Lesson - Perimeter and area

Year: Year 4

Hello, I am Otto! Every garden has a fence round it and a lawn inside it. The fence is the perimeter and the lawn is the area. In this chapter you learn to measure the distance round a shape, to find how much space is inside a shape by counting squares, and to use a quick rule for rectangles.

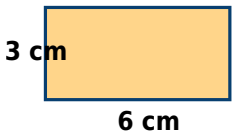
Starter activity

A farmer wants to put a fence round a field and to cover the field with grass seed. To buy the right amount of fence she needs to know the distance round the edge of the field. To buy the right amount of seed she needs to know how much ground the field covers. These are two different measurements. Which is the perimeter and which is the area?

Perimeter

Definition: perimeter

The **perimeter** of a shape is the total distance all the way round its edge. We measure it in units of length such as millimetres (mm), centimetres (cm), metres (m) or kilometres (km).



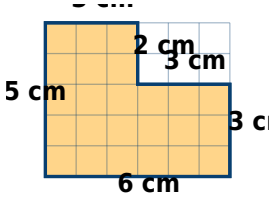
This rectangle is 6 cm long and 3 cm wide. A rectangle has two long sides and two short sides. To find the perimeter, add all four sides: 6 + 3 + 6 + 3 = 18 cm.

Rule: perimeter of a rectangle

The opposite sides of a rectangle are equal. So the perimeter is two lengths plus two widths: **perimeter = 2 × length + 2 × width**. You can also add the length and the width and double the answer: 2 × (6 + 3) = 2 × 9 = 18 cm. For a square all four sides are equal, so the perimeter of a square with side 5 cm is 4 × 5 = 20 cm.

Method: perimeter of any shape made of straight sides

1. Write down the length of every side. If a side is missing, work it out from the opposite sides.
2. Add the lengths of all the sides. Walk all the way round the shape once so you do not miss a side or count a side twice.
3. Write the answer with the unit, for example cm or m.



This L-shaped figure has sides 6, 3, 3, 2, 3 and 5 cm. Its perimeter is 6 + 3 + 3 + 2 + 3 + 5 = 22 cm. Notice that the perimeter of an L-shape is the same as that of the rectangle 6 cm by 5 cm that surrounds it: 2 × (6 + 5) = 22 cm.

Example 1

Find the perimeter of a rectangle with length 9 m and width 4 m.

Perimeter = 9 + 4 + 9 + 4 = **26 m**. Or 2 × (9 + 4) = 2 × 13 = 26 m. Both methods give the same answer.

Example 2

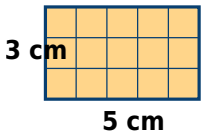
A rectangle has a perimeter of 30 cm and a length of 9 cm. What is its width?

The two lengths take up 9 + 9 = 18 cm. The two widths must make up 30 − 18 = 12 cm. One width is 12 ÷ 2 = **6 cm**. Check: 9 + 6 + 9 + 6 = 30.

Area

Definition: area

The **area** of a shape is the amount of flat space inside it. We measure area by counting squares. One square with a side of 1 cm has an area of 1 square centimetre, written 1 cm². A square with a side of 1 m has an area of 1 square metre, written 1 m².



This rectangle is made of 3 rows with 5 squares in each row. Count the squares: 3 × 5 = 15 squares. The area is 15 cm².

Rule: area of a rectangle

The area of a rectangle is the number of squares in one row multiplied by the number of rows. **Area = length × width**. For a rectangle 8 cm long and 3 cm wide, the area is 8 × 3 = 24 cm². The same rule works for a square: area = side × side.

Example 3

Find the area of a rectangle 12 m long and 5 m wide.

Area = 12 × 5 = **60 m²**. Check: 10 × 5 = 50 and 2 × 5 = 10, so 50 + 10 = 60.

Watch out: perimeter and area are different

Do not mix up perimeter and area! The perimeter is a length (cm, m) and the area is a number of squares (cm², m²). A rectangle 6 cm by 2 cm has perimeter 16 cm and area 12 cm². Another rectangle 4 cm by 4 cm has perimeter 16 cm too, but its area is 16 cm². Shapes with the same perimeter can have different areas!

Areas of compound (L-shaped) shapes

Method: area of a rectilinear shape

1. Split the shape into rectangles by drawing a line. Use dotted lines to show the split.
2. Work out the area of each rectangle (length × width).
3. Add the areas together.
4. Check by splitting the shape in a different way, or by subtracting a missing corner from a large rectangle.

Example 4

Find the area of the L-shaped figure above.

Split it into a bottom rectangle 6 cm by 3 cm and a top rectangle 3 cm by 2 cm. Areas: 6 × 3 = 18 cm² and 3 × 2 = 6 cm². Total area: 18 + 6 = **24 cm²**. Check: the large rectangle 6 by 5 has area 30 cm². The missing corner is 3 by 2 = 6 cm². So 30 − 6 = 24 cm².

Example 5

A rectangular lawn is 8 m by 6 m. A path 1 m wide is built along one of the long sides. What is the area of the lawn that is left?

The path is 8 m long and 1 m wide, so its area is 8 × 1 = 8 m². The lawn had an area of 8 × 6 = 48 m². The lawn that is left has an area of 48 − 8 = **40 m²**.

Did you know?

The word perimeter comes from two Greek words: peri, meaning "around", and metron, meaning "measure". So perimeter means "measuring around". Farmers have used these ideas for thousands of years. The ancient Egyptians had to measure their fields again each year after the River Nile flooded them. That is one of the reasons why geometry (which means "earth measure") was invented!

Otto's tip

For perimeter, trace round the shape with your finger and add each side as you go. For area, count the squares or multiply length by width. If you are not sure which one the question wants, check the unit: cm or m is a perimeter, and cm^2 or m^2 is an area!