1$	$x = 8$	Yes
(vi)	$5x = 25$	$x = 0$	No
(vii)	$5x = 25$	$x = 5$	Yes
(viii)	$5x = 25$	$x = -5$	No
(ix)	$\dfrac{m}{3} = 2$	$m = -6$	No
(x)	$\dfrac{m}{3} = 2$	$m = 0$	No
(xi)	$\dfrac{m}{3} = 2$	$m = 6$	Yes

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

(a) $n+5=19\,(n=1)$

(b) $7n+5=19\ (n=-2)$

(c) $7n+5=19\,(n=2)$

(d) $4p-3=13(p=1)$

(e) $p-3=13(p=-4)$

(f) $4p-3=13(p=0)$.

Sol. (a) $n+5=19\,(n=1)$

$\quad$ L.H.S. $=n+5=1+5$

$\quad \big|$when $n=1$

$\qquad =5$

$\quad$ R.H.S. = 19

$\because \quad$ L.H.S. $\neq$ R.H.S.

$\therefore \quad n=1$ is not a solution to the given equation $n+5=19$.

(b) $7n+5=19\,(n=-2)$

$\quad$ L.H.S. $=7n+5=7(-2)+5$

$\quad \big|$when $n=-2$

$\qquad =-14+5=-9$

$\quad$ R.H.S. = 19

$\because \quad$ L.H.S. $\neq$ R.H.S.

$\therefore \quad n=-2$ is not a solution to the given equation $7n+5=19$.

(c) $7n+5=19(n=2)$

$\quad$ L.H.S. $=7n+5=7(2)+5$

$\quad \big|$when $n=2$

$\quad =14+5=19=$ R.H.S.

$\therefore \quad n=2$ is a solution to the given equation $7n+5=19$.

(d) $4p-3=13(p=1)$

$\quad$ L.H.S. $=4p-3=4(1)-3$

$\quad \big|$when $p=1$

$\qquad =4-3=1$

$\quad$ R.H.S. $=13$

$\because \quad$ L.H.S $\neq$ R.H.S

$\therefore \quad p=1$ is not a solution to the given equation $4p-3=13$

(e) $4p-3=13(p=-4)$

$\quad$ L.H.S $=4p-3=4(-4)-3$

$\quad \big|$when $p=-4$

$\qquad =-16-3=-19$

$\quad$ R.H.S $=13$

$\because \quad$ L.H.S $\neq$ R.H.S

$\therefore \quad p=-4$ is not a solution to the given equation $4p-3=13$.

(f) $4p-3=13(p=0)$

$\quad$ L.H.S. $=4(p)-3=4(0)-3$

$$\left| \begin{array}{l} \text{when } p = 0 \\ \quad = 0 - 3 = -3 \end{array} \right.$$

R.H.S. $= 13$

$\because$ L.H.S. $\neq$ R.H.S.

$\therefore$ $p = 0$ is not a solution to the given equation $4p - 3 = 13$.

3.   **Solve the following equations by trial and error method.**

     (i) $5p + 2 = 17$

     (ii) $3m - 14 = 4$.

Sol.   (i) $5p + 2 = 17$

L.H.S.	Value of p	Value of L.H.S.	R.H.S.
$5p+2$	0	2	17
$5p+2$	1	7	17
$5p+2$	2	12	17
$5p+2$	3	17	17

So, $p = 3$ is the solution of the given equation $5p + 2 = 17$

(ii) $3m - 14 = 4$

L.H.S.	Value of m	Value of L.H.S.	R.H.S.
$3m-14$	0	−14	4
$3m-14$	1	−11	4
$3m-14$	2	− 8	4
$3m-14$	3	−5	4
$3m-14$	4	−2	4
$3m-14$	5	1	4
$3m-14$	6	4	4

So, $m = 6$ is the solution of the given equation $3m - 14 = 4$.

4.   **Write equations for the following statements:**

     (i) The sum of numbers x and 4 is 9.

     (ii) 2 subtracted from y is 8.

     (iii) Ten times a is 70.

     (iv) The number b divided by 5 gives 6.

     (v) Three fourth of t is 15.

     (vi) Seven times m plus 7 gets you 77.

     (vii) One fourth of a number x minus 4 gives 4.

     (viii) If you take away 6 from 6 times y, you get 60.

     (ix) If you add 3 to one-third of z, you get 30.

Sol.   (i) $x + 4 = 9$ (ii) $y - 2 = 8$

     (iii) $10a = 70$ (iv) $\dfrac{b}{5} = 6$

(v) $\dfrac{3}{4}t = 15$ (vi) $7m+7 = 77$

(vii) $\dfrac{1}{4}x - 4 = 4$ (viii) $6y - 6 = 0$

(ix) $\dfrac{1}{3}z + 3 = 30$

5. **Write the following equations in statement forms:**
(i) $p+4 = 15$ **(ii)** $m-7 = 3$

(iii) $2m = 7$ **(iv)** $\dfrac{m}{5} = 3$

(v) $\dfrac{3m}{5} = 6$ **(vi)** $3p+4 = 25$

(vii) $4p-2 = 18$ **(viii)** $\dfrac{p}{2}+2 = 8$

Sol. (i) The sum of p and 4 is 15.
(ii) The difference of m and 7 is 3.
(iii) Two times m is 7.
(iv) The number m divided by 5 gives 3.
(v) Three times m divided by 5 gives 6.
(vi) If you add 4 to three times p, you get 25.
(vii) If you subtract 2 from 4 times p, you get 18.
(viii) If you add 2 to half of p, you get 8.

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6. **Set up an equation in the following cases:**
(i) Irfan says that he has 7 marbles more than five times the marbles Parmit has. Irfan has 37 marbles. (Take m to be the number of Parmit's marbles.)
(ii) Laxmi's father is 49 years old. He is 4 years older than three times Laxmi's age. (Take Laxmi's age to be y years.)
(iii) The teacher tells the class that the highest marks obtained by a student in her class is twice the lowest marks plus 7. The highest Score is 87. (Take the lowest score to be *l*.)
(iv) In an isosceles triangle, the vertex angle is twice either base angle. (Let the base angle be b in degrees. Remember that the sum of angles of a triangle is 180 degrees).

Sol. (i) Let Parmit has m marbles.
Then, five times the marbles Parmit has $= 5m$
Irfan has 7 marbles more than five times the marbles Parmit has $= 5m + 7$, i.e., Irfan has (5m + 7) marbles
But it is given that Irfan has 37 marbles.
Therefore, $5m+7 = 37$
(ii) Let the age of Laxmi be y years.
Then, three times Laxmi's age = 3y years
Laxmi's father is 4 years older than three times Laxmi's age, i.e., Age of Laxmi's father $= (3y+4)$ years
But it is given that Laxmi's father is 49 years old
Therefore, $3y+4 = 49$
(iii) Let the lowest marks be l,
Then, twice the lowest marks $= 2l$

Highest score obtained by a student in her class is twice the lowest marks plus 7, i.e.,

Highest score $= 2l + 7$

But this is given to be 87

Therefore, $2l + 7 = 87$

(iv) Let the base angle be b in degrees. Let the vertex angle be a in degrees.

∵ Sum of the angles of a triangle is 180 degrees.

∴ $a + b + b = 180^o$ or $a + 2b = 180^o$

Exercise 4.2

1. **Give first the step you will use to separate the variable and then solve the equation**

(a) $x - 1 = 0$ **(b)** $x + 1 = 0$ **(c)** $x - 1 = 5$ **(d)** $x + 6 = 2$

(e) $y - 4 = -7$ **(f)** $y - 4 = 4$ **(g)** $y + 4 = 4$ **(h)** $y + 4 = -4$

Sol. (a) The given equation is

$x - 1 = 0$

Add 1 to both sides,

$x - 1 + 1 = 0 + 1$

$\Rightarrow \quad x = 1$

It is the required solution.

Check. Put the solution $x = 1$ back into the equation.

$\text{L.H.S} = x - 1 = 1 - 1 = 0 = \text{R.H.S}$

The solution is thus checked for its correctness.

(b) The given equation is

$x + 1 = 0$

Subtracting 1 from both sides,

$x + 1 - 1 = 0 - 1$

$\Rightarrow \quad x = -1$

It is the required solution.

Check. Put the solution $x = -1$ back into the equation.

$\text{L.H.S.} = x + 1 = (-1) + 1 = 0 = \text{R.H.S.}$

The solution is thus checked for its correctness.

(c) The given equation is

$x - 1 = 5$

Add 1 to both sides,

$x + 1 - 1 = 5 + 1 \Rightarrow x = 6$

It is the required solution

Check. Put the solution $x = 6$ back into the equation.

$\text{L.H.S.} = x - 1 = 6 - 1 = 5 = \text{R.H.S.}$

The solution is thus checked for its correctness.

(d) The given equation is

$x + 6 = 2$

Subtracting 6 from both sides,

$x + 6 - 6 = 2 - 6 \Rightarrow x = -4$

It is the required solution.

Check. Put the solution $x = -4$ back into the equation.

L.H.S. $= x+6 = -4+6 = 2 =$ R.H.S.

The solution is thus checked for its correctness.

(e) The given equation is

$y-4=-7$

Add 4 to both side,

$y-4+4=-7+4 \Rightarrow y=-3$

It is the required solution,

Check. Put the solution $y=-3$ back into the equation.

L.H.S. $= y-4 = -3-4 = -7 =$ R.H.S.

The solution is thus checked for its correctness.

(f) The given equation is $y-4=4$

Add 4 to both sides,

$y-4+4=4+4 \Rightarrow y=8$

It is the required solution.

Check. Put the solution $y=8$ back into the equation.

L.H.S. $= y-4 = 8-4 = 4 =$ R.H.S.

The solution is thus checked for its correctness.

(g) The given equation is

$y+4=4$

Subtracting 4 from both sides,

$y+4-4 = 4-4 \Rightarrow y=0$

It is the required solution.

Check. Put the solution $y=0$ back into the equation.

L.H.S. $= y+4 = 0+4 = 4 =$ R.H.S.

The solution is thus checked for its correctness.

(h) The given equation is

$y+4=-4$

Subtracting 4 form both sides,

$y+4-4=-4-4 \Rightarrow y=-8$

It is the required solution.

Check. Put the solution $y=-8$ back into the equation.

L.H.S. $= y+4 = -8+4 = -4 =$ R.H.S.

The solution is thus checked for its correctness.

2. **Give first the step you will use to separate the variable and then solve the equation:**

(a) $3l=42$ **(b)** $\dfrac{b}{2}=6$ **(c)** $\dfrac{p}{7}=4$ **(d)** $4x=25$

(e) $8y=36$ **(f)** $\dfrac{z}{3}=\dfrac{5}{4}$ **(g)** $\dfrac{a}{5}=\dfrac{7}{15}$ **(h)** $20t=-10$

Sol. (a) The given equation is

$3l=42$

Divide both sides by 3,

$\dfrac{3l}{3}=\dfrac{42}{3} \Rightarrow l=14$

It is the required solution.

Cheek. Put $t=14$ in the given equation.

L.H.S. $= 3l = 3 \times 14 = 42 =$ R.H.S. as required

Hence, the solution correct.

(b) The given equation is

$$\frac{b}{2} = 6$$

Multiply both sides by 2,

$$2 \times \left(\frac{b}{2}\right) = 2 \times 6 \implies b = 12$$

It is the required solution.

Check. Put b = 12 in the given equation.

L.H.S $= \frac{b}{2} = \frac{12}{2} = 6 =$ R.H.S. as required

Hence, the solution is correct.

(c) The given equation is

$$\frac{p}{7} = 4$$

Multiply both sides by 7,

$$7 \times \left(\frac{p}{7}\right) = 7 \times 4 \implies p = 28$$

It is the required solution.

Check. Put $p = 28$ in the given equation.

L.H.S $= \frac{p}{2} = \frac{28}{7} = 4 =$ R.H.S as required.

Hence, the solution is correct.

(d) The given equation is

$$4x = 25$$

Divide both sides by 4,

$$\frac{4x}{4} = \frac{25}{4} \implies x = \frac{25}{4}$$

It is the required solution.

Check. Put $x = \frac{25}{4}$ in the given equation.

$$\text{L.H.S.} = 4x = 4 \times \left(\frac{25}{4}\right) = 25 = \text{R.H.S}$$

as required.

Hence, the solution is correct.

(e) The given equation is

$$8y = 36$$

Divide both sides by 8,

$$\frac{8y}{8} = \frac{36}{8} \implies y = \frac{36}{8}$$

$$\implies y = \frac{36 \div 4}{8 \div 2} \implies y = \frac{9}{2}$$

It is the required solution.

Check. Put $y = \frac{9}{2}$ in the given equation.

$\text{L.H.S.} = 8y = 8 \times \left(\dfrac{9}{2}\right) = 4 \times 9 = 36 = \text{R.H.S}$

as required.

Hence, the solution is correct.

(f) The given equation is

$\dfrac{z}{3} = \dfrac{5}{4}$

Multiply both sides by 3,

$3 \times \left(\dfrac{z}{3}\right) = 3 \times \left(\dfrac{5}{4}\right) \Rightarrow z = \dfrac{15}{4}$

It is the required solution.

Check. Put $z = \dfrac{15}{4}$ in the given equation.

$\text{L.H.S} = \dfrac{z}{3} = \dfrac{1}{3} \times \dfrac{15}{4} = \dfrac{5}{4} = \text{R.H.S}$ as required.

Hence, the solution is correct.

(g) The given equation is

$\dfrac{a}{5} = \dfrac{7}{15}$

Multiply both sides by 5,

$\dfrac{a}{5} \times 5 = \dfrac{7}{15} \times 5 \Rightarrow a = \dfrac{7}{3}$

It is the required solution.

Check. Put $a = \dfrac{7}{3}$ in the given equation.

$\text{L.H.S} = \dfrac{a}{5} = \dfrac{1}{5} \times \left(\dfrac{7}{3}\right) = \dfrac{7}{15} = \text{R.H.S}$

as required

Hence, the solution is correct.

(h) The given equation is

$20t = -10$

Divide both sides by 20,

$\dfrac{20t}{20} = -\dfrac{10}{20} \Rightarrow t = -\dfrac{1}{2}$

It is the required solution.

Check. Put $t = -\dfrac{1}{2}$ in the given equation.

$\text{L.H.S.} = 20t = 20 \times \left(-\dfrac{1}{2}\right) = -10 = \text{R.H.S.}$ as required.

Hence, the solution is correct.

3. **Give the steps you will use to separate the variable and then solve the equation:**

(a) $3n - 2 = 46$ **(b)** $5m + 7 = 17$ **(c)** $\dfrac{20p}{3} = 40$ **(d)** $\dfrac{3p}{10} = 6$

Sol. (a) The given equation is

$3n - 2 = 46$

Add 2 to both sides,

$3n - 2 + 2 = 46 + 2 \Rightarrow 3n = 48$

Divide both sides by 3,

$\dfrac{3n}{3} = \dfrac{48}{3} \Rightarrow n = 16$

It is the required solution.

Check. Put $n = 16$ in the given equation.

L.H.S. $= 3n - 2 = 3 \times 16 - 2$

$= 48 - 2 = 46 = $ R.H.S.

as required.

Hence, the solution is correct.

(b) The given equation is

$5m + 7 = 17$

Subtract 7 from both sides,

$5m + 7 - 7 = 17 - 7 \Rightarrow 5m = 10$

Divide both sides by 5,

$\dfrac{5m}{5} = \dfrac{10}{5} \qquad \Rightarrow m = 2$

It is the required solution

Check. Put $m = 2$ in the given equation.

L.H.S. $= 5m + 7 = 5 \times 2 + 7$

$= 10 + 7 = 17 = $ R.H.S.

as required.

Hence, the solution is correct.

(c) The given equation is

$\dfrac{20p}{3} = 40$

Multiply both sides by 3,

$\dfrac{20p}{3} \times 3 = 40 \times 3 \Rightarrow 20p = 120$

Divide both sides by 20,

$\dfrac{20p}{20} = \dfrac{120}{20} \quad \Rightarrow p = 6$

It is the required solution.

Check. Put p = 6 in the given equation.

L.H.S. $= \dfrac{20p}{3} = \dfrac{20 \times 6}{3} = 40 = $ R.H.S

as required

Hence, the solution is correct.

(d) The given equation is

$\dfrac{3p}{10} = 6$

Multiply both sides by 10,

$\dfrac{3p}{10} \times 10 = 6 \times 10 \Rightarrow 3p = 60$

Divide both side by 3,

$$\frac{3p}{3} = \frac{60}{3} \Rightarrow p = 20$$

It is the required solution.

Check. Put $p = 20$ in the given equation.

$$\text{L.H.S} = \frac{3p}{10} = \frac{3 \times 20}{10} = 3 \times 2 = 6 = \text{R.H.S.}$$

as required.

Hence, the solution is correct.

4. **Solve the following equations:**

(a) $10p = 100$ **(b)** $10p + 10 = 100$ **(c)** $\frac{p}{4} = 5$ **(d)** $\frac{-p}{3} = 5$

(e) $\frac{3p}{4} = 6$ **(f)** $3s = -9$ **(g)** $3s + 12 = 0$ **(h)** $3s = 0$

(i) $2q = 6$ **(j)** $2q - 6 = 0$ **(k)** $2q + 6 = 0$ **(l)** $2q + 6 = 12$.

Sol. (a) The given equation is

$10p = 100$

Divide both sides by 10,

$$\frac{10p}{10} = \frac{100}{10} \Rightarrow p = 10$$

It is the required solution.

Check. Put p = 10 in the given equation.

$\text{L.H.S.} = 10p = 10 \times 10 = 100 = \text{R.H.S.}$

as required.

Hence, the solution is correct.

(b) The given equation is

$10p + 10 = 100$

Subtract 10 from both sides,

$10p + 10 - 10 = 100 - 10 \Rightarrow 10p = 90$

Divide both sides by 10,

$$\frac{10p}{10} = \frac{90}{10} \qquad \Rightarrow p = 9$$

It is the required solution.

Check. Put $p = 9$ in the given equation.

$\text{L.H.S.} = 10p + 10 = 10 \times 9 + 10$

$= 90 + 10 = 100 = \text{R.H.S.}$ as required.

Hence, the solution is correct.

(c) The given equation is

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

Multiply both sides by 4,

$$\frac{p}{4} \times 4 = 5 \times 4 \qquad \Rightarrow p = 20$$

It is the required solution.

Check. Put $p = 20$ in the given equation.

L.H.S. $= \dfrac{p}{4} = \dfrac{20}{4} = 5 =$ R.H.S. as required.

Hence, the solution is correct.

(d) The given equation is

$$-\dfrac{p}{3} = 5$$

Multiplying both sides by (-3),

$$\left(\dfrac{-p}{3}\right) \times (-3) = 5 \times (-3) \Rightarrow p = -15$$

It is the required solution.

Check. Put $p = -15$ in the given equation.

$$\text{L.H.S} = \dfrac{-p}{3} = \dfrac{-(-15)}{3} = \dfrac{15}{3} = 5 = \text{R.H.S}$$

as required.

Hence, the solution is correct.

(e) The given equation is

$$\dfrac{3p}{4} = 6$$

Multiply both sides by 4,

$$\dfrac{3p}{4} \times 4 = 6 \times 4 \quad \Rightarrow \quad 3p = 24$$

Divide both sides by 3,

$$\dfrac{3p}{3} = \dfrac{24}{3} \quad \Rightarrow \quad p = 8$$

It is the required solution.

Check. Put p = 8 in the given equation.

$$\text{L.H.S} = \dfrac{3p}{4} = \dfrac{3}{4} \times 8 = 3 \times 2 = 6 = \text{R.H.S}$$

as required.

Hence, the solution is correct.

(f) The given equation is

$$3s = -9$$

Divide both sides by 3,

$$\dfrac{3s}{3} = -\dfrac{9}{3} \quad \Rightarrow \quad s = -3$$

It is the required solution.

Check. Put $s = -3$ in the given equation.

L.H.S. $= 3 \times (-3) = -9 =$ R.H.S.

as required.

Hence, the solution is correct.

(g) The given equation is

$$3s + 12 = 0$$

Subtract −12 from both sides,

$$3s + 12 - 12 = 0 - 12 \Rightarrow 3s = -12$$

Divide both sides by 3,

$$\frac{3s}{3} = -\frac{12}{3} \Rightarrow s = -4$$

It is the required solution.

Check. Put $s = -4$ in the given equation.

L.H.S. $= 3s + 12 = 3 \times (-4) + 12$

$= -12 + 12 = 0 =$ R.H.S.

as required.

Hence, the solution is correct.

(h) The given equation is

$3s = 0$

Divide both sides by 3,

$$\frac{3s}{3} = \frac{0}{3} \Rightarrow s = 0$$

It is the required solution.

Check. Put $s = 0$ in the given equation.

L.H.S. $= 3s = 3 \times 0 = 0 =$ R.H.S.

as required.

Hence, the solution is correct.

(i) The given equation is

$2q = 6$

Divide both sides by 2,

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

It is the required solution.

Check. Put $q = 3$ in the given equation.

L.H.S. $= 2q = 2 \times 3 = 6 =$ R.H.S.

Hence, the solution is correct.

(i) The given equation is

$2q - 6 = 0$

Add 6 to both sides,

$2q - 6 + 6 = 0 + 6 \Rightarrow 2q = 6$

Divide both sides by 2,

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

It is the required solution.

Check. Put $q = 3$ in the given equation.

L.H.S. $= 2q - 6 = 2 \times 3 - 6 = 6 - 6 = 0 =$ R.H.S.

as required.

Hence, the solution is correct.

(k) The given equation is

$2q + 6 = 0$

Subtract 6 from both sides,

$2q + 6 - 6 = 0 - 6 \Rightarrow 2q = -6$

Divide both sides by 2,

$$\frac{2q}{2} = -\frac{6}{2} \Rightarrow q = -3$$

It is the required solution.

Check. Put $q = -3$ in the given equation.

$$\text{L.H.S.} = 2q + 6 = 2 \times (-3) + 6 = -6 + 6 = 0 = \text{R.H.S.}$$

as required.

Hence, the solution is correct.

(l) The given equation is

$$2q + 6 = 12$$

Subtract 6 from both sides,

$$2q + 6 - 6 = 12 - 6 \Rightarrow 2q = 6$$

Divide both sides by 2,

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

It is the required solution.

Check. Put $q = 3$ in the given equation.

$$\text{L.H.S.} = 2q + 6 = 2 \times 3 + 6 = 6 + 6 = 12 = \text{R.H.S.}$$

as required.

Hence, the solution is correct.

Exercise 4.3

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1. **Solve the following equations:**

(a) $2y + \dfrac{5}{2} = \dfrac{37}{2}$ (b) $5t + 28 = 10$ (c) $\dfrac{a}{5} + 3 = 2$ (d) $\dfrac{q}{4} + 7 = 5$

(e) $\dfrac{5}{2}x = -10$ (f) $\dfrac{5}{2}x = \dfrac{25}{4}$ (g) $7m + \dfrac{19}{2} = 13$ (h) $6z + 10 = -2$

(i) $\dfrac{2b}{3} - 5 = 3$.

Sol. (a) The given equation is

$$2y + \frac{5}{2} = \frac{37}{2}$$

Transposing $\dfrac{5}{2}$ from L.H.S. to R.H.S.,

$$2y = \frac{37}{2} - \frac{5}{2} \quad \Rightarrow \quad 2y = \frac{37 - 5}{2}$$

$$\Rightarrow \qquad 2y = \frac{32}{2} \Rightarrow 2y = 16$$

Divide both sides by 2,

$$\frac{2y}{2} = \frac{16}{2} \Rightarrow y = 8$$

It is the required solution.

Check. Put $y = 8$ in the given equation.

$$\text{L.H.S} = 2y + \frac{5}{2} = 2 \times 8 + \frac{5}{2} = 16 + \frac{5}{2}$$

$$= \frac{32+5}{2} = \frac{37}{2} = \text{R.H.S as required.}$$

Hence, the solution is correct.

(b) The given equation is

$5t + 28 = 10$

Transposing 28 from L.H.S. to R.H.S.,

$\Rightarrow \qquad 5t = 10 - 28 \Rightarrow 5t = -18$

Divide both sides by 5,

$$\frac{5t}{5} = -\frac{18}{5} \Rightarrow t = -\frac{18}{5}$$

It is the required solution.

Check. Put $t = -\frac{18}{5}$ in the given equation.

$$\text{L.H.S} = 5\text{t} + 28 = 5 \times \left(-\frac{18}{5}\right) + 28$$

$$= -18 + 28 = 10$$

= R.H.S. as required.

Hence, the solution is correct.

(c) The given equation is

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

Transposing 3 from L.H.S. to R.H.S.,

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

Multiply both sides by 5,

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

It is the required solution.

Check. Put $a = -5$ in the given equation.

$$\text{L.H.S} = \frac{a}{5} + 3 = -\frac{5}{5} + 3$$

$$= -1 + 3 = 2 = \text{R.H.S}$$

as required.

Hence, the solution is correct.

(d) The given equation is $\frac{q}{4} + 7 = 5$

Transposing 7 from L.H.S. to R.H.S.,

$$\frac{q}{4} = 5 - 7 \qquad \Rightarrow \frac{q}{4} = -2$$

Multiply both sides by 4,

$$\frac{q}{4} \times 4 = (-2) \times 4 \Rightarrow q = -8$$

It is the required solution.

Check. Put $q = -8$ in the given equation.

$$\text{L.H.S} = \frac{q}{4} + 7 = \frac{-8}{4} + 7 = -2 + 7 = 5 = \text{R.H.S}$$

as required.

Hence, the solution is correct.

(e) The given equation is

$$\frac{5}{2}x = -10$$

Multiply both sides by 2,

$$\left(\frac{5}{2}x\right) \times 2 = (-10) \times 2 \implies 5x = -20$$

Divide both sides by 5

$$\frac{5x}{5} = \frac{-20}{5} \implies x = -4$$

It is the required solution.

Check. Put $x = -4$ in the given equation

$$\text{L.H.S} = \frac{5}{2}x = \frac{5}{2} \times (-4) = 5 \times (-2) = -10$$

= R.H.S. as required.

Hence, the solution is correct.

(f) The given equation is

$$\frac{5}{2}x = \frac{25}{4}$$

Multiply both sides by 2,

$$\left(\frac{5}{2}x\right) \times 2 = \frac{25}{4} \times 2 \implies 5x = \frac{25}{2}$$

Divide both sides by 5,

$$\frac{5x}{5} = \frac{25}{2 \times 5} \implies x = \frac{5}{2}$$

It is the required solution.

Check. Put $x = \frac{5}{2}$ in the given equation.

$$\text{L.H.S} = \frac{5}{2}x = \frac{5}{2} \times \frac{5}{2} = \frac{25}{4} = \text{R.H.S}$$

as required.

Hence, the solution is correct.

(g) The given equation is

$$7m + \frac{19}{2} = 13$$

Transposing $\frac{19}{2}$ from L.H.S. to R.H.S.,

$$7m = 13 - \frac{19}{2} = \frac{26 - 19}{2} = \frac{7}{2}$$

Divide both sides by 7

$$\frac{7m}{7} = \frac{7}{2 \times 7} \implies m = \frac{1}{2}$$

It is the required solution.

Check. Put $m = \frac{1}{2}$ in the given equation.

$$\text{L.H.S} = 7m + \frac{19}{2} = 7 \times \left(\frac{1}{2}\right) + \frac{19}{2} = \frac{7}{2} + \frac{19}{2}$$

$$= \frac{7+19}{2} = \frac{26}{2} = 13 = \text{R.H.S}$$

as required.

Hence, the solution is correct.

(h) The given equation is

$$6z + 10 = -2$$

Transposing 10 from L.H.S. to R.H.S.,

$$6z = -2 - 10 \quad \Rightarrow 6z = -12$$

Dividing both sides by 6,

$$\frac{6z}{6} = -\frac{12}{6} \Rightarrow z = -2$$

It is the required solution.

Check. Put $z = -2$ in the given equation.

$$\text{L.H.S.} = 6z + 10 = 6 \times (-2) + 10.$$

$$= -12 + 10 = -2$$

$$= \text{R.H.S. as required.}$$

Hence, the solution is correct.

(i) The given equation is

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

Multiply both sides by 2,

$$\frac{3l}{2} \times 2 = \frac{2}{3} \times 2 \quad \Rightarrow 3l = \frac{4}{3}$$

Divide both sides by 3,

$$\frac{3l}{3} = \frac{4}{3 \times 3} \quad \Rightarrow l = \frac{4}{9}$$

It is the required solution.

Check. Put $l = \frac{4}{9}$ in the given equation.

$$\text{L.H.S} = \frac{3l}{2} = \frac{3}{2} \times \left(\frac{4}{9}\right) = \frac{2}{3} = \text{R.H.S}$$

as required.

Hence, the solution is correct.

(j) The given equation is

$$\frac{2b}{3} - 5 = 3$$

Transposing -5 from L.H.S. to R.H.S.,

$$\frac{2b}{3} = 3 + 5 \Rightarrow \frac{2b}{3} = 8$$

Multiply both sides by 3,

$$\left(\frac{2b}{3}\right) \times 3 = 8 \times 3 \quad \Rightarrow 2b = 24$$

Divide both sides by 2,

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

It is the required solution.

Check. Put b = 12 in the given equation.

L.H.S. $= \frac{2b}{3} - 5 = \frac{2}{3} \times 12 - 5$

$= 2 \times 4 - 5 = 8 - 5$

$= 3 = $ R.H.S.

as required.

Hence, the solution is correct

2. **Solve the following equations:**

(a) $2(x+4) = 12$ **(b)** $3(n-5) = 21$ **(c)** $3(n-5) = -21$ **(d)** $-4(2+x) = 8$

(e) $4(2-x) = 8$

Sol. (a) The given equation is

$2(x-4) = 12$

Divide both sides by 2,

$\frac{2(x+4)}{2} = \frac{12}{2} \Rightarrow x + 4 = 6$

Transposing 4 from L.H.S. to R.H.S.,

$x = 6 - 4 \Rightarrow x = 2$

It is the required solution.

Check. Put $x = 2$ in the given equation.

L.H.S. $= 2(x + 4) = 2(2+4) = 2(6)$

$= 12 = $ R.H.S. as required.

Hence, the solution is correct.

(b) The given equation is

$3(n-5) = 21$

Divide both sides by 3,

$\frac{3(n-5)}{3} = \frac{21}{3} \Rightarrow n - 5 = 7$

Transposing -5 from L.H.S. to R.H.S.,

$n = 7 + 5 \Rightarrow n = 12$

It is the required solution.

Check. Put $n = 12$ in the given equation.

L.H.S. $= 3(n - 5) = 3(12-5)$

$= 3(7) = 21$

$= $ R.H.S. as required.

Hence, the solution is correct.

(c) The given equation is

$3(n-5) = -21$

Divide both sides by 3,

$\frac{3(n-5)}{3} = -\frac{21}{3} \Rightarrow n - 5 = -7$

Transposing -5 from L.H.S. to R.H.S.,

$n = -7 + 5 \Rightarrow n = -2$

It is the required solution.

Check. Put $n = -2$ in the given equation.

L.H.S. $= 3(n-5) = 3(-2-5) = 3(-7)$

$= -21 = $ R.H.S. as required.

Hence, the solution is correct.

(d) The given equation is

$-4(2+x) = 8$

Divide both sides by -4,

$\dfrac{3(2+x)}{-4} = \dfrac{8}{-4} \Rightarrow 2+x = -2$

Transposing 2 from L.H.S. to R.H.S.,

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

It is the required solution.

Check. Put $x = -1$ in the given equation.

L.H.S. $= -4(2-4) = -4(-2)$

$= -8 = $ R.H.S. as required.

Hence, the solution is correct.

(e) The given equation is

$4(2-x) = 8$

Divide both sides by 4,

$\dfrac{4(2-x)}{4} = \dfrac{8}{4} \Rightarrow 2-x = 2$

Transposing 2 from L.H.S. to R.H.S.,

$-x = 2-2 = 0 \Rightarrow -x = 0$

Multiplying both sides by (-1)

$(-1)(-x) = (0) \times (1) = 0 \Rightarrow x = 0$

It is the required solution.

Check. Put $x = 0$ in the given equation.

L.H.S. $= 4(2-0) = 4(2)$

$= 8 = $ R.H.S. as required.

Hence, the solution is correct.

3. **Solve the following equations:**

(a) $4 = 5(p-2)$ **(b)** $-4 = 5(p-2)$ **(c)** $16 = 4+3(t+2)$ **(d)** $4+5(p-1) = 34$

(e) $0 = 16+4(m-6)$.

Sol. (a) The given equation is

$4 = 5(p-2)$

$\Rightarrow \quad 5(p-2) = 4$

$\Big|$ An equation remains the same,

when the expressionson the left

and on the right are interchanged.

Divide both sides by 5,

$\dfrac{5(p-2)}{5} = \dfrac{4}{5} \Rightarrow P-2 = \dfrac{4}{5}$

Transposing -2 from L.H.S. to R.H.S.,

$P = \dfrac{4}{5}+2 \Rightarrow P = \dfrac{4+10}{5}$

$\Rightarrow \qquad p = \dfrac{14}{5}$

It is the required solution.

Check. Put $p = \dfrac{14}{5}$ in the given equation.

$\text{R.H.S} = 5(p\text{-}2) = 5\left(\dfrac{14}{5} - 2\right)$

$= 5\left(\dfrac{14-10}{5}\right) = 5\left(\dfrac{4}{5}\right) = 4$

$= \text{L.H.S. as required.}$

Hence, the solution is correct.

(b) The given equation is

$\qquad -4 = 5(p-2)$

$\Rightarrow \qquad 5(p-2) = -4$

An equation remains the same when the expressions on the left and on the right are interchanged.

Divide both sides by 5,

$\dfrac{5(p-2)}{5} = \dfrac{-4}{5} \quad \Rightarrow p - 2 = \dfrac{-4}{5}$

Transposing -2 from L.H.S. to R.H.S.,

$\qquad p = \dfrac{-4}{5} + 2 \Rightarrow p = \dfrac{-4+10}{5}$

$\Rightarrow \qquad p = \dfrac{6}{5}$

It is the required solution.

Check. Put $p = \dfrac{6}{5}$ in the given equation.

$R.H.S = 5(p-2)$

$= 5\left(\dfrac{6}{5} - 2\right) = 5\left(\dfrac{6-10}{5}\right)$

$= 5\left(-\dfrac{4}{5}\right) = -4$

$= \text{L.H.S. as required.}$

Hence, the solution is correct.

(c) The given equation is

$16 = 4 + 3(t+2)$

Transposing it from L.H.S. to R.H.S.,

$\qquad 16 - 4 = 3(t+2)$

$\Rightarrow \qquad 12 = 3(t+2)$

Divide both sides by 3,

$\qquad \dfrac{12}{3} = \dfrac{3(t+2)}{3} \Rightarrow 4 = t + 2$

$\Rightarrow \qquad t = 2$

Transposing 2 from L.H.S. to R.H.S.,

$$4-2=t \implies 2=t$$
$$\implies \quad t=2$$

It is the required solution.

Check. Put $t=2$ in the given equation.

R.H.S. $=4+3(2+2)$

$=4+3(4)$

$=4+12$

$=16$

= L.H.S. as required.

Hence, the solution is correct.

(d) The given equation is

$$4+5(p-1)=34$$

Transposing it from L.H.S. to R.H.S.,

$$5(p-1)=34-4=30$$

Divide both sides by 5,

$$\frac{5(p-1)}{5}=\frac{30}{5} \implies p-1=6$$

Transposing -1 from L.H.S. to R.H.S.,

$$p=6+1=7$$

It is the required solution.

Check. Put $p=7$ in the given equation.

R.H.S. $=4+5(7-1)$

$=4+5(6)$

$=4+30$

$=34$

= L.H.S. as required.

Hence, the solution is correct.

(e) The given equation is

$$0=16+4(m-6)$$
$$\implies \quad 16+4(m-6)=0$$

$\Big|$An equation remains the same when the expres –

sions on the left and on the right are interchanged

Transposing 16 form L.H.S. to R.H.S.,

$$4(m-6)=-16$$

Divide both sides by 4,

$$\frac{4(m-6)}{4}=-\frac{16}{4} \implies m-6=-4$$

Transposing - 6 from L.H.S. to R.H.S.,

$$m=-4+6 \implies m=2$$

It is the required solution.

Check. Put m = 2 in the given equation.

R.H.S. $=16+4(m-6)=16+4(2-6)$

$=16+4(-4)=16-16=0$

$=$ L.H.S. as required.

Hence, the solution is correct.

4. **(a) Construct 3 equations starting with** $x = 2$
   (b) Construct 3 equations starting with $x = -2$ **.**

Sol. (a) **1**. Start with $x = 2$
Multiply both sides by 3,
$3x = 6$
Subtract 2 from both sides,
$3x - 2 = 4$ ... (1)
2.   Start with $x = 2$
Multiply both sides by 4,
$4x = 8$
Add 5 to both sides,
$4x + 5 = 13$ ... (2)
3.   Start with $x = 2$
Multiply both sides by 5
$5x = 10$
Subtract 1 from both sides,
$5x - 1 = 9$ ... (3)
(b) **1.** Start with $x = -2$
Multiply both sides by 3,
$3x = -6$
Subtract 2 from both sides,
$3x - 2 = -8$ ... (1)
2.   Start with $x = -2$
Multiply both sides by 5,
$5x = -10$
Subtract 1 from both sides,
$5x - 1 = -11$ ... (2)
3.   Start with $x = -2$
Multiply both sides by 4,
$4x = -8$
Add 5 to both sides
$4x + 5 = -3$ ... (3)

Exercise 4.4

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1. **Set up equations and solve them to find the unknown numbers in the following cases:**
   (a) Add 4 to eight times a number; you get 60.
   (b) One-fifth of a number minus 4 gives 3.
   (c) If I take three-fourths of a number and add 3 to it, I get 21.
   (d) What I subtracted 11 from twice a number, the result was 15.
   (e) Munna subtracts thrice the number of notebooks he has from 50, he finds the result to be 8.
   (f) Ibenhal thinks of a number. If she adds 19 to it and divides the sum by 5, she will get 8.

   (g) Anwar thinks of a number. If he takes away 7 from $\dfrac{5}{2}$ of the number, the result is 23.

Sol. (a) Let 'x' be the number.
Then according to the question, we get

$$4 + 8x = 60$$
$$\Rightarrow \quad 8x = 60 - 4$$
$$\Rightarrow \quad x = \frac{56}{8} = 7$$

Therefore, the number is 7.

(b) Let $'x'$ be the number.

Then according to the question, we get

$$\frac{1}{5} \times x - 4 = 3$$
$$\Rightarrow \quad \frac{x}{5} = 3 + 4$$
$$\Rightarrow \quad x = 7 \times 5 = 35$$

Therefore, the number is 35.

(c) Let $'x'$ be the number.

Then according to the question, we get

$$\frac{3x}{4} + 3 = 21$$
$$\Rightarrow \quad \frac{3x}{4} = 21 - 3$$
$$\Rightarrow \quad 3x = 18 \times 4$$
$$\Rightarrow \quad x = \frac{72}{3} = 24$$

Therefore, the number is 24.

(d) Let $'x'$ be the number.

$$2x - 11 = 15$$
$$\Rightarrow \quad 2x = 15 + 11$$
$$\Rightarrow \quad x = \frac{26}{2} = 13$$

Therefore, the number is 13.

(e) Let $'x'$ be the number

The according to the question, we get

$$50 - 3x = 8$$
$$\Rightarrow \quad 3x = 50 - 8$$
$$\Rightarrow \quad x = \frac{42}{3} = 14$$

Therefore, the number is 14.

(f) Let $'x'$ be the number,

Then according to the question, we get

$$\frac{x + 19}{5} = 8$$
$$\Rightarrow \quad x + 19 = 8 \times 5$$
$$\Rightarrow \quad x = 40 - 19 = 21$$

Therefore, the number is 21.

(g) Let $'x'$ be the number

Then according to the question, we get

$$\frac{5}{2}x - 7 = 23$$

$$\Rightarrow \quad \frac{5}{2}x = 23 + 7$$

$$\Rightarrow \quad \frac{5}{2}x = 30$$

$$\Rightarrow \quad 5x = 60$$

$$\Rightarrow \quad x = \frac{60}{5} = 12$$

2. **Solve the following:**
(a) The teacher tells the class that the highest marks obtained by a student in her class is twice the lowest mark plus 7. The highest score is 87. What is the lowest score?
(b) In an isosceles triangle, the base angles are equal. The vertex angle is $40°$. What are the base angles of the triangle? (Remember, the sum of three angles of a triangle is $180°$).
(c) Sachin scored twice as many runs as Rahul. Together, their runs fell two short of a double century. How many runs did each one score?

Sol. (a) Let 'x' marks be the lowest score
Then according to the question, we get
$$2x + 7 = 87$$
$$\Rightarrow \quad 2x = 87 - 7$$
$$\Rightarrow \quad x = \frac{80}{2} = 40$$
Therefore, the lowest score is 40 marks.
(b) Let 'x' be the base angle of an isosceles triangle.
Then according to the question, we get
$$2x° + 40° = 180°$$
$$\Rightarrow \quad 2x° = 180° - 40°$$
$$\Rightarrow \quad x° = \frac{140°}{2} = 70°$$
Therefore the base angles of the triangle are $70°$ and $70°$.
(c) Let 'x' runs be the score of Rahul.
Then according to the question, we get
$$2x + x = 198$$
$$\Rightarrow \quad 3x = 198$$
$$\Rightarrow \quad x = \frac{198}{3} = 66$$
Therefore, Rahul scores 66 runs, and Sachin scores $2 \times 66 = 132$ runs.

3. **Solve the following:**
(i) Irfan says that he has 7 marbles more than five times the marbles Parmit has. Irfan has 37 marbles. How many marbles does Parmit have?
(ii) Laxmi's father is 49 years old. He is 4 years older than three times Laxmi's age. What is Laxmi's age?
(iii) People of Sundargram planted trees in the village garden. Some of the trees were fruit trees. The number of non-fruit trees were two more than three times the number of fruit trees. What was the number of fruit trees planted if the number of non-fruit trees planted was 77?

Sol. (i) Let the number of marbles of Parmit be 'x'. Then according to the question, we have
$$7 + 5x = 37$$
$$\Rightarrow \quad 5x = 37 - 7$$

$$\Rightarrow \qquad x = \frac{30}{5} = 6$$

Therefore, Parmit has 6 marbles

(ii) Let 'x' years be the Laxmi's age.

Then according to the question, we have

$$4 + 3x = 49$$
$$\Rightarrow \qquad 3x = 49 - 4$$
$$\Rightarrow \qquad x = \frac{45}{3} = 15$$

Therefore, Laxmi's age is 15 years.

(iii) Let 'x' be the number of fruit trees planted.

Then, non-fruit trees $= 2 + 3x$

By question, we get

$$2 + 3x = 77$$
$$\Rightarrow \qquad 3x = 77 - 2$$
$$\Rightarrow \qquad x = \frac{75}{3} = 25$$

Therefore, the number of fruit trees planted is 25.

4. **Solve the following riddle:**
I am a number,
     Tell my identity!
Take me seven times over
     And add a fifty!
To reach a triple century
     You still need forty!

Sol. Let 'x' be the number,

then according to the question, we get

$$(x \times 7) + 50 = 300 - 40$$
$$7x + 50 = 260$$
$$7x = 210$$
$$x = \frac{210}{7} = 30$$

So, the number is 30.