



Pair of Linear Equations in Two variables Ex 3.11 Q1

Answer :

Let the length and breadth of the rectangle be x and y units respectively

Then, area of rectangle = xy square units

If length is increased and breadth reduced each by 2 units, then the area is reduced by 28 square units

$$\begin{aligned}(x + 2)(y - 2) &= xy - 28 \\ \Rightarrow xy - 2x + 2y - 4 &= xy - 28 \\ \Rightarrow -2x + 2y - 4 + 28 &= 0 \\ \Rightarrow -2x + 2y + 24 &= 0 \\ \Rightarrow 2x - 2y - 24 &= 0\end{aligned}$$

Therefore, $2x - 2y - 24 = 0 \dots(i)$

Then the length is reduced by 1 unit and breadth is increased by 2 units then the area is increased by 33 square units

$$\begin{aligned}(x - 1)(y + 2) &= xy + 33 \\ \Rightarrow xy + 2x - y - 2 &= xy + 33 \\ \Rightarrow 2x - y - 2 - 33 &= 0 \\ \Rightarrow 2x - y - 35 &= 0\end{aligned}$$

Therefore, $2x - y - 35 = 0 \dots(ii)$

Thus we get the following system of linear equation

$$2x - 2y - 24 = 0$$

$$2x - y - 35 = 0$$

By using cross multiplication, we have

$$\begin{aligned}\frac{x}{(-2 \times -35) - (-1 \times -24)} &= \frac{y}{(2 \times -35) - (2 \times -24)} = \frac{1}{(2 \times -1) - (2 \times -2)} \\ \frac{x}{70 - 24} &= \frac{-y}{-70 + 48} = \frac{1}{-2 + 4} \\ \frac{x}{46} &= \frac{-y}{-22} = \frac{1}{2} \\ x &= \frac{46}{2} \\ x &= 23\end{aligned}$$

and

$$\begin{aligned}y &= \frac{22}{2} \\ y &= 11\end{aligned}$$

The length of rectangle is 23 units.

The breadth of rectangle is 11 units.

$$\begin{aligned}\text{Area of rectangle} &= \text{length} \times \text{breadth}, \\ &= x \times y \\ &= 23 \times 11 \\ &= 253 \text{ square units}\end{aligned}$$

Hence, the area of rectangle is 253 square units

Pair of Linear Equations in Two variables Ex 3.11 Q2

Answer :

Let the length and breadth of the rectangle be x and y units respectively

Then, area of rectangle = xy square units

If length is increased by 7 meters and breadth is decreased by 3 meters when the area of a rectangle remains the same

Therefore,

$$xy = (x+7)(y-3)$$

$$xy = xy + 7y - 3x - 21$$

$$\cancel{xy} = \cancel{xy} + 7y - 3x - 21$$

$$3x - 7y + 21 = 0 \dots (i)$$

If the length is decreased by 7 meters and breadth is increased by 5 meters when the area remains unaffected, then

$$xy = (x-7)(y+5)$$

$$xy = xy - 7y + 5x - 35$$

$$\cancel{xy} = \cancel{xy} - 7y + 5x - 35$$

$$0 = 5x - 7y - 35 \dots (ii)$$

Thus we get the following system of linear equation

$$3x - 7y + 21 = 0$$

$$5x - 7y - 35 = 0$$

By using cross-multiplication, we have

$$\frac{x}{(-7 \times -35) - (-7 \times 21)} = \frac{-y}{(3 \times -35) - (5 \times 21)} = \frac{1}{(3 \times -7) - (5 \times -7)}$$
$$\frac{x}{245 + 147} = \frac{-y}{-105 - 105} = \frac{1}{-21 + 35}$$
$$\frac{x}{392} = \frac{-y}{-210} = \frac{1}{14}$$
$$x = \frac{392}{14}$$

$$x = 28$$

and

$$y = \frac{210}{14}$$

$$y = 15$$

Hence, the length of rectangle is **28** meters

The breadth of rectangle is **15** meters

***** END *****