

Problems with Area

The problems to follow will all use triangle, rectangles, squares or a trapezium.

You will need to know the geometric facts and formulae for these shapes.

Remember that a picture will nearly always help!

1

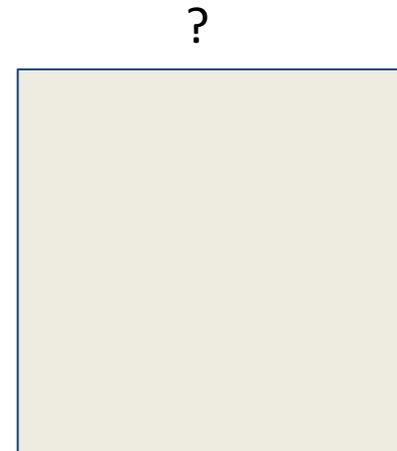
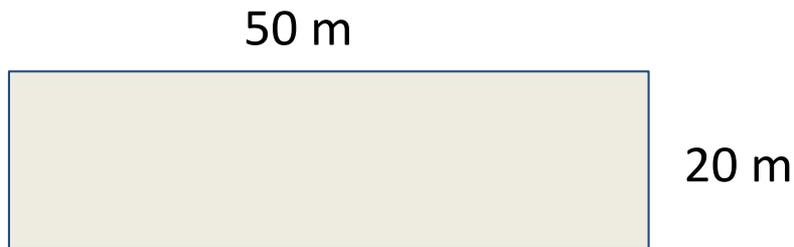
A rectangular field 50m by 20m is enclosed by a fence.

The fencing is rearranged so that the enclosure is now a square.

By how much has the area increased?

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The fencing is rearranged so that the enclosure is now a square.
By how much has the area increased?



Find the perimeter of the rectangle to know the length of fencing that you have, rearrange that fencing to make a square, how long is each side of the square

2



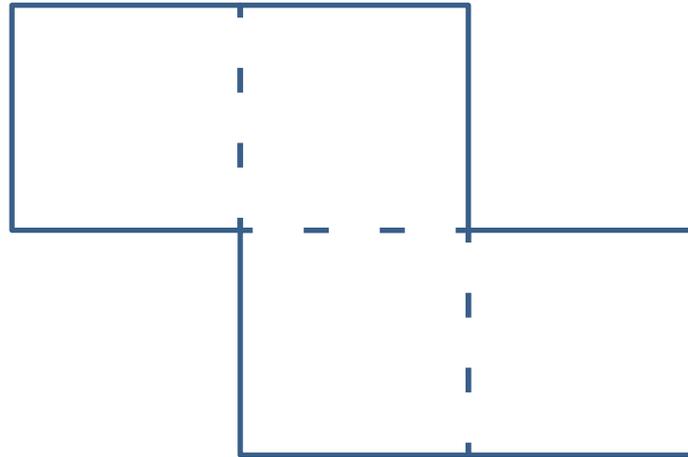
All three shapes are squares. The yellow square has an area of 9cm^2 and the red square has a perimeter of 24cm . What is the area of the blue square?

2



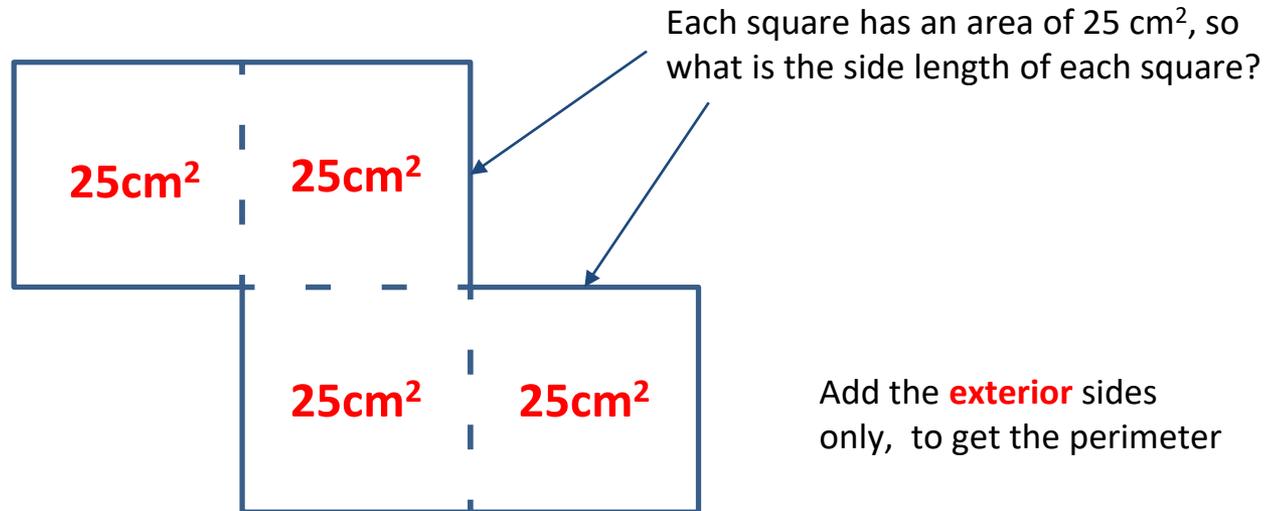
All three shapes are **squares**. The yellow square has an area of 9cm² and the red square has a perimeter of 24cm. What is the area of the blue square?

3



The shape is made up of 4 squares and has an area of 100cm^2 . What is the perimeter of the shape.

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4

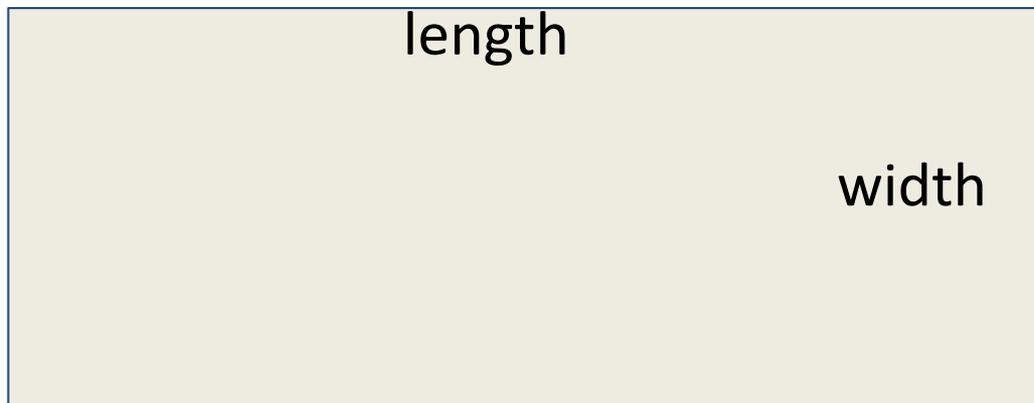
James has a rectangular garden. If he wants to walk 1km, he needs to walk the length of his garden 25 times. If he walks around the perimeter, he will need to walk round it 10 times. What is the area of the garden?

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1 km = 1000m

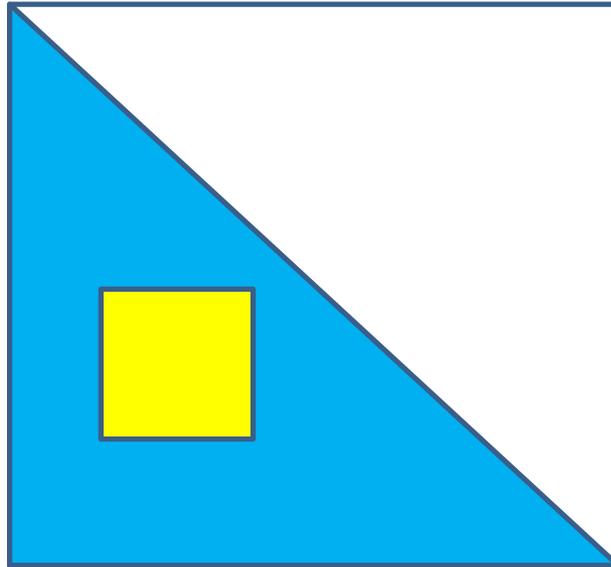
25 of these will make 1km?



2 lengths + 2 widths = perimeter

10 of these will make 1km?
So how far is just one of them?

5

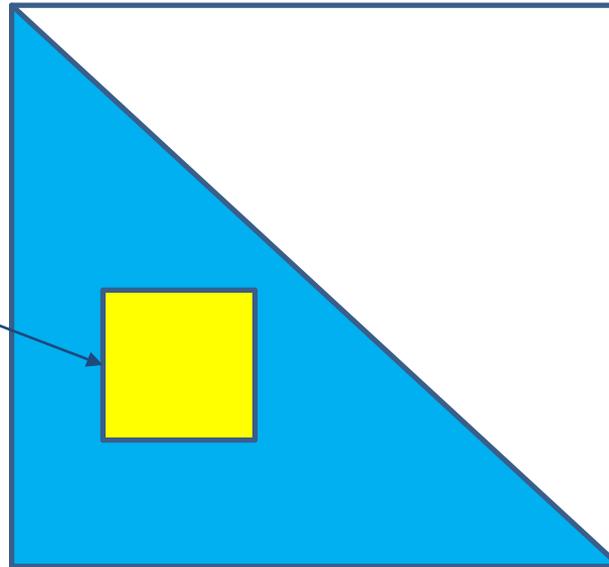


The big square has a perimeter of 16cm. The yellow square has a perimeter of 4cm. What is the area of the part shaded blue?

5

Perimeter is 4, so
what is each side
length?

What is the area of
the yellow square?



Perimeter is 16, so
what is each side
length?

What is the area of
the white triangle?

The big square has a perimeter of 16cm. The yellow square has a perimeter of 4cm. What is the area of the part shaded blue?

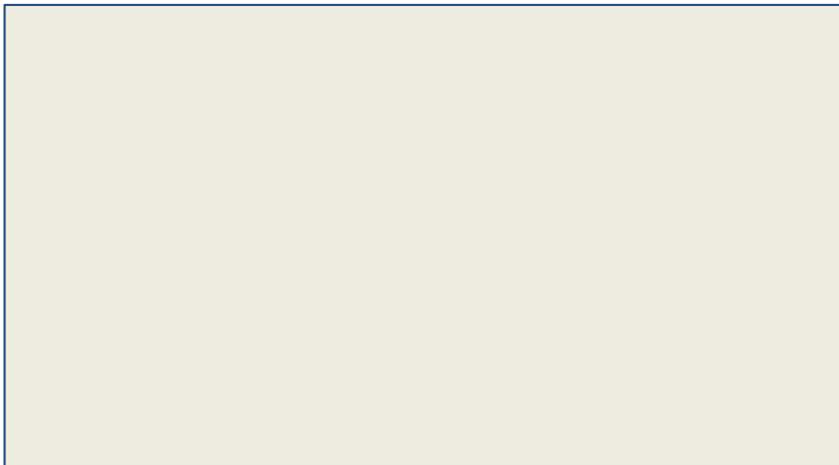
6

A rectangular room has an area of 24m^2 . Its length is 2m longer than the width.
What is the perimeter of the room?

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$w + 2$

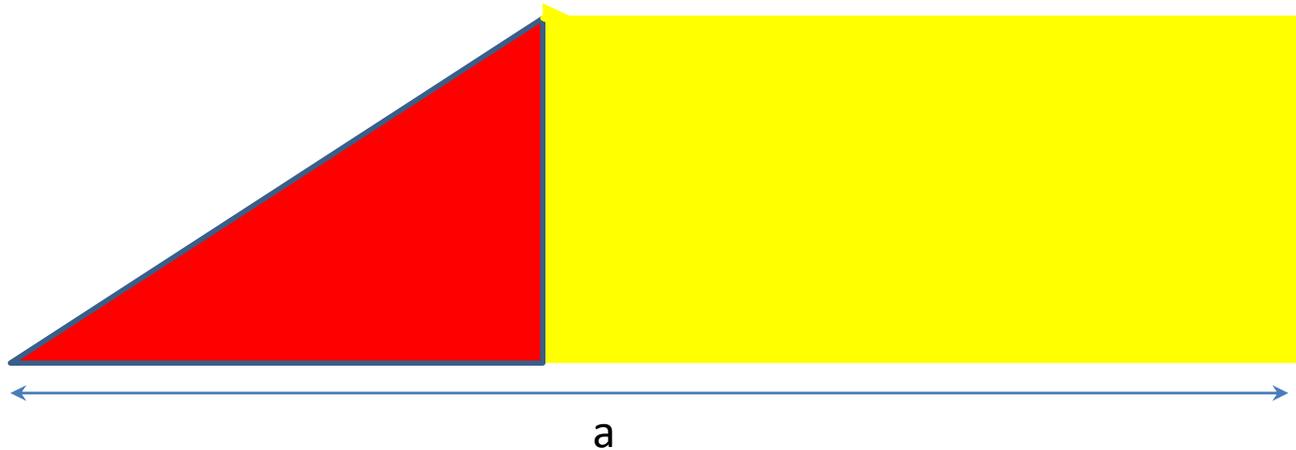


Area is 24 so

$$(w+2) \times w = 24$$

Consider factor pairs
for 24?

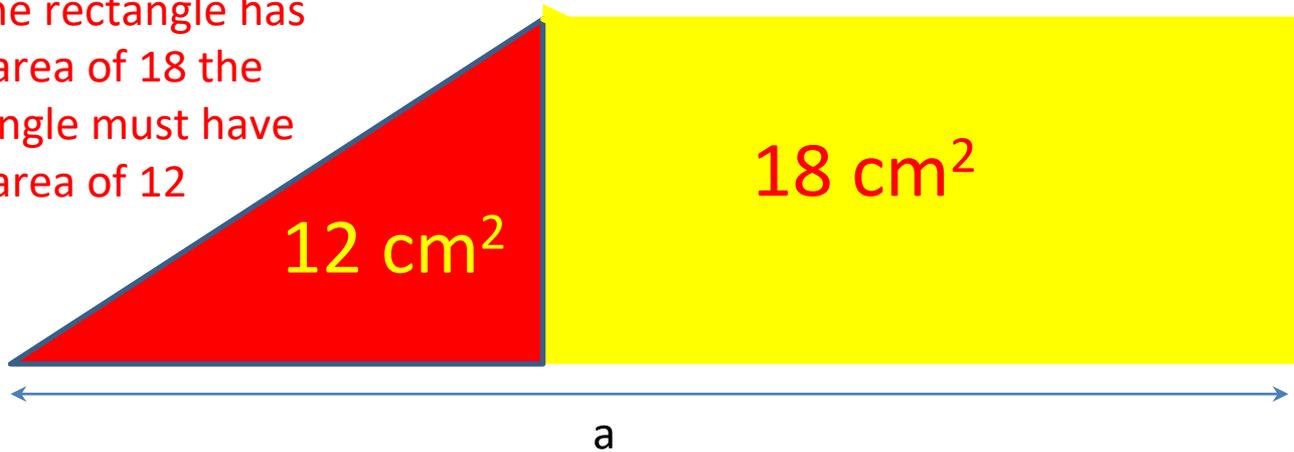
7



A trapezium of area 30cm^2 is made up of a rectangle and a right angled triangle. The rectangle has area 18cm^2 and perimeter 18cm . What is the value of a ?

7

If the rectangle has an area of 18 the triangle must have an area of 12



The rectangle and triangle have the **same height**.

For the rectangle $\text{base} \times \text{height} = 18$ and the **perimeter** is also 18

For the triangle $\text{base} \times \text{height} \div 2 = 12$ therefore $\text{base} \times \text{height} = 24$

What value could height be for all of these to work?

A trapezium of area 30 cm^2 is made up of a rectangle and a right angled triangle. The rectangle has area 18 cm^2 and perimeter 18cm. What is the value of a?

8

A rectangle's length is 3 times its width. If it were 3m shorter and 3 m wider it would be a square.

What is the length and width of the rectangle?

8

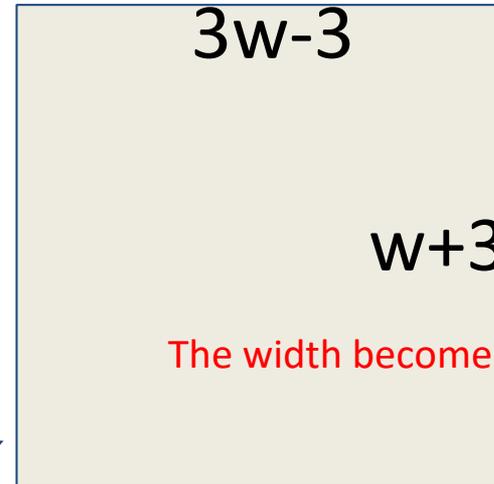
A rectangle's length is 3 times its width. If it were 3m shorter and 3 m wider it would be a square.

What is the length and width of the rectangle ?

The length is 3 times the width



The length becomes 3m shorter

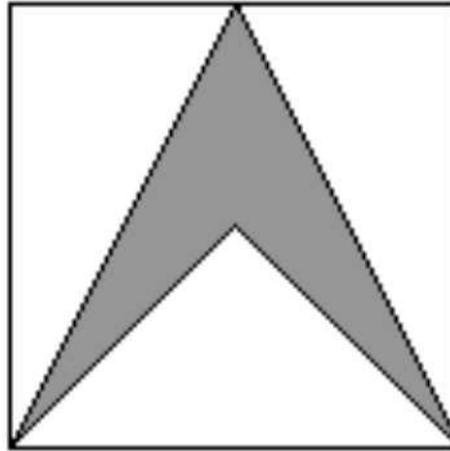


The width becomes 3m longer

The shape is now a square, so the sides are equal in length.

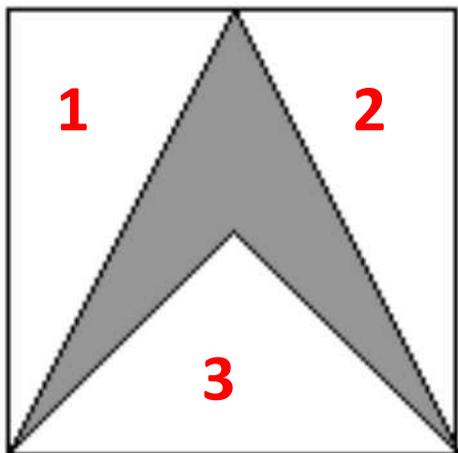
$$3w - 3 = w + 3$$

9



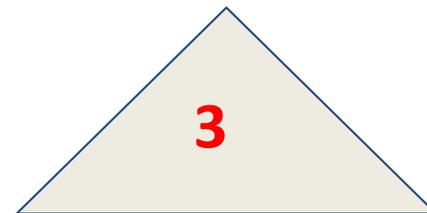
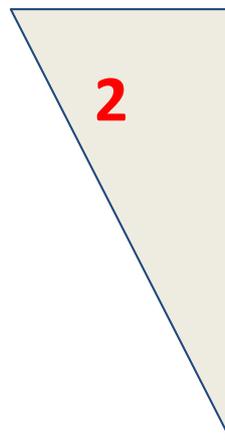
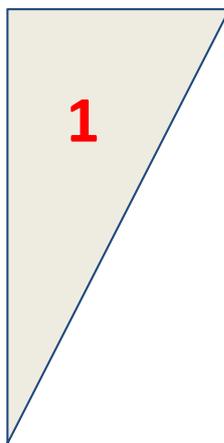
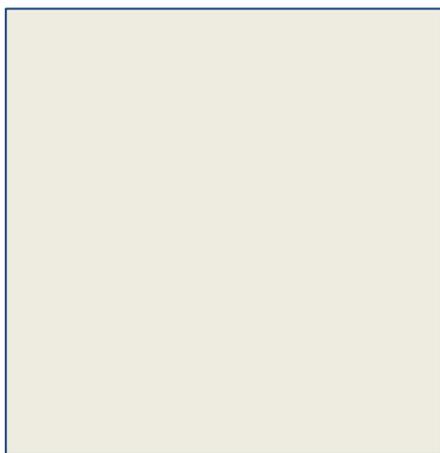
An arrow is formed in a 2cm x 2cm square by joining the bottom corners to the midpoint of the top edge and the centre of the square.
What is the area of the arrow?

9



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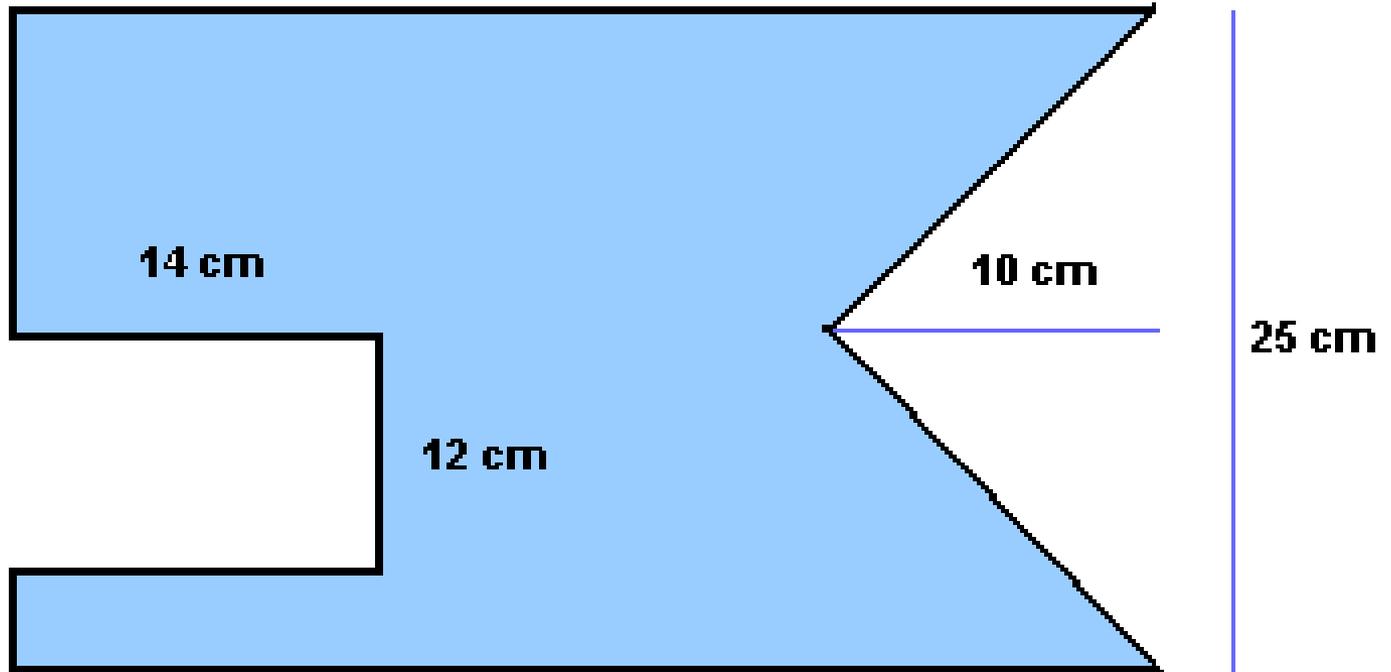
What is the area of the arrow?



Find the areas of these pieces and subtract the triangles from the square to find the area of the arrow?

10

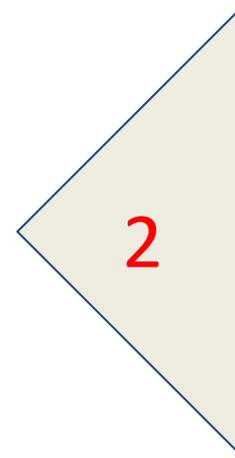
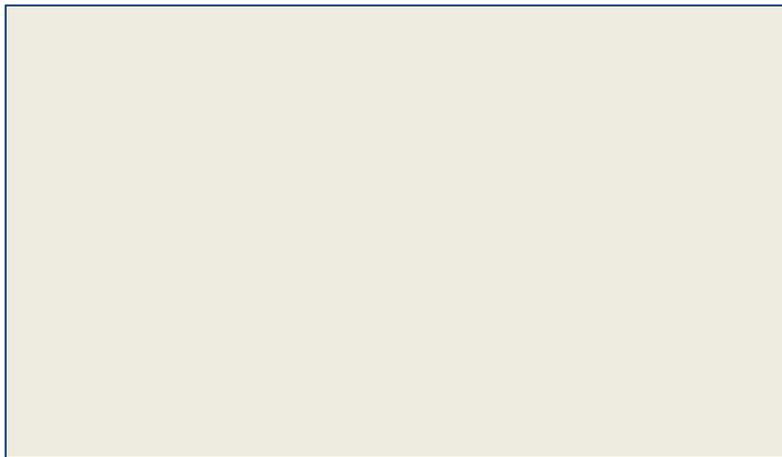
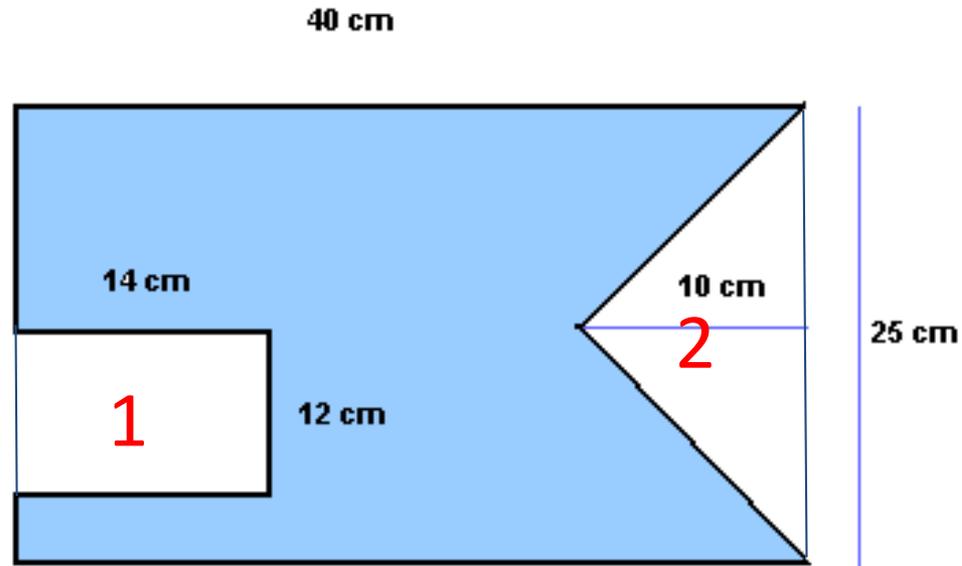
40 cm



Find the area of the shape

10

Find the area of the shape



Find the area of the outside rectangle and subtract the two cut out areas.

11

The length of a rectangle is four times its width.
If the area is 100 m^2 what is the length of the rectangle?



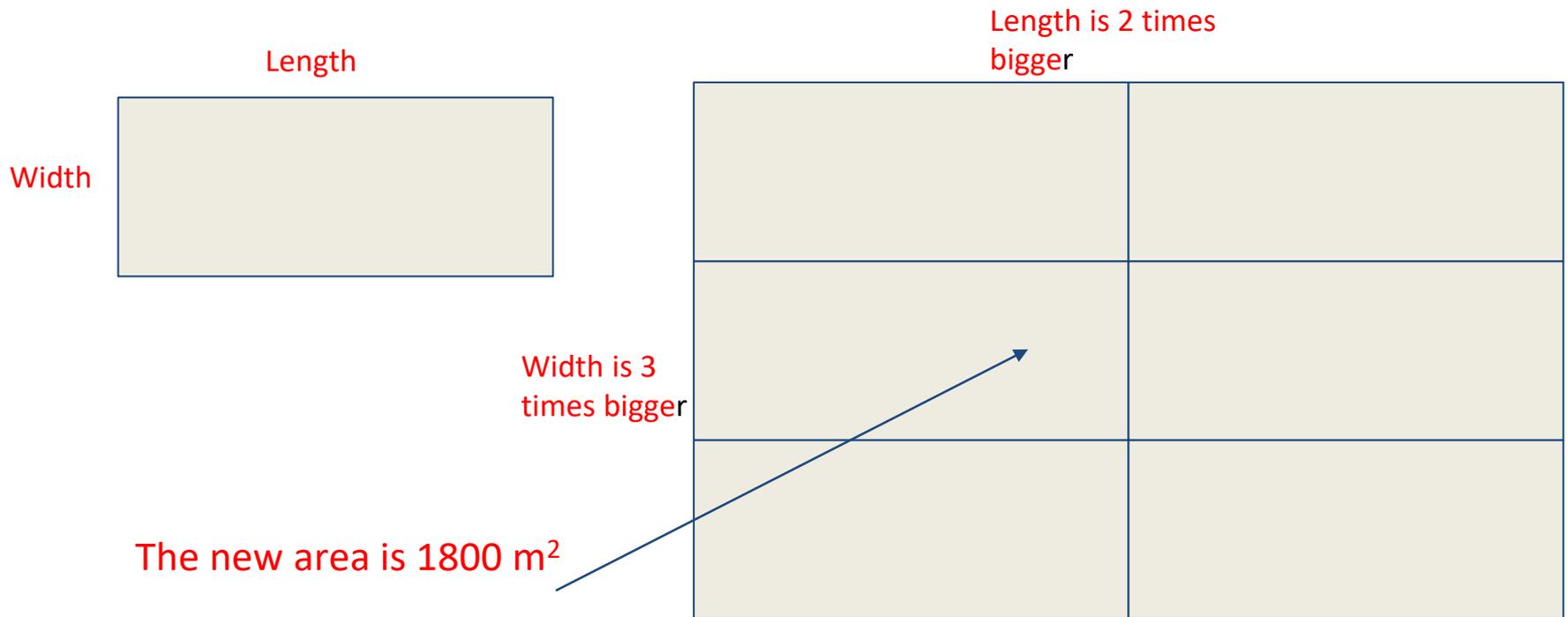
Area is 100 m^2 so

$$4w \times w = 100$$

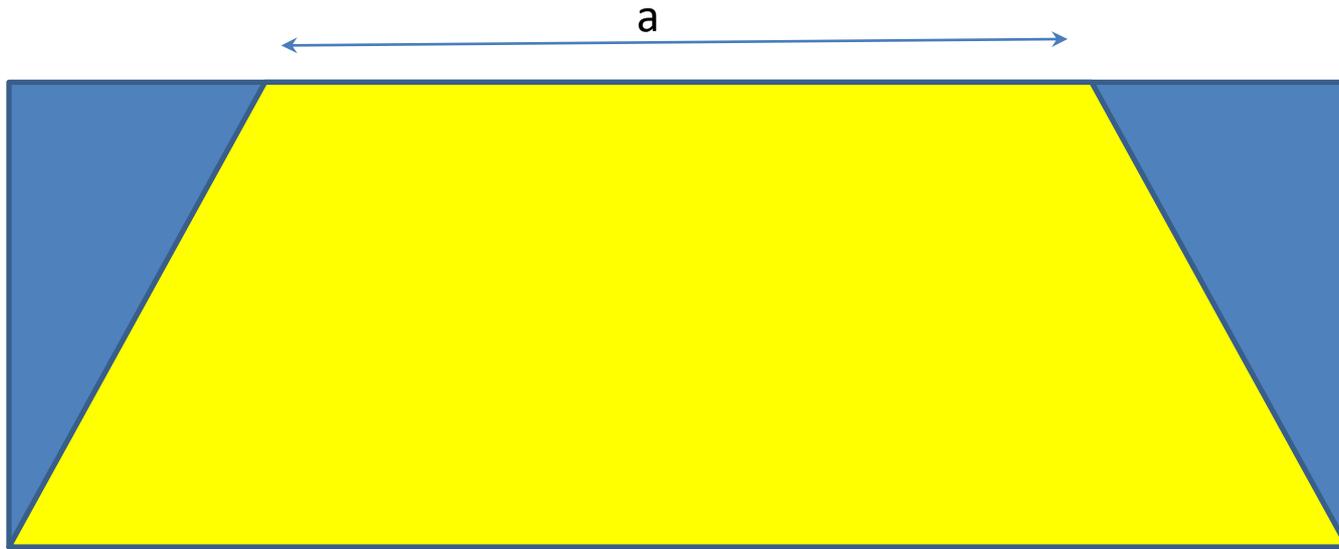
Consider factors of 100.

12

The length of a rectangle is increased to 2 times its original size and its width is increased to 3 times its original size. If the area of the new rectangle is equal to 1800 square metres, what is the area of the original rectangle?



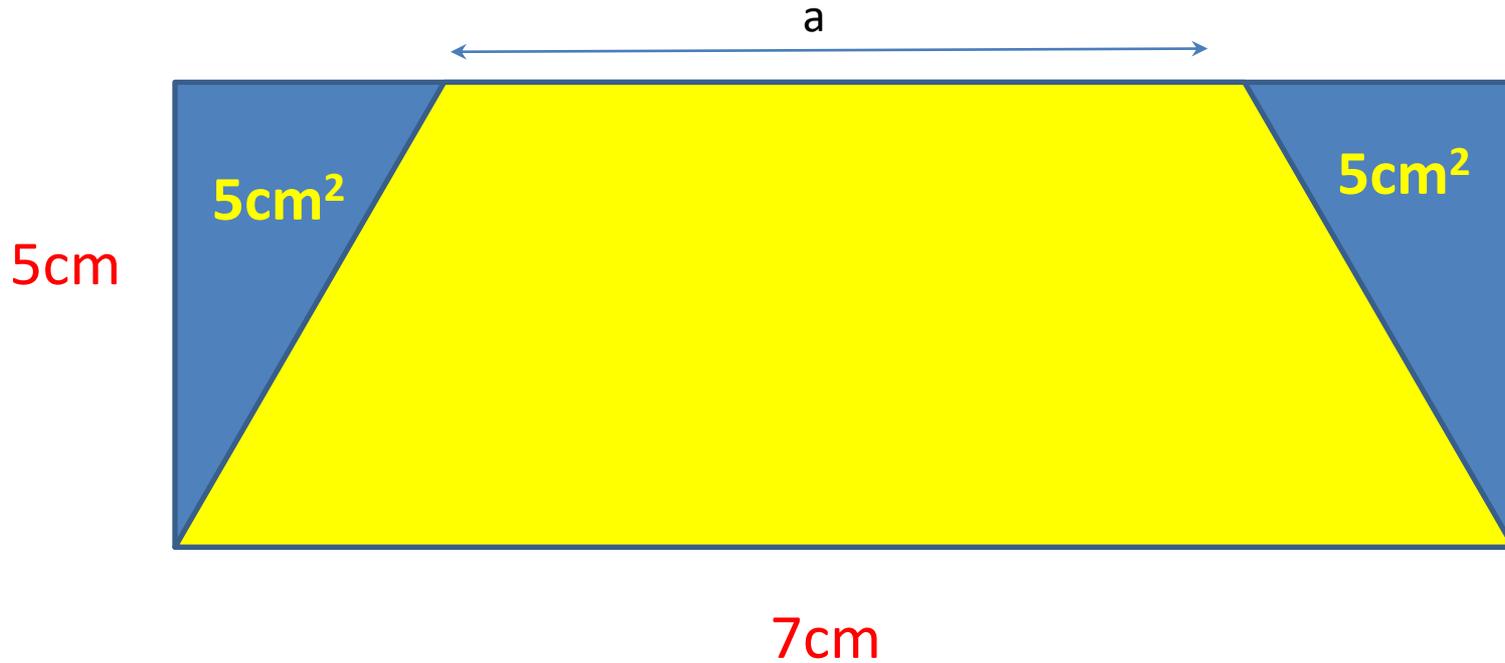
13



A trapezium is placed in a rectangle of length 7cm and width 5cm. The combined area of the two blue triangles is 10cm^2 . What is the length of a ?

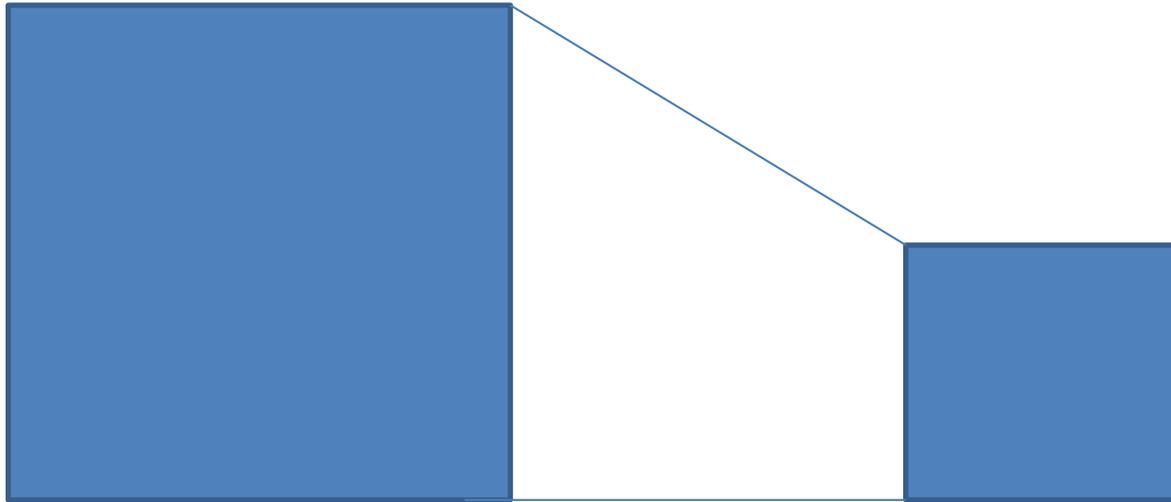
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If each of the blue triangles has an area of 5cm^2 and a height of 5cm, what does the base of the triangle measure?

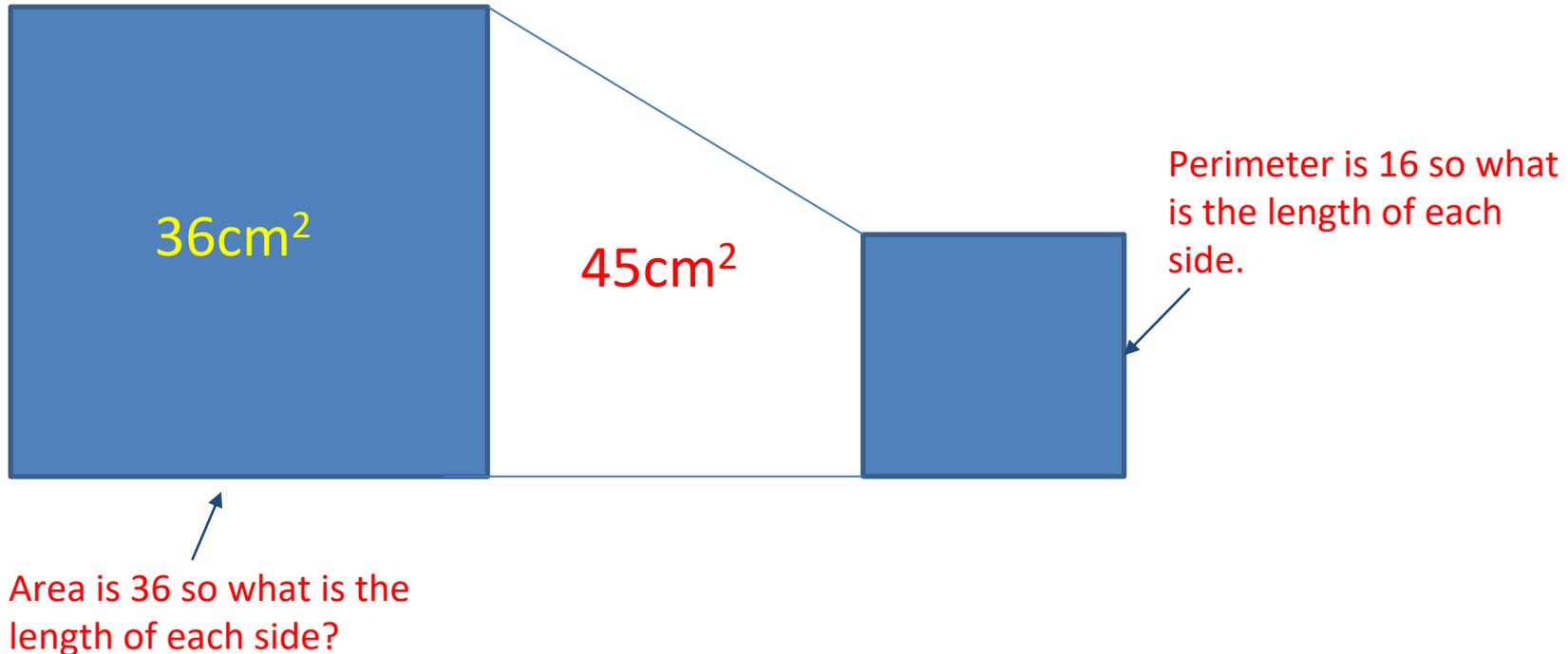
14



The area of the big square is 36cm^2 . The small square has a perimeter of 16cm . The area of the trapezium between the squares is 45cm^2 . What is the distance between the two squares?

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The area of the trapezium is 45.
You know the length of the two parallel sides
Use the formula for the area of a trapezium to find the missing length.