



THIRD SPACE
LEARNING

GCSE Maths Intervention Pack

Solving Area and Perimeter
Problems

Grade 4

Teacher Notes

Question Sets

Set 1: Applied Perimeter Problem Solving

Solve worded problems involving the perimeter of 2D shapes.

Key words: Centimetres, formula, L-shape, length, perimeter, quadrilateral, metres

Set 2: Applied Area Problem Solving

Solve worded problems involving the area of 2D shapes.

Key words: Area, centimetres squared, compound shape, formula, meters squared, shaded region

Set 3: Applied Compound Area Problem Solving

Solve worded problems involving the area of compound 2D shapes when another area has been removed.

Key words: Area, height, formula, parallelogram, proportion, quadrilateral, right-angled triangle, sector (of a circle), trapezium



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“We now tell our staff that if Third Space Learning do a version of that resource, prioritise it over all of the alternatives, because we feel that they are always the best ones.”



Gabriel Ogbeifun,
Head of Mathematics, Regent High School

Slide 1: Cover Slide

Teaching Prompts

- What would you do to work out the area of the shaded section?
-

Answers

We need to find the area of the trapezium and then subtract the area of the rectangle. (student does not need to complete the question)

(94cm²)

Teacher Reference Only

Common Misconceptions

- Students mistake the height of a shape to a diagonal side length and not the perpendicular height.
- Multiplying by a value between 0 and 1 will reduce the value.
- Some students mistake different parts of a circle.
- Students try to split a trapezium into two compound shapes (a triangle and a rectangle) without enough information as they cannot recall the formula for the area of a trapezium.
- Students only add the known side lengths to determine the perimeter of the shape and do not find any missing lengths. They may also use the height when it is not a valid side length of the shape.
- Students may get confused over converting between m and cm.
- Students may not round (or round correctly) when the number must be an integer e.g. a person cannot score 3.4 goals.
- Students regularly mistake area and perimeter.

Slide 1: Cover Slide

Terminology

- **Area:** The size (amount of space) inside a closed 2D shape.
 - **Perimeter:** The distance around a two-dimensional shape.
 - **Perpendicular:** At right angles (90°) to.
 - **Centre:** The middle. Such as the centre of a circle or a square.
 - **Radius:** The distance from the centre to the circumference of a circle.
 - **Diameter:** The distance from one point on a circle **through the centre** to another point on the circle.
 - **Circumference:** The distance around the edge of a circle.
 - **Arc:** The distance along the arc (part of the circumference of a circle, or of any curve).
 - **Sector:** The area between two radii and the connecting arc of a circle.
 - **Proportion:** A part, share, or number considered in comparative relation to a whole.
-

Slide 2: Try this exam-style question...

Set 1: Applied Perimeter Problem Solving.

Teaching Prompts

- Can you try this question by yourself?
-

If Stuck

- Move on to the next slide.
-

Mark Scheme

Allow full marks for any other correct method

- (1 mark) Finds missing lengths and attempts to add together the lengths to find perimeter
 - (1 mark) Total perimeter = 15m
 - (1 mark) $\text{£}9.99 \times 30$
 - (1 mark) $\text{£}299.70$
-

Watch out for

- Students mistake the height of a shape to a diagonal side length and not the perpendicular height.
- Some students mistake different parts of a circle.
- Students only add the known side lengths to determine the perimeter of the shape and do not find any missing lengths. They may also use the height when it is not a valid side length of the shape.
- Students may get confused over converting between m and cm.
- Students may not round (or round correctly) when the number must be an integer e.g. a person cannot score 3.4 goals.
- Students regularly mistake area and perimeter.

Slide 3: Let's go through it together...

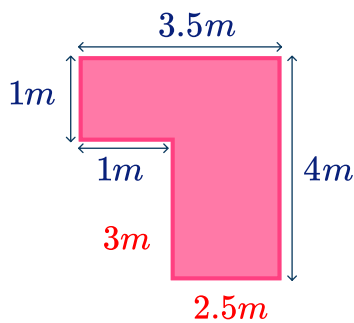
Set 1: Applied Perimeter Problem Solving.

Teaching Prompts

- How do you find the missing horizontal and vertical lengths? (Subtract)
 - What is the total perimeter? (15m)
 - How much does it cost for 1 metre? (£19.98)
 - How many decimal places should the solution be? (2 decimal places)
-

Answers

1)



2) $P = 3.5 + 4 + 2.5 + 3 + 1 + 1 = 15\text{cm}$

3) $1500 \div 50 = 30$ packs

4) $30 \times 9.99 = £299.70$

Mark Scheme

Allow full marks for any other correct method

- (1 mark) Finds missing lengths and attempts to add together the lengths to find perimeter
- (1 mark) Total perimeter = 15m
- (1 mark) $£9.99 \times 30$
- (1 mark) £299.70

Slide 4: Your turn...

Set 1: Applied Perimeter Problem Solving.

Teaching Prompts

- How can we work out the missing lengths? ($7 - 2$ and $8 - 3$)
-

Mark Scheme

Allow full marks for any other correct method

- (1 mark) Finds missing lengths and attempts to add together the lengths to find perimeter
- (1 mark) Total perimeter = 30m
- (1 mark) $\pounds 2.50 \times 30$
- (1 mark) $\pounds 75$

Slide 5: Try this exam-style question...

Set 1: Applied Perimeter Problem Solving.

Teaching Prompts

- Can you try this question yourself?
-

If Stuck

- Move on to the next slide.
-

Mark Scheme

Allow full marks for any other correct method

- (1 mark) Area of the whole circle (12.6m^2)
 - (1 mark) Area of the sector 9.42m^2
 - (1 mark) $9.42 \div 3 = 3.14$ packets (allow 4)
 - (1 mark) $\pounds 1.99 \times 4 = \pounds 7.96$
-

Watch out for

- Students mistake the height of a shape to a diagonal side length and not the perpendicular height.
- Some students mistake different parts of a circle.
- Students regularly mistake area and perimeter.

Slide 6: Let's go through it together...

Set 2: Applied Area Problem Solving.

Teaching Prompts

- 1) What is the radius of our circle? (2)
 - 1) How do we find $\frac{3}{4}$ of the circle? ($\text{Area} \times 3 \div 4$)
 - 2) If we have an answer of 3.14 packets, how many packets do we actually need? (4)
-

Answers

- 1) $\frac{3}{4} \times 12.6 = 9.42\text{m}^2$
 - 2) $9.42 \div 3 = 3.14$, 4 packets
 - 3) $1.99 \times 4 = £7.96$
-

Mark Scheme

Allow full marks for any other correct method

- (1 mark) Area of the whole circle (12.6m^2)
- (1 mark) Area of the sector 9.42m^2
- (1 mark) $9.42 \div 3 = 3.14$ packets (allow 4)
- (1 mark) $£1.99 \times 4 = £7.96$

Slide 7: Your turn...

Set 2: Applied Area Problem Solving.

Teaching Prompts

- Can you break the shape into two areas?
 - What is the total area if you add these two areas together? (31m^2)
 - How many rolls will we need? (8)
 - How can we work out the total cost? (8×25.99)
-

Mark Scheme

Allow full marks for any other correct method

- (1 mark) Finds area of shape = 31m^2
- (1 mark) $31 \div 4 = 7.75$
- (1 mark) Works out need 8×25.99
- (1 mark) Finds final cost as £207.92 and concludes he does not have enough money

Slide 8: Try this exam-style question...

Set 2: Applied Compound Area Problem Solving.

Teaching Prompts

- Can you use the formulae to work out the area of each of the shapes?
-

Mark Scheme

- (1 mark) Area of trapezium = 130cm^2
 - (1 mark) Area of parallelogram = 48cm^2
 - (1 mark) Area of shaded region = 82cm^2
-

Watch out for

- Some students mistake different parts of a circle.
- Students may not round (or round correctly) when the number must be an integer e.g. a person cannot score 3.4 goals.
- Students regularly mistake area and perimeter.

Slide 9: Let go through it together...

Set 3: Applied Compound Area Problem Solving.

Teaching Prompts

- What is the formula for the area of a trapezium? ($A = \frac{a+b}{2} \times h$)
 - What is the formula for the area of a rhombus? ($A = base \times h$)
 - How do we calculate the shaded region if we know the area of these two shapes? (Subtract)
-

Mark Scheme

Allow full marks for any other correct method

- (1 mark) Area of trapezium = 130cm^2
- (1 mark) Area of parallelogram = 48cm^2
- (1 mark) Area of shaded region = 82cm^2

Slide 10: Your turn...

Set 3: Applied Compound Area Problem Solving.

Teaching Prompts

- What is the area of the triangle? ($\frac{1}{2} \times 10 \times 8$)
 - What is the area of the quarter circle? ($\frac{1}{4} \pi \times 52$)
 - How can you find the shaded area using these areas? (subtract the quarter circle from the triangle)
-

Mark Scheme

Allow full marks for any other correct method

- (1 mark) Area of triangle = 40cm^2
- (1 mark) Area of quarter circle = 19.6cm^2
- (1 mark) Final area = 20.4cm^2 (to 3sf)

Slide 11: Ready for a Challenge?

Teaching Prompts

- Can you work this question out by yourself?
-

If Stuck

- If the perimeter of the square is 20cm, what is the length of each side? (5cm)
 - Therefore, what is the area of the square? (25cm^2)
 - What is the area of each of the triangles? ($\frac{1}{2} \times 5 \times 1 = 2.5\text{cm}^2$ and $\frac{1}{2} \times 2 \times 5 = 5\text{cm}^2$)
 - What is the area of the section labelled A? ($25 - 7.5 = 17.5\text{cm}^2$)
 - How can we find this as a fraction of the whole square? ($17.5 \div 25 = \frac{7}{10}$)
-

Mark Scheme

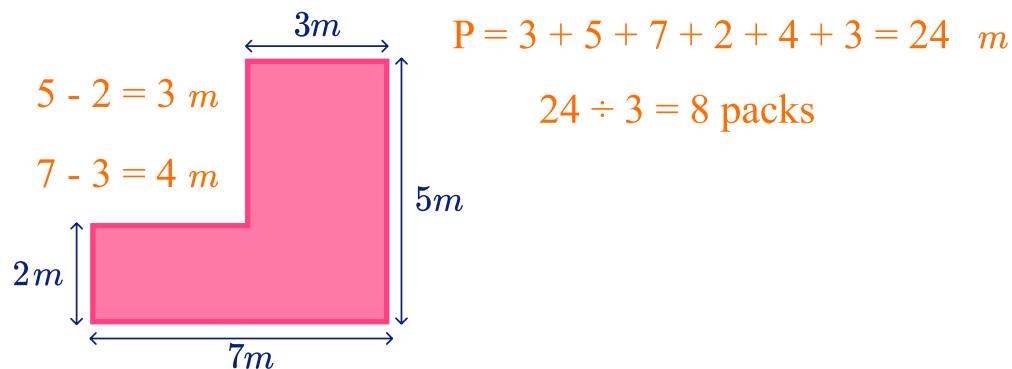
Allow full marks for any other correct method

- (1 mark) Area of square = 25cm^2
- (1 mark) Area of triangles = 2.5cm^2 and 5cm^2
- (1 mark) Area of A = $25 - 7.5 = 17.5\text{cm}^2$
- (1 mark) Expresses area as fraction of whole square : $\frac{7}{10}$ or equivalent

Slide 12: What have we learnt?

Teaching Prompts

- a) Can you see where the student has gone wrong? (they haven't worked out the missing lengths, and they have rounded down instead of up for the number of packs)
- b) What should they have done instead?



- b) Can you see where the student has gone wrong? (they have used the wrong formula to calculate the area of the trapezium)
- b) What should they have done instead?

$$\begin{aligned} \text{Rectangle} &= 8 \times 6 \\ &= 48 \end{aligned}$$

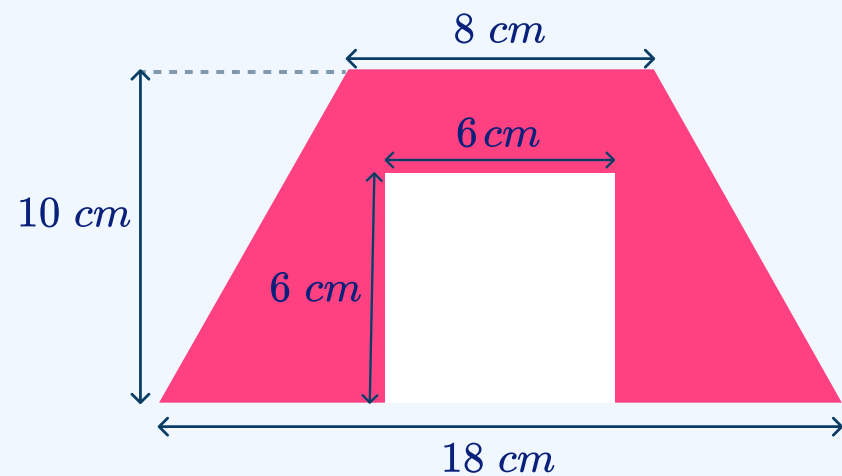
$$\begin{aligned} \text{Trapezium} &= (10 + 8) \div 2 \times 8 \\ &= 12 \times 8 = 112 \end{aligned}$$

$$\text{Total area} = 112 - 48 = 64\text{cm}^2$$

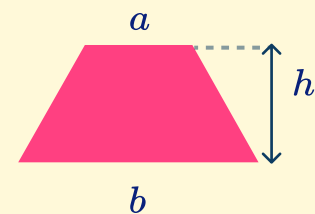
Solving Area and Perimeter Problems

How would you approach this question?

Find the area of the shaded section.

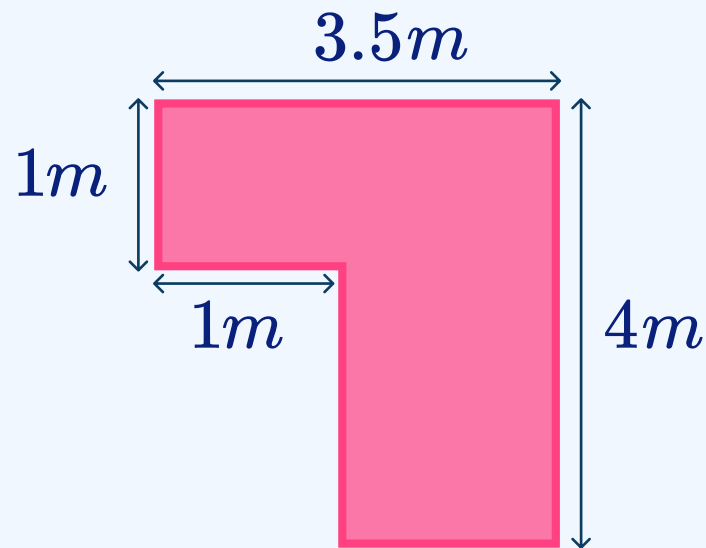


Remember:



$$A = \frac{a + b}{2} \times h$$

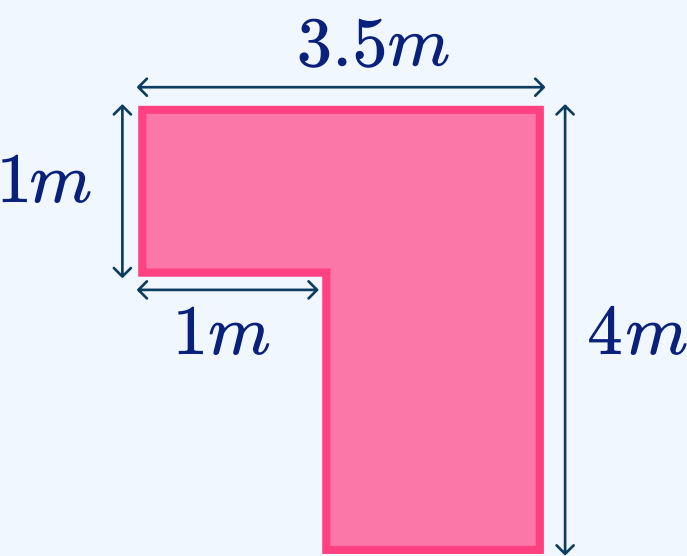
Janette is decorating her living room.
A diagram is shown below.



She wants to put a new skirting
board around the edge of the room.

It costs £9.99 per $50cm$.
How much will it cost altogether?

Janette is decorating her living room.
A diagram is shown below.



She wants to put a new skirting board around the edge of the room.

It costs £9.99 per 50cm.
How much will it cost altogether?

The **perimeter** of a shape is the distance around the outside of the shape.

1 Work out the missing lengths shown on the shape.

2 Find the total perimeter of the shape.

$P =$

$P =$

3 Work out how many packs of skirting Janette needs.

..... \div =

..... packs

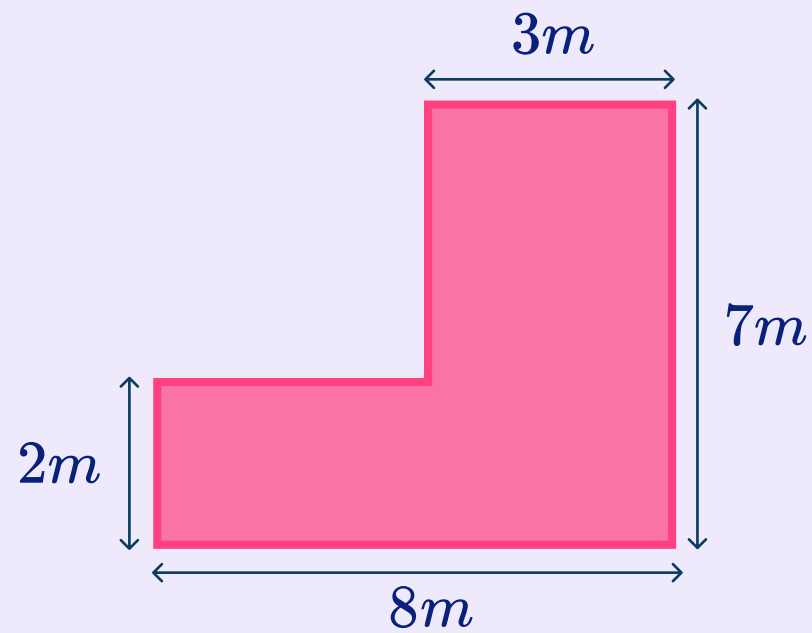
4 Find the cost of the skirting.

Cost = \times

=

Bert is laying wiring around the edge of his dining room.

A diagram is shown below.

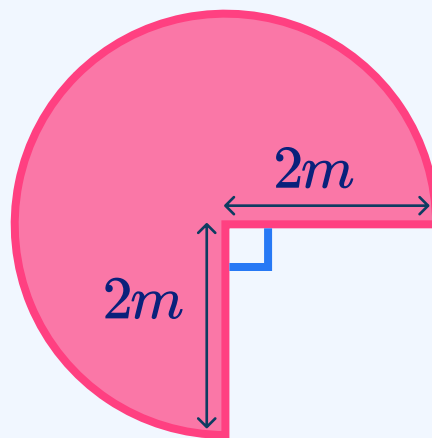


The wire costs £2.50 per metre to buy and can be cut to any length.

How much will it cost him to buy exactly enough wire?

Ian has dug a flower bed in his garden.

A diagram is shown below.

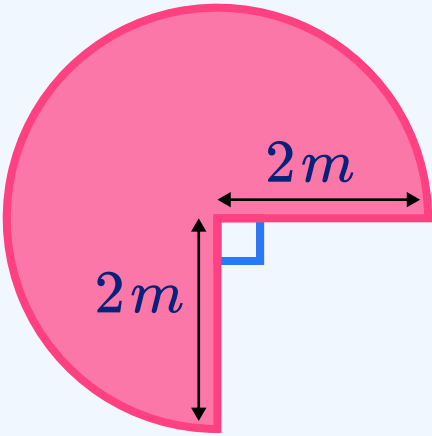


He wants to cover it with flower seeds, costing £1.99 per packet.

Each packet covers $3m^2$.

How much will it cost to cover the entire flower bed?

Ian has dug a flower bed in his garden.
A diagram is shown below.



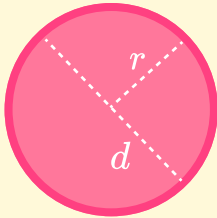
He wants to cover it with flower seeds, costing £1.99 per packet.
Each packet covers $3m^2$.
How much will it cost to cover the entire flower bed?

The **area** of a shape is the amount of space inside it.

- 1 Find the area of the flower bed.

Remember:

$A = \pi r^2$



- 2 Work out how many packets of seeds Ian needs.

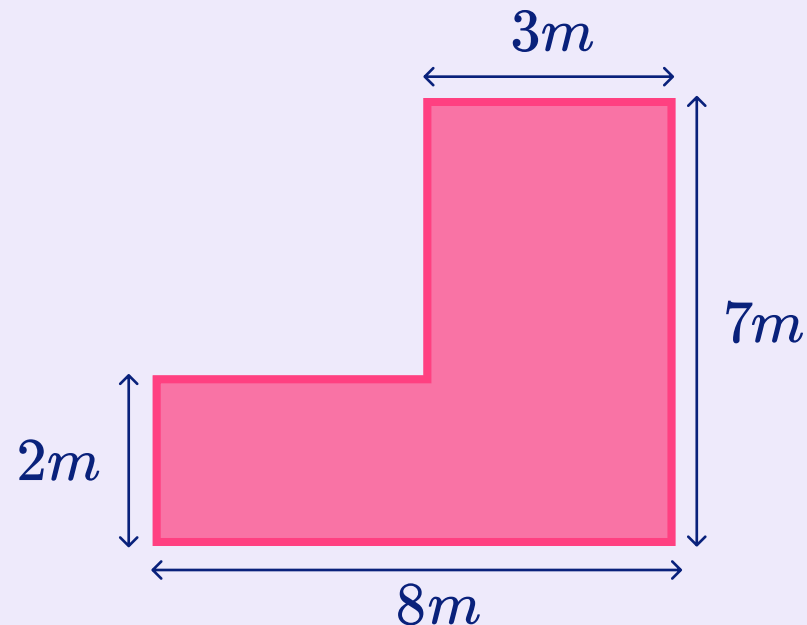
$$\frac{\text{Area of flower bed}}{\text{Area covered by one packet}} = \text{Number of packets}$$

- 3 Work out how much the seeds will cost him.

$$\text{Cost} = \text{Number of packets} \times \text{Cost per packet}$$

Your turn...

Alex wants to carpet his dining room.
A diagram is shown below.



Carpet can only be bought in rolls.
Each roll will cover $4m^2$ and will cost
£25.99.

He has budgeted £200 for the carpet;
does he have enough money?

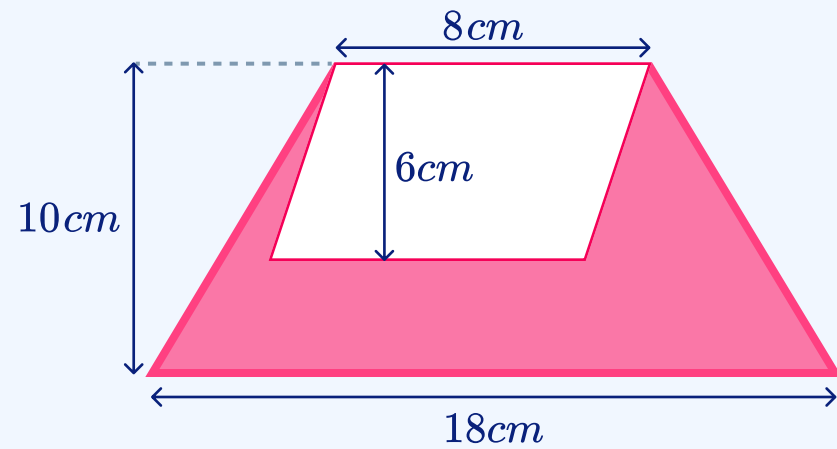
A **compound shape** is made of two or more smaller shapes.

Break it into pieces and sum the areas together.

$$\text{Total Area} = \text{Area 1} + \text{Area 2}$$

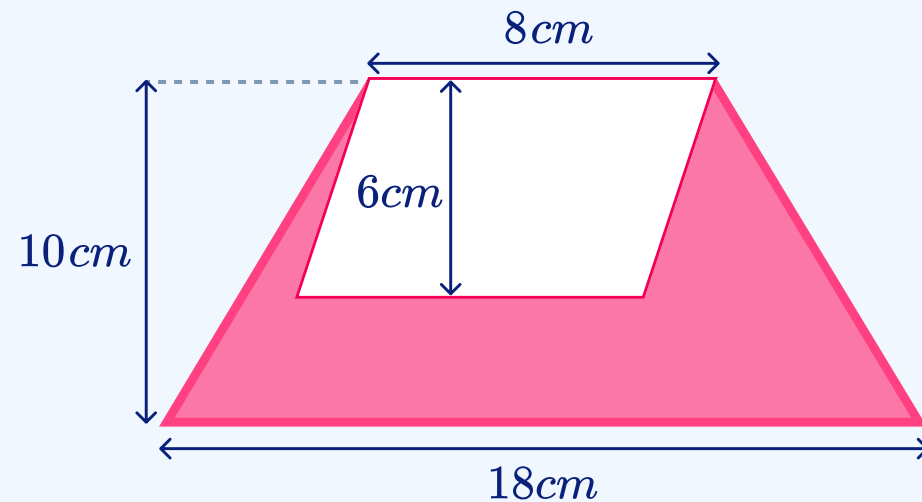
Try this exam-style question...

Find the shaded area of the shape.



Let's go through it together...

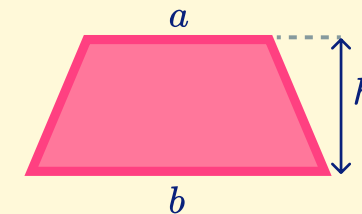
Find the shaded area of the shape.



We can work out the area of part of a shape by using subtraction.

- 1 Find the area of the large trapezium.

Remember:



$$A = \frac{a + b}{2} \times h$$

- 2 Find the area of the parallelogram.

Remember:

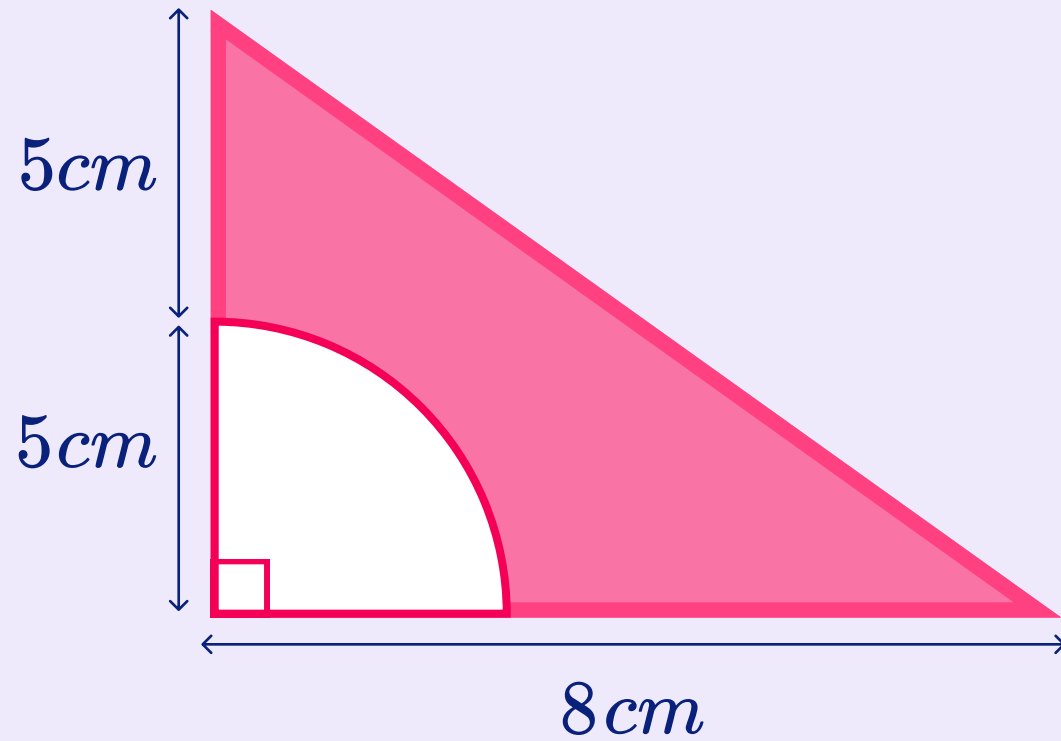


$$A = base \times h$$

- 3 Find the shaded area.

Your turn...

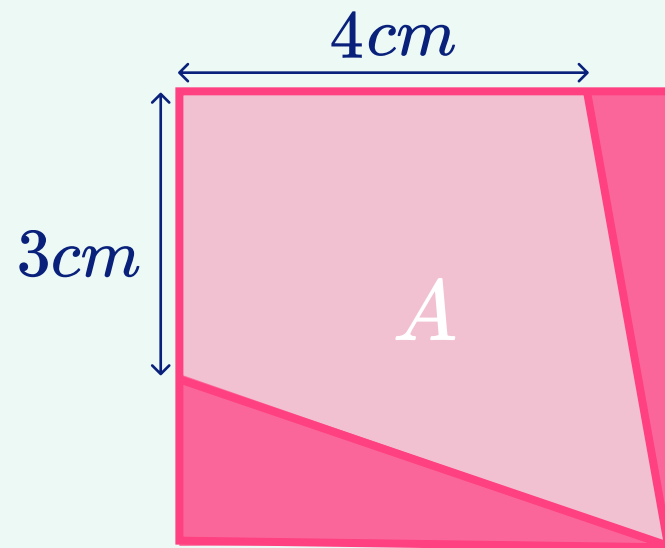
Find the shaded area of the shape.
Give your answer to 1 decimal
place.



(3)

Ready for a Challenge?

The diagram shows a square with perimeter 20cm .



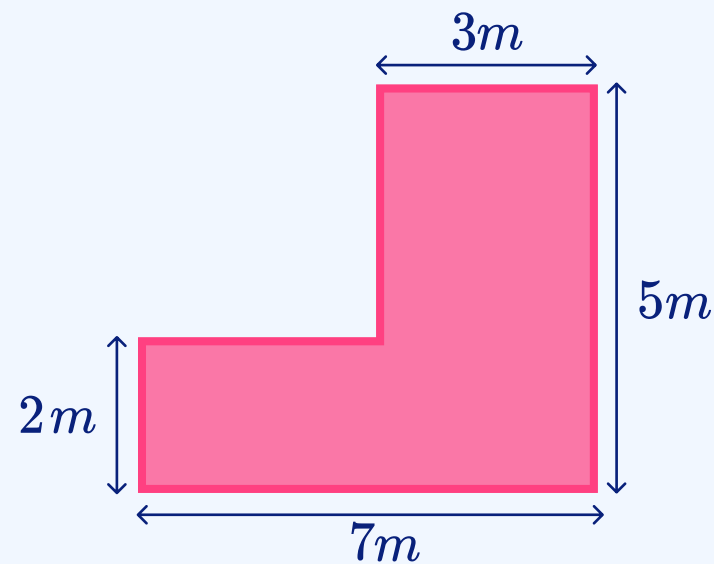
Express the area labelled A as a fraction of the whole square.

We can work out the **area** of part of a shape as a proportion of the whole shape.

Just find the **total area**, and write the part we need as as a **fraction out of the total**.

Can you correct the answers to the questions below?

Tom is hanging bunting along each wall of their living room. Each pack contains 3m of bunting. How many packs of bunting does Tom need?

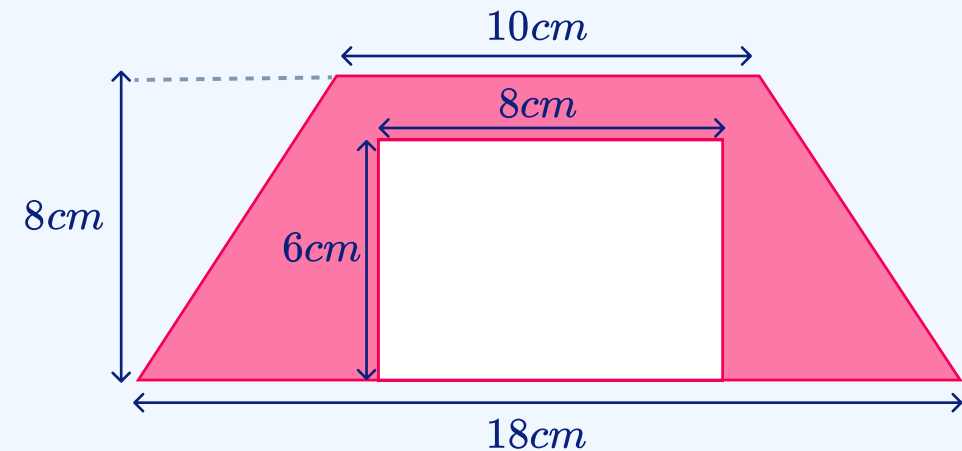


$$P = 3 + 5 + 2 + 7 = 17m$$

$$\begin{aligned} \text{Packs} &= 17 \div 3 = 5.6... \\ &= 5 \text{ packs} \end{aligned}$$

5 packs

Find the shaded area of the shape.



$$\begin{aligned} \text{Parallelogram} &= 18 \times 8 \div 2 \\ &= 72 \end{aligned}$$

$$\begin{aligned} \text{Rectangle} &= 8 \times 6 \\ &= 48 \end{aligned}$$

$$72 - 48 = 24\text{cm}^2$$

Where to go next?

For more diagnostic questions, and GCSE maths revision resources and worksheets to support students in fixing any misconceptions take a look at the free Third Space Learning [GCSE maths revision](#) pages.

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