

Chapter 9 Linear Equations and Inequalities

Ex 9.2

Question 1.

If 7 is added to five times a number, the result is 57. Find the number.

Solution:

Let the number be x

Five times a number is $= 5x$

If 7 is added, it becomes $7 + 5x$

According to given condition,

$$7 + 5x = 57$$

$$\Rightarrow 5x = 57 - 7$$

$$\Rightarrow 5x = 50$$

$$\Rightarrow x = 10$$

Question 2.

Find a number, such that one-fourth of the number is 3 more than 7.

Solution:

Let number $= x$

According to the condition,

$$\frac{1}{4}x - 3 = 7$$

$$\frac{1}{4}x = 7 + 3 = 10$$

$$x = 10 \times 4 = 40$$

Number $= 40$

Question 3.

A number is as much greater than 15 as it is less than 51. Find the number.

Solution:

Let the number be x

If it is greater than 15, it becomes $x - 15$.

If it is less than 51, it becomes $51 - x$

According to statement,

$$x - 15 = 51 - x$$

$$\Rightarrow x + x = 51 + 15$$

$$\Rightarrow 2x = 66$$

$$\Rightarrow x = 33$$

Question 4.

If 12 is subtracted from a number and the difference is multiplied by 4, the result is 5. What is the number?

Solution:

Let the number = x

According to the condition,

$$(x - \frac{1}{2}) \times 4 = 5$$

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

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

$$\Rightarrow 4x = 7$$

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

$$\text{Number} = \frac{7}{4}$$

Question 5.

The sum of two numbers is 80 and the greater number exceeds twice the smaller by 11. Find the numbers.

Solution:

Let the numbers be x and y

Smaller number = x

Greater number = y

If greater number exceeds twice the smaller by 11,

It becomes $y = 2x + 11$

According to statement,

$$x + 2x + 11 = 80$$

$$\Rightarrow 3x + 11 = 80$$

$$\Rightarrow 3x = 80 - 11$$

$$\Rightarrow 3x = 69$$

$$\Rightarrow x = 23$$

Smaller number = 23

Greater number = $2x + 11 = 2 \times 23 + 11 = 46 + 11 = 57$

Question 6.

Find three consecutive odd natural numbers whose sum is 87.

Solution:

Let the three consecutive odd natural numbers be

$x, x + 2, x + 4$.

According to statement,

$$x + x + 2 + x + 4 = 87$$

$$\Rightarrow 3x + 6 = 87$$

$$\Rightarrow 3x = 81$$

$$\Rightarrow x = 27$$

$$x + 2 = 27 + 2 = 29 \text{ and } x + 4 = 27 + 4 = 31$$

Three consecutive odd natural numbers are 27, 29 and 31.

Question 7.

In a class of 35 students, the number of girls is two-fifths of the number of boys. Find the number of girls in the class.

Solution:

Let the number of boys = x

The number of girls = $\frac{2x}{5}$

According to statement,

$$x + \frac{2x}{5} = 35 \Rightarrow \frac{5x + 2x}{5} = 35 \Rightarrow \frac{7x}{5} = 35$$

$$7x = 35 \times 5 \Rightarrow x = \frac{35 \times 5}{7} = 25.$$

\therefore Number of boys = $x = 25$

$$\text{Number of girls} = \frac{2}{5}x = \frac{2}{5} \times 25 = 10$$

Question 8.

A chair costs ₹ 250 and the table costs ₹ 400. If a housewife purchased a certain number of chairs and two tables for ₹ 2800, find the number of chairs she purchased.

Solution:

Cost of a chair = ₹ 250

and cost of a table = ₹ 400

Let number of chairs = x

and number of tables = 2

Total cost = ₹ 2800

$$x \times 250 + 2 \times 400 = 2800$$

$$\Rightarrow 250x + 800 = 2800$$

$$\Rightarrow 250x = ₹ 2800 - ₹ 800 = ₹ 2000$$

$$\Rightarrow x = 8$$

Number of chairs = 8

Question 9.

Aparna got ₹ 27840 as her monthly salary and over-time. Her salary exceeds the overtime by ₹ 16560. What is her monthly salary?

Solution:

Let Apama's monthly salary = ₹ x

Then over-time payment = ₹ $(27840 - x)$

According to the condition,

$$x - (27840 - x) = 16560$$

$$\Rightarrow x - 27840 + x = 16560$$

$$\Rightarrow 2x = 16560 + 27840 = ₹ 44400$$

$$\Rightarrow x = 22200$$

Monthly salary = ₹ 22200

Question 10.

Heena has only ₹ 2 and ₹ 5 coins in her purse. If in all she has 80 coins in her purse amounting to ₹ 232, find the number of ₹ 5 coins.

Solution:

Total number of coins = 80

Let the number of ₹ 2 coins = x

The number of ₹ 5 coins = $80 - x$

According to given statement,

$$2x + 5(80 - x) = 232$$

$$\Rightarrow 2x + 400 - 5x = 232$$

$$\Rightarrow -3x = 232 - 400$$

$$\Rightarrow -3x = -168$$

$$\Rightarrow x = 56$$

Number of ₹ 5 coins = $80 - x = 80 - 56 = 24$

Number of ₹ 5 coins = 24

Question 11.

A purse contains ₹ 550 in notes of denominations of ₹ 10 and ₹ 50. If the number of ₹ 50 notes is one less than that of ₹ 10 notes, then find the number of ₹ 50 notes.

Solution:

Total amount in a purse = ₹ 550

Let number of notes of ₹ 10 = x

The number of notes of ₹ 50 = $x - 1$

According to the condition,

$$x \times 10 + (x - 1) \times 50 = 550$$

$$\Rightarrow 10x + 50x - 50 = 550$$

$$\Rightarrow 10x = 550 + 50 = 600$$

$$\Rightarrow x = 10$$

$$50 \text{ rupees notes} = 10 - 1 = 9$$

Question 12.

After 12 years, I shall be 3 times as old as I was 4 years ago. Find my present age.

Solution:

Let my present age = x years

After 12 years, I will be = $(x + 12)$ years

and 4 years ago, I was = $(x - 4)$ years

According to the condition,

$$(x - 4) \times 3 = x + 12$$

$$\Rightarrow 3x - 12 = x + 12$$

$$\Rightarrow 3x - x = 12 + 12$$

$$\Rightarrow 2x = 24$$

$$\Rightarrow x = 12$$

My present age = 12 years

Question 13.

Two equal sides of an isosceles triangle are $3x - 1$ and $2x + 2$. The third side is $2x$ units. Find x and the perimeter of the triangle.

Solution:

Two equal sides of an isosceles Δ are $3x - 1$ and $2x + 2$

$$3x - 1 = 2x + 2$$

$$3x - 2x = 2 + 1$$

$$x = 3$$

We know that

$$\text{Perimeter of a } \Delta = (3x - 1) + (2x + 2) + (2x)$$

$$= (3 \times 3 - 1) + (2 \times 3 + 2) + (2 \times 3)$$

$$= (9 - 1) + (6 + 2) + (6)$$

$$= 8 + 8 + 6$$

$$= 22 \text{ units}$$

Question 14.

The length of a rectangle plot is 6 m less than thrice its breadth. Find the dimensions of the plot if its perimeter is 148 m.

Solution:

Let the breadth of a rectangle = x m.

Thrice its breadth = $3x$ m

Length of a rectangle = $3x - 6$ m

Perimeter of a rectangle = $2(l + b)$

$$= 2(3x - 6 + x)$$

$$= 2(4x - 6)$$

$$= 8x - 12$$

But we are given, perimeter = 148 m

$$8x - 12 = 148$$

$$8x = 148 + 12$$

$$8x = 160$$

$$x = 20 \text{ metres}$$

Breadth = $x = 20$ metres

and Length = $3x - 6 = 3 \times 20 - 6 = 60 - 6 = 54$ metres.

Question 15.

Two complementary angles differ by 20° . Find the measure of each angle.

Solution:

We know that

Sum of measures of two complementary angles = 90°

$$\Rightarrow x + y = 90^\circ \dots\dots (i)$$

But we are given $x - y = 20^\circ \dots\dots (ii)$

$$2x = 110^\circ \text{ [On comparing (i) and (ii)]}$$

$$\Rightarrow x = 55^\circ$$

Now, $x + y = 90^\circ$

$$\Rightarrow y = 90^\circ - x$$

$$\Rightarrow y = 90^\circ - 55^\circ = 35^\circ$$