S1.2 Area of a rectangle

objectives

- Understand that area is measured in square centimetres (cm^2).
- Know and use the formula for the area of a rectangle; calculate the area of shapes made from rectangles.
- Explain and justify methods and conclusions.

starter

Vocabulary
area
square centimetres (cm^2)

Resources
OHT S1.2a

Tell the class that this lesson is about finding areas. Explain that area is the space inside a shape and is measured in square units: for example, centimetre squares, square centimetres or cm^2.

Say that one way to estimate an area is to count the squares that it covers. Show **OHT S1.2a** and invite a pupil to count the squares covered by the wood. Count any whole squares first, then look for parts of squares that would combine to make a whole square. Show pupils how to mark off the parts of squares that they use to avoid counting them twice.

Work with the class to establish an estimate for the area of the island in unit squares.

main activity

Vocabulary
area
length
breadth
width

Resources
OHTs S1.2b, S1.2d
Resource S1.2c (one OHT and copies for individual pupils)
mini-whiteboards
ITP *Area* (optional)

You could, if you wish, support the main activity by using the ITP *Area*, downloaded from www.standards.dfes.gov.uk/numeracy. Use it as an alternative to or in addition to the OHTs. Select options and ask questions to consolidate pupils' understanding.

Show **OHT S1.2b**. Tell the class that it is a grid of 1 cm by 1 cm squares. Ask pupils to find the area of rectangle A by counting the rows of squares and to write the answer on their whiteboards. Repeat with rectangles B and C. Write on the board:

area of A is $6 \times 4 = 24\,\text{cm}^2$
area of B is $12 \times 2 = 24\,\text{cm}^2$
area of C is $8 \times 3 = 24\,\text{cm}^2$

Point out that the areas of rectangles A, B and C are the same but that their perimeters are all different. Stress that to find the area of a rectangle we need to know its length and width, or breadth. Write on the board:

area of rectangle = length $\times$ breadth

Q What is the name of shape D? What are its area and perimeter?

Take responses. Point out that the square has the same perimeter as rectangle A: $(5 + 5) \times 2 = 20\,\text{cm}$, but it has a larger area. Write:

area of D is $5 \times 5 = 25\,\text{cm}^2$

Q What is the name of shape E? How do we find its area?

Establish that the area of this triangle is half the area of a 5 cm by 5 cm square. Write:

area of E is $\frac{1}{2}$ of $25\,\text{cm}^2 = 12.5\,\text{cm}^2$

Confirm by counting the squares of the triangle.

Give out copies of **Resource S1.2c**. Explain that the grid is in centimetres. Ask pupils to find the area of the square in the top left corner. Encourage them to calculate the area by multiplying the length by the width, $4 \times 4 = 16\,\text{cm}^2$. Emphasise that the units are square centimetres. Ask them to write the area in the centre of the square, reminding them to include the units.

Q How can we work out the area of the triangles in the top row?

Get the pupils to draw rectangles to surround the triangles and to use the fact that the area of the triangle is half the area of the rectangle.

Ask pupils to find the areas of the other shapes. Encourage them to draw in surrounding rectangles, and to find and write on the sheet the areas of any rectangles or triangles that form part of the original shape.

Display an OHT made from **Resource S1.2c**. Collect answers and invite individual pupils to explain their methods and conclusions to the rest of the class.

Show **OHT S1.2d**, with two rectangles made up from squares. Establish the area and the perimeter for each rectangle.

Indicate the compound shape that combines the two rectangles.

Q What is the area of this new shape? And the perimeter?

Q The area of the new shape is the same as the areas of the original two shapes added together. Why?

Q The perimeter of the new shape is not the same as the perimeters of the original two shapes added together. Why? What has happened to part of the perimeter of the original two shapes? (parts are now inside the shape and are not part of the new perimeter)

Now refer to the outlines of shapes on the bottom row, pointing out the dimensions. Ask pupils to sketch the compound shape on their whiteboards and to mark in all the dimensions for each side.

Q What is the perimeter of this shape? (20 cm)

Q How could we find the area of this shape? (add the areas of the two rectangles)

Q Is there another way to find the area of the compound shape?

Ask pupils to discuss this question in pairs. Remind them that in their last lesson they found the areas of shapes by drawing the surrounding rectangle. Ask them to draw in the rectangle that surrounds the compound shape, to work out its dimensions and also the dimensions of the two extra small rectangles. Show them how they can subtract the areas of the two small rectangles from the area of the surrounding rectangle to find the area of the compound shape.

Establish that each method produces the same result. Stress that pupils can choose the method that they think will work best, depending on the problem.

other tasks

Springboard 7
Unit 3

Unit 3 section 4: Area

plenary

Resources
Resource S2.1e
mini-whiteboards

Tell the class you are going to sketch a rectangle with an area of 20 square centimetres. Each side is a whole number of centimetres.

Q What could be the length and the width of my rectangle?

Establish that the length multiplied by the width must be 20 square centimetres. The possibilities are 1cm by 20cm, 2cm by 10cm, and 4cm by 5cm. Sketch all three rectangles on the board and label the length and width in each case. Explain that your drawings do not show true measurements.

Ask pupils to sketch on their whiteboards a rectangle with an area of 12 square centimetres, and to label the length and the width of their rectangle. Point out the three possibilities: 1cm by 12cm, 2cm by 6cm, and 3cm by 4cm.

Q What is the same about all three rectangles? (the area)

Q What is the perimeter of each rectangle? (26cm, 16cm, and 14cm)

Give out copies of **Resource S1.2e**. Ask pupils to complete the two questions. Invite individual pupils to explain their methods to the rest of the class.

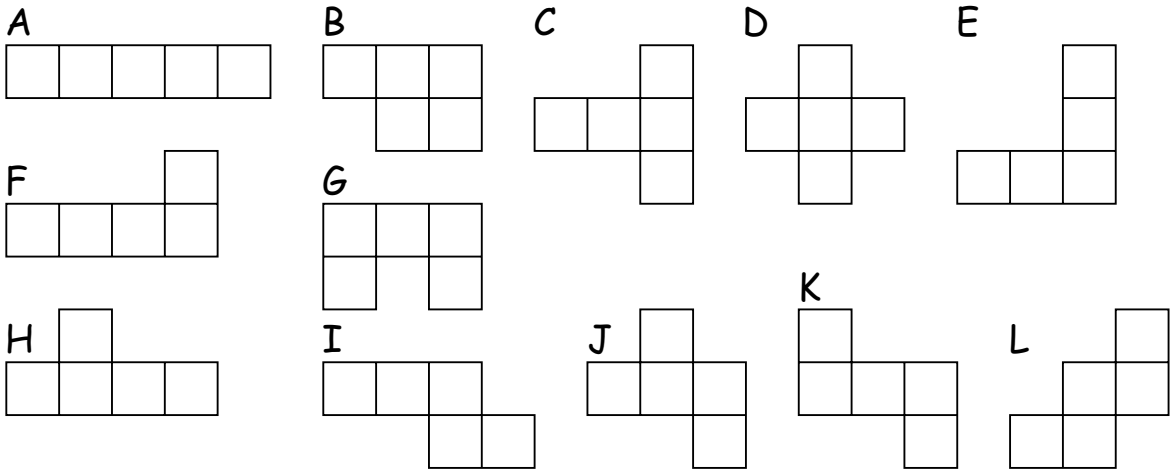
Remember

- Area is the space inside a flat shape. It is measured in square units such as square centimetres, written as cm^2.
- Areas of shapes can be estimated or worked out by counting squares or part squares.
- Areas of some shapes can be found by surrounding them by a rectangle, working out the area of the extra parts, and subtracting this from the area of the surrounding rectangle.
- Shapes that have the same area do not necessarily have the same perimeter.

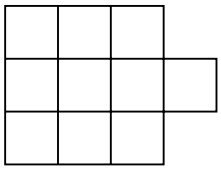
OHT S1.3a

OHT S1.3b

There are 12 different pentominoes.



Which two pentominoes will fit into this shape?



Find four different pairs.