Measurement: Area of Composite Shapes

Aim:	**Success Criteria:**	**Resources:**
Calculate and compare the area of rectangles (including squares), including using standard units, square centimetres (cm^2) and square metres (m^2), and estimate the area of irregular shapes. To calculate the area of composite shapes.	I can separate composite shapes into separate rectangles. I can multiply the length and width of each rectangle. I can add the area of each rectangle together to find the total area of a composite shape. I can explain how to efficiently separate composite shapes into rectangles.	Lesson Pack Plain paper Squared paper
	Key/New Words: Area, length, width, rectangle, square, standard unit, square centimetres, square metres, composite.	**Preparation:** Diving into Mastery Sheets – per child Area of Composite Shapes Activity Sheet – Per child

Prior Learning: It will be helpful if children have learned how to calculate the area of rectangles.It would also be helpful if children have previously found unknown sides within composite shapes.

Learning Sequence

	**Remember It:** Children revisit prior learning, ordering the total area of each rectangle from smallest to largest. Can children multiply the length and width of a given rectangle?	
	**Finding Unknown Sides:** Using the composite rectilinear shape on the Lesson Presentation, children are reminded how to find unknown sides.	
	**Area of Composite Shapes:** Using the definition featured on the Lesson Presentation, children learn what a composite shape is. They use this definition and their understanding of how to find the area of rectangles to find the area of the composite shape shown. They multiply the length and width of separate rectangles and then add the answers to find the area. Can children add the area of each rectangle together to find the total area of a composite shape?	
	**Area with Missing Lengths:** Children explore what happens when composite shapes are not clearly divided into separate rectangles. They calculate missing lengths from composite shapes shown on the Lesson Presentation, before separating the shapes into separate rectangles using vertical or horizontal lines. Can children separate composite shapes into separate rectangles?	
	**Being Mathematically Efficient:** Children consider the benefits and constraints of splitting the composite shapes differently on the Lesson Presentation. They consider the most mathematically efficient way to calculate the area of a composite shape using the lengths and widths that have been given. Can children explain how to efficiently separate composite shapes into rectangles?	
	**Area 41:** Children calculate then decide which of the composite shapes shown on the Lesson Presentation have a total area of 41cm^2. They use reasoning to explain their answers.	
	**Your Turn!** Using the word problem on the Lesson Presentation, the children work out how to find the area of composite shapes where rectangles and squares are positioned in the middle.	

Area of Composite Shapes: Children complete the differentiated Area of Composite Shapes Activity Sheet, showing that they can calculate the area of composite shapes.

Children calculate the area of composite shapes that are visibly separated into rectangles.

Children calculate the area of composite shapes that do not have visibly separated lines drawn within rectangles. They use given dimensions to calculate missing lengths and widths within composite shapes, helping to find the total area.

Children extend their learning beyond the objective when finding the area of composite shapes with holes in the middle.

Diving into Mastery: Schools using a mastery approach may prefer to use the following as an alternative activity. These sheets might not necessarily be used in a linear way. Some children might begin at the 'Deeper' section and in fact, others may 'dive straight in' to the 'Deepest' section if they have already mastered the skill and are applying this to show their depth of understanding.

Children solve fluency questions to find the area of composite shapes. First, the shapes are divided into rectangles and all the necessary sides are given. Then the children have to calculate unknown sides and decide how best to divide the composite shapes.

To practise their fluency, children measure the sides of a composite shape in order to find the overall area. They draw three different composite shapes with a given area.

In our problem solving questions, children have to recognise when it is impossible to find the area of a composite shape because not enough information is given. An open ended question challenges children to find the dimensions of a playground with a known area.

Boxed Up: Children recap on learning, attempting to answer a worded problem with partners. They use their understanding of area to help explain their answers.

Exploreit

Designit: Using squared paper, children draw different composite shapes which have an area of 100cm². Can they include shapes with holes and gaps inside?

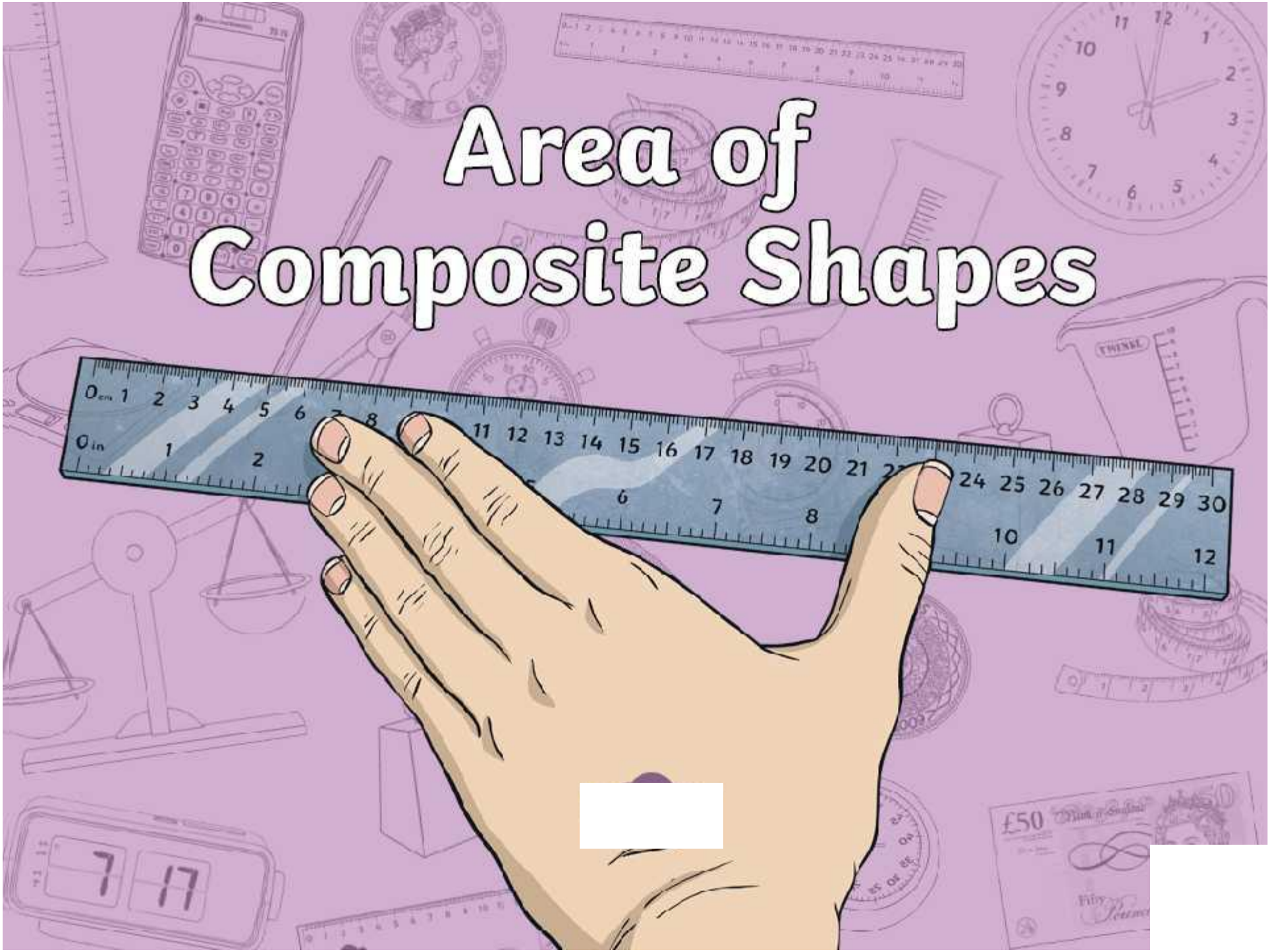
Orderit: Children draw their own composite shapes. They cut the shapes out and order them from smallest to greatest in area.

Designit: Children design a poster to explain, with examples, how to efficiently calculate the area of composite shapes.

Learnit: Children will find this visually exciting Knowledge Organiser a useful tool for strengthening skills on area and perimeter.

Maths

Measurement


Area of
Composite Shapes

Aim

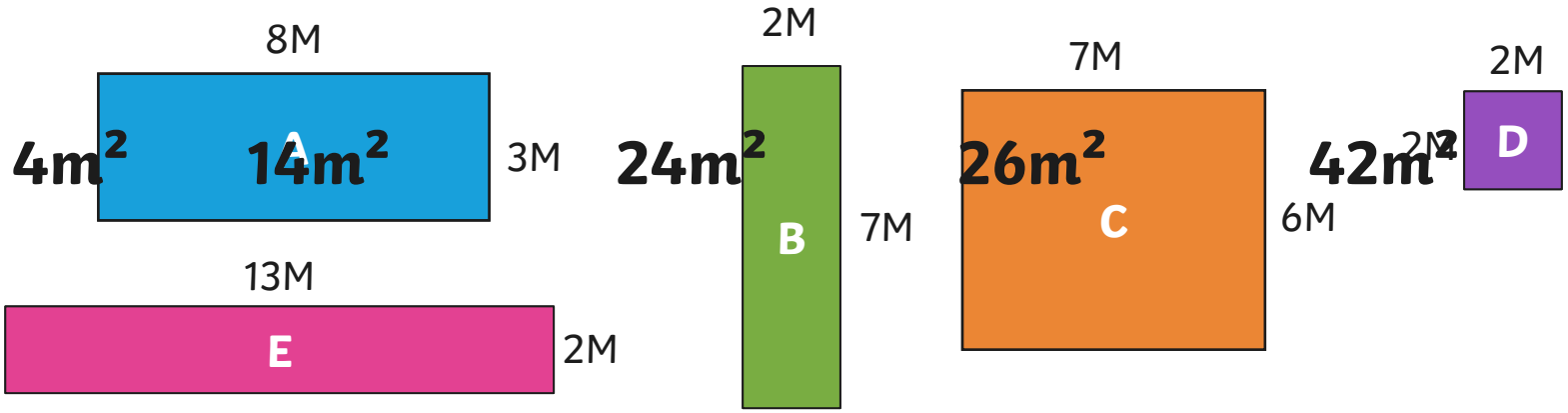
- To calculate the area of composite shapes.

Success Criteria

- I can separate composite shapes into separate rectangles.
- I can multiply the length and width of each rectangle.
- I can add the area of each rectangle together to find the total area of a composite shape.
- I can explain how to efficiently separate composite shapes into rectangles.

Remember It

Order the shapes from smallest to largest in area.



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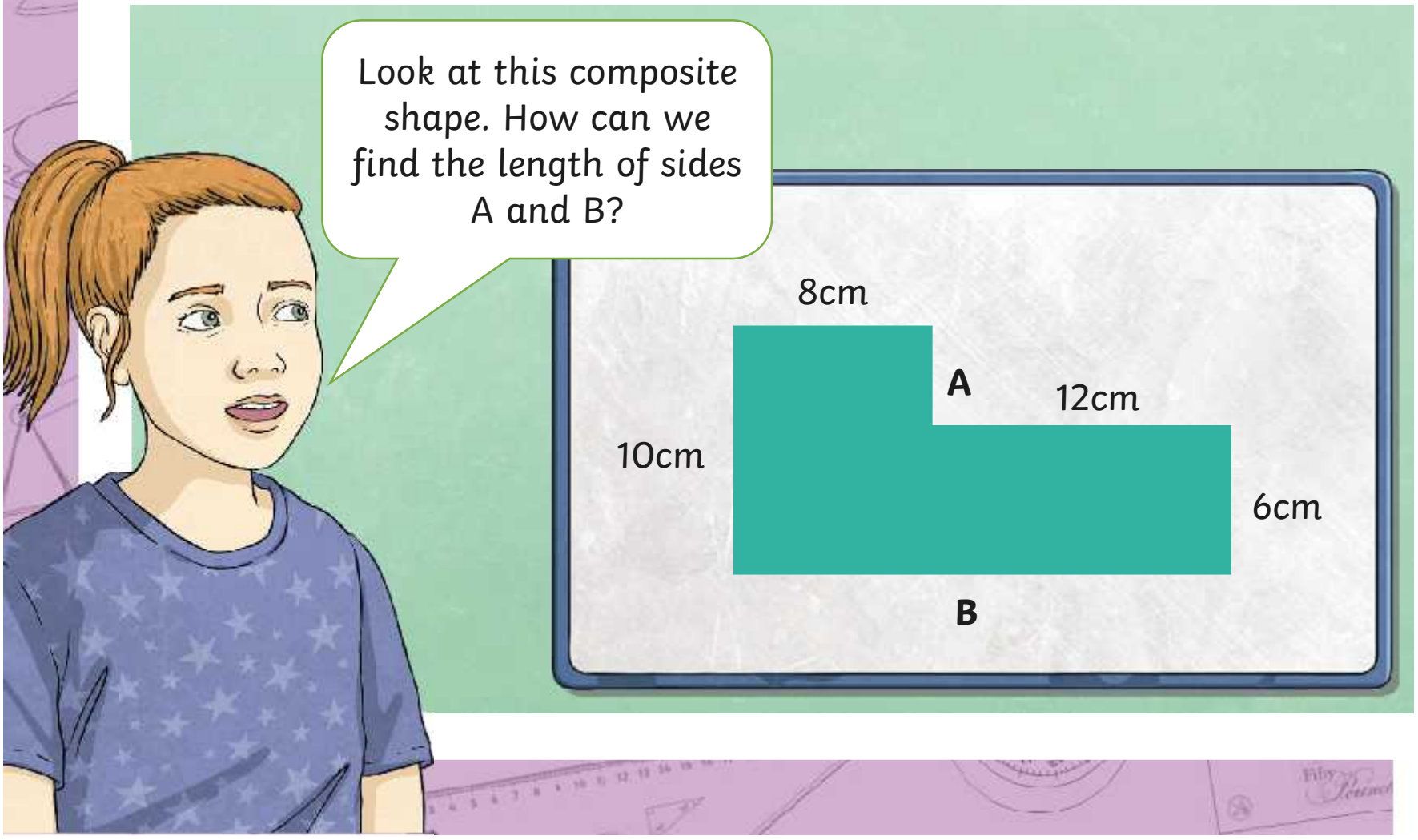
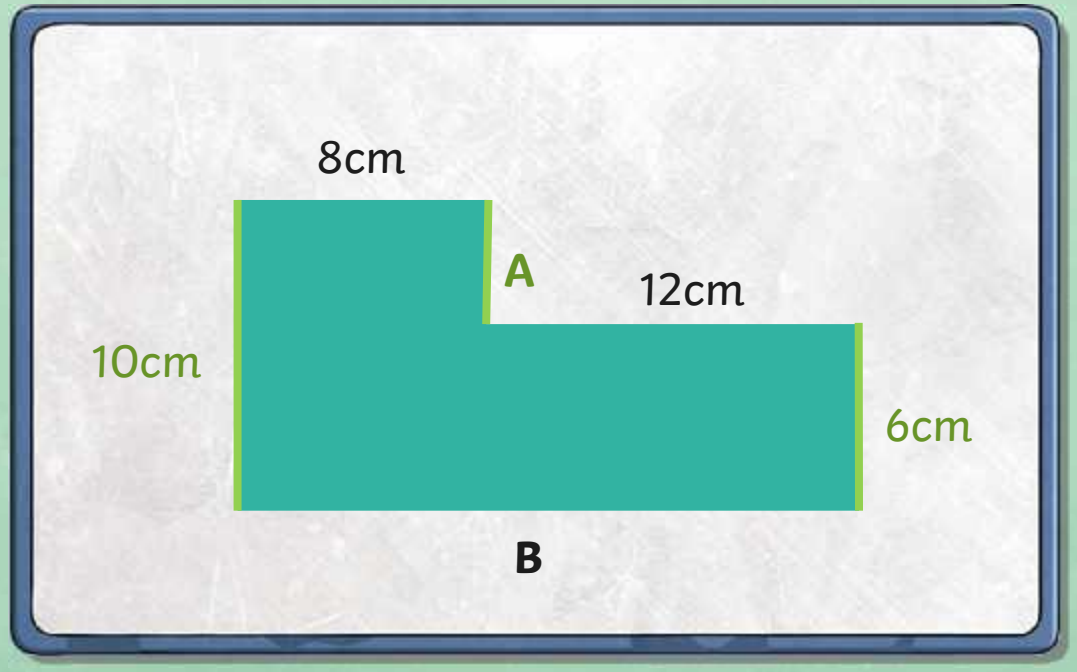
Finding Unknown Sides

In previous lessons, we have measured the perimeter of composite shapes which sometimes meant finding the length of unknown sides.



Finding Unknown Sides

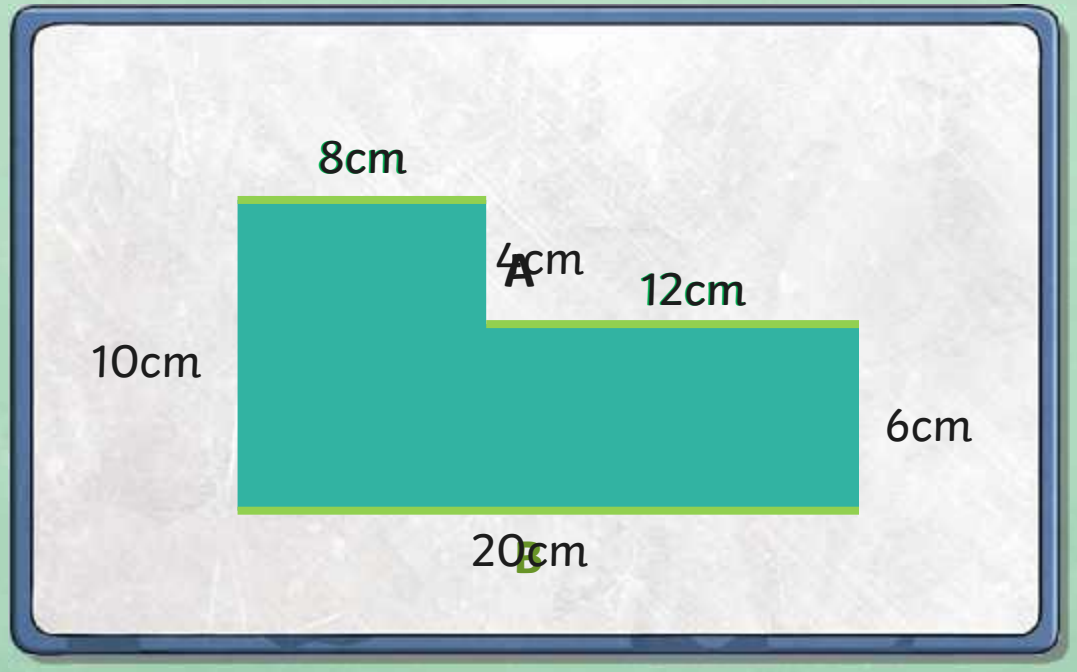
Side A and the vertical side measuring 6cm are equal to the parallel vertical side of 10cm.



A = 10cm - 6cm
A = 4cm

Finding Unknown Sides

Side B is equal in length to the parallel, horizontal sides of 8cm and 12cm.



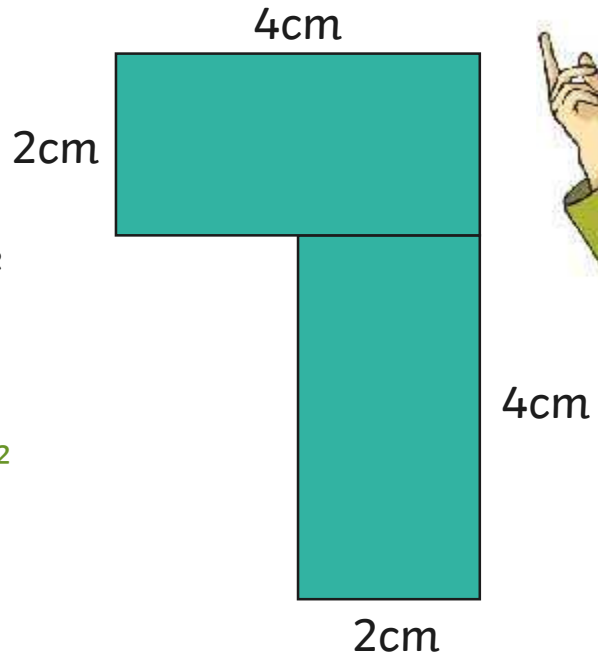
B = 8cm + 12cm

B = 20cm

Area of Composite Shapes

Today, we will learn how to calculate the area of composite shapes.
A composite shape is a figure that consists of two or more geometric shapes.

Two rectangles have been combined to make this composite shape. The length of each rectangle is 4cm and the width is 2cm.



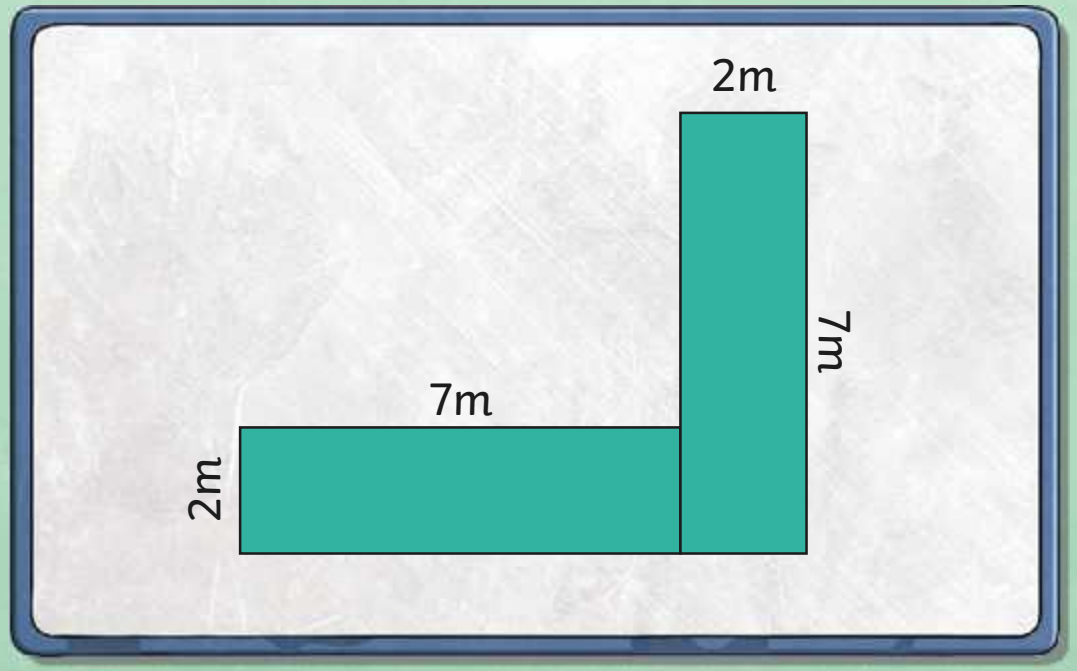
To calculate the area of the composite shape, we firstly find the area of each individual rectangle, then add the totals together.

$(4cm \times 2cm) + (4cm \times 2cm) = 16cm^2$

$8cm + 8cm = 16cm^2$

Area of Composite Shapes

Calculate the area of this composite shape.

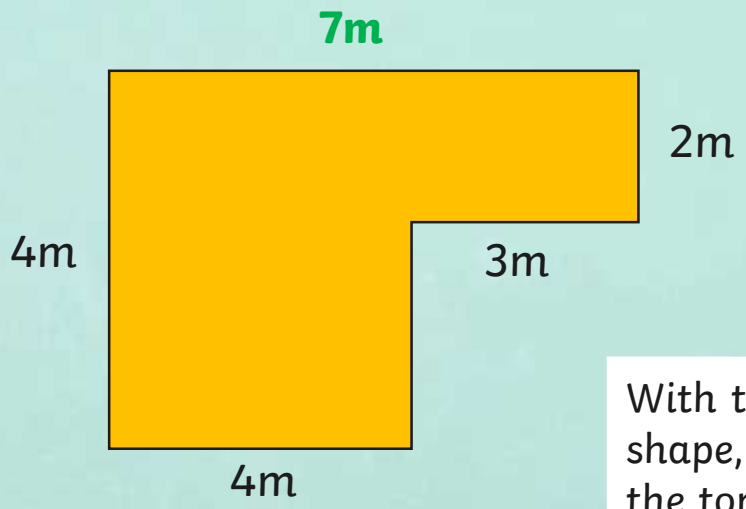


$(7m \times 2m) + (7m \times 2m) = 28m^2$

$14m + 14m = 28m^2$

Area with Missing Lengths

With many composite shapes, the rectangles are not always clearly divided. Imagine, for example, the floor of a living room.

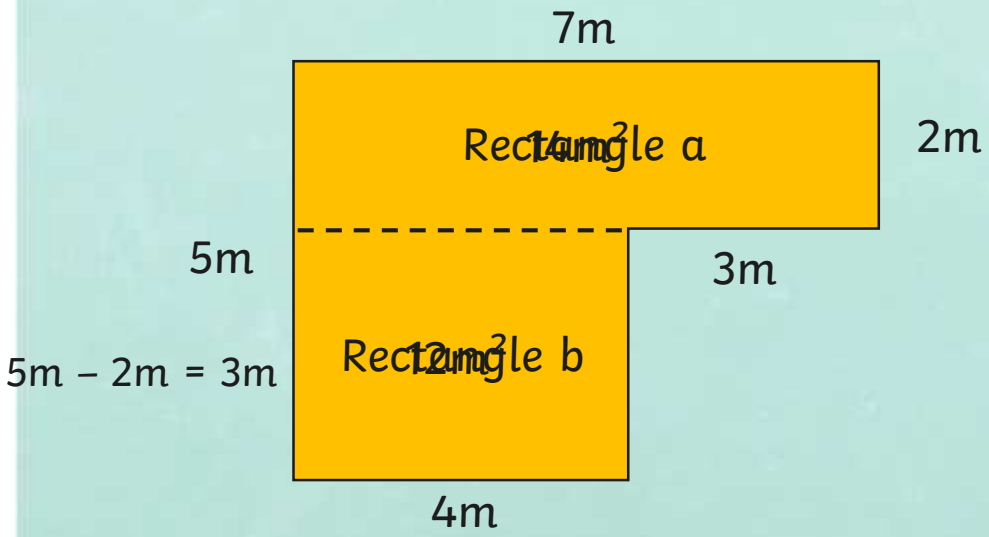


With this composite shape, the length at the top is missing.

What could it be? Use reasoning to explain your answer to a partner.

Area with Missing Lengths

Once each length is known, we can calculate the area by splitting the composite shapes into rectangles.



The total area is
$14m^2 + 12m^2 = 26m^2$.

In this example, the composite shape has been separated into two rectangles – as shown by the horizontal dotted line.

Rectangle A measures 7m by 2m. The area is $14m^2$.

To find the area of rectangle B, we first need to find the missing side.

Rectangle B measures 4m by 3m. The area is $12m^2$.

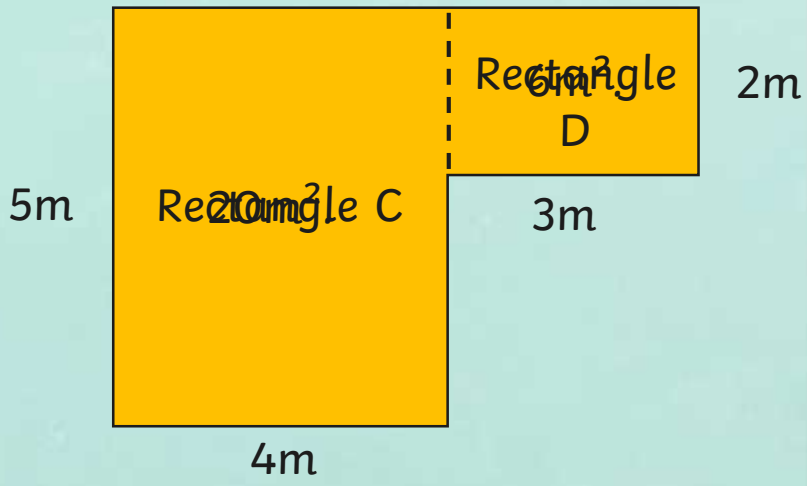
Area with Missing Lengths

In the previous example, the shape was separated into two rectangles horizontally. Could the shape be separated differently?

In this example, the composite shape has been separated into two rectangles – as shown by the vertical dotted line.

Rectangle C measures 5m by 4m. The area is $20m^2$.

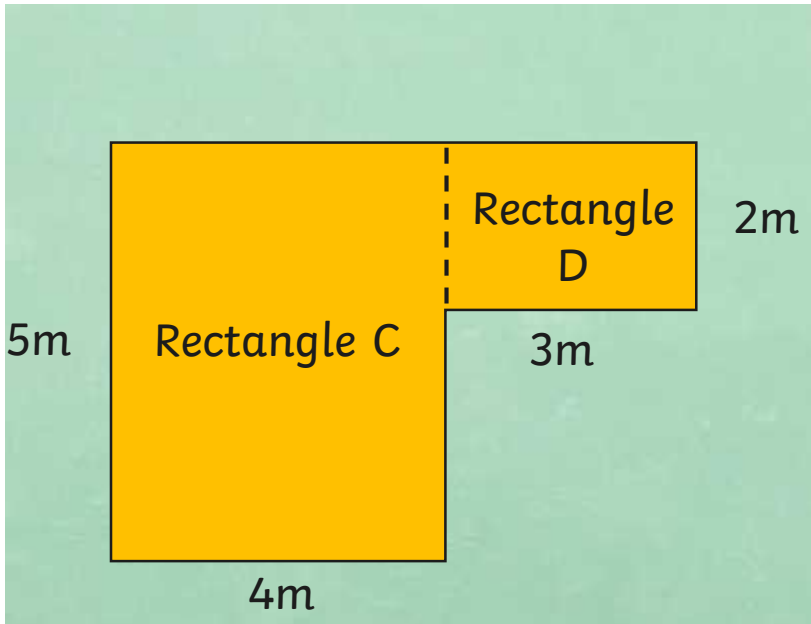
Rectangle D measures 2m by 3m. The area is $6m^2$.



The total area is $20m^2 + 6m^2 = 26m^2$.

Being Mathematically Efficient

Although the two calculations gave the same answer, the second method – shown below – was the more mathematically efficient.

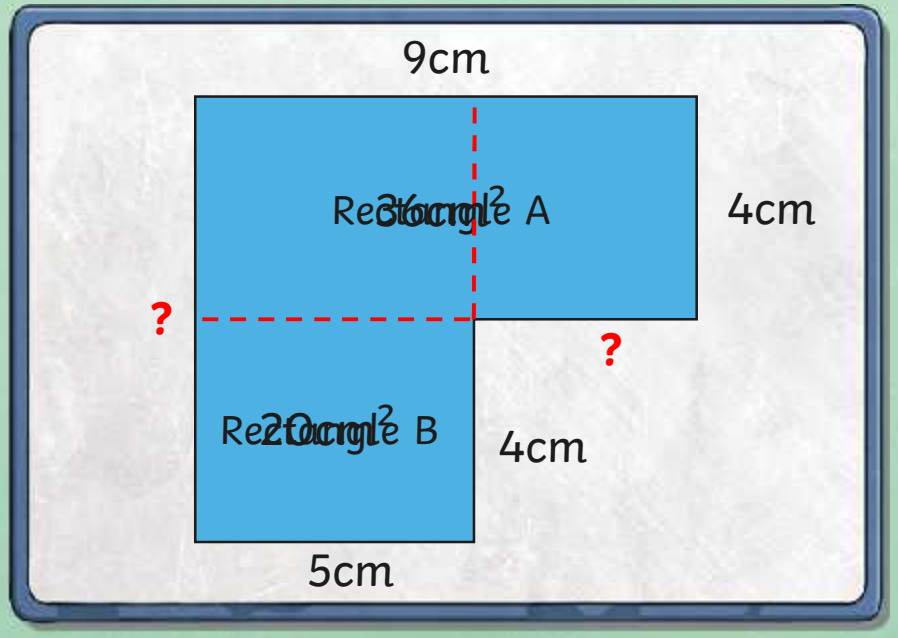


Being efficient means having the ability to accomplish something with the least time and effort.

This is because the measurements for Rectangle C and D are already visible. It makes the calculation a lot easier.

Being Mathematically Efficient

Look at the composite shape. With a partner, agree on a mathematically efficient way to separate the shape into two rectangles. Explain your thinking.



If you split the shapes vertically, you would have to calculate 2 missing sides.

It is more mathematically efficient to separate the shapes horizontally as each rectangle's dimensions are given.

Rectangle A 9cm × 4cm = $36cm^2$

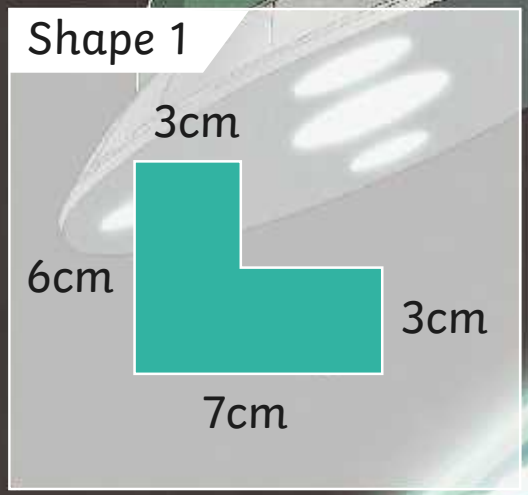
Rectangle B 5cm × 4cm = $20cm^2$

$36cm^2 + 20cm^2 = 56cm^2$

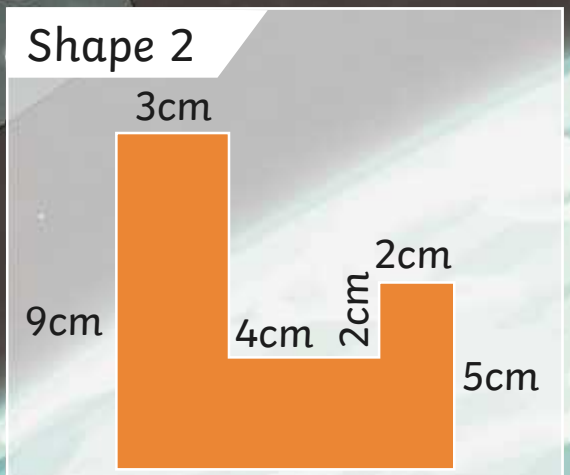
Area 41

Which of the following composite shapes has an area of 41cm^2? Explain fully.

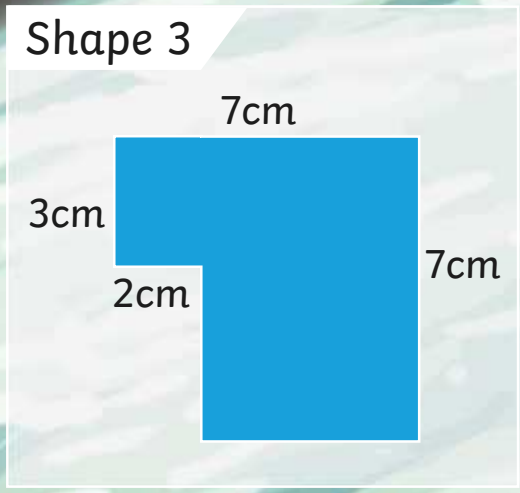
Shape 1



Shape 2



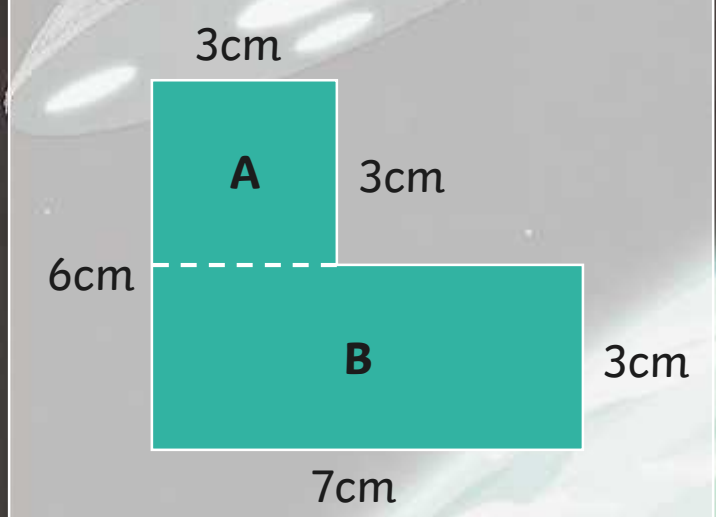
Shape 3



Area 41

Whole Class

Shape 1



Square A

$3cm \times 3cm = 9cm^2$

Rectangle B

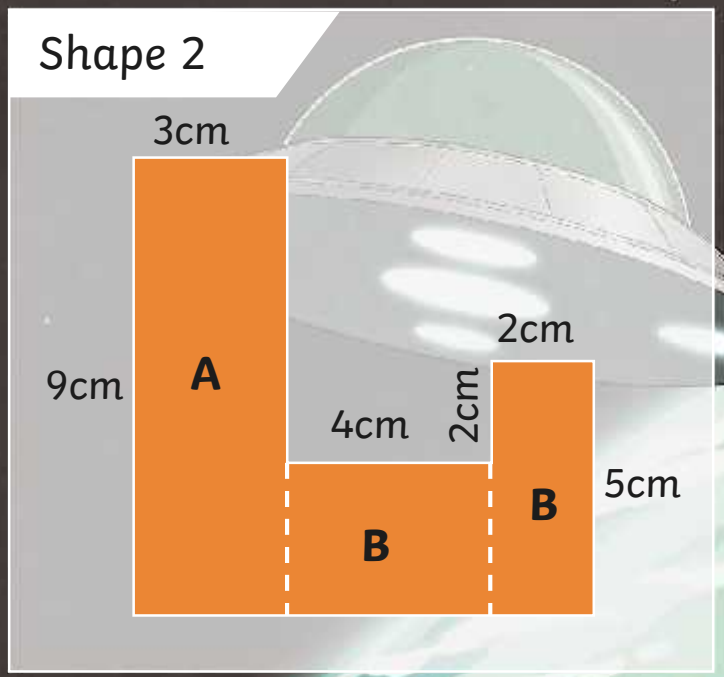
$7cm \times 3cm = 21cm^2$

$9cm^2 + 21cm^2 = 30cm^2$

This shape does not have an area of $41cm^2$.

Area 41

Whole Class



Rectangle A
$9cm \times 3cm = 27cm^2$

Rectangle B
$4cm \times 3cm = 12cm^2$

Rectangle C
$5cm \times 2cm = 10cm^2$

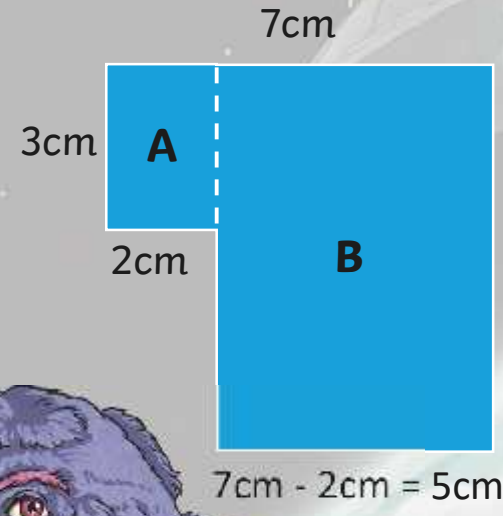
$27cm^2 + 12cm^2 + 10cm^2 = 49cm^2$

This shape does not have an area of $41cm^2$.

Area 41

Whole Class

Shape 3



Rectangle A

$3cm \times 2cm = 6cm^2$

Rectangle B

$5cm \times 7cm = 35cm^2$

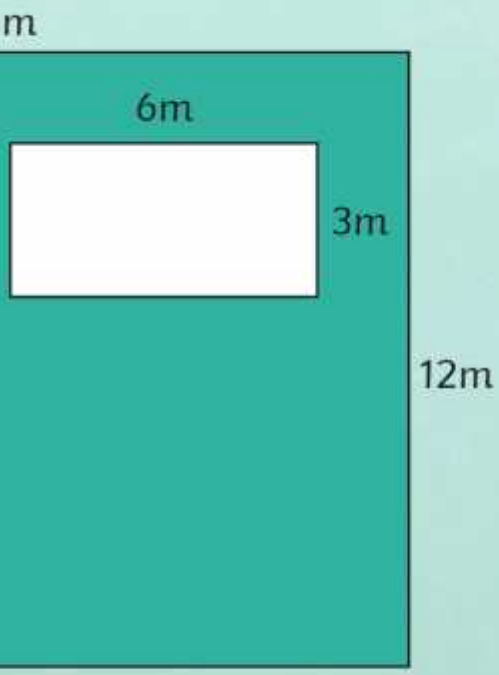
$6cm^2 + 35cm^2 = 41cm^2$

This shape has an area of $41cm^2$.

Your Turn!

The picture shows a garden with a pond at Twinkl Primary School.
Mr Jacobs, the school gardener, is laying new turf in the school garden.
To lay new grass, he needs to know how much turf he should buy.

How might the area of the garden be calculated? Discuss.



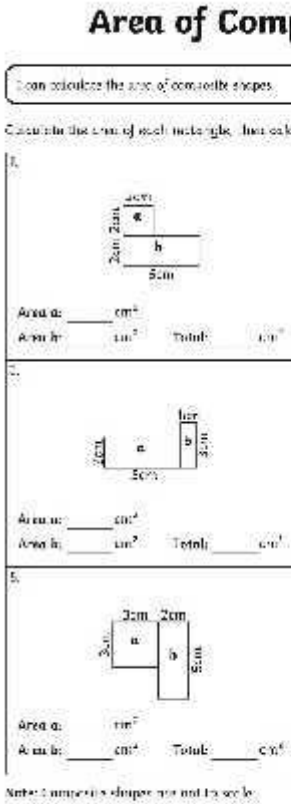
To calculate the area of turf needed, the area of the pond should be subtracted from the overall area of the garden.

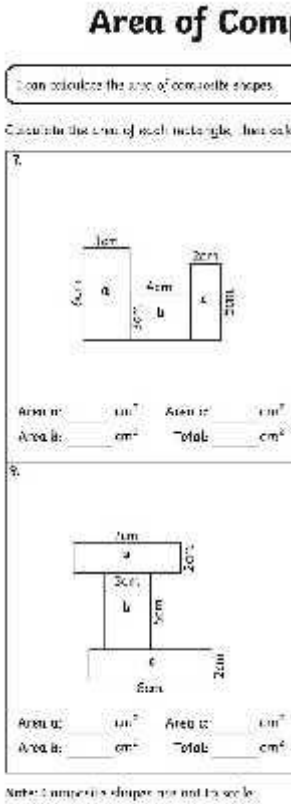
Garden
$16m \times 12cm = 192m^2$

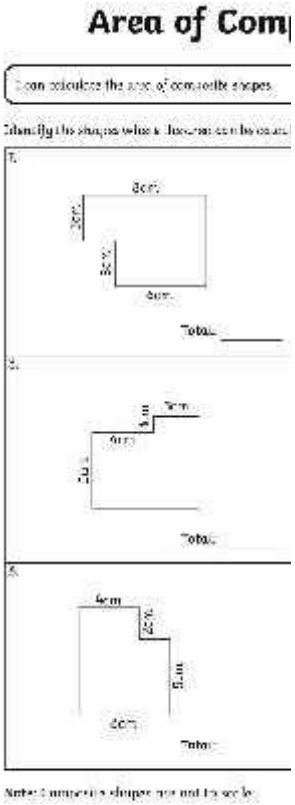
Pond
$6\ cm \times 3cm = 18m^2$

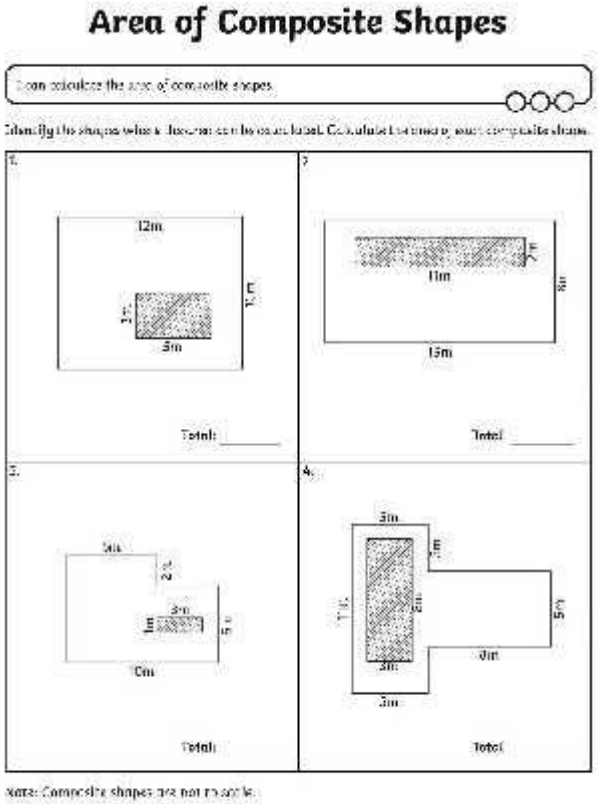
$192m^2 - 18m^2 = 174m^2$

Area of Composite Shapes



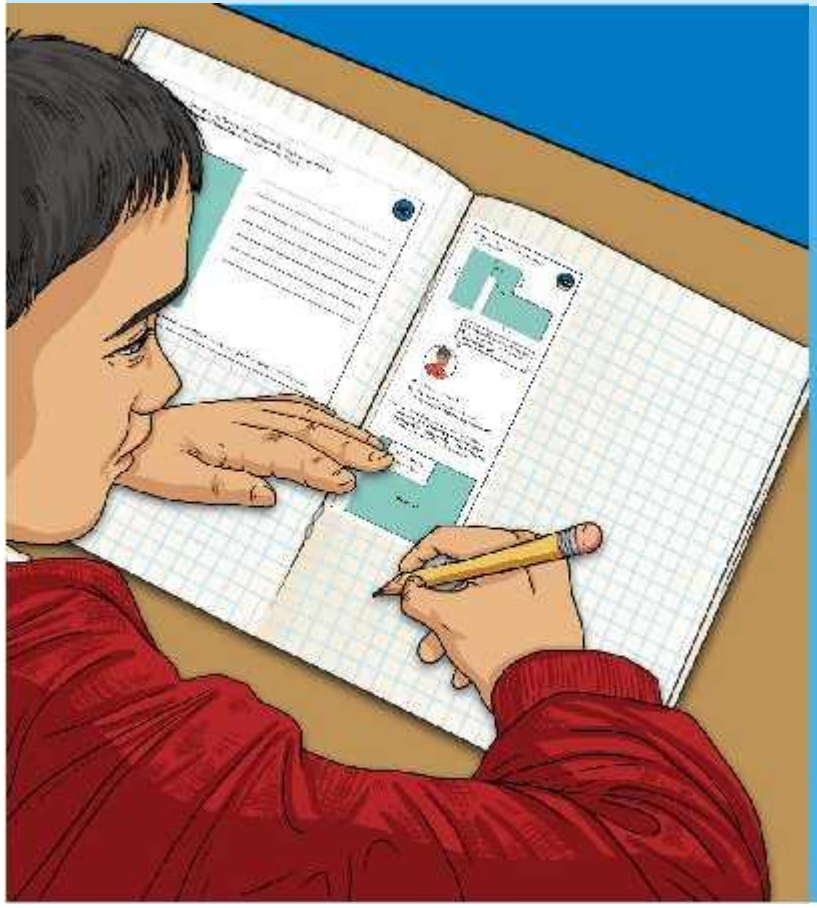


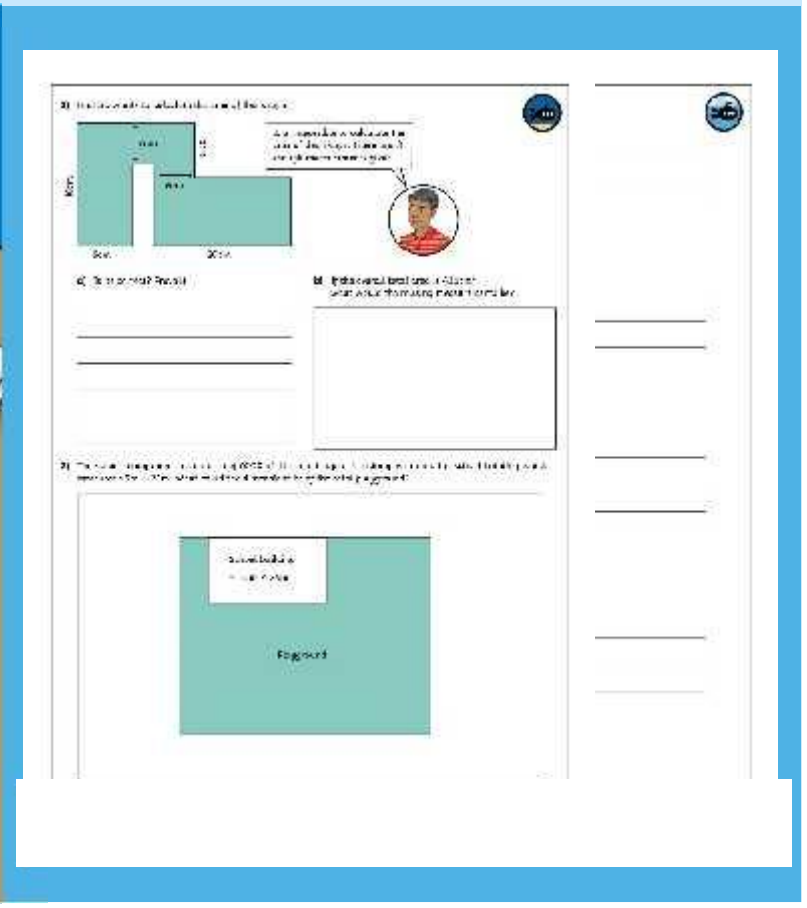




Diving into Mastery

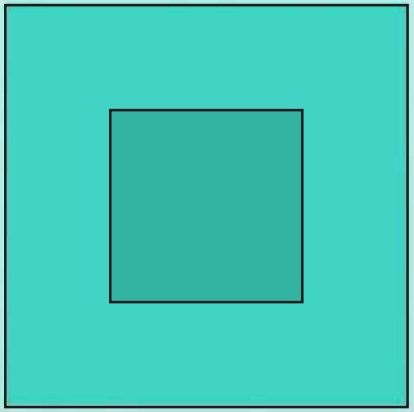
Dive in by completing your own activity!





Boxed Up

The diagram shows a square inside another square.



16m

The area of the inner square is four times smaller than the area of the outer square.

With a partner, calculate the overall area of each square.

Outer square = 16m × 16m = $256m^2$

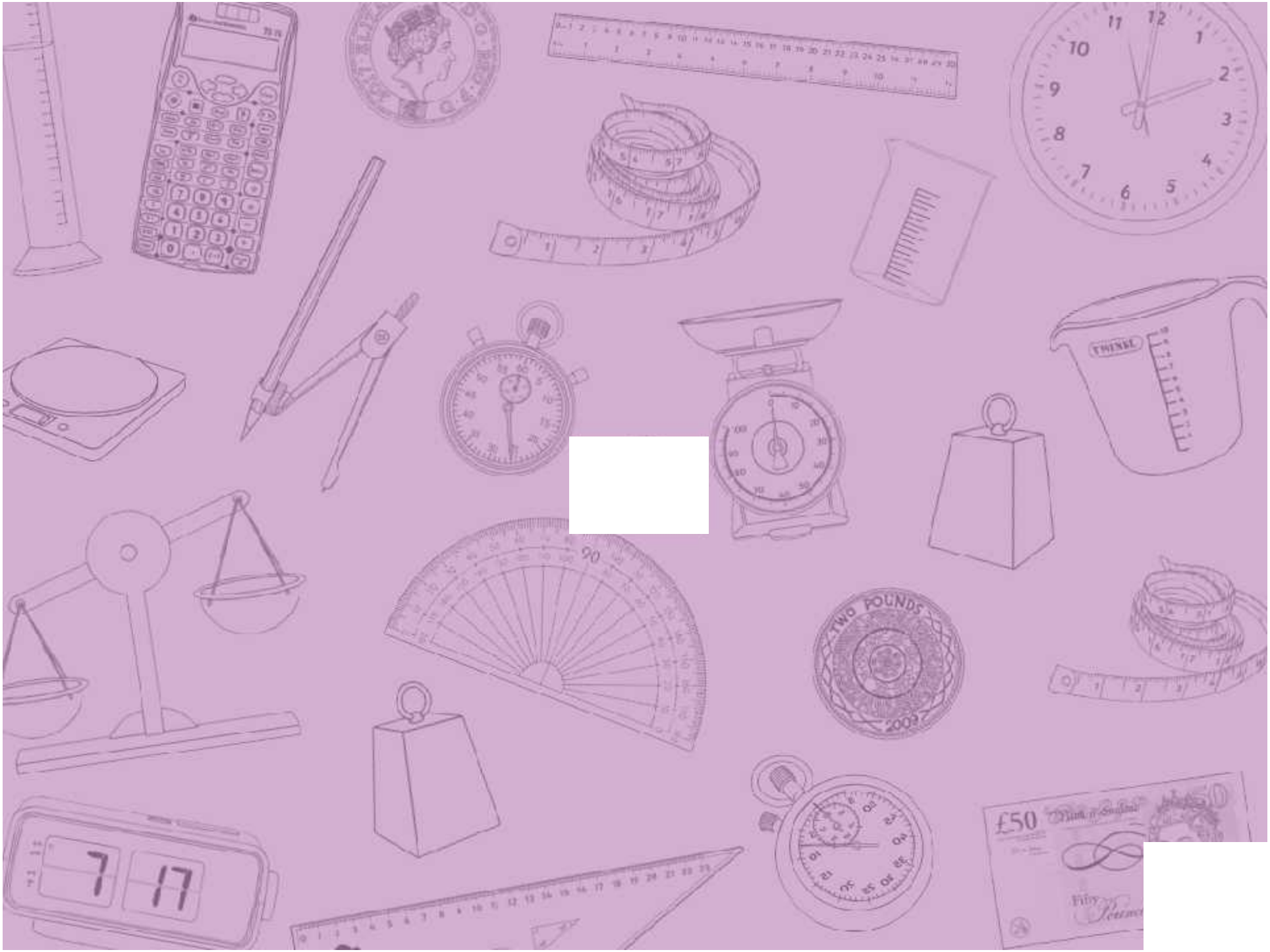
Inner square = $256m^2 \div 4 = 64m^2$

Aim

- To calculate the area of composite shapes.

Success Criteria

- I can separate composite shapes into separate rectangles.
- I can multiply the length and width of each rectangle.
- I can add the area of each rectangle together to find the total area of a composite shape.
- I can explain how to efficiently separate composite shapes into rectangles.


TWO POUNDS
£50

Aim : To calculate the area of composite shapes.				**Date:**					
				Delivered By:			**Support:**		
Success Criteria	**Me**	**Friend**	**Teacher**	**T**	**PPA**	**S**	**I**	**AL**	**GP**
I can separate composite shapes into separate rectangles.				**Notes/Evidence**					
I can multiply the length and width of each rectangle.									
I can add the area of each rectangle together to find the total area of a composite shape.									
I can explain how to efficiently separate composite shapes into rectangles.									

Next Steps

- _____
- _____

T	Teacher	**I**	Independent
PPA	Planning, Preparation and Assessment	**AL**	Adult Led
S	Supply	**GP**	Guided Practice

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Next Steps

- _____
- _____

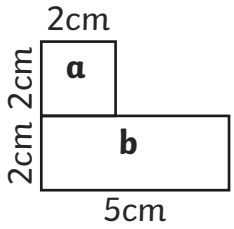
T	Teacher	**I**	Independent
PPA	Planning, Preparation and Assessment	**AL**	Adult Led
S	Supply	**GP**	Guided Practice

Area of Composite Shapes

I can calculate the area of composite shapes.

Calculate the area of each rectangle, then calculate the area of the whole composite shape.

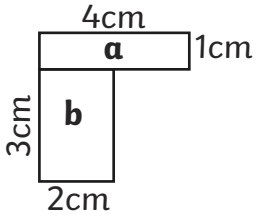
1.



Area a: _____ cm^2

Area b: _____ cm^2 **Total:** _____ cm^2

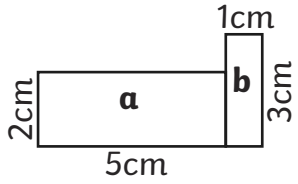
2.



Area a: _____ cm^2

Area b: _____ cm^2 **Total:** _____ cm^2

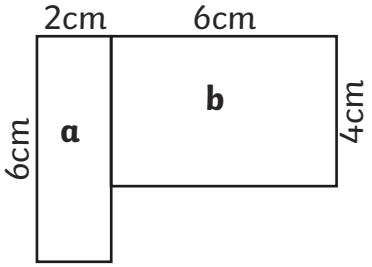
3.



Area a: _____ cm^2

Area b: _____ cm^2 **Total:** _____ cm^2

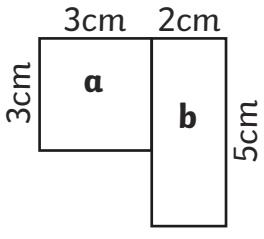
4.



Area a: _____ cm^2

Area b: _____ cm^2 **Total:** _____ cm^2

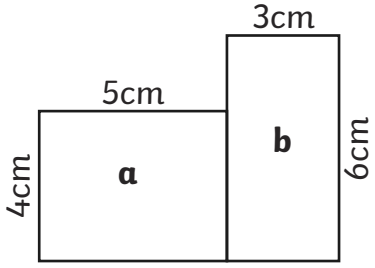
5.



Area a: _____ cm^2

Area b: _____ cm^2 **Total:** _____ cm^2

6.



Area a: _____ cm^2

Area b: _____ cm^2 **Total:** _____ cm^2

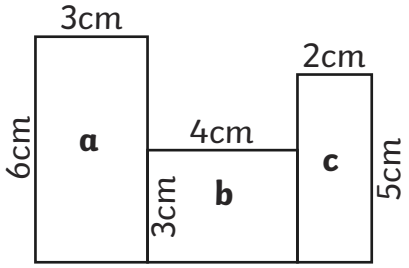
Note: Composite shapes are not to scale.

Area of Composite Shapes

I can calculate the area of composite shapes.

Calculate the area of each rectangle, then calculate the area of the whole composite shape.

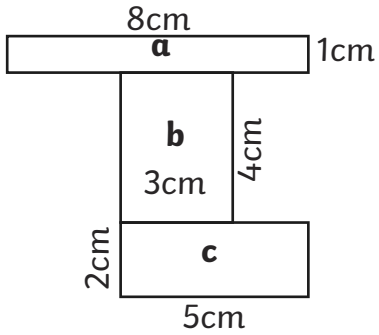
7.



Area a: _____ cm^2 **Area c:** _____ cm^2

Area b: _____ cm^2 **Total:** _____ cm^2

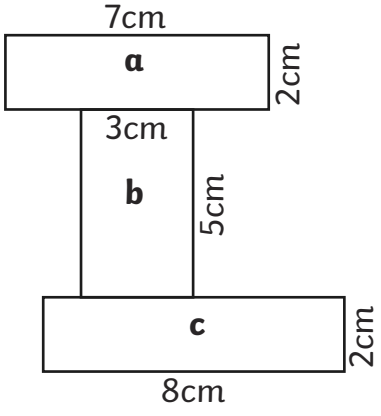
8.



Area a: _____ cm^2 **Area c:** _____ cm^2

Area b: _____ cm^2 **Total:** _____ cm^2

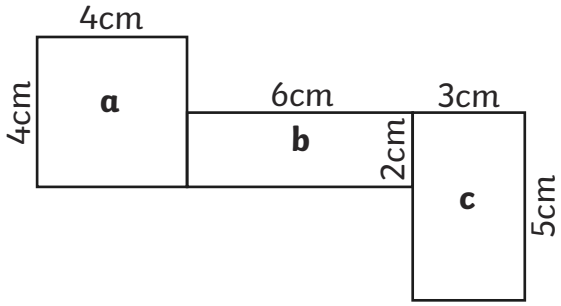
9.



Area a: _____ cm^2 **Area c:** _____ cm^2

Area b: _____ cm^2 **Total:** _____ cm^2

10.



Area a: _____ cm^2 **Area c:** _____ cm^2

Area b: _____ cm^2 **Total:** _____ cm^2

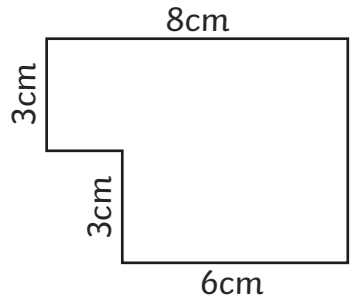
Note: Composite shapes are not to scale.

Area of Composite Shapes

I can calculate the area of composite shapes.

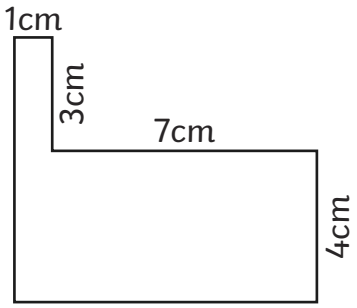
Identify the shapes where the area can be calculated. Calculate the area of each composite shape.

1.



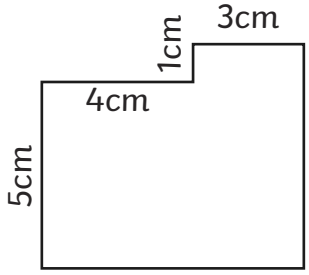
Total: _____

2.



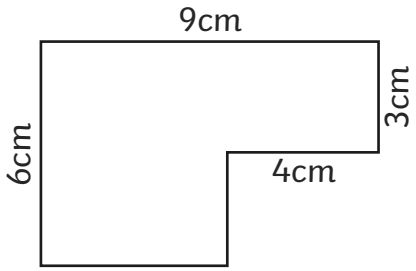
Total: _____

3.



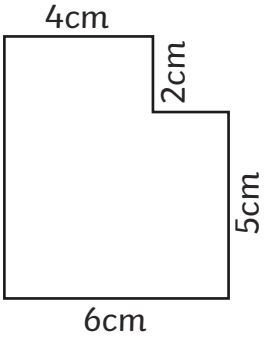
Total: _____

4.



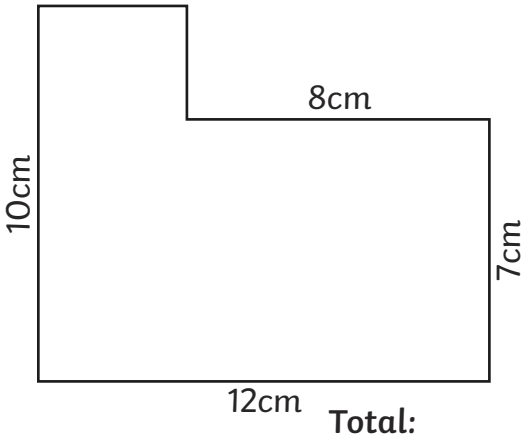
Total: _____

5.



Total: _____

6.



Total: _____

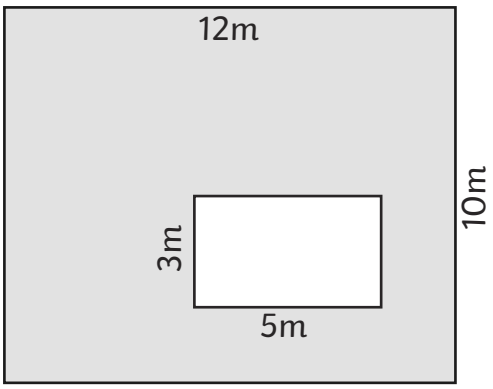
Note: Composite shapes are not to scale.

Area of Composite Shapes

I can calculate the area of composite shapes.

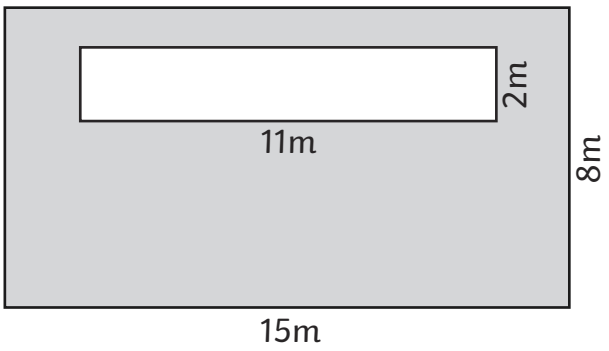
Calculate the shaded area of each shape.

1.



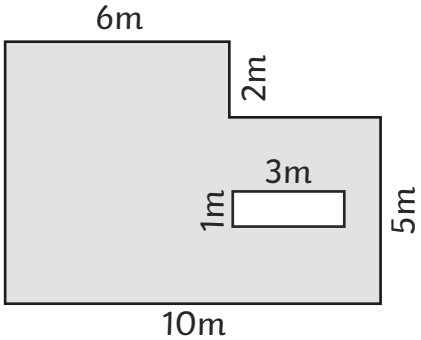
Total: _____

2.



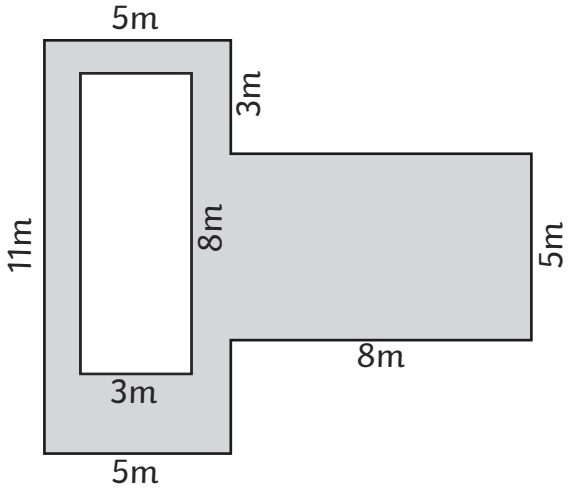
Total: _____

3.



Total: _____

4.



Total: _____

Note: Composite shapes are not to scale.

Area of Composite Shapes **Answers**

1* Answers

Question	Answer
Identify the shapes where the area can be calculated. Calculate the area of each compound shape.	
1	Area a: **4cm²** Area b: **10cm²** Total: **14cm²**
2	Area a: **4cm²** Area b: **6cm²** Total: **10cm²**
3	Area a: **10cm²** Area b: **3cm²** Total: **13cm²**
4	Area a: **12cm²** Area b: **24cm²** Total: **36cm²**
5	Area a: **9cm²** Area b: **10cm²** Total: **19cm²**
6	Area a: **20cm²** Area b: **18cm²** Total: **38cm²**
7	Area a: **18cm²** Area b: **12cm²** Area c: **10cm²** Total: **40cm²**
8	Area a: **8cm²** Area b: **12cm²** Area c: **10cm²** Total: **30cm²**
9	Area a: **14cm²** Area b: **15cm²** Area c: **16cm²** Total: **45cm²**
10	Area a: **16cm²** Area b: **12cm²** Area c: **15cm²** Total: **43cm²**

Area of Composite Shapes **Answers**

2* Answers

Question	Answer
Identify the shapes where the area can be calculated. Calculate the area of each compound shape.	
1	Total: **42cm²**
2	Total: **35cm²**
3	Total: **38cm²**
4	Total: **42cm²**
5	Total: **38cm²**
6	Total: **96cm²**

3* Answers

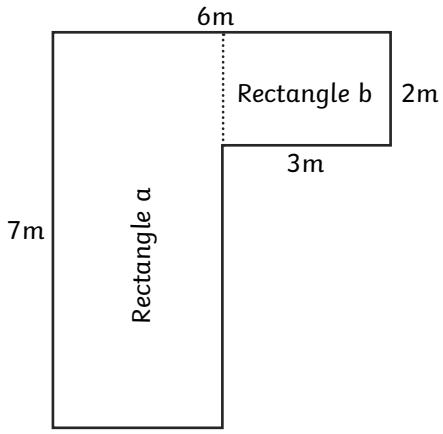
Question	Answer
Identify the shapes where the area can be calculated. Calculate the area of each compound shape.	
1	Total: **105m²**
2	Total: **98m²**
3	Total: **59m²**
4	Total: **71m²**

1)

a) Rectangle a 5m x 2m = $10m^2$
Rectangle b 3m x 1m = $3m^2$
$10m^2 + 3m^2 = 13m^2$

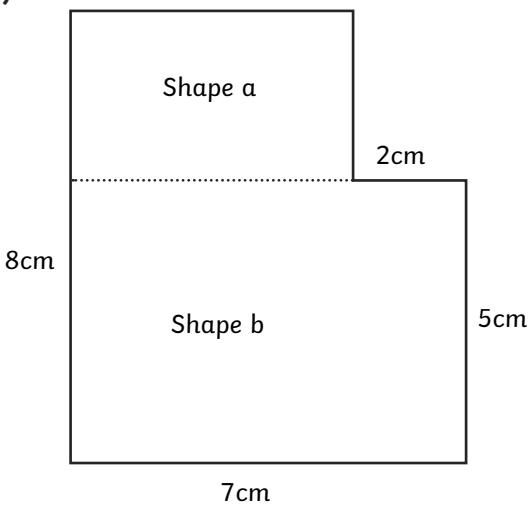
b) Rectangle a 5cm x 3cm = $15cm^2$
Rectangle b 6cm x 2cm = $12cm^2$
$15cm^2 + 12cm^2 = 27cm^2$

c)



Rectangle a 3m x 7m = $21m^2$
Rectangle b 3m x 2m = $6m^2$
$21m^2 + 6m^2 = 27m^2$

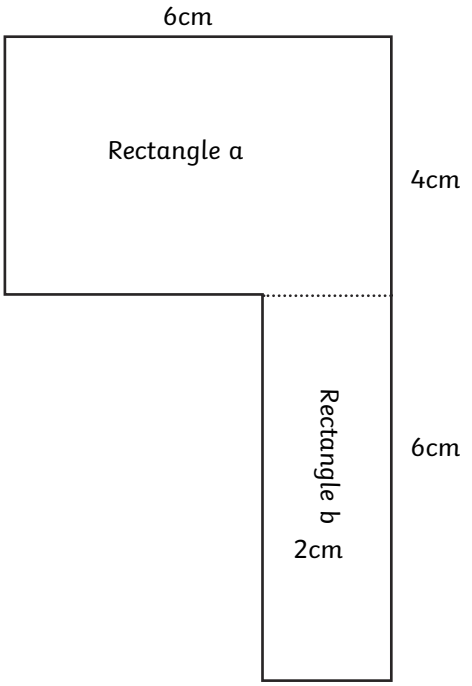
d)



Rectangle a 5cm x 3cm = $15cm^2$
Rectangle b = 7cm x 5cm = $35cm^2$
$15cm^2 + 35cm^2 = 50cm^2$

1) There are 2 ways this shape can be split up, but both should give the correct area of 36cm^2.

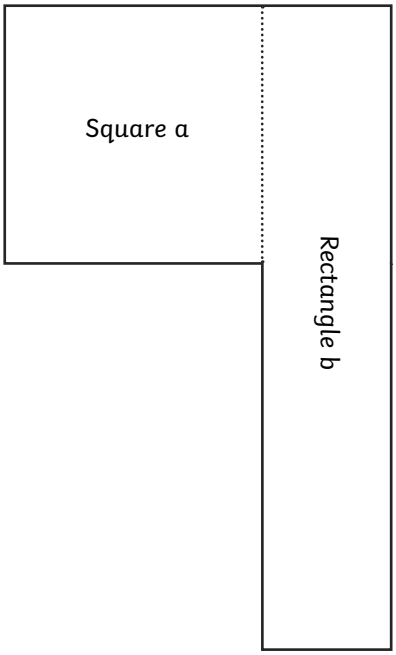
Option one



Rectangle a 6cm x 4cm = 24cm^2
Rectangle b 6cm x 2cm = 12cm^2

16cm^2 + 20cm^2 = 36cm^2

Option two



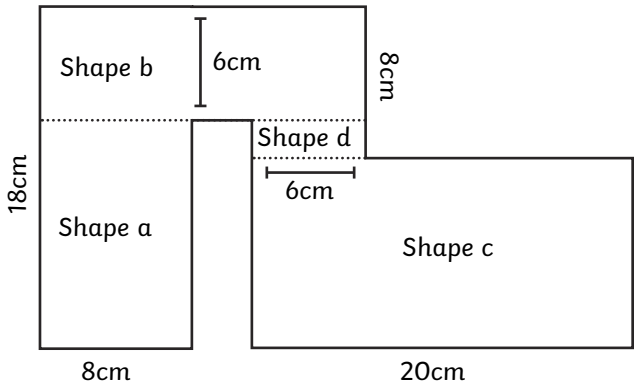
Square a 4cm x 4cm = 16cm^2
Rectangle b 10cm x 2cm = 20cm^2

16cm^2 + 20cm^2 = 36cm^2

2) Children will draw composite shapes that can be split into 2 or more parts. When calculating, children should multiply the sides of each separated rectangle, before adding the answers together to find the overall area.

Examples include
(6cm × 5cm) + (5cm × 5cm) = 55cm^2
(7cm × 5cm) + (5cm × 4cm) = 55cm^2
(8cm × 5cm) + (3cm × 5cm) = 55cm^2

1)



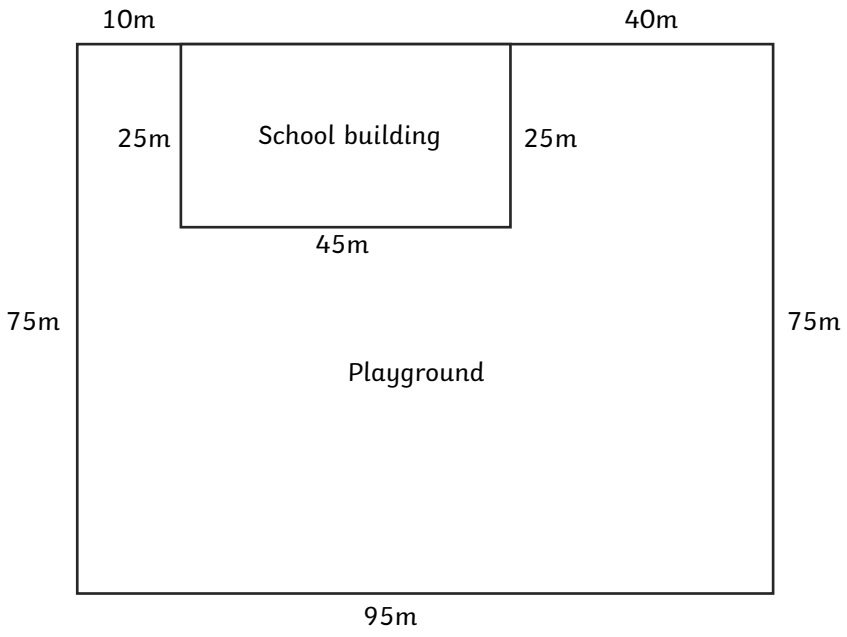
a) Lautaro is correct. It is not possible to calculate the total area of the composite shape because we can not calculate the lengths of the two top horizontal sides.

b) The measurements for the 2 missing lengths are 18cm for the top horizontal side and 4cm for the shorter horizontal side between rectangles a and d.

Rectangle a: 12cm × 8cm = $96cm^2$
Rectangle b: ? × 6cm = unknown
Rectangle c: 10cm × 20cm = $200cm^2$
Rectangle d: 2cm × 6cm = $12cm^2$

$96cm^2 + 200cm^2 + 12cm^2 = 308cm^2$
$416cm^2 - 308cm^2 = 108cm^2$
$108cm^2 \div 6cm = 18cm$
18cm – (8cm + 6cm) = 4cm

2) Open ended question with various possible answers. An example is given.



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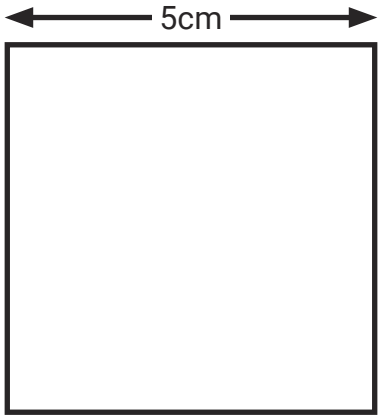
- Once Adobe Reader is installed, open your PDF.
- Go to File>Print.
- Under 'Page Sizing & Handling', select 'Size'.
- From here, make sure that 'Actual Size' is selected.
- Print this page as a test, making sure that the shape below is the correct size once printed.
- If the test print is correct, print your PDF.

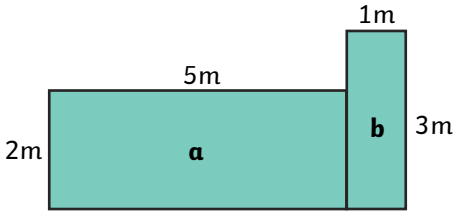
Foxit Reader

- Go to File>Print.
- Set the 'Scaling' to 'None'.

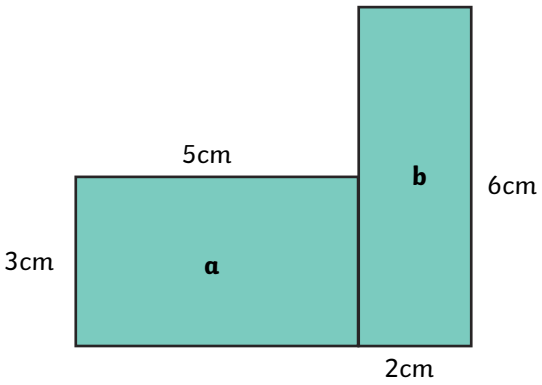


1) Find the area of the following shapes. (Shapes are not drawn to scale)

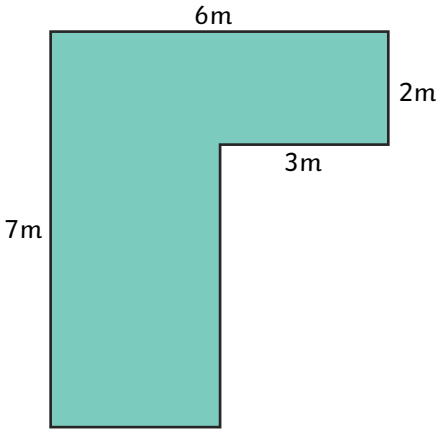
a)



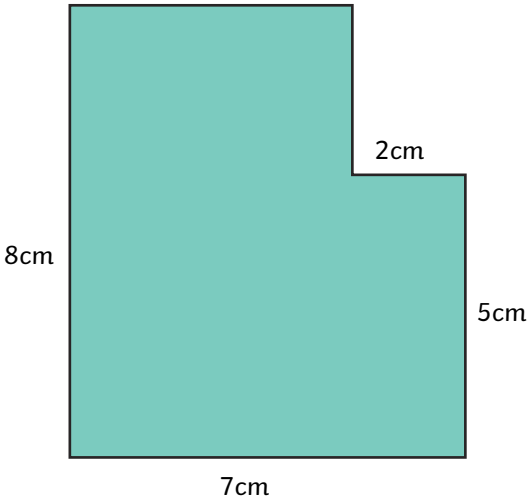
b)



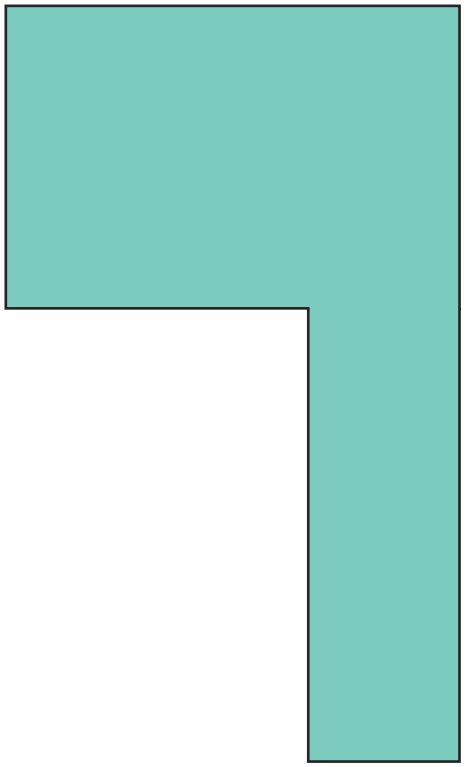
c)



d)

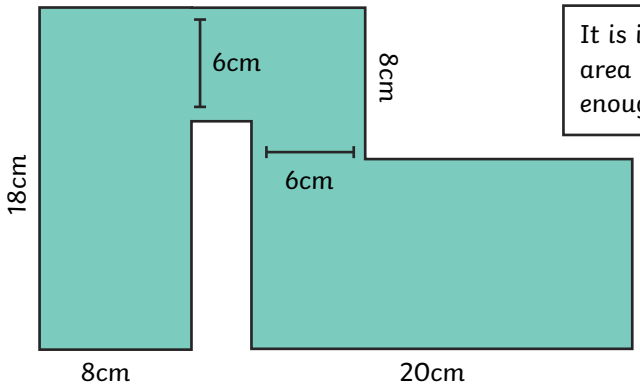


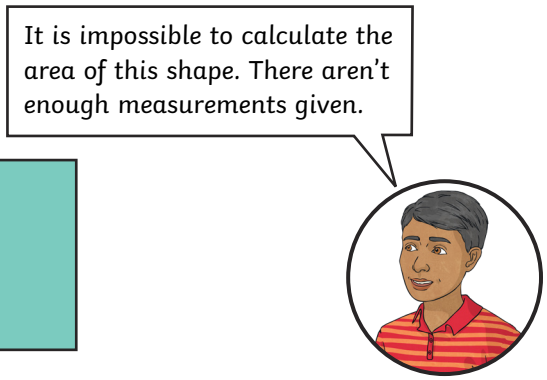
1) Use a ruler to draw on the ways you could split this shape to find the area.
Measure the sides of each shape to calculate the overall area.



2) Draw 3 composite shapes that each have an area of $55m^2$. You do not need to draw each shape to scale.

1) Lautaro wants to calculate the area of this shape.

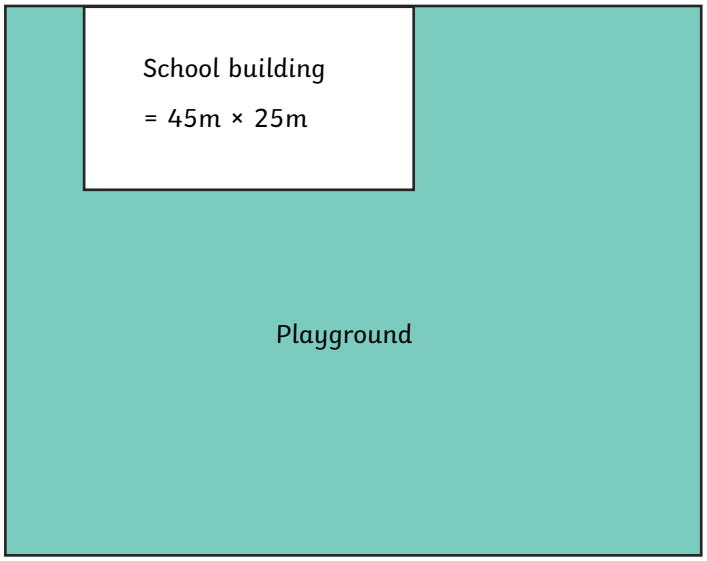




a) Is he correct? Prove it.

b) If the overall total area is 416cm^2, what would the missing measurements be?

2) The school playground has an area of 6000m^2. It is made up of 3 rectangles around the school building which measures 45m × 25m. What could the dimensions be of the total playground?



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Foxit Reader

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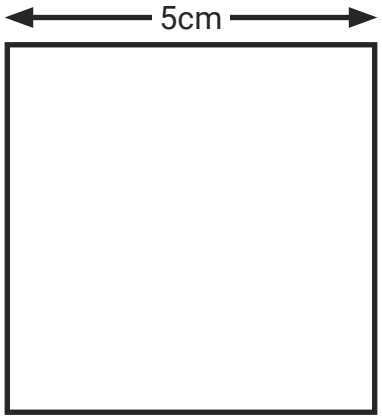
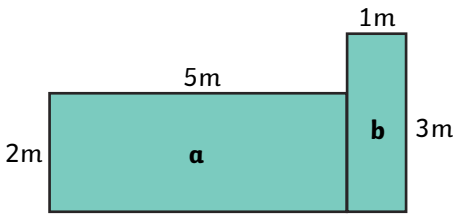
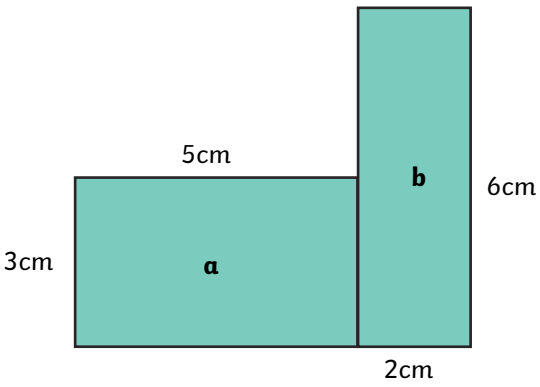


1) Find the area of the following shapes.
(Shapes are not drawn to scale)

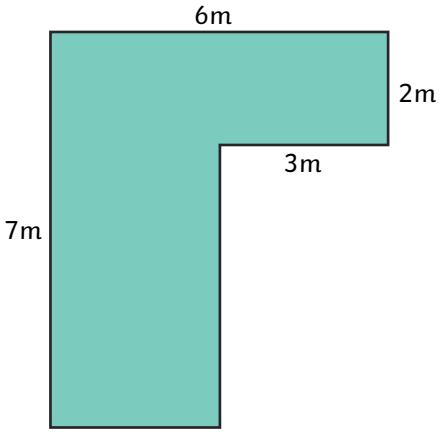
a)



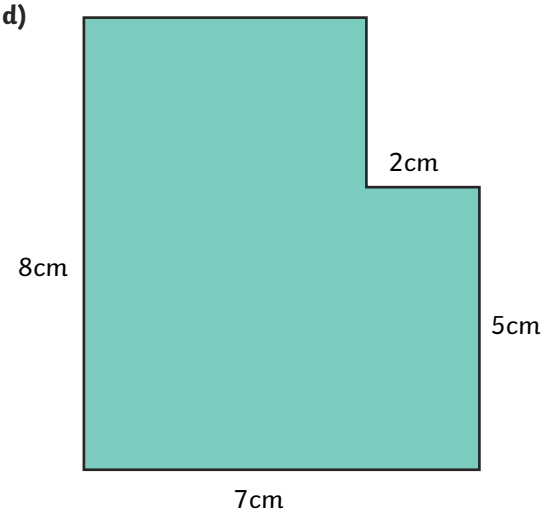
b)



c)



d)



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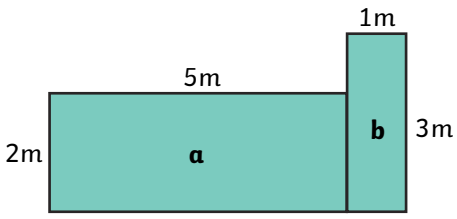
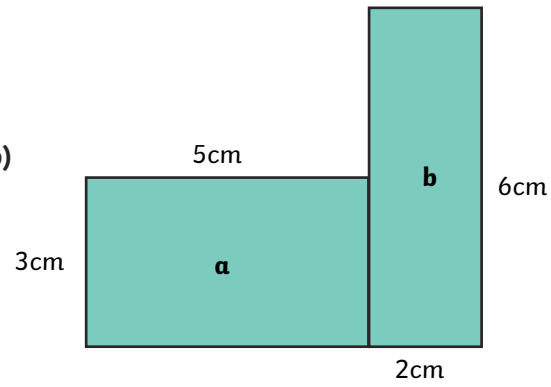
(Shapes are not drawn to scale)

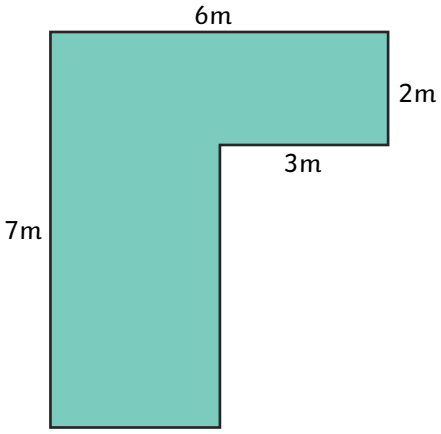
a)



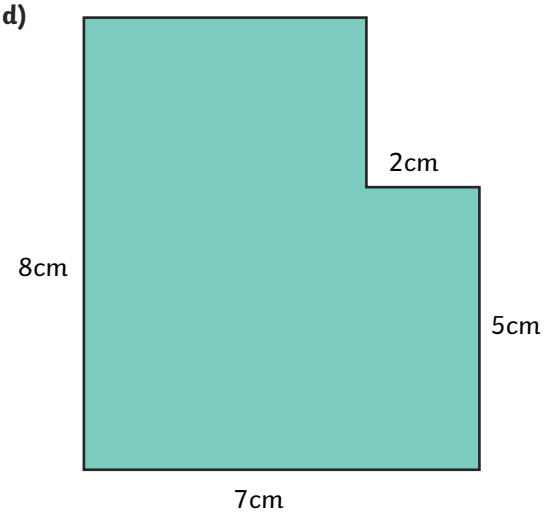
b)



c)

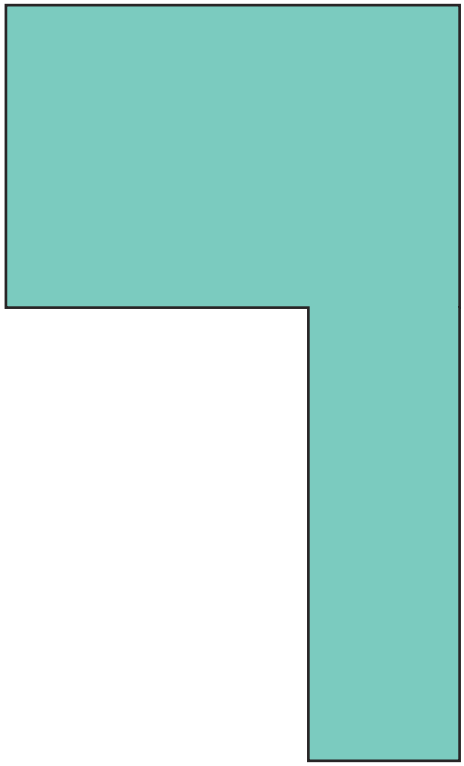


d)



1) Use a ruler to draw on both ways you could split this shape to find the area.

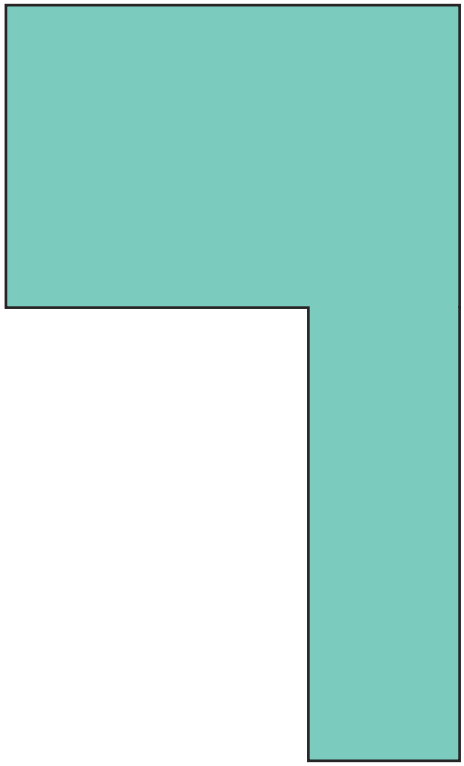
Measure the sides of each rectangle to calculate the overall area. Check that both methods give you the same answer.



2) Draw 3 composite shapes that each have an area of $55m^2$. You do not need to draw each shape to scale.

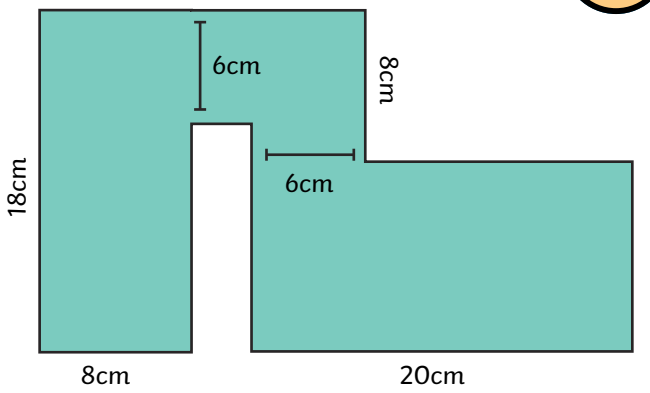
1) Use a ruler to draw on both ways you could split this shape to find the area.

Measure the sides of each rectangle to calculate the overall area. Check that both methods give you the same answer.



2) Draw 3 composite shapes that each have an area of $55m^2$. You do not need to draw each shape to scale.

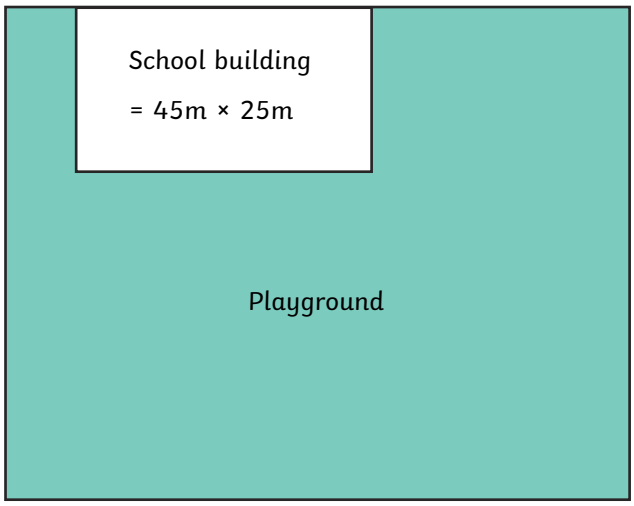
1) Lautaro wants to calculate the area of this shape.



a) Is he correct? Prove it.

b) If the overall total area is 416cm^2, what would the missing measurements be?

2) The school playground has an area of 6000m^2. It is made up of 3 rectangles around the school building which measures 45m × 25m. What could the dimensions be of the total playground?



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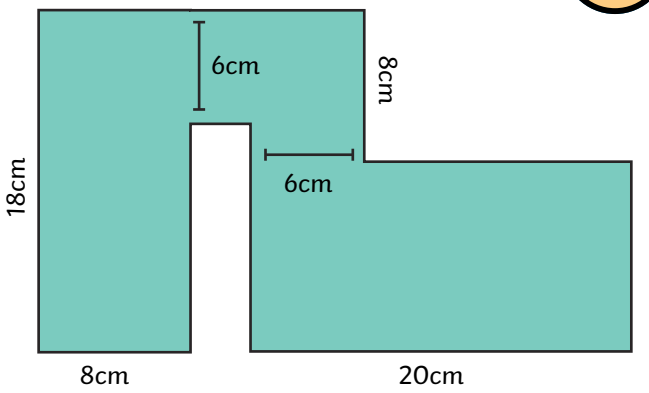

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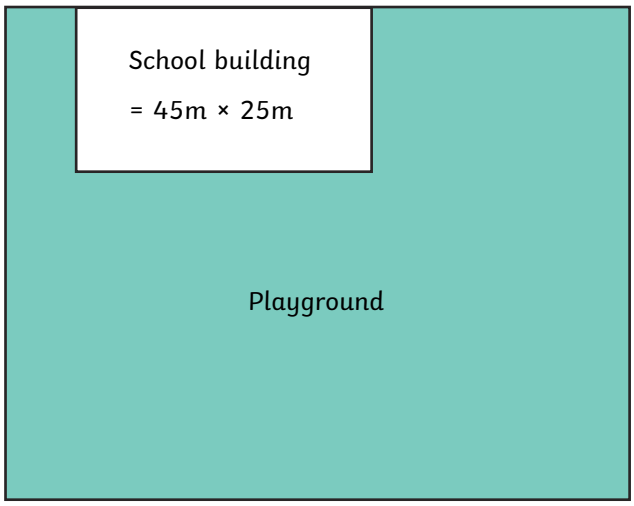

Measurement: Area of Composite Shapes

To calculate the area of composite shapes.		
I can separate composite shapes into separate rectangles.		
I can multiply the length and width of each rectangle.		
I can add the area of each rectangle together to find the total area of a composite shape.		
I can explain how to efficiently separate composite shapes into rectangles.		

Measurement: Area of Composite Shapes

To calculate the area of composite shapes.		
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