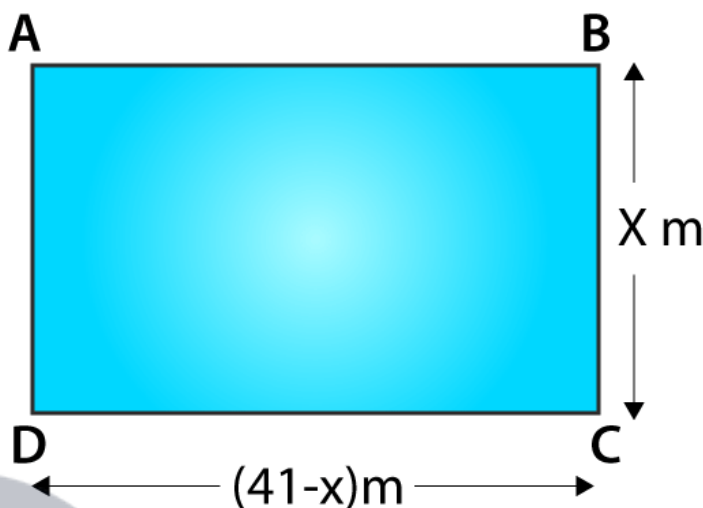


Exercise 8.11

1. The perimeter of the rectangular field is 82 m and its area is 400 m^2 . Find the breadth of the rectangle?

Solution:



Given,

Perimeter = 82 m and its area = 400 m^2

Let the breadth of the rectangle be considered as $x \text{ m}$.

We know that,

Perimeter of a rectangle = $2(\text{length} + \text{breadth})$

$$82 = 2(\text{length} + x)$$

$$41 = (\text{length} + x)$$

$$\Rightarrow \text{Length} = (41 - x)m$$

We also know that,

Area of the rectangle = length * breadth

$$400 = (41 - x)(x)$$

$$400 = 41x - x^2$$

$$x^2 - 41x + 400 = 0$$

$$x^2 - 25x - 16x + 400 = 0$$

$$x(x - 25) - 16(x - 25) = 0$$

$$(x - 16)(x - 25) = 0$$

$$\text{Now, either } x - 16 = 0 \Rightarrow x = 16$$

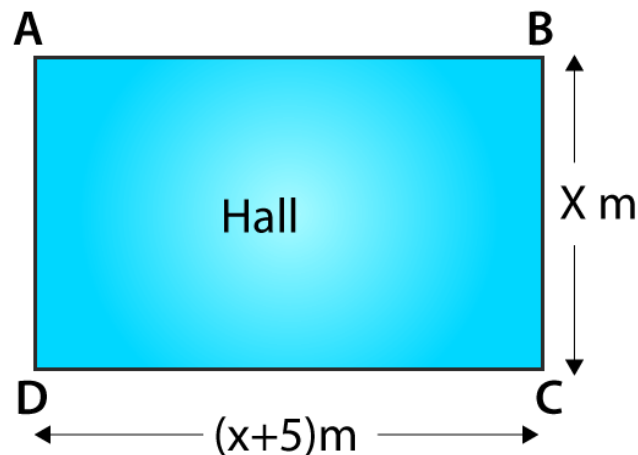
$$\text{Or, } x - 25 = 0 \Rightarrow x = 25$$

Therefore, the breadth of the rectangle can be either 16 m or 25 m respectively.

2. The length of the hall is 5 m more than its breadth. If the area of the floor of the hall is 84 m^2 , what are the length and breadth of the hall?

Solution:

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Considering the breadth of the rectangle be x m

Then, the length of the hall is 5 m more than its breadth i.e., $= (x + 5) m$

Given, area of the hall is $= 84 m^2$

As the shape of the hall is rectangular, its area is given by

Area of the rectangular hall = length * breadth

$$84 = x(x + 5)$$

$$x^2 + 5x - 84 = 0$$

$$x^2 + 12x - 7x - 84 = 0$$

$$x(x + 12) - 7(x + 12) = 0$$

$$(x + 12)(x - 7) = 0$$

Now, either $x + 12 = 0 \Rightarrow x = -12$ (neglected since the side of a rectangle can never be negative)

$$\text{Or, } x - 7 = 0 \Rightarrow x = 7$$

So, only $x = 7$ is considered.

$$\Rightarrow x + 5 = 12$$

Thus, the length and breadth of the rectangle is 7 and 12 respectively.

3. Two squares have sides x and $(x + 4)$ cm. The sum of their area is $656 cm^2$. Find the sides of the square.

Solution:

Let S_1 and S_2 be the two squares.

And, let x cm be the side square S_1 and $(x + 4)$ cm be the side of the square S_2 .

So,

$$\text{Area of the square } S_1 = x^2 cm^2$$

$$\text{Area of the square } S_2 = (x + 4)^2 cm^2$$

From the question, we have

$$\text{Area of the square } S_1 + \text{Area of the square } S_2 = 656 cm^2$$

$$\Rightarrow x^2 cm^2 + (x + 4)^2 cm^2 = 656 cm^2$$

$$x^2 + x^2 + 16 + 8x - 656 = 0$$

$$2x^2 + 16 + 8x - 656 = 0$$

$$2(x^2 + 4x - 320) = 0$$

$$x^2 + 4x - 320 = 0$$

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$$x^2 + 20x - 16x - 320 = 0$$

$$x(x + 20) - 16(x + 20) = 0$$

$$(x + 20)(x - 16) = 0$$

Now, either $x + 20 = 0 \Rightarrow x = -20$

Or, $x - 16 = 0 \Rightarrow x = 16$

As the value of x cannot be negative, we choose the value of $x = 16 \Rightarrow x + 4 = 20$

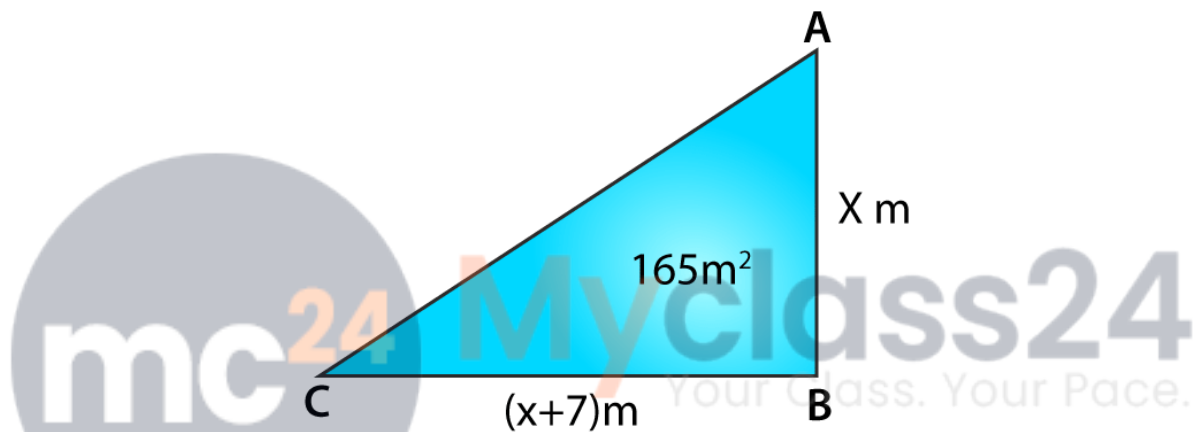
Therefore,

The side of the square $S_1 = 16$ cm

The side of the square $S_2 = 20$ cm

4. The area of a right-angled triangle is 165 cm^2 . Determine its base and altitude if the latter exceeds the former by 7 m .

Solution:



Let the altitude of the right angle triangle be considered as $x \text{ m}$

So given that, the altitude exceeds the base by $7 \text{ m} \Rightarrow \text{altitude} = (x - 7) \text{ m}$

We know that,

Area of the triangle = $\frac{1}{2} \times \text{base} \times \text{altitude}$

$$\Rightarrow 165 = \frac{1}{2} \times (x - 7) \times x$$

$$x(x - 7) = 330$$

$$x^2 - 7x - 330 = 0$$

$$x^2 - 22x + 15x - 330 = 0$$

$$x(x - 22) + 15(x - 22) = 0$$

$$(x - 22)(x + 15) = 0$$

Now, either $x - 22 = 0 \Rightarrow x = 22$

Or, $x + 15 = 0 \Rightarrow x = -15$ (neglected)

Since the value of x cannot be negative, so the value of $x = 22$ is only considered

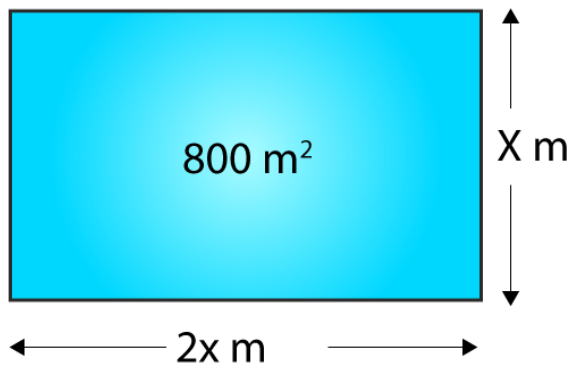
$$\Rightarrow x - 7 = 15$$

Therefore the base and altitude of the right angled triangle are 15 cm and 22 cm respectively.

5. Is it possible to design a rectangular mango grove whose length is twice its breadth and the area is 800 m^2 ? If so, find its length and breadth.

Solution:

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Let the breadth of the rectangular mango grove be x m
Given that, the length of rectangle is twice of its breadth.

So, length = $2x$

Area of the grove = 800 m^2 (given)

We know that,

Area of the rectangle = length * breadth

$$800 = x(2x)$$

$$2x^2 - 800 = 0$$

$$x^2 - 400 = 0$$

$$\Rightarrow x = \sqrt{400} = 20 \text{ (neglecting the negative sq. root as side can never be negative)}$$

Therefore,

The breadth of the rectangular groove is 20 m.

And, the length of the rectangular groove is 40 m.

Yes, it is possible to design a rectangular groove whose length is twice of its breadth.