



SpeedLabs

MATHS

CBSE 8th

TEEVRA EDUTECH PVT. LTD.

Linear Equation

Exercise-2.4

Q.1 Amina thinks of a number and subtracts $\frac{5}{2}$ from it. She multiplies the result by 8. The result now obtained is 3 times the same number she thought of. What is the number?

Sol: Let Amina think a number, x

After subtracting $\frac{5}{2}$ from it we have $= x - \frac{5}{2}$

According to the conditions given,

$$8\left(x - \frac{5}{2}\right) = 3x$$

$$\Rightarrow 8x - \frac{8 \times 5}{2} = 3x$$

$$\Rightarrow 8x - 4 \times 5 = 3x$$

$$\Rightarrow 8x - 20 = 3x$$

$$\Rightarrow 8x - 3x = 20 \quad (\text{Transposing } 3x \text{ to L. H. S. and } 20 \text{ to R. H. S.})$$

$$\Rightarrow 5x = 20 \Rightarrow x = \frac{20}{5} \quad (\text{Dividing both sides by } 5)$$

$$\text{or } x = 4$$

Hence, the required number is 4.

Q.2 A positive number is 5 times another number. If 21 is added to both the numbers, then one of the new numbers becomes twice the other new number. What are the numbers?

Sol: Let another number be x .

Then, positive number $= 5x$

According to the given conditions,

$$(5x + 21) = 2(x + 21)$$

$$\Rightarrow 5x + 21 = 2x + 42$$

$$\Rightarrow 5x - 2x = 42 - 21 \quad (\text{Transposing } 2x \text{ to L.H.S. and } 21 \text{ to R.H.S.})$$

$$\Rightarrow 3x = 21$$

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

or $x = 7$ and positive number, $5x = 5 \times 7 = 35$

Hence, required numbers are 7 and 35.

Q.3 Sum of the digits of a two-digit number is 9. When we interchange the digits, it is found that the resulting new number is greater than the original number by 27. What is the two-digit number?

Sol: Given: sum of the digits of a two-digit number = 9

Let the units place digit of a number be x .

Then, tens place digit of a number = $9 - x$.

So, the original number formed by these digits = $10(9 - x) + x$

(\because 2-digit number = 10 times of tens place digit + unit place digit)

On interchanging the digits, then new number = $10x + (9 - x)$

According to the conditions,

New number = Original number + 27

$$10x + (9 - x) = 10(9 - x) + x + 27$$

$$\Rightarrow 10x + 9 - x = 90 - 10x + x + 27$$

$$\Rightarrow 9x + 9 = 90 + 27 - 9 \quad (\text{Transposing } 9x \text{ to L.H.S. and } 9 \text{ to R.H.S.})$$

$$\Rightarrow 18x = 108$$

$$\Rightarrow x = \frac{108}{18} \quad (\text{Dividing both sides by 18})$$

or $x = 6$

Hence, the two - digit number = $10(9 - x) + x$

$$= 10(9 - 6) + 6$$

$$= 10 \times 3 + 6 = 30 + 6 = 36.$$

Therefore, the required two - digit number is 36.

Q.4 One of the two digits of a two-digit number is three times the other digit. If you interchange the digits of this two-digit number and add the resulting number to the original number, you get 88. What is the original number?

Sol: Let the units place digit be x and tens place digit = $3x$.

Then, original number = $10 \times 3x + x = 30x + x$

After interchanging the digits, then new number = $10x + 3x$

According to conditions,

New number + original number = 88

$$10x + 3x + 30x + x = 88$$

$$\Rightarrow 44x = 88 \Rightarrow x = \frac{88}{44} \quad (\text{Dividing both sides by } 44)$$

$$\text{or } x = 2$$

Original number = $10 \times 3x + x = 30x + x = 30 \times 2 + 2$

$$= 60 + 2 = 62$$

Hence, required number = 62.

Q.5 Shobo's mother's present age is six times Shobo's present age. Shobo's age five years-from now will be one third of his mother's present age. What are their present ages?

Sol: Let Shobo's present age be x years and Shobo's mother's present age = $6x$ years

After five years, Shobo's age = $(x + 5)$ years

According to the conditions,

$$x + 5 = \frac{1}{3} \times 6x$$

$$\Rightarrow x + 5 = 2x \Rightarrow 2x = x + 5 \quad (\text{Interchanging the positions})$$

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

$$\text{or } x = 5$$

Hence, Shobo's present age = 5 years and Shobo's mother's present age = $6x = 6 \times 5 = 30$ years.

Q.6 There is a narrow rectangular plot, reserved for a school, in Mahuli village. The length and breadth of the plot are in the ratio 11: 4. At the rate of 100 per metre it will cost the village panchayat Rs 75,000 to fence the plot. What are the dimensions of the plot?

Sol: Let the length and breadth of the plot be $11x$ and $4x$ respectively.

$$\text{Perimeter of the plot} = \frac{\text{Total cost}}{\text{Cost of 1 meter}} = \frac{75000}{100} = 750 \text{ m}$$

We know that

$$\text{Perimeter} = 2(\text{length} + \text{breadth})$$

According to the condition,

$$\Rightarrow 750 = 2(11x + 4x) = 2 \times (15x)$$

$$\Rightarrow 750 = 30x$$

$$\Rightarrow 30x = 750 \quad (\text{Interchanging the positions})$$

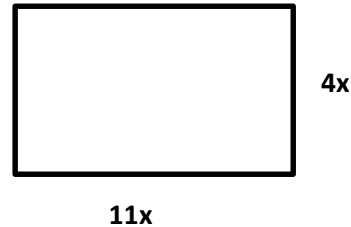
$$\Rightarrow x = \frac{750}{30} \quad (\text{Dividing both sides by 30})$$

$$\text{or } x = 25$$

$$\text{Hence, length} = 11x = 11 \times 25 = 275 \text{ m}$$

$$\text{And breadth} = 4x = 4 \times 25 = 100 \text{ m.}$$

Therefore, the length and breadth of the plot are 275 m and 100m.



Q.7 Hasan buys two kinds of cloth materials for school uniforms, shirt material that costs him Rs 50 per metre and trouser material that costs him Rs 90 per metre. For every 2 metres of the trouser material he buys 3 metres of the shirt material. He sells the materials at 12% and 10% profit respectively. His total sale is Rs 36,600. How much trouser material did he buy?

Sol: Let, ratio between shirt material and trouser material be $3x: 2x$.

$$\text{The cost of shirt material} = 50 \times 3x = 150x$$

$$\text{The selling price at 12% gain} = \frac{100+12}{100} \times 150x \quad \left[\because \text{S. P.} = \frac{100+P\%}{100} \times \text{C. P.} \right]$$

$$= \frac{112}{100} \times 150x$$

$$= \frac{16800x}{100} = 168x$$

$$\text{The cost of trouser material} = 90 \times 2x = 180x$$

$$\text{The selling price at 10% profit} = \frac{100+10}{100} \times 180x = \frac{110}{100} \times 180x = 198x$$

According to the condition,

$$168x + 198x = 36,600$$

$$\Rightarrow 366x = 36600$$

$$x = \frac{36600}{366} \quad (\text{Dividing both sides by } 366)$$

$$\text{or } x = 100$$

Now, trouser material = $2x = 2 \times 100 = 200$ meters.

Q.8 Half of a herd of deer are grazing in the field and three fourths of the remaining are playing nearby. The rest 9 are drinking water from the pond. Find the number of deer in the herd.

Sol: Let the total number of deer in the herd be x .

According to the conditions,

$$x = \frac{x}{2} + \frac{3}{4} \times \left(x - \frac{x}{2}\right) + 9$$

$$\Rightarrow x = \frac{x}{2} + \frac{3}{4} \times \left(\frac{2x-x}{2}\right) + 9$$

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

$$\Rightarrow x = \frac{x}{2} + \frac{3}{8}x + \frac{9}{1}$$

$$\Rightarrow x = \frac{4x+3x+72}{8} \Rightarrow x = \frac{7x+72}{8}$$

$$\Rightarrow 8x = 7x + 72 \quad (\text{By cross multiplication})$$

$$\Rightarrow 8x - 7x = 72 \quad (\text{Transposing } 7x \text{ to L.H.S.})$$

$$\text{or } x = 72$$

Hence, total number of deer in the herd is 72.

Q.9 A grandfather is ten times older than his granddaughter. He is also 54 years older than her. Find their present ages.

Sol: Let present age of his granddaughter be x years.

Grandfather's age = $10 \times x = 10x$ years.

According to the conditions, Grandfather's age = Granddaughter's age + 54

$$10x = x + 54$$

$$\Rightarrow 10x - x = 54 \quad (\text{Transposing } x \text{ to L.H.S})$$

$$\Rightarrow 9x = 54 \Rightarrow x = \frac{54}{9} \quad (\text{Dividing both sides by } 9)$$

$$\text{or } x = 6$$

Hence, his granddaughter's age = 6 years and grandfather's age = $10x = 10 \times 6 = 60$ years.

Q.10 Aman's age is three times his son's age. Ten years ago he was five times his son's age. Find their present ages.

Sol: Let the present age of his son be x years.

Aman's age = $3x$ years

Ten years ago, his son's age = $x - 10$

Ten years ago, Aman's age = $3x - 10$

According to the condition,

$$3x - 10 = 5(x - 10)$$

$$\Rightarrow 3x - 10 = 5x - 50 \Rightarrow -10 + 50 = 5x - 3x \quad (\text{Transposing } 50 \text{ to L.H.S. and } 3x \text{ to R.H.S.})$$

$$\Rightarrow 5x - 3x = 50 - 10 \quad (\text{Interchanging the position})$$

$$\Rightarrow 2x = 40$$

$$\Rightarrow x = \frac{40}{2} \quad \text{or } x = 20 \quad (\text{Dividing both sides by } 20)$$

Hence, Aman's son's age = 20 years. and Aman's age = $3x = 3 \times 20 = 60$ years.