CHAPTER-4

Simple Equations

EX 4.1:-

Question 1

Complete the given 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)	$\frac{m}{3} = 2$	$m = -6$	____
(x)	$\frac{m}{3} = 2$	$m = 0$	____
(xi)	$\frac{m}{3} = 2$	$m = 6$	____

Solution:

S.No.	Equations	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)	$\frac{m}{3} = 2$	$m = -6$	No
(x)	$\frac{m}{3} = 2$	$m = 0$	No
(xi)	$\frac{m}{3} = 2$	$m = 6$	Yes

Question 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; in – -2)
(c) 7n + 5 = 19; (n = 2)
(d) 4p – 3 = 13; (p = 1)
(e) 4p – 3 = 13; (p = -4)
(f) 4p-3 = 13; (p = 0)

Solution:

(a) n + 5 = 19 (n = 1)
Put n = 1 in LHS
1 + 5 = 6 ≠ 19 (RHS)
Since LHS ≠ RHS
Thus n = 1 is not the solution of the given equation.

(b) 7n + 5 = 19; (n = -2)
Put n = – 2 in LHS
7 × (-2) + 5 = -14 + 5 = -9 ≠ 19 (RHS)
Since LHS ≠ RHS
Thus, n = -2 is not the solution of the given equation.

(c) 7n+ 5 = 19; (n = 2)
Put n = 2 in LHS
7 × 2 + 5 = 14 + 5 = 19 = 19 (RHS)
Since LHS = RHS
Thus, n – 2 is the solution of the given equation.

(d) 4p – 3 = 13; (p = 1)
Put p = 1 in LHS
4 × 1 – 3 = 4 – 3 = 1 ≠ 13 (RHS)
Since LHS ≠ RHS
Thus, p = 1 is not the solution of the given equation.

(e) 4p – 3 = 13; (p = -A)
Put p = -4 in LHS
4 × (-4) – 3 = -16 – 3 = -19 ≠ 13 (RHS)
Since LHS ≠ RHS
Thus p = -4 is not the solution of the given equation.

(f) 4p – 3 = 13; (p = 0)
Put p = 0 in LHS
4 × (0) – 3 = 0 – 3 = -3 ≠ 13 (RHS)
Since LHS ≠ RHS
Thus p – 0 is not the solution of the given equation.

Question 3

Solve the following equations by trial and error method:

(i) 5p + 2 = 17

(ii) 3m − 14 = 4

Solution:

(i) 5p + 2 = 17

For p = 1, LHS

= 5 × 1 + 2 = 5 + 2 = 7 ≠ 17 (RHS)

For p = 2, LHS = 5 × 2 + 2

= 10 + 2 = 12 ≠ 17 (RHS)

For p = 3, LHS = 5 × 3 + 2

= 15 + 2 = 17 = 17 (RHS)

Since the given equation is satisfied for p = 3 Thus, p = 3 is the required solution.

(ii) 3m − 14 = 4

For m = 1, LHS = 3 × 1 − 14

= 3 − 14 = -11 ≠ 4 (RHS)

For m = 2, LHS = 3 × 2 − 14 = 6 − 14

= -8 ≠ 4 (RHS)

For m = 3, LHS = 3 × 3 − 14 = 9 − 14

= -5 ≠ 4 (RHS)

Form m = 4, LHS = 3 × 4 − 14

= 12 − 14 = -2 ≠ 4 (RHS)

For m = 5, LHS = 3 × 5 − 14

= 15 − 14 = -1 ≠ 4 (RHS)

For m = 6, LHS = 3 × 6 − 14

= 18 − 14 = 4 (=) 4 (RHS) .

Since, the given equation is satisfied for m = 6.

Thus, m = 6 is the required solution.

Question 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.

Solution:

Statements	Equations
(*i*) The sum of numbers x and 4 is 9.	$x + 4 = 9$
(*ii*) 2 subtracted from y is 8.	$y - 2 = 8$
(*iii*) Ten times a is 70.	$10a = 7$
(*iv*) The number b divided by 5 gives 6.	$\frac{b}{5} = 6$
(*v*) Three-fourth of t is 15.	$\frac{3}{4}t = 15$
(*vi*) Seven times m plus 7 gets you 77.	$7m + 7 = 77$
(*vii*) One-fourth of a number x minus 4 gives 4.	$\frac{1}{4}x - 4 = 4$
(*viii*) If you take away 6 from 6 times y, you get 60.	$6y - 6 = 60$
(*ix*) If you add 3 to one-third of z, you get 30.	$\frac{z}{3} + 3 = 30$

Question 5

Write the following equations in statement forms.

$(i)\ p + 4 = 15$ $(ii)\ m - 7 = 3$

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

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

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

Solution:

Equations	Statements
$(i)\ p + 4 = 15$	Sum of a number p and 4 gives 15.
$(ii)\ m - 7 = 3$	Seven subtracted from m gives 3.
$(iii)\ 2m = 7$	Twice of m gives 7.
$(iv)\ \frac{m}{5} = 3$	m divided by 5 gives 3.
$(v)\ \frac{3m}{5} = 6$	Three times of m divided by 5 gives 6.
$(vi)\ 3p + 4 = 25$	4 added to three times p gives 25.
$(vii)\ 4p - 2 = 18$	2 subtracted from four times p gives 18.
$(viii)\ \frac{p}{2} + 2 = 8$	2 added to half of p gives 8.

Question 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 1)

(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).

Solution:

(i) Let m be the Parmit's marbles.

∴ Irfan's marble = 5m + 7

Total number of Irfan's marble is given by 37.
Thus, the required equation is 5m + 7 = 37

(ii) Let Laxmi's age bey years.
∴ Laxmi's father's age = 3y + 4
But the Laxmi's father age is given by 49
Thus the required equation is 3y + 4 = 49

(iii) Let the lowest score be l.
∴ The highest score = 2l + 1
But the highest score is given by 87.
Thus, the required equation is 2l + 1 = 87

(iv) Let each base angle be 'b' degrees.
∴ Vertex angle of the triangle = 2b
Sum of the angles of a triangle = 180°
∴ Required equation is b + b + 2b = 180° or 4b = 180°

Question 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)	$\frac{m}{3} = 2$	$m = -6$	-
(x)	$\frac{m}{3} = 2$	$m = 0$	-
(xi)	$\frac{m}{3} = 2$	$m = 6$	-

Answer:

(i) $x + 3 = 0$

L.H.S. $= x + 3$

By putting $x = 3$,

L.H.S. $= 3 + 3 = 6 \neq$ R.H.S.

∴ No, the equation is not satisfied.

(ii) $x + 3 = 0$

L.H.S. $= x + 3$

By putting $x = 0$,

L.H.S. $= 0 + 3 = 3 \neq$ R.H.S.

∴ No, the equation is not satisfied.

(iii) $x + 3 = 0$

L.H.S. $= x + 3$

By putting $x = -3$,

L.H.S. $= -3 + 3 = 0 =$ R.H.S.

∴ Yes, the equation is satisfied.

(iv) $x - 7 = 1$

L.H.S. $= x - 7$

By putting $x = 7$,

L.H.S. $= 7 - 7 = 0 \neq$ R.H.S.

∴ No, the equation is not satisfied.

(v) $x - 7 = 1$

L.H.S. $= x - 7$

By putting $x = 8$,

L.H.S. $= 8 - 7 = 1 =$ R.H.S.

$\therefore$ Yes, the equation is satisfied.

(vi) $5x = 25$

L.H.S. $= 5x$

By putting $x = 0$,

L.H.S. $= 5 \times 0 = 0 \neq$ R.H.S.

$\therefore$ No, the equation is not satisfied.

(vii) $5x = 25$

L.H.S. $= 5x$

By putting $x = 5$,

L.H.S. $= 5 \times 5 = 25 =$ R.H.S.

$\therefore$ Yes, the equation is satisfied.

(viii) $5x = 25$

L.H.S. $= 5x$

By putting $x = -5$,

L.H.S. $= 5 \times (-5) = -25 \neq$ R.H.S.

$\therefore$ No, the equation is not satisfied.

(ix) $\frac{m}{3} = 2$

L.H.S. = $\frac{m}{3}$

By putting $m = -6$,

L. H. S. = $\frac{-6}{3} = -2$ ≠ R.H.S.

∴No, the equation is not satisfied.

(x) $\frac{m}{3} = 2$

L.H.S. = $\frac{m}{3}$

By putting $m = 0$,

L.H.S. = $\frac{0}{3} = 0$ ≠ R.H.S.

∴No, the equation is not satisfied.

(xi) $\frac{m}{3} = 2$

L.H.S. = $\frac{m}{3}$

By putting $m = 6$,

L.H.S. = $\frac{6}{3} = 2$ = R.H.S.

∴ Yes, the equation is satisfied.

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

Answer:

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

Putting $n = 1$ in L.H.S.,

$n + 5 = 1 + 5 = 6 \neq 19$

As L.H.S. ≠ R.H.S.,

Therefore, $n = 1$ is not a solution of the given equation, $n + 5 = 19$.

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

Putting $n = -2$ in L.H.S.,

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

As L.H.S. ≠ R.H.S.,

Therefore, $n = -2$ is not a solution of the given equation, $7n + 5 = 19$.

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

Putting $n = 2$ in L.H.S.,

$7n + 5 = 7 \times (2) + 5 = 14 + 5 = 19 =$ R.H.S.

As L.H.S. = R.H.S.,

Therefore, $n = 2$ is a solution of the given equation, $7n + 5 = 19$.

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

Putting $p = 1$ in L.H.S.,

$4p - 3 = (4 \times 1) - 3 = 1 \neq 13$

As L.H.S ≠ R.H.S.,

Therefore, $p = 1$ is not a solution of the given equation, $4p - 3 = 13$.

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

Putting $p = -4$ in L.H.S.,

$4p - 3 = 4 \times (-4) - 3 = -16 - 3 = -19 \neq 13$

As L.H.S. ≠ R.H.S.,

Therefore, $p = -4$ is not a solution of the given equation, $4p - 3 = 13$.

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

Putting $p = 0$ in L.H.S.,

$4p - 3 = (4 \times 0) - 3 = -3 \neq 13$

As L.H.S. ≠ R.H.S.,

Therefore, $p = 0$ is not a solution of the given equation, $4p - 3 = 13$.

Question 3:

Solve the following equations by trial and error method:

(i) $5p + 2 = 17$ (ii) $3m - 14 = 4$

Answer:

(i) $5p + 2 = 17$

Putting $p = 1$ in L.H.S.,

$(5 \times 1) + 2 = 7 \neq$ R.H.S.

Putting $p = 2$ in L.H.S.,

$(5 \times 2) + 2 = 10 + 2 = 12 \neq$ R.H.S.

Putting $p = 3$ in L.H.S.,

$(5 \times 3) + 2 = 17 =$ R.H.S.

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

(ii) $3m - 14 = 4$

Putting $m = 4$,

$(3 \times 4) - 14 = -2 \neq$ R.H.S.

Putting $m = 5$,

$(3 \times 5) - 14 = 1 \neq$ R.H.S.

Putting $m = 6$,

$(3 \times 6) - 14 = 18 - 14 = 4 =$ R.H.S.

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

Question 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.

Answer:

(i) $x + 4 = 9$

(ii) $y - 2 = 8$

(iii) $10a = 70$

(iv) $\frac{b}{5}=6$

(v) $\frac{3}{4}t=15$

(vi) Seven times of m is $7m$.

$7m + 7 = 77$

(vii) One-fourth of a number x is $\frac{x}{4}$.

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

(viii) Six times of y is $6y$.

$6y - 6 = 60$

(ix) One-third of z is $\frac{z}{3}$.

$\frac{z}{3}+3=30$

Question 5:

Write the following equations in statement forms:

(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) $\frac{p}{2}+2=8$

Answer:

(i) The sum of p and 4 is 15.

(ii) 7 subtracted from m is 3.

(iii) Twice of a number m is 7.

(iv) One-fifth of m is 3.

(v) Three-fifth of m is 6.

(vi) Three times of a number p, when added to 4, gives 25.

(vii) When 2 is subtracted from four times of a number p, it gives 18.

(viii) When 2 is added to half of a number p, it gives 8.

Question 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.)

Answer:

(i) Let Parmit has m marbles.

5 × Number of marbles Parmit has + 7 = Number of marbles Irfan has

$5 \times m + 7 = 37$

$5m + 7 = 37$

(ii) Let Laxmi be y years old.

3 × Laxmi's age + 4 = Laxmi's father's age

$3 \times y + 4 = 49$

$3y + 4 = 49$

(iii) Let the lowest marks be l.

$2 \times$ Lowest marks $+ 7 =$ Highest marks

$2 \times l + 7 = 87$

$2l + 7 = 87$

(iv) An isosceles triangle has two of its angles of equal measure.

Let base angle be b.

Vertex angle $= 2 \times$ Base angle $= 2b$

Sum of all interior angles of a $\Delta = 180°$

$b + b + 2b = 180°$

$4b = 180°$

Ex 4.2:-

Question 1

Given 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

Solution:

(a) x − 1 = 0
Adding 1 to both sides, we get
x − 1 + l = 0 + 1 ⇒ x = 1
Thus, x = 1 is the required solutions.
Check: Put x = 1 in the given equations
x − 1 = 0
1 − 1 = 0
0 = 0
LHS = RHS
Thus x = 1 is the correct solution.

(b) x + 1 = 0
Subtracting 1 from both sides, we get
x + 1 − 1 = 0 − 1 ⇒ x = -1
Thus x = -1 is the required solution.
Check: Put x = -1 in the given equation
-1 + 1 = 0
0 = 0
LHS = RHS
Thus x = -1 is the correct solution.

(c) $x - 1 = 5$
Adding 1 to both sides, we get
$x - 1 + 1 = 5 + 1 \Rightarrow x = 6$
Thus $x = 6$ is the required solution.
Check: $x - 1 = 5$
Putting $x = 6$ in the given equation
$6 - 1 = 5 \Rightarrow 5 = 5$
LHS = RHS
Thus, $x = 6$ is the correct solution.

(d) $x + 6 = 2$
Subtracting 6 from both sides, we get
$x + 6 - 6 = 2 - 6 \Rightarrow x = -4$
Thus, $x = -4$ is the required solution.
Check: $x + 6 = 2$
Putting $x = -4$, we get
$-4 + 6 = 2 \Rightarrow 2 = 2$ LHS = RHS
Thus $x = -4$ is the correct solution.

(e) $y - 4 = -7$
Adding 4 to both sides, we get
$y - 4 + 4 = -7 + 4 \Rightarrow y = -3$
Thus, $y = -3$ is the required solution.
Check: $y - 4 = -7$
Putting $y = -3$, we get
$-3 - 4 = -7 \Rightarrow -7 = -7$
LHS = RHS
Thus, $y = -3$ is the correct solution.

(f) $y - 4 = 4$
Adding 4 to both sides, we get
$y - 4 + 4 = 4 + 4 \Rightarrow y = 8$
Thus, $y = 8$ is the required solution.
Check: $y - 4 = 4$
Putting $y = 8$, we get
$8 - 4 = 4 \Rightarrow 4 = 4$
LHS = RHS
Thus $y = 8$ is the correct solution.

(g) $y + 4 = 4$
Subtracting 4 from both sides, we get
$y + 4 - 4 = 4 - 4 \Rightarrow y = 0$
Thus $y = 0$ is the required solution.
Check: $y + 4 = 4$
Putting $y = 0$, we get
$0 + 4 = 4 \Rightarrow 4 = 4$

LHS = RHS
Thus y = 0 is the correct solution.

(h) y + 4 =-4
Subtracting 4 from both sides, we get
y + 4 – 4 = -4 – 4 ⇒ y = -8
Thus, y = -8 is the required solution.
Check: y + 4 = -4
Putting y = -8, we get
-8 + 4 = -4 ⇒ -4 = -4
LHS = RHS
Thus, y = -8 is the correct solution.

Question 2

Give first the step you will use to separate the variable and then solve the following equation:

(a) $3l = 42$ (b) $\frac{b}{2} = 6$

(c) $\frac{p}{7} = 4$ (d) $4x = 25$

(e) $8y = 36$ (f) $\frac{z}{3} = \frac{5}{4}$

(g) $\frac{a}{5} = \frac{7}{15}$ (h) $20t = -10$

Solution:

(*a*) $3l = 42$

Dividing both sides by 3, we get

$$3l \div 3 = 42 \div 3 \Rightarrow l = \frac{\cancel{42}^{14}}{\cancel{3}} = 14$$

Thus $l = 14$

(*b*) $\frac{b}{2} = 6$

Multiplying both sides by 2, we get

$$\frac{b}{2} \times 2 = 6 \times 2 \Rightarrow b = 12$$

Thus, $b = 12$

(*c*) $\frac{p}{7} = 4$

Multiplying both sides by 7, we get

$$\frac{p}{7} \times 7 = 4 \times 7 \Rightarrow p = 28$$

Thus $p = 28$

(*d*) $4x = 25$

Dividing both sides by 4, we get

$$4x \div 4 = 25 \div 4$$

$$\Rightarrow x = \frac{25}{4} = 6\frac{1}{4}$$

Thus $x = 6\frac{1}{4}$

(*e*) $8y = 36$

Dividing both sides by 8, we get

$$8y \div 8 = 36 \div 8$$

$$\Rightarrow y = \frac{\cancel{36}^{9}}{\cancel{8}_{2}} = \frac{9}{2} = 4\frac{1}{2}$$

Thus, $y = 4\frac{1}{2}$

(f) $\frac{z}{3} = \frac{5}{4}$

Multiplying both sides by 3, we get

$$\frac{z}{3} \times 3 = \frac{5}{4} \times 3 \Rightarrow z = \frac{15}{4} = 3\frac{3}{4}$$

Thus, $z = 3\frac{3}{4}$

(g) $\frac{a}{5} = \frac{7}{15}$

Multiplying both sides by 5, we get

$$\frac{a}{5} \times 5 = \frac{7}{\cancel{15}_{3}} \times \cancel{5} = \frac{7}{3}$$

$$\Rightarrow \quad a = \frac{7}{3} = 2\frac{1}{3}$$

Thus, $a = 2\frac{1}{3}$

(h) $20t = -10$

Dividing both sides by 20, we get

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

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

Question 3

Give the steps you will use to separate the variables and then solve the equation:

(a) 3n − 2 = 46

(b) 5m + 7 = 17

(c) $20p3=40$

(d) $3p10=6$

Solution:

(a) 3n − 2 = 46

⇒ 3n- 2 + 2 = 46+ 2 (adding 2 to both sides)

⇒ 3n = 48

⇒ 3n + 3 = 48 ÷ 3

$$\Rightarrow \quad n = \frac{\cancel{48}^{16}}{\cancel{3}} = 16$$

Thus $n = 16$

(b) 5m + 7 = 17

⇒ 5m+ 7 − 7 = 17 − 7 (Subtracting 7 from both sides)

⇒ 5m = 10

⇒ 5m + 5 = 10 ÷ 5 (Dividing both sides by 5)

$$\Rightarrow \quad m = \frac{\cancel{10}^{2}}{\cancel{5}} = 2$$

Thus $m = 2$

(c) $\frac{20p}{3}=40$

$$\Rightarrow \quad \frac{20p}{3} \times 3 = 40 \times 3$$

(Multiplying both sides by 3)

$$\Rightarrow \quad 20p = 120$$

$$\Rightarrow \quad 20p \div 20 = 120 \div 20$$

(Dividing both sides by 20)

$$\Rightarrow \quad p = \frac{\cancel{120}^{6}}{\cancel{20}} = 6$$

Thus $p = 6$

(d) $\frac{3p}{10}=6$

$\Rightarrow \frac{3p}{10}\times 10=6\times 10$ (Multiplying both sides by 10)

⇒ 3p = 60

⇒ 3p ÷ 3 = 60 ÷ 3 (Dividing both sides by 3)

$$\Rightarrow \quad p = \frac{\cancel{60}^{20}}{\cancel{3}} = 20$$

Thus $p = 20$

Question 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

Solution:

(a) 10p = 100

⇒ 10p ÷ 10 = 100 ÷ 10 (Dividing both sides by 10)

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

Thus p= 10

(b) 10p + 10 = 100
⇒ 10p + 10 − 10 = 100 -10 (Subtracting 10 from both sides)
⇒ 10p = 90
⇒ 10p ÷ 10 = 90 ÷ 10 (Dividing both side by 10)
p=$\frac{90}{10}$=9
Thus p = 9

(c) $\frac{p}{4} = 5$

$\Rightarrow \quad \frac{p}{4} \times 4 = 5 \times 4$

(Multiplying both sides by 4)

$\Rightarrow \quad p = 20$

Thus $p = 20$

(d) $\frac{-p}{3} = 5$

$\Rightarrow \quad \frac{-p}{3} \times 3 = 5 \times 3$

(Multiplying both sides by 3)

$\Rightarrow \quad -p = 15$

$\Rightarrow \quad -p \times (-1) = 15 \times (-1)$

[Multiplying both sides by (–1)]

$\Rightarrow \quad p = -15$

Thus $p = -15$

(e) $\frac{3p}{4} = 6$

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

(Multiplying both sides by 4)

$\Rightarrow \quad 3p = 24$

$\Rightarrow \quad 3p \div 3 = 24 \div 3$

(Dividing both sides by 3)

$\Rightarrow \quad p = \frac{\cancel{24}^{8}}{\cancel{3}} = 8$

Thus $p = 8$

(f) $3s = -9$

$\Rightarrow \quad 3s \div 3 = -9 \div 3$

(Dividing both sides by 3)

$$\Rightarrow \qquad s = -\frac{\cancel{9}^{3}}{\cancel{3}} = -3$$

Thus $s = -3$

(*g*) $3s + 12 = 0$

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

(Subtracting 12 from both sides)

$\Rightarrow$ $3s = -12$

$\Rightarrow$ $3s \div 3 = -12 \div 3$

(Dividing both sides by 3)

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

Thus $s = -4$

(*h*) $3s = 0$

$\Rightarrow$ $3s \div 3 = 0 \div 3$

(Dividing both sides by 3)

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

Thus, $s = 0$

(*i*) $2q = 6$

$\Rightarrow \quad 2q \div 2 = 6 \div 2$

(Dividing both sides by 2)

$\Rightarrow \quad q = \frac{\cancel{6}^{3}}{\cancel{2}} = 3$

Thus $q = 3$

(*j*) $2q - 6 = 0$

$\Rightarrow \quad 2q - 6 + 6 = 0 + 6$ (Adding 6 to both sides)

$\Rightarrow \quad 2q = 6$

$\Rightarrow \quad 2q \div 2 = 6 \div 2$ (Dividing both sides by 2)

$\Rightarrow \quad q = \frac{\cancel{6}^{3}}{\cancel{2}} = 3$

Thus $q = 3$

(*k*) $2q + 6 = 0$

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

(Subtracting 6 from each side)

$\Rightarrow \quad 2q = -6$

$\Rightarrow \quad 2q \div 2 = -6 \div 2$

(Dividing both sides by 2)

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

Thus $q = -3$

(l) $2q + 6 = 12$

$\Rightarrow 2q + 6 - 6 = 12 - 6$ (Subtracting 6 from both sides)

$\Rightarrow 2q = 6$

$\Rightarrow \quad 2q \div 2 = 6 \div 2$

(Dividing both sides by 2)

$\Rightarrow \quad q = \frac{\cancel{6}^{3}}{\cancel{2}} = 3$

Thus $q = 3$

Question 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) $y + 4 = -4$

Answer:

(a) $x - 1 = 0$

Adding 1 to both sides of the given equation, we obtain

$x - 1 + 1 = 0 + 1$

$x = 1$

(b) $x + 1 = 0$

Subtracting 1 from both sides of the given equation, we obtain

$x + 1 - 1 = 0 - 1$

$x = -1$

(c) $x - 1 = 5$

Adding 1 to both sides of the given equation, we obtain

$x - 1 + 1 = 5 + 1$

$x = 6$

(d) $x + 6 = 2$

Subtracting 6 from both sides of the given equation, we obtain

$x + 6 - 6 = 2 - 6$

$x = -4$

(e) $y - 4 = -7$

Adding 4 to both sides of the given equation, we obtain

$y - 4 + 4 = -7 + 4$

$y = -3$

(f) $y - 4 = 4$

Adding 4 to both sides of the given equation, we obtain

$y - 4 + 4 = 4 + 4$

$y = 8$

(g) $y + 4 = 4$

Subtracting 4 from both sides of the given equation, we obtain

$y + 4 - 4 = 4 - 4$

$y = 0$

(h) $y + 4 = -4$

Subtracting 4 from both sides of the given equation, we obtain

$y + 4 - 4 = -4 - 4$

$y = -8$

Question 2:

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

(a) $3l = 42$ (b) $\frac{b}{2} = 6$ (c) $\frac{p}{7} = 4$

(d) $4x = 25$ (e) $8y = 36$ (f) $\frac{z}{3} = \frac{5}{4}$

(g) $\frac{a}{5} = \frac{7}{15}$ (h) $20t = -10$

Answer:

(a) $3l = 42$

Dividing both sides of the given equation by 3, we obtain

$\frac{3l}{3} = \frac{42}{3}$

$l = 14$

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

Multiplying both sides of the given equation by 2, we obtain

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

$b = 12$

(c) $\frac{p}{7} = 4$

Multiplying both sides of the given equation by 7, we obtain

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

$p = 28$

(d) $4x = 25$

Dividing both sides of the given equation by 4, we obtain

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

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

(e) $8y = 36$

Dividing both sides of the given equation by 8, we obtain

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

$$y = \frac{9}{2}$$

(f) $\frac{z}{3} = \frac{5}{4}$

Multiplying both sides of the given equation by 3, we obtain

$$\frac{z \times 3}{3} = \frac{5 \times 3}{4}$$

$$z = \frac{15}{4}$$

(g) $\frac{a}{5} = \frac{7}{15}$

Multiplying both sides of the given equation by 5, we obtain

$$\frac{a \times 5}{5} = \frac{7 \times 5}{15}$$

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

(h) $20t = -10$

Dividing both sides of the given equation by 20, we obtain

$$\frac{20t}{20} = \frac{-10}{20}$$

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

Question 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)

$$\frac{20p}{20}=\frac{120}{20}$$

$$p=6$$

Multiplying both sides of the given equation by 10, we obtain

$$\frac{3p\times10}{10}=6\times10$$

$$3p=60$$

(d) $\frac{3p}{10}=6$

Dividing both sides of the given equation by 3, we obtain

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

$p = 20$

Question 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) $2q + 6 = 12$

Answer:

(a) $10\ p = 100$

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

$$p=10$$

(b) $10\ p + 10 = 100$

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

$10\ p = 90$

$$\frac{10p}{10}=\frac{90}{10}$$

$$p=9$$

(c) $\frac{p}{4}=5$

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

$p=20$

(d) $\frac{-p}{3}=5$

$\frac{-p\times(-3)}{3}=5\times(-3)$

$p=-15$

(e)

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

$\frac{3p\times 4}{4}=6\times 4$

$3p=24$

$\frac{3p}{3}=\frac{24}{3}$

$p=8$

(f) $3s=-9$

$\frac{3s}{3}=\frac{-9}{3}$

$s=-3$

(g) $3s+12=0$

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

$3s=-12$

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

$s=-4$

(h) $3s=0$

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

$s=0$

(i) $2q = 6$

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

$$q = 3$$

(j) $2q - 6 = 0$

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

$2q = 6$

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

$$q = 3$$

(k) $2q + 6 = 0$

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

$2q = -6$

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

$$q = -3$$

(l) $2q + 6 = 12$

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

$2q = 6$

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

$$q = 3$$

Ex 4.3:-

Question 1

Solve the following equations:

(a) $2y + \frac{5}{2} = \frac{37}{2}$ (b) $5t + 28 = 10$

(c) $\frac{a}{5} + 3 = 2$ (d) $\frac{q}{4} + 7 = 5$

(e) $\frac{5}{2}x = -10$ (f) $\frac{5}{2}x = \frac{25}{4}$

(g) $7m + \frac{19}{2} = 13$ (h) $6z + 10 = -2$

(i) $\frac{3l}{2} = \frac{2}{3}$ (j) $\frac{2b}{3} - 5 = 3$

Solution:

(a) $2y + \frac{5}{2} = \frac{37}{2} \Rightarrow 2y = \frac{37}{2} - \frac{5}{2}$

(Transposing $\frac{5}{2}$ to RHS)

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

$= \frac{32}{2} = 16$

$\Rightarrow 2y = 16$

$\Rightarrow 2y \div 2 = 16 \div 2$

(Dividing both sides by 2)

$\Rightarrow y = 8$

Check: Put $y = 8$ in LHS

$$2 \times 8 + \frac{5}{2} = 16 + \frac{5}{2} = \frac{32+5}{2}$$

$$= \frac{37}{2} \text{ RHS as required.}$$

(*b*) $5t + 28 = 10$

$\Rightarrow \quad 5t = 10 - 28$ (Transposing 28 to RHS)

$\Rightarrow \quad 5t = -18$

$\Rightarrow \quad 5t \div 5 = -18 \div 5$ (Dividing both sides by 5)

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

Check: Put $t = \frac{-18}{5}$ in LHS

$$5 \times \left(\frac{-18}{5}\right) + 28 = -18 + 28$$

$$= 10 \text{ RHS as required}$$

(*c*) $\frac{a}{5} + 3 = 2$

$\Rightarrow \quad \frac{a}{5} = 2 - 3$ (Transposing 3 to RHS)

$\Rightarrow \quad \frac{a}{5} = -1$

$\Rightarrow \quad \frac{a}{5} \times 5 = -1 \times 5$ (Multiplying both sides by 5)

$\Rightarrow \quad a = -5$

Check: Put $a = -5$ in LHS

$$\frac{-5}{5} + 3 = -1 + 3 = 2 \text{ RHS as required}$$

(*d*) $\frac{q}{4} + 7 = 5$

$\Rightarrow \quad \frac{q}{4} = 5 - 7$ (Transposing 7 to RHS)

$\Rightarrow \quad \frac{q}{4} = -2$

$\Rightarrow \quad \frac{q}{4} \times 4 = -2 \times 4$ (Multiplying both sides by 4)

$\Rightarrow \quad q = -8$

Check: Put $q = -8$ in LHS

$$\frac{-8}{4} + 7 = -2 + 7 = 5 \text{ RHS as required}$$

(*e*) $\frac{5}{2}x = -10$

$\Rightarrow \quad \frac{5}{2}x \times 2 = -10 \times 2$ (Multiplying both sides by 2)

$\Rightarrow \quad 5x = -20$

$\Rightarrow \quad 5x \div 5 = -20 \div 5$

(Dividing both sides by 5)

$\Rightarrow \quad x = -4$

Check: Put $x = -4$ in LHS

$$\frac{5}{2} \times (-4) = 5 \times (-2) = -10 \text{ RHS as required}$$

(f) $\frac{5}{2}x = \frac{25}{4}$

$\Rightarrow \quad \frac{5}{2}x \times 2 = \frac{25}{\cancel{4}_2} \times \cancel{2}$

(Multiplying both sides by 2)

$\Rightarrow \quad 5x = \frac{25}{2}$

$\Rightarrow \quad 5x \div 5 = \frac{25}{2} \div 5$ (Dividing both sides by 5)

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

Check: Put $x = \frac{5}{2}$ in LHS

$\frac{5}{2} \times \frac{5}{2} = \frac{25}{4}$ RHS as required

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

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

$\left(\text{Transposing } \frac{19}{2} \text{ to RHS}\right)$

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

$\Rightarrow \quad 7m \div 7 = \frac{7}{2} \div 7$ (Dividing both sides by 7)

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

Check: Put $m = \frac{1}{2}$ in LHS

$$7 \times \frac{1}{2} + \frac{19}{2} = \frac{7}{2} + \frac{19}{2}$$

$$= \frac{7 + 19}{2} = \frac{26}{2}$$

= 13 RHS as required

(*h*) $6z + 10 = -2$

$\Rightarrow \quad 6z = -2 - 10$ (Transposing 10 to RHS)

$\Rightarrow \quad 6z = -12$

$\Rightarrow \quad 6z \div 6 = -12 \div 6$

(Dividing both sides by 6)

$\Rightarrow \quad z = -2$

Check: Put $z = -2$ in LHS

$6 \times (-2) + 10 = -12 + 10 = -2$ RHS as required.

(*i*) $\frac{3l}{2} = \frac{2}{3}$

$\Rightarrow \quad \frac{3l}{2} \times 2 = \frac{2}{3} \times 2$ (Multiplying both sides by 2)

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

$\Rightarrow \quad 3l \div 3 = \frac{4}{3} \div 3$ (Dividing both sides by 3)

$\Rightarrow \quad l = \frac{4}{3} \times \frac{1}{3} = \frac{4}{9}$

Check: Put $l = \frac{4}{9}$ in LHS

$\frac{\cancel{3}}{\cancel{2}} \times \frac{\cancel{4}^{2}}{\cancel{9}_{3}} = \frac{2}{3}$ RHS as required

(j) $\frac{2b}{3} - 5 = 3$

$\Rightarrow \quad \frac{2b}{3} = 5 + 3$ (Transposing 5 to RHS)

$\Rightarrow \quad \frac{2b}{3} = 8$

$\Rightarrow \quad \frac{2b}{3} \times 3 = 8 \times 3$ (Multiplying both sides by 3)

$\Rightarrow \quad 2b = 24$

$\Rightarrow \quad 2b \div 2 = 24 \div 2$ (Dividing both sides by 2)

$\Rightarrow \quad b = 12$

Check: Put $b = 12$ in LHS

$\frac{2}{\cancel{3}} \times \cancel{12}^{4} - 5 = 8 - 5 = 3$ RHS as required

Question 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

Solution:

(a) 2(x + 4) = 12

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

⇒ x + 4 = 6

⇒ x = 6 − 4 (Transposing 4 to RHS)

⇒ x − 2

Check: Put x = 2 in LHS

2(2 + 4) = 2 × 6 = 12 RHS as required

(b) 3(n − 5) = 21

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

⇒ n − 5 = 7

⇒ n = 7 + 5 (Transposing 5 to RHS)

n = 12
Check: Put n = 12 in LHS
3(12 – 5) = 3 × 7 = 21 RHS as required
(c) 3(n – 5) = -21
⇒ $\frac{3(n-5)}{3}=\frac{-21}{3}$ (Dividing both sides by 3)
⇒ n – 5 = -7
⇒ n = -7 + 5 (Transposing 5 to RHS)
⇒ n = -2
Check: Put n = -2 in LHS
3(-2 – 5) = 3 × -7
= -21 RHS as required
(d) -4(2 + x) = 8
⇒ $\frac{-4(2+x)}{-4}=\frac{8}{-4}$ (Dividing both sides by -4)
⇒ 2 + x = -2
⇒ x = -2 – 2 (Transposing 2 to RHS)
⇒ x = —4
Check: Put x = -4 in LHS
-4(2 – 4) = -4 × -2 = 8 RHS as required
(e) 4(2-x) = 8
⇒ $\frac{4(2-x)}{4}=\frac{8}{4}$ (Dividing both sides by 4)
⇒ 2 – x = 2 – 2 (Transposing 2 to RHS)
⇒ -x = 0
∴ x = 0 (Multiplying both sides by -1)
Check: Put x = 0 in LHS
4(2 – 0) = 4 × 2 = 8 RHS as required

Question 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)

Solution:

(a) $4 = 5(p-2)$

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

$\Rightarrow \quad \frac{4}{5} = p-2$ (Transposing 2 to LHS)

$\Rightarrow \quad \frac{4}{5} + 2 = p$

$\Rightarrow \quad \frac{4+10}{5} = p \quad \Rightarrow \quad \frac{14}{5} = p$

$\Rightarrow \quad p = \frac{14}{5}$

Check: Put $p = \frac{14}{5}$ in RHS

$5\left(\frac{14}{5} - 2\right) = 5\left(\frac{14-10}{5}\right) = \cancel{5} \times \frac{4}{\cancel{5}}$

$= 4$ LHS as required

(b) $-4 = 5(p-2)$

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

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

$\Rightarrow \quad -\frac{4}{5} + 2 = p$ (Transposing 2 to LHS)

$\Rightarrow \quad \frac{-4+10}{5} = p \quad \Rightarrow \quad p = \frac{6}{5}$

Check: Put $p = \frac{6}{5}$ in RHS

$5\left(\frac{6}{5} - 2\right) = 5\left(\frac{6-10}{5}\right) = \frac{\cancel{5} \times (-4)}{\cancel{5}}$

$= -4$ LHS as required

(c) 16 = 4 + 3 (t + 2)
⇒ 16 − 4 = 3(t + 2) (Transposing 4 to LHS)
⇒ 12 = 3 (t + 2)
⇒ $\frac{12}{3}=\frac{3(t+2)}{3}$ (Dividing both sides by 3)
⇒ 4 = t + 2
⇒ 4 − 2 = t (Transposing 2 to LHS)
⇒ 2 = t or t = 2
Check: Put t = 2 in RHS
4 + 3(2 + 2) = 4 + 3 × 4 = 4 + 12
= 16 LHS as required
(d) 4 + 5(p − 1) = 34
⇒ 5(p − 1) = 34 − 4(Transposing 4 to RHS)
⇒ 5(p − 1) = 30
⇒ $\frac{5(p-1)}{5}=\frac{30}{5}$ (Dividing both sides by 5)
⇒ p − 1 = 6
⇒ P = 7
Check: Put p = 7 in LHS
4 + 5(7 − 1) = 4 + 5 × 6
= 4 + 30 = 34 RHS as required
(e) 0 = 16 + 4(m − 6)
⇒ 0 — 16 = 4(m − 6) (Transposing 16 to LHS)
⇒ -16 = 4(m − 6)
⇒ $\frac{-16}{4}=\frac{4(m-6)}{4}$ (Dividing both sides by 4)
⇒ -4 = m − 6
⇒ -4 + 6 = m (Transposing 6 to LHS)
⇒ 2 = m
or m = 2
Check: Put m = 2 in RHS
16 + 4(2 − 6) = 16 + 4 × (-4) = 16 − 16 = 0 LHS as required

Question 4

(a) Construct 3 equations starting with x = 2
(b) Construct 3 equations starting with x − -2.

Solution:

(a) Possible equations are:
10x + 2 = 22; $\frac{x}{5}=25$; 5x − 3 = 7
(b) Possible equations are:
3x= -6; 3x + 7 = 1; 3x + 10 = 4

Question 1:

Solve the following equations.

(a) $2y+\frac{5}{2}=\frac{37}{2}$ (b) $5t + 28 = 10$ (c) $\frac{a}{5}+3=2$

(d) $\frac{q}{4}+7=5$ (e) $\frac{5}{2}x=-10$ (f) $\frac{5}{2}x=\frac{25}{4}$

(g) $7m+\frac{19}{2}=13$ (h) $6z + 10 = -2$ (i) $\frac{3l}{2}=\frac{2}{3}$

(j) $\frac{2b}{3}-5=3$

Answer:

(a) $2y+\frac{5}{2}=\frac{37}{2}$

$2y=\frac{37}{2}-\frac{5}{2}=\frac{32}{2}=16$ (Transposing $\frac{5}{2}$ to R.H.S.)

Dividing both sides by 2,

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

(b) $5t + 28 = 10$

$5t = 10 - 28 = -18$ (Transposing 28 to R.H.S.)

Dividing both sides by 5,

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

(c) $\frac{a}{5}+3=2$

$\frac{a}{5}=2-3=-1$ (Transposing 3 to R.H.S.)

Multiplying both sides by 5,

$a = -1 \times 5 = -5$

(d) $\frac{q}{4}+7=5$

$\frac{q}{4} = -2$ (Transposing 7 to R.H.S.)

Multiplying both sides by 4,

$q = -8$

(e) $\frac{5}{2}x = -10$

Multiplying both sides by 2,

$5x = -10 \times 2 = -20$

Dividing both sides by 5,

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

(f) $\frac{5}{2}x = \frac{25}{4}$

Multiplying both sides by 2,

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

Dividing both sides by 5,

$x = \frac{25}{2} \times \frac{1}{5} = \frac{5}{2}$

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

$7m = 13 - \frac{19}{2} = \frac{26-19}{2}$ (Transposing $\frac{19}{2}$ to R.H.S.)

$7m = \frac{7}{2}$

Dividing both sides by 7,

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

(h) $6z + 10 = -2$

$6z = -2 - 10 = -12$ (Transposing 10 to R.H.S.)

Dividing both sides by 6,

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

(i) $\frac{3l}{2} = \frac{2}{3}$

Multiplying both sides by 2,

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

Dividing both sides by 3,

$$l = \frac{4}{3} \times \frac{1}{3} = \frac{4}{9}$$

(j) $\frac{2b}{3} - 5 = 3$

$\frac{2b}{3} = 3 + 5 = 8$ (Transposing −5 to R.H.S.)

Multiplying both sides by 3,

$2b = 8 \times 3 = 24$

Dividing both sides by 2,

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

Question 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

Answer:

(a) 2 (x + 4) = 12

Dividing both sides by 2,

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

x = 6 − 4 = 2 (Transposing 4 to R.H.S.)

(b) 3 (n − 5) = 21

Dividing both sides by 3,

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

$n = 7 + 5 = 12$ (Transposing -5 to R.H.S.)

(c) $3(n - 5) = -21$

Dividing both sides by 3,

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

$n = -7 + 5 = -2$ (Transposing -5 to R.H.S.)

(d) $-4(2 + x) = 8$

Dividing both sides by -4,

$$2+x=\frac{8}{-4}=-2$$

$x = -2 - 2 = -4$ (Transposing 2 to R.H.S.)

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

Dividing both sides by 4,

$2 - x = 2$

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

$-x = 0$

$x = 0$

Question 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) $0 = 16 + 4(m - 6)$

Answer:

(a) $4 = 5(p - 2)$

Dividing both sides by 5,

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

$$\frac{4}{5} + 2 = p \qquad \text{(Transposing } -2 \text{ to L.H.S.)}$$

$$\frac{4+10}{5} = p$$

$$\frac{14}{5} = p$$

(b) $-4 = 5(p - 2)$

Dividing both sides by 5,

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

$$-\frac{4}{5} + 2 = p \qquad \text{(Transposing } -2 \text{ to L.H.S.)}$$

$$\frac{-4+10}{5} = p$$

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

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

$16 - 4 = 3(t + 2)$ (Transposing 4 to L.H.S.)

$12 = 3(t + 2)$

Dividing both sides by 3,

$$\frac{12}{3} = t + 2$$

$4 = t + 2$

$4 - 2 = t$ (Transposing 2 to L.H.S.)

$2 = t$

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

$5(p - 1) = 34 - 4 = 30$ (Transposing 4 to R.H.S.)

Dividing both sides by 5,

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

$p = 6 + 1 = 7$ (Transposing -1 to R.H.S.)

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

$0 = 16 + 4m - 24$

$0 = -8 + 4m$

$4m = 8$ (Transposing -8 to L.H.S)

Dividing both sides by 4,

$m = 2$

Question 4:

(a) Construct 3 equations starting with $x = 2$

(b) Construct 3 equations starting with $x = -2$

Answer:

(a) $x = 2$

Multiplying both sides by 5,

$5x = 10$ (i)

Subtracting 3 from both sides,

$5x - 3 = 10 - 3$

$5x - 3 = 7$ (ii)

Dividing both sides by 2,

$\frac{5x}{2} - \frac{3}{2} = \frac{7}{2}$ (iii)

(b) $x = -2$

Subtracting 2 from both sides,

$x - 2 = -2 - 2$

$x - 2 = -4$ (i)

Again, $x = -2$

Multiplying by 6,

$6 \times x = -2 \times 6$

$6x = -12$

Subtracting 12 from both sides,

$6x - 12 = -12 - 12$

$6x - 12 = -24$ (ii)

Adding 24 to both sides,

$6x - 12 + 24 = -24 + 24$

$6x + 12 = 0$ (iii)

Ex 4.4:-

Question 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) When 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 52 of the numbers, the result is 23.

Solution:

(a) Let the required number be x.
Step I: 8x + 4
Step II: 8x + 4 = 60 is the required equation
Solving the equation, we have
8x + 4 = 60
⇒ 8x = 60 − 4 (Transposing 4 to RHS)
⇒ 8x = 56
⇒ $8x8=568$ (Dividing both sides by 8)
⇒ x = 7
Thus, x − 7 is the required unknown number.
(b) Let the required number be x.
Step I: 15 x − 4
Step II: 15x − 4 = 3 is the required equation. 5
Solving the equation, we get
15x − 4 = 3
⇒ 15x =4 + 3 (Transposing 4 to RHS)
⇒ $15x=7$
⇒ $15x×5=7×5$ (Multiplying both sides by 5)
⇒ x = 35 is the required unknown number,
(c) Let the required number be x.
Step I: 34x + 3
Step II: 34x + 3 = 21 is the required equation.
Solving the equation, we have

$$\frac{3}{4}x + 3 = 21$$

$$\Rightarrow \quad \frac{3}{4}x = 21 - 3 \text{(Transposing 3 to RHS)}$$

$$\Rightarrow \quad \frac{3}{4}x = 18$$

$$\Rightarrow \quad \frac{3}{4}x \times 4 = 18 \times 4 \quad \text{(Multiplying both sides by 4)}$$

$$\Rightarrow \quad 3x = 72$$

$$\Rightarrow \quad \frac{3x}{3} = \frac{72}{3} \text{ (Dividing both sides by 3)}$$

⇒ x = 24 is the required unknown number.
(d) Let the required unknown number be x.
Step I: 2x – 11
Step II: 2x -11 = 15 is the required equations.
Solving the equation, we have
2x – 11= 15
⇒ 2x = 15 + 13 (Transposing 11 to RHS)
⇒ 2x = 28
⇒ $\frac{2x}{2}=\frac{28}{2}$ (Dividing both sides by 2)
⇒ x = 14 is the required unknown number,
(e) Let the required number be x.
Step I: 50 – 3x
Step II: 50 – 3x = 8 is the required equations.
Solving the equation, we have
50 – 3x = 8
⇒ -3x = 8 – 50 (Transposing 50 to RHS)
⇒ -3x = -42
⇒ $\frac{-3x}{-3}=\frac{-42}{-3}$ (Dividing both sides by -3)
⇒ x = 14 is the required unknown number.
(f) Let the required number be x.
Step I: x + 19
Step II: $\frac{x+19}{5}$
Step III: $\frac{x+19}{5}$ = 8 is the required equation.
Solving the equation, we have
$\frac{x+19}{5}$ = 8
⇒ $\frac{x+19}{5}$ × 5 = 8 × 5(Multiplying both sides by 5)
⇒ x + 19 = 40
⇒ x = 40 – 19 (Transposing 19 to RHS)
∴ x = 21 is the required unknown number.
(g) Let the required number be x.
Step I: $\frac{5}{2}$x – 7
Step II: $\frac{5}{2}$ – 7 = 23 is the required equation.
Solving the equation, we have

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

$$\Rightarrow \quad \frac{5}{2}x = 7 + 23 \quad \text{(Transposing 7 to RHS)}$$

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

$$\Rightarrow \quad \frac{5}{2}x \times 2 = 30 \times 2 \quad \text{(Multiplying both side of 2)}$$

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

$$\Rightarrow \quad \frac{5x}{5} = \frac{60}{5} \quad \text{(Dividing both side by 5)}$$

⇒ x = 12 is the required unknown number.

Question 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 marks plus 7. The highest score is 87. What is the lowest score?

(b) In an isosceles triangle, the base angle 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?

Solution:

(a) Let the lowest score be x.

Step I: Highest marks obtained = 2x + 7

Step II: 2x + 7 = 87 is the required equation. Solving the equation, we have

2x + 7 = 87

⇒ 2x = 87 – 7 (Transposing 7 to RHS)

⇒ 2x = 80

⇒ $2x2=802$ (Dividing both sides by 2)

⇒ x = 40 is the required lowest marks.

(b) Let each base angle be x degrees.

Step I: Sum of all angles of the triangle (x + x + 40) degrees.

Step II: x + x + 40 = 180°

⇒ 2x + 40° = 180°

Solving the equation, we have

2x + 40° = 180°

2x = 180° – 40° (Transposing 40° to RHS)

2x = 140°

⇒ $2x2=140∘2$ (Dividing both sides by 2)

⇒ x = 70°

Thus the required each base angle = 70°

(c) Let the runs scored by Rahul = x

Runs scored by Sachin = 2x

Step I: x + 2x = 3x

Step II: 3x + 2 = 200

Solving the equation, we have
3x + 2 = 200
⇒ 3x = 200 − 2 (Transposing 2 to RHS)
⇒ 3x = 198
⇒ $\frac{3x}{3}=\frac{198}{3}$ (Dividing both sides by 3)
⇒ x = 66
Thus, the runs scored by Rahul is 66 and the runs scored by Sachin = 2 × 66 = 132

Question 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 a 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?

Solution:

(i) Let the number of marbles with Parmit be
Step I: Number of marbles that Irfan has = 5x + 7
Step II: 5x + 7 = 37 Solving the equation, we have 5x + 7 = 37
⇒ 5x = 37 − 7 (Transposing 7 to RHS)
⇒ 5x = 30
⇒ $\frac{5x}{5}=\frac{30}{5}$ (Dividing both sides by 5)
⇒ x = 6
Thus, the required number of marbles = 6.
(ii) Let Laxmi's age be x years.
Step I: Father's age = 3x + 4
Step II: 3x + 4 = 49
Solving the equation, we get
3x + 4-= 49
⇒ 3x = 49 − 4 (Transposing to RHS)
⇒ 3x = 45
⇒ $\frac{3x}{3}=\frac{45}{3}$ (Dividing both sides by 3)
⇒ x = 15
Thus, the age of Laxmi = 15 years
(iii) Let the number of planted fruit tree be x.
Step I: Number of non-fruit trees = 3x + 2
Step II: 3x + 2 = 77
Solving the equation, we have
3x + 2 = 77
⇒ 3x = 77 − 2 (Transposing 2 to RHS)
⇒ 3x = 75
⇒ $\frac{3x}{3}=\frac{75}{3}$ (Dividing both sides by 3)
⇒ x = 25
Thus, the required number of fruit tree planted = 25

Question 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!

Solution:

Suppose my identity number is x.
Step I: 7 + 50
Step II: 7x + 50 + 40 = 300
or 7x + 90 = 300
Solving the equation, we have
7x + 90 = 300
⇒ 7x = 300 – 90 (Transforming 90 to RHS)
⇒ 7x = 210
⇒ $\frac{7x}{7}=\frac{210}{7}$ (Dividing both sides by 7)
⇒ x = 30
Thus, my identity is 30.

Question 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) When 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 $\frac{5}{2}$ of the number, the result is 23.

Answer:

(a) Let the number be x.

8 times of this number = $8x$

$8x + 4 = 60$

$8x = 60 - 4$ (Transposing 4 to R.H.S.)

$8x = 56$

Dividing both sides by 8,

$$\frac{8x}{8} = \frac{56}{8}$$

$$x = 7$$

(b) Let the number be x.

One-fifth of this number = $\frac{x}{5}$

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

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

$$x=35$$

(c) Let the number be x.

Three-fourth of this number = $\frac{3x}{4}$

$$\frac{3}{4}x+3=21$$

$$\frac{3}{4}x=18$$ (Transposing 3 to R.H.S.)

Multiplying both sides by 4,

$$\frac{3x\times 4}{4}=18\times 4$$

$$3x=72$$

Dividing both sides by 3,

$$\frac{3x}{3}=\frac{72}{3}$$

$$x=24$$

(d) Let the number be x.

Twice of this number = $2x$

$2x - 11 = 15$

$2x = 15 + 11$ (Transposing -11 to R.H.S.)

$2x = 26$

Dividing both sides by 2,

$$\frac{2x}{2}=\frac{26}{2}$$

$x = 13$

(e) Let the number of books be x.

Thrice the number of books = $3x$

$50 - 3x = 8$

$- 3x = 8 - 50$ (Transposing 50 to R.H.S.)

$-3x = -42$

Dividing both sides by -3,

$$\frac{-3x}{-3}=\frac{-42}{-3}$$

$$x=14$$

(f) Let the number be x.

$$\frac{x+19}{5}=8$$

Multiplying both sides by 5,

$$\frac{(x+19)\times 5}{5}=8\times 5$$

$x + 19 = 40$

$x = 40 - 19$ (Transposing 19 to R.H.S.)

$x = 21$

(g) Let the number be x.

$\frac{5}{2}$ of this number = $\frac{5x}{2}$

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

$$\frac{5x}{2}=23+7 \quad (\text{Transposing} -7 \text{ to R.H.S})$$

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

Multiplying both sides by 2,

$$\frac{5x\times 2}{2}=30\times 2$$

$$5x=60$$

Dividing both sides by 5,

$$\frac{5x}{5}=\frac{60}{5}$$

$$x=12$$

Question 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 marks 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?

Answer:

(a) Let the lowest score be l.

2 × Lowest marks + 7 = Highest marks

$2l + 7 = 87$

$2l = 87 - 7$ (Transposing 7 to R.H.S.)

$2l = 80$

Dividing both sides by 2,

$$\frac{2l}{2} = \frac{80}{2}$$

$$l = 40$$

Therefore, the lowest score is 40.

(b) Let the base angles be equal to b.

The sum of all interior angles of a triangle is 180°.

$b + b + 40° = 180°$

$2b + 40° = 180°$

$2b = 180° - 40° = 140°$ (Transposing 40° to R.H.S.)

Dividing both sides by 2,

$$\frac{2b}{2} = \frac{140°}{2}$$

$$b = 70°$$

Therefore, the base angles of the triangle are of 70° measure.

(c) Let Rahul's score be x.

Therefore, Sachin's score = $2x$

Rahul's score + Sachin's score = 200 − 2

$2x + x = 198$

$3x = 198$

Dividing both sides by 3,

$$\frac{3x}{3} = \frac{198}{3}$$

$x = 66$

Rahul's score = 66

Sachin's score = 2 × 66 = 132

Question 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 year 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 was 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?

Answer:

(i) Let Parmit's marbles equal x.

5 times the number of marbles Parmit has = $5x$

$5x + 7 = 37$

$5x = 37 - 7 = 30$ (Transposing 7 to R.H.S.)

Dividing both sides by 5,

$$\frac{5x}{5} = \frac{30}{5}$$

$x = 6$

Therefore, Parmit has 6 marbles.

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

3 × Laxmi's age + 4 = Her father's age

$3x + 4 = 49$

$3x = 49 - 4$ (Transposing 4 to R.H.S.)

$3x = 45$

Dividing both sides by 3,

$$\frac{3x}{3} = \frac{45}{3}$$

$x = 15$

Therefore, Laxmi's age is 15 years.

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

3 × Number of fruit trees + 2 = Number of non-fruit trees

$3x + 2 = 77$

$3x = 77 - 2$ (Transposing 2 to R.H.S.)

$3x = 75$

Dividing both sides of the equation by 3,

$$\frac{3x}{3} = \frac{75}{3}$$

$x = 25$

Therefore, the number of fruit trees was 25.

Question 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!

Answer:

Let the number be x.

$(7x + 50) + 40 = 300$

$7x + 90 = 300$

$7x = 300 - 90$ (Transposing 90 to R.H.S.)

$7x = 210$

Dividing both sides by 7,

$$\frac{7x}{7} = \frac{210}{7}$$

$x = 30$

Therefore, the number is 30.