

Exercise 2.4

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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?

Solution:

Let the number be x .

According to the question,

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

$$\Rightarrow 8x - \frac{40}{2} = 3x$$

$$\Rightarrow 8x - 3x = \frac{40}{2}$$

$$\Rightarrow 5x = 20$$

$$\Rightarrow x = 4$$

Thus, the number is 4.

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?

Solution:

Let one of the positive number be x then other number will be $5x$.

According to the question,

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

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

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

$$\Rightarrow 3x = 21$$

$$\Rightarrow x = 7$$

One number = $x = 7$

Other number = $5x = 5 \times 7 = 35$

The two numbers are 7 and 35.

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?

Solution:

Let the digit at tens place be x then digit at ones place will be $(9-x)$.

Original two digit number = $10x + (9-x)$

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

According to the question,

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

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

$$\begin{aligned} &\Rightarrow 9x \\ &+ 36 = 90 - 9x \\ &\Rightarrow 9x + 9x = 90 - 36 \\ &\Rightarrow 18x = 54 \\ &\Rightarrow x = 3 \\ &\text{Original number} = 10x + (9-x) = (10 \times 3) + (9-3) = 30 + 6 = 36 \\ &\text{Thus, the number is 36.} \end{aligned}$$

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?

Solution:

Let the digit at tens place be x then digit at ones place will be $3x$.
Original two digit number = $10x + 3x$
After interchanging the digits, the new number = $30x + x$
According to the question,
 $(30x + x) + (10x + 3x) = 88$
 $\Rightarrow 31x + 13x = 88$
 $\Rightarrow 44x = 88$
 $\Rightarrow x = 2$
Original number = $10x + 3x = 13x = 13 \times 2 = 26$

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?

Solution:

Let the present age of Shobo be x then age of her mother will be $6x$.
Shobo's age after 5 years = $x + 5$
According to the question,
 $(x + 5) = \frac{1}{3} \times 6x$
 $\Rightarrow x + 5 = 2x$
 $\Rightarrow 2x - x = 5$
 $\Rightarrow x = 5$
Present age of Shobo = $x = 5$ years
Present age of Shobo's mother = $6x = 30$ years

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 ₹100 per metre it will cost the village panchayat ₹75000 to fence the plot. What are the dimensions of the plot?

Solution:

Let the length of the rectangular plot be $11x$ and breadth be $4x$.
Rate of fencing per metre = ₹100
Total cost of fencing = ₹75000
Perimeter of the plot = $2(l+b) = 2(11x + 4x) = 2 \times 15x = 30x$

Total amount
of fencing = $(30x \times 100)$

According to the question,

$$(30x \times 100) = 75000$$

$$\Rightarrow 3000x = 75000$$

$$\Rightarrow x = \frac{75000}{3000}$$

$$\Rightarrow x = 25$$

$$\text{Length of the plot} = 11x = 11 \times 25 = 275\text{m}$$

$$\text{Breadth of the plot} = 4x = 4 \times 25 = 100\text{m}$$

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

Solution:

Let $2x$ m of trouser material and $3x$ m of shirt material be bought by him.

$$\text{Selling price of shirt material per metre} = ₹ 50 + 50 \times \left(\frac{12}{100}\right) = ₹ 56$$

$$\text{Selling price of trouser material per metre} = ₹ 90 + 90 \times \left(\frac{10}{100}\right) = ₹ 99$$

$$\text{Total amount of sale} = ₹ 36,600$$

According to the question,

$$(2x \times 99) + (3x \times 56) = 36600$$

$$\Rightarrow 198x + 168x = 36600$$

$$\Rightarrow 366x = 36600$$

$$\Rightarrow x = \frac{36600}{366}$$

$$\Rightarrow x = 100$$

$$\text{Total trouser material he bought} = 2x = 2 \times 100 = 200 \text{ m.}$$

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.

Solution:

Let the total number of deer be x .

$$\text{Deer grazing in the field} = \frac{x}{2}$$

$$\text{Deer playing nearby} = \frac{3}{4} \left(x - \frac{x}{2}\right) = \frac{3}{4} \times \frac{x}{2} = \frac{3x}{8}$$

$$\text{Deer drinking water} = 9$$

According to the question,

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

$$\Rightarrow \frac{4x+3x}{8} + 9 = x$$
$$\Rightarrow \frac{7x}{8} + 9 = x$$

$$\Rightarrow x - \frac{7x}{8} = 9$$
$$\Rightarrow \frac{(8x-7x)}{8} = 9$$
$$\Rightarrow x = 9 \times 8$$

$$\Rightarrow x = 72$$

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

Solution:

Let the age of granddaughter be x and grandfather be $10x$.

Also, he is 54 years older than her.

According to the question,

$$10x = x + 54$$

$$\Rightarrow 10x - x = 54$$

$$\Rightarrow 9x = 54$$

$$\Rightarrow x = 6$$

Age of grandfather = $10x = 10 \times 6 = 60$ years.

Age of granddaughter = $x = 6$ years.

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.

Solution:

Let the age of Aman's son be x then age of Aman will be $3x$.

According to the question,

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

$$\Rightarrow 5x - 50 = 3x - 10$$

$$\Rightarrow 5x - 3x = -10 + 50$$

$$\Rightarrow 2x = 40$$

$$\Rightarrow x = 20$$

Aman's son age = $x = 20$ years

Aman age = $3x = 3 \times 20 = 60$ years