Mathematics

Exercise 2.4

Question 1:

Amina thinks of a number and subtracts $\dfrac{5}{2}$ 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?

Answer 1:

Let Amina think a number x.

According to the question,

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

$$\Rightarrow \quad 8x - \dfrac{8 \times 5}{2} = 3x \qquad \Rightarrow \quad 8x - 4 \times 5 = 3x \qquad \Rightarrow \quad 8x - 20 = 3x$$

$$\Rightarrow \quad 8x - 3x = 20 \qquad \Rightarrow \quad 5x = 20 \qquad \Rightarrow \quad x = \dfrac{20}{5} = 4$$

Hence, the number is 4.

Question 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?

Answer 2:

Let another number be x.

Then positive number = $5x$

According to the question,

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

$$\Rightarrow \quad 5x + 21 = 2x + 42 \qquad \Rightarrow \quad 5x - 2x = 42 - 21 \qquad \Rightarrow \quad 3x = 21$$

$$\Rightarrow \quad x = \dfrac{21}{3} = 7$$

Hence another number = 7 and positive number = 5 x 7 = 35

Question 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?

Answer 3:

Let the unit place digit of a two-digit number be x.

Therefore, the tens place digit = $9 - x$

$\because$ 2-digit number = 10 x tens place digit + unit place digit

$\therefore$ Original number = $10(9 - x) + x$

According to the question,   New number = Original number + 27

$$\Rightarrow \quad 10x + (9 - x) = 10(9 - x) + x + 27 \qquad \Rightarrow \quad 10 + 9 - x = 90 - 10x + x + 27$$

$$\Rightarrow \quad 9x + 9 = 117 - 9x \qquad\qquad\qquad\qquad \Rightarrow \quad 9x + 9x = 117 - 9$$

$$\Rightarrow \quad 18x = 108$$

$$\Rightarrow \quad x = \dfrac{108}{18} = 6$$

Hence, the 2-digit number = $10(9 - x) + x$ = 10 (9 – 6) + 6 = 10 x 3 + 6 = 30 + 6 = 36

Question 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?

Answer 4:

Let the unit place digit of a two-digit number be x.

Therefore, the tens place digit = $3x$

$\because$ 2-digit number = 10 x tens place digit + unit place digit

$\therefore$ Original number = $10 \times 3x + x = 30x + x = 31x$

According to the question,   New number + Original number = 88

$\Rightarrow$ $10x + 3x + 31x = 88$ $\Rightarrow$ $44x = 88$ $\Rightarrow$ $x = \dfrac{88}{44} = 2$

Hence, the 2-digit number = $31x = 31 \times 2 = 62$

Question 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 age?

Answer 5:

Let Shobo's present age be x years.

And Shobo's mother's present age = $6x$ years

According to the question, $x + 5 = \dfrac{1}{3} \times 6x$

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

$\Rightarrow$ $x = 5$ Years.

Hence, Shobo's present age = 5 years and Shobo's mother's present age = 6 x 5 = 30 years

Question 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 meter it will cost the village panchayat ` 75,000 to fence the plot. What are the dimensions of the plot?

Answer 6:

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

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

We know that   Perimeter of rectangle = 2 (length + breadth)

Therefore, according to the question, $750 = 2(11x + 4x)$

$\Rightarrow 750 = 2 \times 15x$ $\Rightarrow 750 = 30x$ $\Rightarrow 30x = 750$ $\Rightarrow x = \dfrac{750}{30} = 25$

Hence, length of rectangular plot = 11 x 25 = 275 m and breadth of rectangular plot = 4 x 25 = 100 m

Question 7:

Hasan buys two kinds of cloth materials for school uniforms, shirt material that costs him ₹50 per meter and trouser material that costs him ₹90 per meter. For every 2 meters of the trouser material he buys 3 meters of the shirt material. He sells the materials at 12% and 10% respectively. His total sale is ₹36,000. How much trouser material did he buy?

Answer 7:

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

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

The selling price at 12% gain = $\dfrac{100 + \text{P\%}}{100} \times \text{C.P.} = \dfrac{100 + 12}{100} \times 150x$

$$= \dfrac{112}{100} \times 150x = 168x$$

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

The selling price at 12% gain = $\dfrac{100 + \text{P\%}}{100} \times \text{C.P.} = \dfrac{100 + 10}{100} \times 180x$

$$= \dfrac{110}{100} \times 180x = 198x$$

According to the question,

$168x + 198x = 36,600$

$\Rightarrow \qquad 366x = 36600$

$\Rightarrow \qquad x = \dfrac{36600}{366} = 100$ meters

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

Hence, Hasan bought 200 meters of the trouser material.

Question 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.

Answer 8:

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

According to question,

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

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

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

$\Rightarrow \qquad x = \dfrac{x}{2} + \dfrac{3}{8}x + 9$

$\Rightarrow \qquad x - \dfrac{x}{2} - \dfrac{3x}{8} = 9$

$\Rightarrow \qquad \dfrac{8x - 4x - 3x}{8} = 9$

$\Rightarrow \qquad \dfrac{x}{8} = 9$

$\Rightarrow \qquad x = 9 \times 8 = 72$

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

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

Answer 9:

Let present age of granddaughter be x years.

Therefore, Grandfather's age = $10x$ years

According to question,

$10x = x + 54$

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

$\Rightarrow \qquad 9x = 54$

$\Rightarrow \qquad x = \dfrac{54}{9} = 6$ years

Hence, granddaughter's age = 6 years and grandfather's age = 10 x 6 = 60 years.

Question 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.

Answer 10:

Let the present age of Amon's son be x years.

Therefore, Aman's age = $3x$ years

According to question,

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

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

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

$\Rightarrow \qquad -2x = -40$

$\Rightarrow \qquad x = \dfrac{-40}{-2} = 20$ years

Hence, Aman's son's age = 20 years and Aman's age = 3 x 2 = 60 years