Pair of Linear Equations in Two varibles 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

$$(x + 2)(y - 2) = xy - 28$$
$$\Rightarrow xy - 2x + 2y - 4 = xy - 28$$
$$\Rightarrow -2x + 2y - 4 + 28 = 0$$
$$\Rightarrow -2x + 2y + 24 = 0$$
$$\Rightarrow 2x - 2y - 24 = 0$$

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

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

$$(x - 1)(y + 2) = xy + 33$$
$$\Rightarrow xy + 2x - y - 2 = xy + 33$$
$$\Rightarrow 2x - y - 2 - 33 = 0$$
$$\Rightarrow 2x - y - 35 = 0$$

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

Thus we get the following system of linear equation

$$2x - 2y - 24 = 0$$
$$2x - y - 35 = 0$$

By using cross multiplication, we have

$$\frac{x}{(-2\times-35)-(-1\times-24)} = \frac{y}{(2\times-35)-(2\times-24)} = \frac{1}{(2\times-1)-(2\times-2)}$$

$$\frac{x}{70-24} = \frac{-y}{-70+48} = \frac{1}{-2+4}$$

$$\frac{x}{46} = \frac{-y}{-22} = \frac{1}{2}$$

$$x = \frac{46}{2}$$

$$x = 23$$

and

$$y = \frac{22}{2}$$

$$y = 11$$

The length of rectangle is 23 units.

The breadth of rectangle is 11 units.

Area of rectangle =length $\times$ breadth,

$= x \times y$

$= 23 \times 11$

$= 253$ square units

Hence, the area of rectangle is $\boxed{253}$ square units

Pair of Linear Equations in Two varibles 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,

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

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

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

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

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

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

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

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

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

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 $\boxed{28}$ meters

The breadth of rectangle is $\boxed{15}$ meters

********** END **********