Finding unknown lengths

National Curriculum attainment targets

- Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
- Calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm^2) and square metres (m^2) and estimate the area of irregular shapes

Lesson objective

- Use the relations of perimeter or area to find unknown lengths

Previous related lessons

Unit 8, Week 3, Lesson 1; Unit 8, Week 3, Lesson 2

Prerequisites for learning

Pupils need to:

- measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres using the rule $P = 2(a + b)$
- calculate and compare the area of rectangles, in square centimetres (cm^2) and square metres (m^2), using the rule $A = a \times b$

Vocabulary

perimeter, area, adjacent, centimetre (cm), square centimetre (cm^2)

Future related lesson

Unit 8, Week 3, Lesson 4

Success criteria

Pupils can:

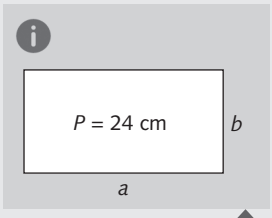
- find an unknown length of a side in a rectangle when the perimeter of the rectangle and the length of an adjacent side are given
- find an unknown length of a side in a rectangle when the area of the rectangle and the length of an adjacent side are given

Getting Started

- Choose an activity from Measurement (perimeter and area).

Teach

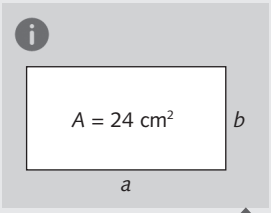
Collins Connect
Year 5, Unit 8, Week 3



- Say: **I put 18 cubes into a bag. I add some more cubes to the bag. The bag now holds 24 cubes. How many cubes did I add to the bag?** (6)
- Ask: **How did you work out how many cubes I added to the bag?** (subtracted 18 from 24)
- Write on the board: 18 + □ = 24
  □ = 24 – 18
  □ = 6
- Sketch a rectangle on the board and ask: **What is the rule for finding the perimeter of a rectangle?** Elicit the rule: $P = 2(a + b)$.
- Write inside the rectangle: $P = 24$ cm
- Ask: I**f side *a* of the rectangle measures 9 cm, how can we use the rule to find the length of side *b*?**
- Take suggestions from the children. Then talk through and display the following steps on the board:

$2a + 2b = P$
(2×9) cm $+ 2b = 24$ cm
$2b = 24$ cm $- 18$ cm
$= 6$ cm
$b = 6$ cm $\div 2$
$= 3$ cm

- Say: **Tell your partner how we can check that we have found the correct value for *b*.** (by substituting the values for sides *a* and *b* in the equation for *P*)
- Repeat as above giving values of 7 cm and then of 10 cm for side *a*.
- Ask: **Can anyone suggest a quicker way to find the missing length for side *b*?**



- Take feedback. Elicit that as there are two pairs of adjacent sides, *a* and *b*, in the rectangle, we could, in this situation, simplify the rule to $a + b = \frac{1}{2} P$
- Write these steps on the board: $a + b = \frac{1}{2} P$
  $9 \text{ cm} + b = 24 \text{ cm} \div 2$
  $b = 12 \text{ cm} - 9 \text{ cm}$
  $b = 3 \text{ cm}$
- Say: **We have halved the length of the perimeter and then subtracted the length of one side.**
- Write on the board: $\square \times 4 = 24$
- Say: **I'm thinking of a number. I multiply it by four and the answer is 24. What is my number?**
- Ask: **How did you find the answer?** (divided 24 by 4 to give 6)
- Ask: **What is the rule for finding the area of a rectangle?** Elicit the rule: $A = a \times b$
- Write inside the rectangle: $A = 24 \text{ cm}^2$
- Ask: **If side *a* of the rectangle measures 6 cm, how can we use the rule to find the length of side *b*?** Take feedback and establish that by dividing the value of the area by the given length of the adjacent side we find the length of the missing side.
- Write on the board: $a \times b = A$
  $6 \text{ cm} \times b = 24 \text{ cm}^2$
  $b = (24 \div 6) \text{ cm}$
  $b = 4 \text{ cm}$
- Repeat as above giving values of 8 cm and then 12 cm for side a.

Individualised Learning

Refer to Activity 3 from the Learning activities on page 339.

Pupil Book 5B: – Page 96: Finding missing lengths
Resources: 1 cm squared paper (per child); ruler (per child)

Plenary

- Sketch a rectangle on the board and label one pair of adjacent sides *a* and *b*.
- Ask: **If you know the lengths of sides *a* and *b*, how do you find the perimeter of the rectangle?**
- Say: **You know the perimeter of the rectangle and the length of side *a*.** Ask: **How do you use this information to find the length of side *b*?**
- Ask: **In this rectangle, side a measures 7 cm and the perimeter measures 40 cm. What is the length of side *b*?** (13 cm) **How did you find your answer?**
- Repeat by giving different whole number values for side *a*.
- Write inside the rectangle: $A = 40 \text{ cm}^2$
- Ask pairs to find possible whole number values for sides *a* and *b*. (40 × 1, 20 × 2, 10 × 4 and 5 × 8)

Homework Guide 5
Year 5, Unit 8, Week 3, Lesson 3: Missing a length

Overcoming Barriers

- Check that children know the following:
  - The perimeter is the distance all the way round a 2-D shape and is measured in units of length.
  - The area is the amount of surface space inside the perimeter and is measured in square units of length.