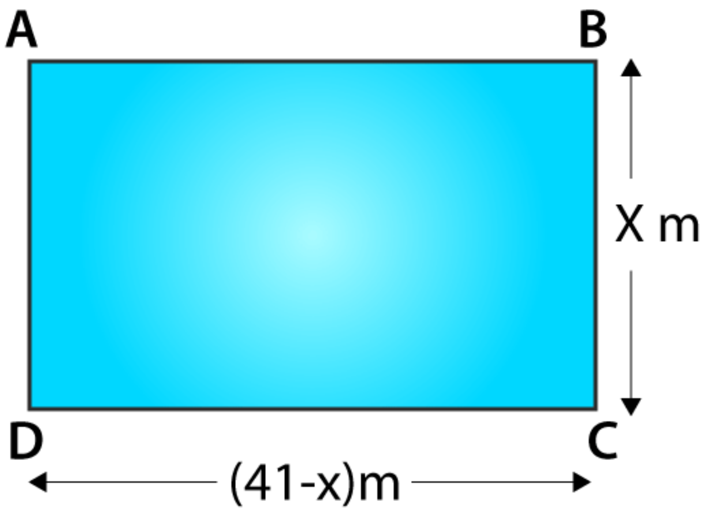
Exercise 8.11 Page No: 8.70

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

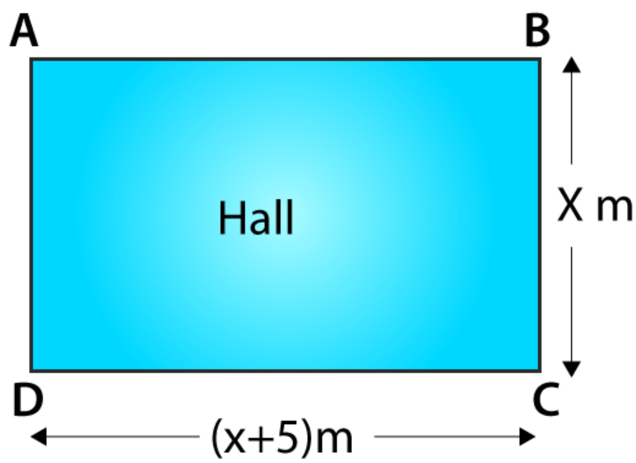
Solution:



Given,
Perimeter = 82 m and its area = 400 m^2
Let the breadth of the rectangle be considered as x m.
We know that,
Perimeter of a rectangle = 2(length + breadth)
82 = 2(length + x)
41 = (length + x)
⇒Length = (41 - x)m
We also know that,
Area of the rectangle = length * breadth
$400 = (41 - x)(x)$
$400 = 41x - x^2$
$x^2 - 41x + 400 = 0$
$x^2 - 25x - 16x + 400 = 0$
$x(x - 25) - 16(x - 25) = 0$
$(x - 16)(x - 25) = 0$
Now, either $x - 16 = 0 \Rightarrow x = 16$
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:



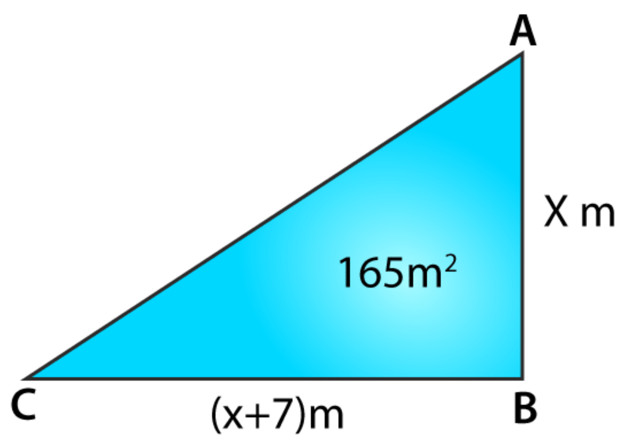
Considering the breadth of the rectangle be x m
Then, the length of the hall is 5 m more than its breadth i.e, = (x + 5) m
Given, area of the hall is = 84 m^2
As the shape of the hall is rectangular, its area is given by
Area of the rectangular hall = length * breadth
84 = x(x + 5)
$x^2 + 5x - 84 = 0$
$x^2 + 12x - 7x - 84 = 0$
$x(x + 12) - 7(x + 12) = 0$
$(x + 12)(x - 7) = 0$
Now, either x + 12 = 0 ⇒ x = - 12 (neglected since the side of a rectangle can never be negative)
Or, x - 7 = 0 ⇒ x = 7
So, only x = 7 is considered.
⇒ 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,
Area of the square $S_1 = x^2$ cm^2
Area of the square $S_2 = (x + 4)^2$ cm^2
From the question, we have
Area of the square S_1 + Area of the square S_2 = 656 cm^2
⇒ $x^2\ cm^2 + (x + 4)^2\ cm^2 = 656\ cm^2$
$x^2 + x^2 + 16 + 8x - 656 = 0$
$2x^2 + 16 + 8x - 656 = 0$
$2(x^2 + 4x - 320) = 0$
$x^2 + 4x - 320 = 0$

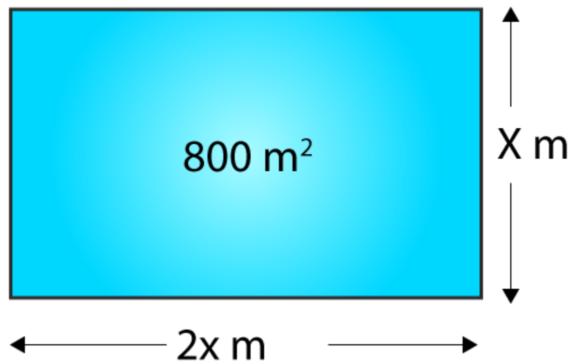
$x^2 + 20x - 16x - 320 = 0$
$x(x + 20) - 16(x + 20) = 0$
$(x + 20)(x - 16) = 0$
Now, either $x + 20 = 0 \Rightarrow x = -20$
Or, $x - 16 = 0 \Rightarrow x = 16$
As the value of x cannot be negative, we choose the value of $x = 16 \Rightarrow x + 4 = 20$
Therefore,
The side of the square $S_1 = 16$ cm
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 7m.
Solution:



Let the altitude of the right angle triangle be considered as x m
So given that, the altitude exceeds the base by 7m $\Rightarrow$ altitude = $(x – 7)$m
We know that,
Area of the triangle = 1/2 × base × altitude
$\Rightarrow \quad 165 = 1/2 \times (x - 7) \times x$
$x(x - 7) = 330$
$x^2 - 7x - 330 = 0$
$x^2 - 22x + 15x - 330 = 0$
$x(x - 22) + 15(x - 22) = 0$
$(x - 22)(x + 15) = 0$
Now, either $x - 22 = 0 \quad \Rightarrow \quad x = 22$
Or, $x + 15 = 0 \quad \Rightarrow \quad x = -15$ (neglected)
Since the value of x cannot be negative, so the value of $x = 22$ is only considered
$\Rightarrow \quad x - 7 = 15$
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:



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
$800 = x(2x)$
$2x^2 - 800 = 0$
$x^2 - 400 = 0$
$\Rightarrow x = \sqrt{400} = 20$ (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.