



Exercise 10D

Question 33:

Let the faster pipe takes x minutes to fill the cistern

Then, the other pipe takes $(x + 3)$ minute

$$\frac{1}{x} + \frac{1}{(x + 3)} = \frac{13}{40} \Rightarrow \frac{(x + 3) + x}{x(x + 3)} = \frac{13}{40}$$

$$\Rightarrow 40(2x + 3) = 13(x^2 + 3x)$$

$$\Rightarrow 13x^2 - 41x - 120 = 0$$

$$\Rightarrow 13x^2 - 65x + 24x - 120 = 0$$

$$\Rightarrow 13x(x - 5) + 24(x - 5) = 0$$

$$\Rightarrow (x - 5)(13x + 24) = 0$$

$$\Rightarrow x = 5 \quad \text{or} \quad x = \frac{-24}{3}$$

$$x = 5 \quad (\text{Time cannot be negative})$$

The faster pipe takes 5 minutes to fill the cistern

Then, the other pipe takes $(5 + 3)$ minutes = 8 minutes

Question 34:

Let the age of son be x and age of man = y

1 year ago

$$\therefore (y - 1) = 8(x - 1)$$

$$\Rightarrow y - 1 = 8x - 8$$

$$\Rightarrow y - 8x = -7$$

$$\Rightarrow y = -7 + 8x$$

$$\text{Also, } y = x^2 \Rightarrow (-7 + 8x) = x^2$$

$$\Rightarrow 8x - 7 = x^2$$

$$\Rightarrow x^2 - 8x + 7 = 0$$

$$\Rightarrow x^2 - 7x - x + 7 = 0$$

$$\Rightarrow x(x - 7) - 1(x - 7) = 0$$

$$\Rightarrow (x - 7)(x - 1) = 0$$

$$\Rightarrow x = 7 \text{ or } x = 1$$

$$x = 7 \quad [x \neq 1]$$

Age of son = 7 years

$$\text{Age of man} = (-7 + 8 \times 7) = -7 + 56 = 49 \text{ years}$$

Question 35:

Let the age of man and son be x and y

Then, $x + y = 45$

Five years ago

Product of their ages = 4 times the age of man five years ago

$$(x - 5)(y - 5) = 4(x - 5)$$

$$\Rightarrow y - 5 = 4$$

$$y = 9$$

$$\Rightarrow x + 9 = 45$$

$$x = 45 - 9 = 36$$

Hence the ages of man and son are 36 years and 9 years respectively.

Question 36:

Let the present age of Meena be x

Then,

$$(x - 5)(x + 8) = 30$$

$$\Rightarrow x^2 + 8x - 5x - 40 = 30$$

$$\Rightarrow x^2 + 3x - 40 - 30 = 0$$

$$\Rightarrow x^2 + 3x - 70 = 0$$

$$\Rightarrow x^2 + 10x - 7x - 70 = 0$$

$$\Rightarrow x(x + 10) - 7(x + 10) = 0$$

$$\Rightarrow (x + 10)(x - 7) = 0$$

$$x = -10 \text{ or } x = 7$$

$$x = 7 \quad (\because \text{age cannot be negative})$$

Hence the present age of Meena is 7 years.

Question 37:

Let the ages of two brothers be x and $25 - x$
Then,

$$\therefore x \times (25 - x) = 126$$

$$\Rightarrow 25x - x^2 = 126 \Rightarrow x^2 - 25x + 126 = 0$$

$$\Rightarrow x^2 - 18x - 7x + 126 = 0$$

$$\Rightarrow x(x - 18) - 7(x - 18) = 0$$

$$\Rightarrow (x - 18)(x - 7) = 0$$

$$x - 18 = 0 \quad \text{or} \quad x - 7 = 0$$

$$x = 18, x = 7$$

Hence, present ages of the two brothers is 18 years and 7 years.

Question 38:

Let the width of the path be x meters,

Then,

$$\text{Area of path} = 16 \times 10 - (16 - 2x)(10 - 2x) = 120$$

$$\Rightarrow 16 \times 10 - (160 - 32x - 20x + 4x^2) = 120$$

$$\Rightarrow 160 - 160 + 32x + 20x - 4x^2 = 120$$

$$\Rightarrow -4x^2 + 52x - 120 = 0$$

$$\Rightarrow 2x^2 - 26x + 60 = 0$$

$$\Rightarrow x^2 - 13x + 30 = 0$$

$$\Rightarrow x^2 - 10x - 3x + 30 = 0 \Rightarrow x(x - 10) - 3(x - 10) = 0$$

$$\Rightarrow (x - 10)(x - 3) = 0$$

$$\Rightarrow x - 10 = 0 \quad \text{or} \quad x - 3 = 0$$

$$x = 10 \quad \text{or} \quad x = 3$$

Hence the required width is 3 meter as x cannot be 10m.

Question 39:

Let the breadth of a rectangle = x cm

Then, length of the rectangle = $2x$ cm

$$\therefore \text{Area} = \text{length} \times \text{breadth} = 288 \text{ cm}^2$$

$$\Rightarrow 2x \times x = 288$$

$$\Rightarrow 2x^2 = 288$$

$$\Rightarrow x^2 = 144$$

$$\Rightarrow x = \sqrt{144} \Rightarrow x = \pm 12$$

$$\Rightarrow x = 12 \quad [\because \text{breadth cannot be negative}]$$

Thus, breadth of rectangle = 12 cm

And length of rectangle = $(2 \times 12) = 24$ cm

***** END *****