

## Simple word problems involving area and perimeter

Sometimes we can only communicate ideas or problems through words.

So it is important to be able to take written/spoken information and turn it into something useful.

For example,

Miguel wants to paint a square. He has just enough paint to create a line 240 cm long.

What is the longest length each side of the square can be if he wishes to use all of the paint?



To use up all the paint, the total perimeter of the square must equal 240 cm.

$$\begin{aligned}\text{So each side length} &= 240 \text{ cm} \div 4 \\ &= 60 \text{ cm}\end{aligned}$$



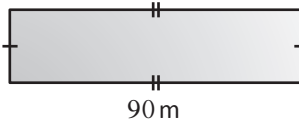
$\therefore$  The longest length each side of the square painted by Miguel can be is 60 cm.

This is useful for Miguel to know because if he painted the first side too long, he would run out of paint!

Here are some more examples

- (i) A rectangular park is four times longer than it is wide. If the park is 90 m long, how much area does this park cover?

$$(90 \div 4) \text{ m} = 22.5 \text{ m}$$

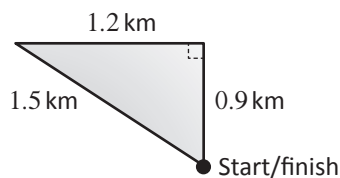


Draw diagram to illustrate problem



$$\begin{aligned}\text{Area} &= \text{length} \times \text{width} \\ &= 90 \text{ m} \times 22.5 \text{ m} \\ &= 2025 \text{ m}^2\end{aligned}$$

- (ii) At a fun run, competitors run straight for 0.9 km before turning left 90 degrees to run straight for a further 1.2 km. The course has one final corner which leads back to the start along a straight 1.5 km long street. How many laps of this course do competitors complete if they run a total of 18 km?



Draw diagram to illustrate problem

$$\begin{aligned}\text{Perimeter of course} &= 0.9 \text{ km} + 1.2 \text{ km} + 1.5 \text{ km} \\ &= 3.6 \text{ km}\end{aligned}$$

Perimeter will be the length of each lap

$\therefore$  Length of each lap of the course is 3.6 km

$$\begin{aligned}\therefore \text{Number of laps} &= 18 \text{ km} \div 3.6 \text{ km} \\ &= 5\end{aligned}$$

Race distance divided by the length of each lap

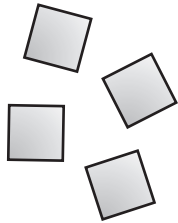
$\therefore$  Competitors must complete 5 laps of the course to finish



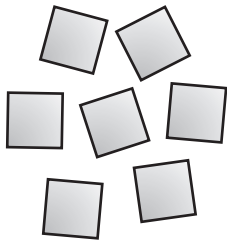
## Simple word problems involving area and perimeter

- 1 Three equilateral triangles, each with sides of length 3 cm have been placed together to make one closed four-sided shape. Each triangle shares at least one whole side with another. Calculate the perimeter of the shape formed.

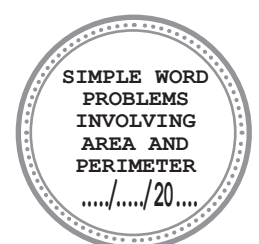
- 2 a Use **all** four squares below to make **two** shapes in which the number of sides is also equal to four. Compare the distance around the outside of your two shapes and explain what this shows us about the relationship between area and perimeter.



- b You have been employed by a fabric design company called Double Geometrics. Your first task as a pattern maker is to design the following using all seven identical squares:  
“Closed shapes for a new pattern in which the value of their perimeter is twice the value of their area.” Draw five possible different patterns that match this design request.



- 3 The base length of a right-angled triangle is one fifth of its height. If the base of this triangle is 4.2 m, calculate the area of the triangle.



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- 4 An architect is asked to design an art gallery building. One of the design rules is that the floor must be a rectangle shape with an area of  $64 \text{ m}^2$ .

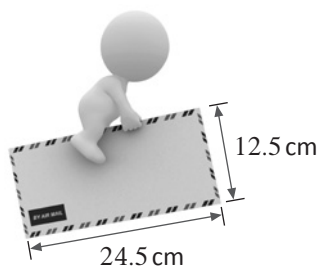
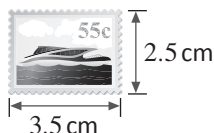
a If only whole metre measurements can be used, sketch all the different possible floor dimensions.

- b Another design rule is to try ensure a large perimeter so there is more space to hang paintings from. Use calculations to show which floor plan will have the largest perimeter.



- c Would the design with the largest possible perimeter be a good choice? Explain briefly why/why not.

- d A small art piece at the gallery has one side of an envelope completely covered in stamps like the one pictured below. How many of these stamps were needed to cover one side of an envelope  $12.5 \text{ cm}$  wide and  $24.5 \text{ cm}$  long if they all fit perfectly without any edges overlapping?

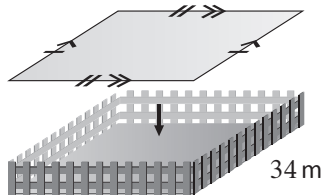




### Simple word problems involving area and perimeter


- 5 A fence used to close off a parallelogram-shaped area is being rearranged to create a square area with the same perimeter. The short side of the area is 34 m long (half the length of the long side).

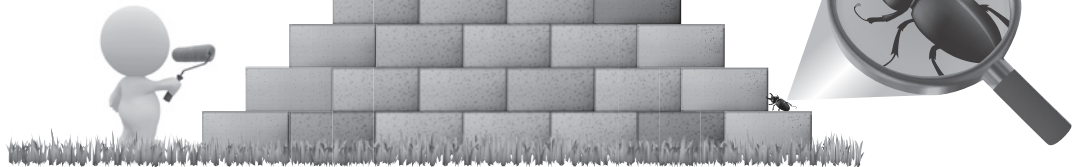
- a How long will each side of the new square area be after using the whole length of this fence?



- b If the distance between the longer sides of the original area was 30 m and the length did not change, use calculations to show which fencing arrangement surrounded the largest area.

- 6 A wall is created by stacking equal-sized rectangular bricks on top of each other as shown. The end of each rectangle sits exactly half-way along the long side of the rectangle underneath it.

Each brick =  16 cm  
28 cm



- a A 500 mL tin of white paint has been purchased to paint the wall. The instructions on the paint tin say this is enough to cover an area of  $11\,500\text{ cm}^2$ .  
Use calculations to show that there is enough paint in the tin to cover side of the wall.

- b If a beetle walked all around the outside of the wall (including along the ground), how many metres did it walk?