Measurement: Area of Triangles

Aim:	**Success Criteria:**	**Resources:**
I can calculate the area of parallelograms and triangles. I can calculate the area of a triangle.	I can use a formula to calculate the area of right-angled triangles. I can use a formula to calculate the area of isosceles and scalene triangles.	Lesson Pack
	Key/New Words: Area, triangle, right-angled triangle, scalene triangle.	**Preparation:** Matching Area of Triangles Cards - one set per pair Differentiated Find the Area of Triangles Activity Sheet – one per child

Prior Learning: It will be helpful if children have learned how to use a formula to calculate the area of rectangles.

Learning Sequence

	**Area of Rectangles and Squares:** Children calculate the area of the rectangles and squares shown on the Lesson Presentation. They then order the shapes by size to spell a word.	
	**How to Calculate the Area of a Right-Angled Triangle:** Use the Lesson Presentation to explain how to calculate the area of a right-angled triangle (multiply the base by the height and divide by two). Use the Lesson Presentation to explain why this formula works.	
	**Find the Area of Right-Angled Triangles:** Children use the formula given to calculate the area of right-angled triangles shown on the Lesson Presentation.	
	**How to Calculate the Area of Other Triangles:** Use the Lesson Presentation to explain how to calculate the area of scalene and isosceles triangles. Use the Lesson Presentation to explain why the same formula as the formula for right-angled triangles works.	
	**Find the Area of Other Triangles:** Children use the formula given to calculate the area of other triangles shown on the Lesson Presentation.	
	**Match It Game:** Children shuffle the Matching Area of Triangles Cards and place them face down. They take turns to find matching cards. The player with the most pairs wins.	
	**Find the Area of Triangles Activity:** Children complete the differentiated Find the Area of Triangles Activity Sheet, calculating the area of a variety of triangles.  Children calculate the area of triangles with areas up to 75cm². They explain why the area of a triangle is base multiplied by the height then divided by two.  Children calculate the area of triangles with areas up to 200cm². The answers are all whole numbers. They explain why the area of a triangle is base multiplied by the height then divided by two. They calculate the area of a composite shape, made up of a rectangle and a right-angled triangle.  Children calculate the area of triangles with areas up to 600cm². Some of the answers have half unit numbers (for example, 67.5cm²). They explain why the area of a triangle is base multiplied by the height then divided by two. They calculate the area of a composite shape, made up of a rectangle and a right-angled triangle. An Extra Challenge Activity Sheet is also included.	

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 complete fluency problems which involve finding the area of a range of triangles and shapes made from more than one triangle.

Children explore answering reasoning problems which involve identifying and explaining if calculations and statements are correct.

Children use problem-solving skills in order to calculate answers to tasks that involves a greater depth of thinking to calculate missing numbers and area in context.

Find the Unknown Side: Children are given the area of a triangle and the length of one side. They have to find the length of the other side.

Exploreit

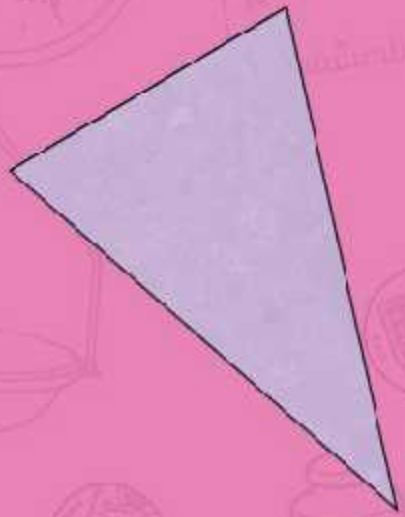
Designit: Children design a poster to explain how to calculate the area of a triangle. Part of the poster should include an explanation of why the method works.

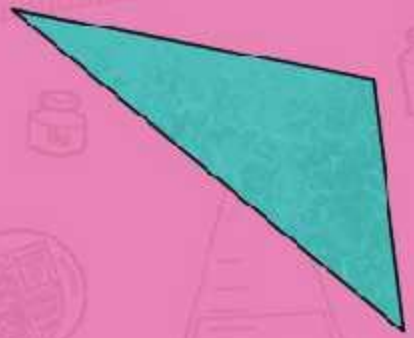
Practiseit: Children complete the differentiated They practise their skills of calculating area but also measure the lengths of sides.

Maths

Measurement

Area of Triangles





Aim

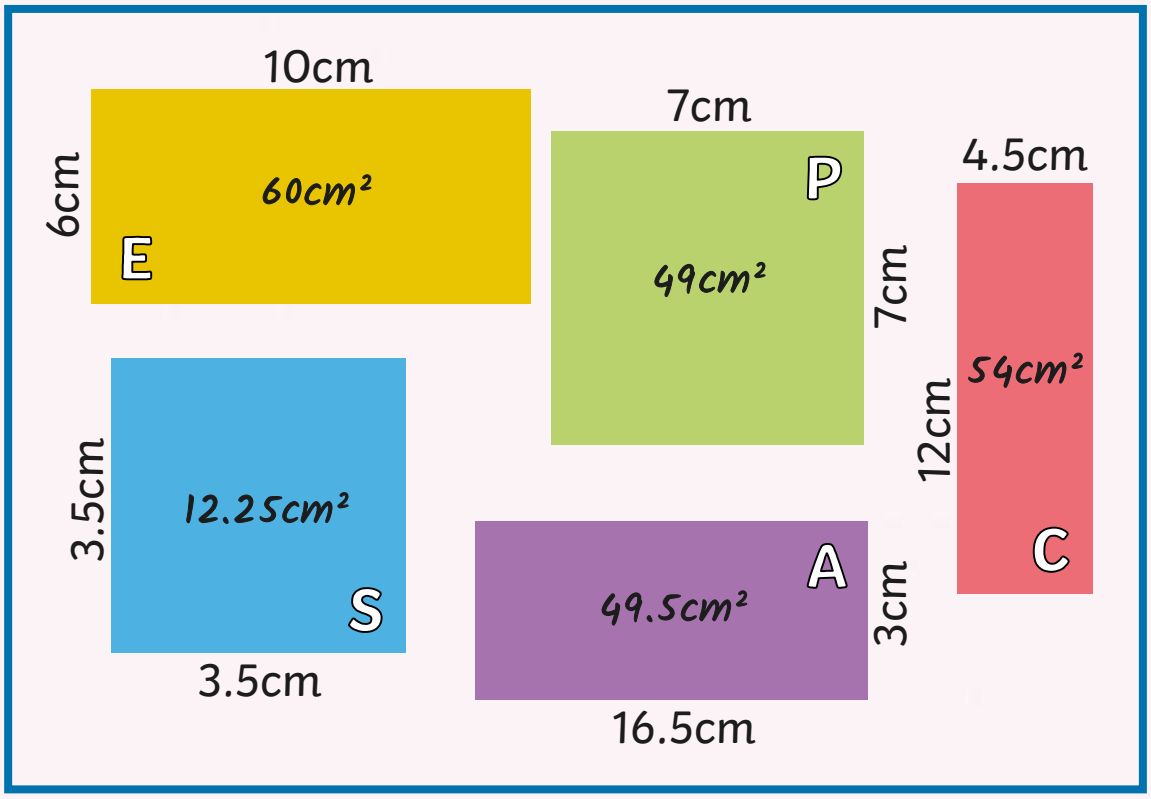
I can calculate the area of a triangle.

Success Criteria

- I can use a formula to calculate the area of right-angled triangles.
- I can use a formula to calculate the area of isosceles and scalene triangles.

Area of Rectangles and Squares

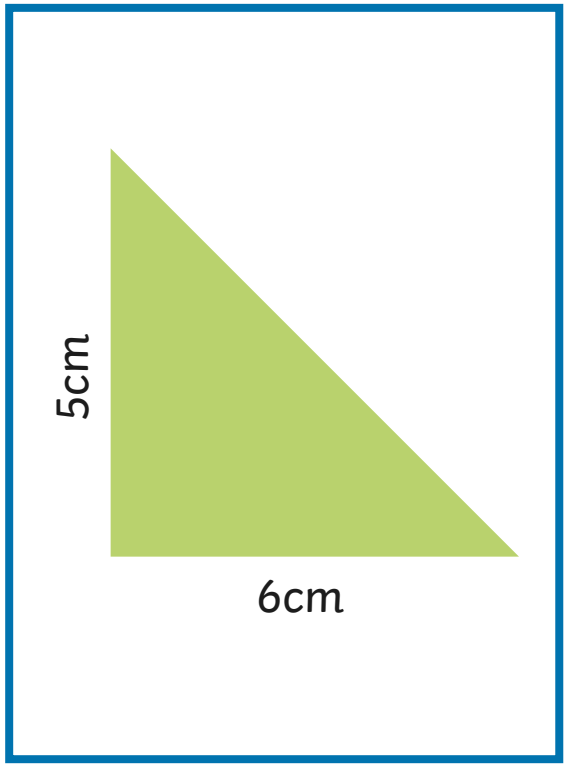
Calculate the area of these shapes. Order the shapes from smallest to largest area to spell a word connected to this topic.



S P A C E

How to Calculate the Area of a Right-Angled Triangle

To calculate the area of a right-angled triangle, multiply the base by the height and divide by 2.



The base multiplied by the height is
6cm × 5cm = **30cm²**

30cm² ÷ 2 = **15cm²**

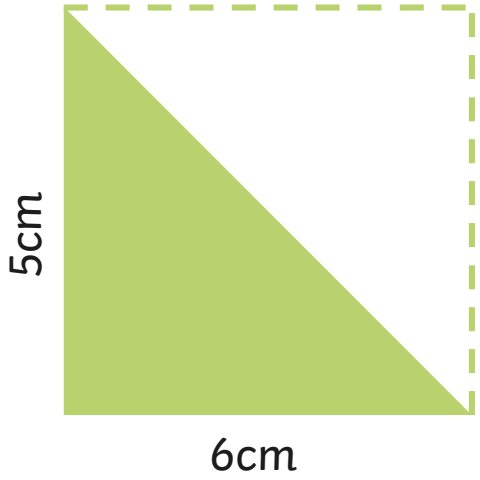
The area of this triangle is **15cm²**.

You might see it written like this **$\frac{1}{2}$ (b × h)**, like this $\frac{\mathbf{b \times h}}{\mathbf{2}}$, or like this **b × h ÷ 2**.

They all mean the same thing and give the same answer.

How to Calculate the Area of a Right-Angled Triangle

But why is (b × h) ÷ 2 the formula to calculate the area of a right-angled triangle?



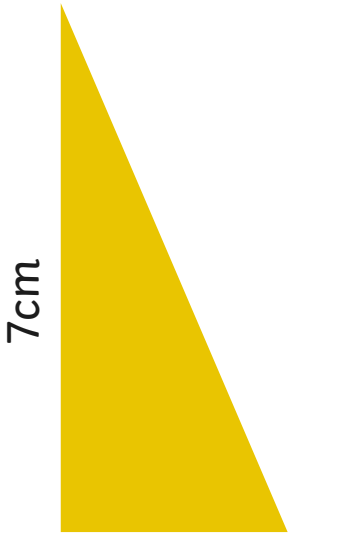
Let's extend this triangle to make a rectangle.

The area of the rectangle is 6cm × 5cm = **30cm²**.

The area of the triangle is half of this:
(6cm × 5cm) ÷ 2 = **15cm²**

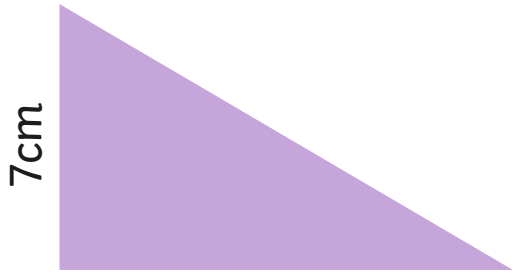
Find the Area of Right-Angled Triangles

Find the area of these right-angled triangles:



Area = 10.5cm²

Area = 10cm²

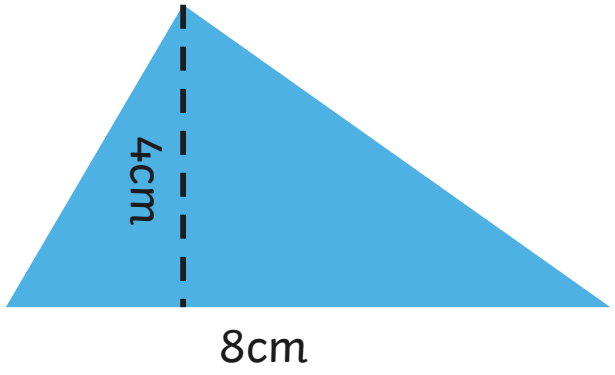


Area = 42cm²

Area = 16.5cm²

How to Calculate the Area of Other Triangles

The area of this scalene triangle is 16cm^2.
Does the same formula work?
Try it. **(b × h) ÷ 2**



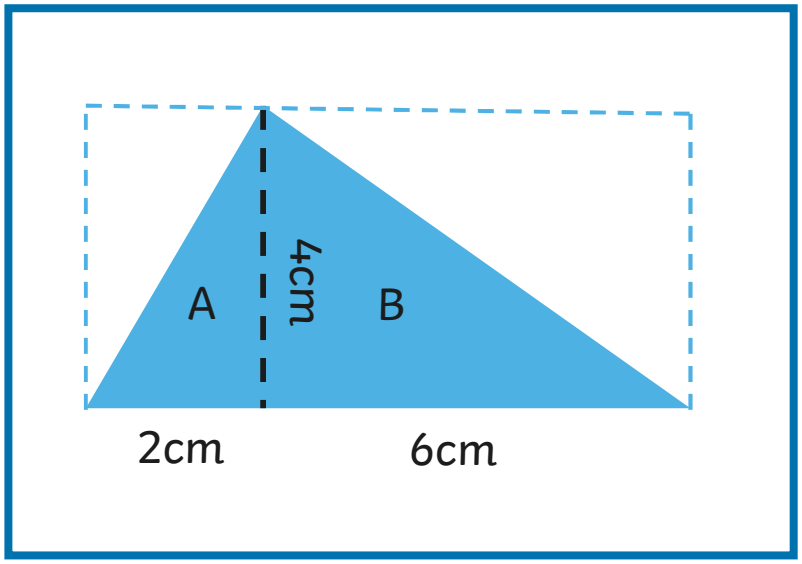
Base 8cm × height 4cm = **32 cm**

32cm ÷ 2 = **16cm^2**

Yes, the same formula works.
Let's find out why.

How to Calculate the Area of Other Triangles

Let's consider this scalene triangle as 2 right-angled triangles.



The area of triangle A is (2cm × 4cm) ÷ 2 = **4cm²**

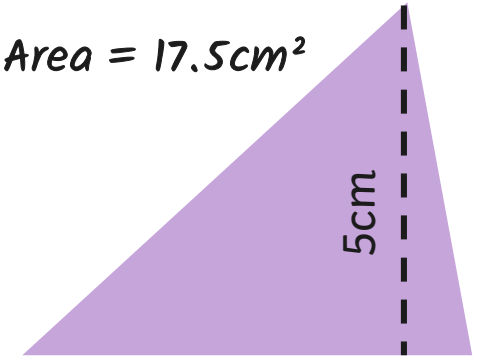
The area of triangle B is (6cm × 4cm) ÷ 2 = **12cm²**

A + B = **16cm²**

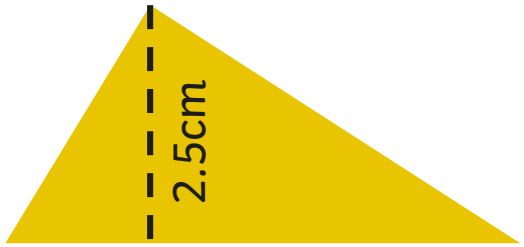
The area of the whole triangle is (8cm × 4cm) ÷ 2 = 16cm².

Find the Area of Other Triangles

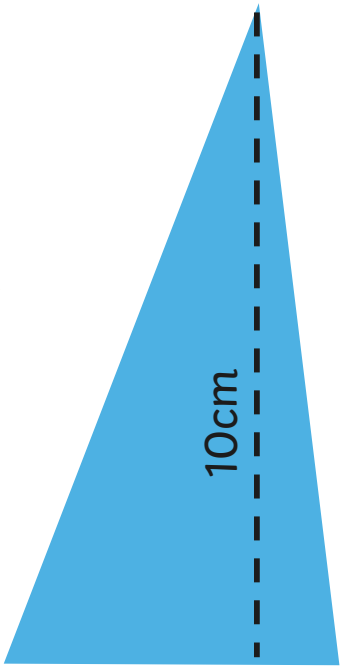
Find the area of these triangles:



Area = 17.5cm²



Area = 7.5cm²

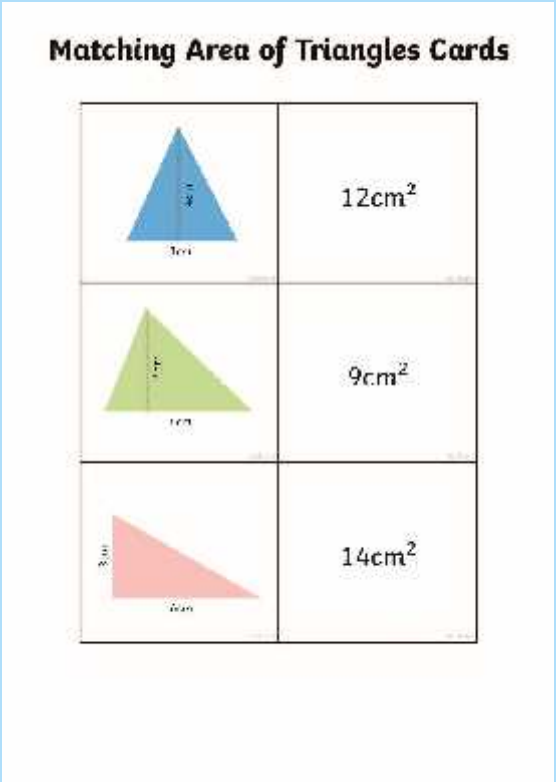


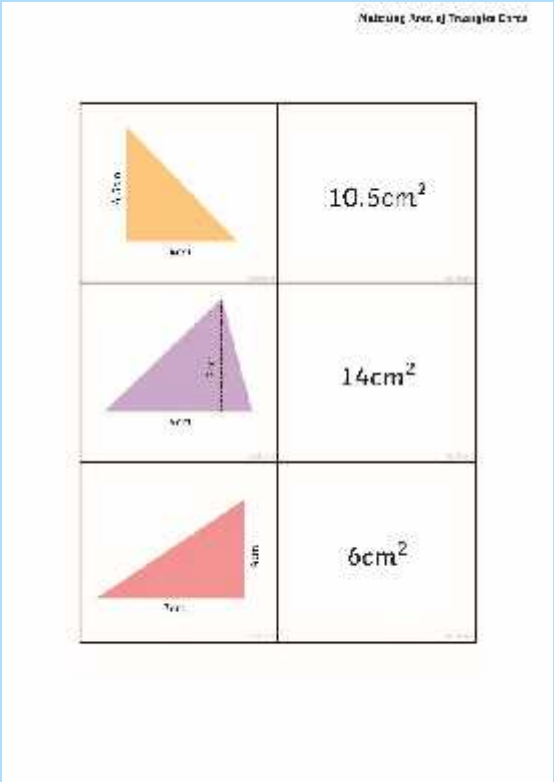
Area = 15cm²

Area = 15cm²

Match It Game

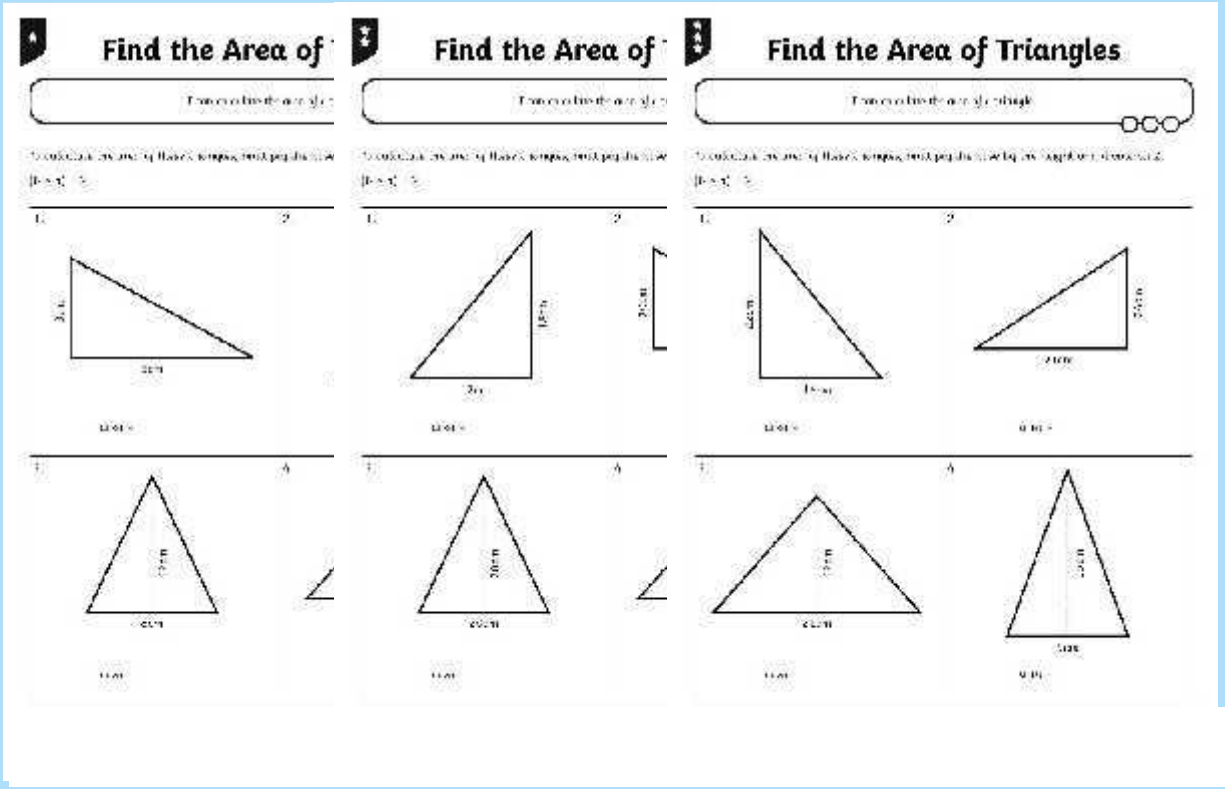
Shuffle the **Matching Area of Triangles Cards** and place them face down in front of you. Take turns to find matching pairs.





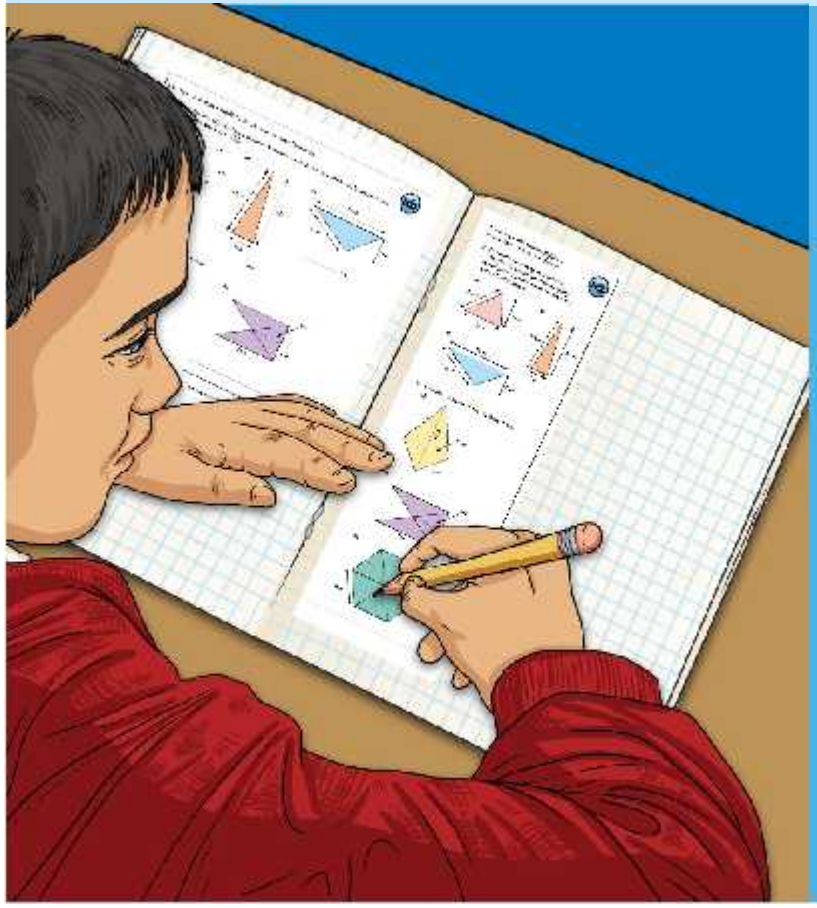
Find the Area of Triangles

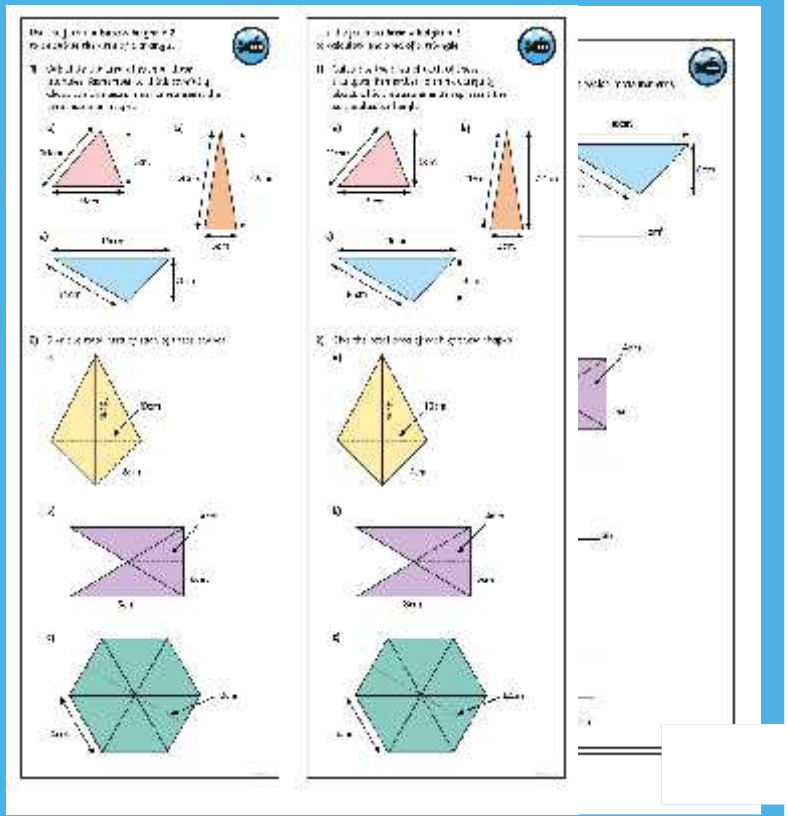
Use your wonderful skills to complete these activity sheets.



Diving into Mastery

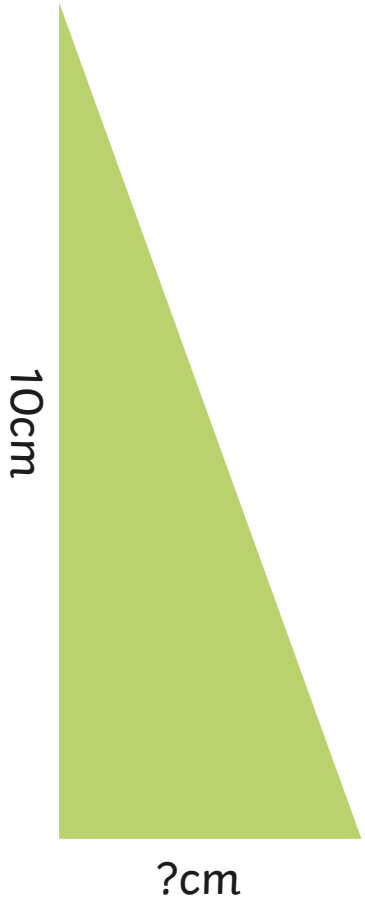
Dive in by completing your own activity!





Find the Unmarked Side

This triangle has an area of 20cm^2.



Look at the side marked with a question mark. What is the dimension of this side?

What do you need to do to calculate the answer?

You can put the known numbers into the formula and then do the inverse.

(b × h) ÷ 2 = h

(b × 10) ÷ 2 = 20cm^2

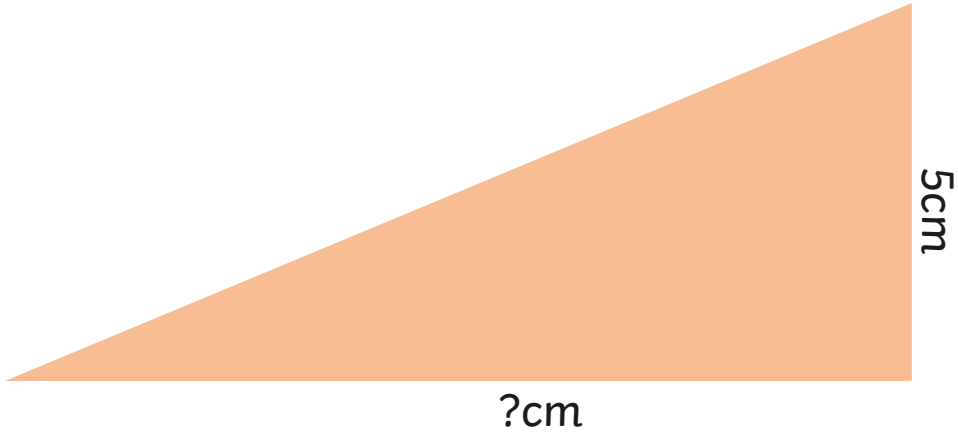
So the base multiplied by the height must be 20 × 2 = 40.

What number multiplied by 10 gives 40?

The missing base must be **4cm**.

Find the Unmarked Side

If the area of this triangle is 30cm^2, calculate the length of the side marked with a question mark.



Answer:

$30cm^2 \times 2 = 60$

$60 \div 5cm = 12cm$

Aim

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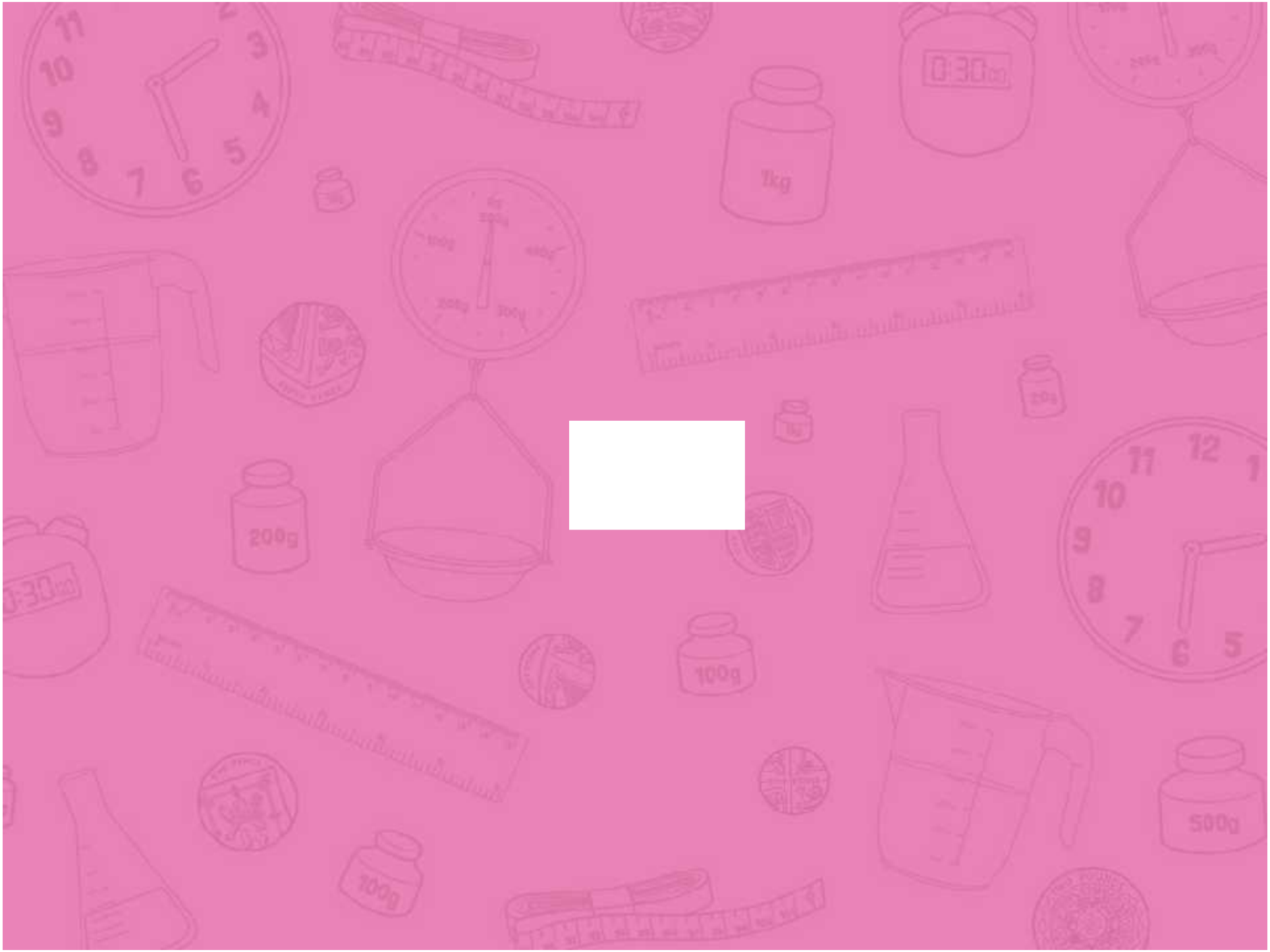

Aim: I can calculate the area of a triangle.				**Date:**					
				Delivered By:			**Support:**		
Success Criteria	**Me**	**Friend**	**Teacher**	**T**	**PPA**	**S**	**I**	**AL**	**GP**
I can use a formula to calculate the area of right-angled triangles.				**Notes/Evidence**					
I can use a formula to calculate the area of isosceles and scalene triangles.									

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

1) a) $9 \times 5 \div 2 = 22.5cm^2$

b) $3 \times 22 \div 2 = 33cm^2$

c) $16 \times 8 \div 2 = 64cm^2$

2) a) $18 \times 5 \div 2 = 45cm^2$

$45cm^2 \times 2 = 90cm^2$

Area = $90cm^2$

b) $6 \times 4 \div 2 = 12cm^2$

$8 \times 3 \div 2 = 12cm^2$ (x 2)

$12cm^2 + 12cm^2 + 12cm^2 = 36cm^2$

Area = $36cm^2$

c) One triangle has an area of $4 \times 6 \div 2 = 12cm^2$ (2)

$12cm^2 \times 6 = 72cm^2$

Area = $72cm^2$

1) a) Pasha has used the correct calculation.

Anna has incorrectly multiplied the base by the side length 8cm, rather than by the perpendicular height.

Jack has incorrectly multiplied the base by the perpendicular height of two triangles. He needs to halve this in order to find the height of one triangle.

b) $17.5cm^2 \times 4 = 70cm^2$

2) True. Both triangles have an area of $18cm^2$.

$4 \times 9 \div 2 = 18cm^2$

$3 \times 12 \div 2 = 18cm^2$

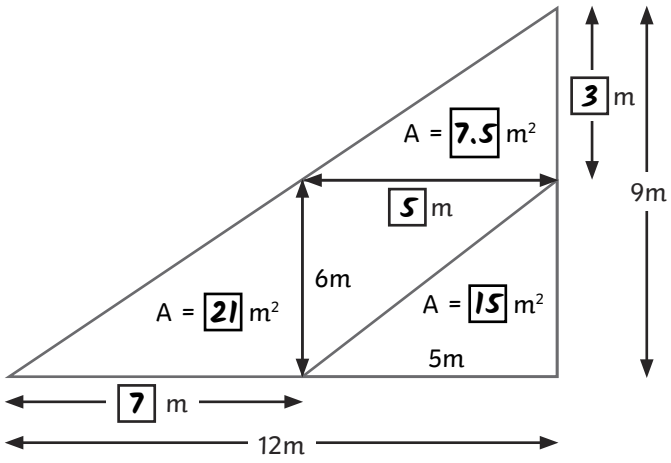
1) One triangle = $(56cm \times 45cm) \div 2 = 1260cm^2$

Four triangles = $1260cm^2 \times 4 = 5040cm^2$

Square base = $56cm \times 56cm = 3136cm^2$

Whole pyramid = $5040cm^2 + 3136cm^2 = 8176cm^2$

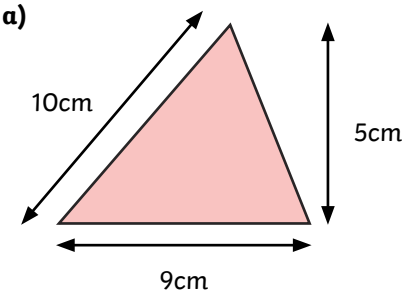
2)



Use the formula **base × height ÷ 2** to calculate the area of a triangle.

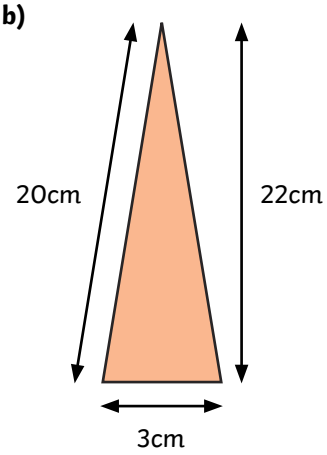
1) Calculate the area of each of these triangles. Remember to think carefully about which measurements represent the perpendicular height.

a)



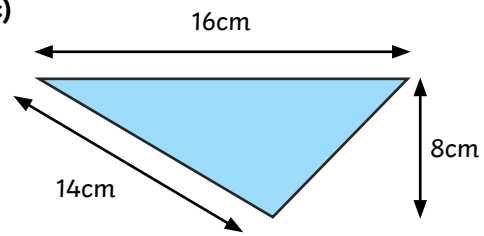
_____ cm^2

b)



_____ cm^2

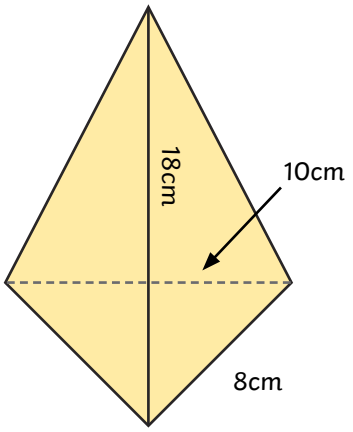
c)



_____ cm^2

2) Give the total area of each of these shapes.

a)



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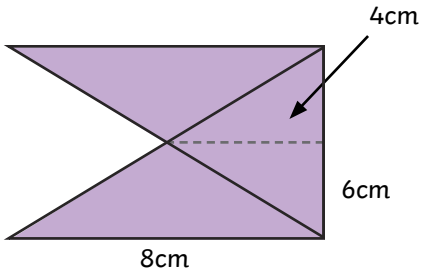
Total area of a) = _____cm^2

b)



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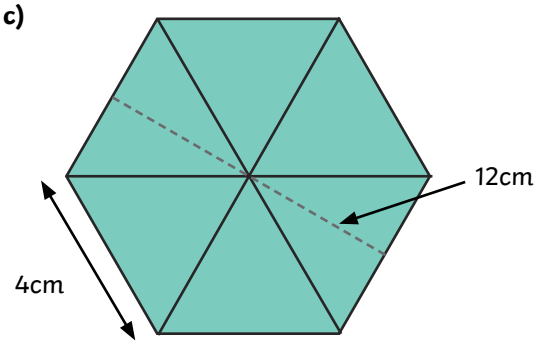
_____

Total area of b) = _____cm^2

c)



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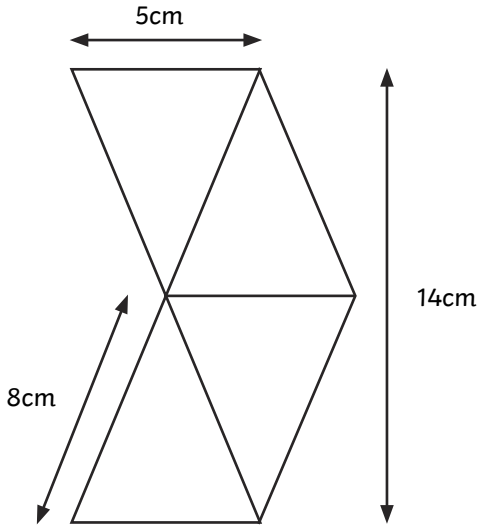
Total area of c) = _____cm^2

Use the formula **base × height ÷ 2** to calculate the area of a triangle.

1) Anna, Jack and Pasha are working out the area of this shape that is made from four identical triangles.

They each start by calculating the area of one triangle.

a) Which child has used the correct calculation to find the area of one triangle? What mistakes have the other two children made?



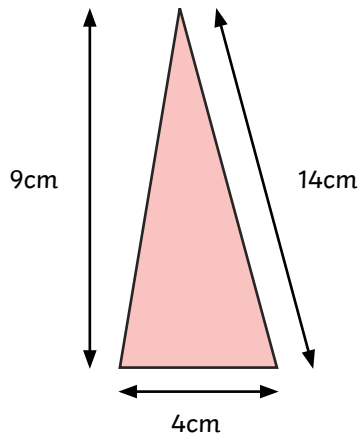
Anna: $5 \times 8 \div 2 = 15cm^2$

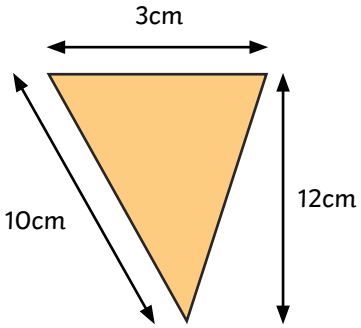
Jack: $5 \times 14 \div 2 = 35cm^2$

Pasha: $5 \times 7 \div 2 = 17.5cm^2$

b) What is the area of the whole shape?

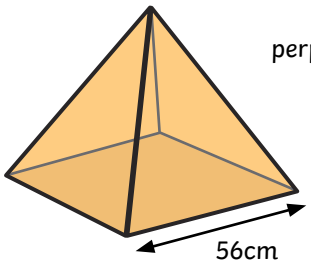
2) True or false? Both triangles have the same area.





Use the formula **base × height ÷ 2** to calculate the area of a triangle.

1) Year 6 are making a pyramid out of cardboard for their ancient Egypt topic.

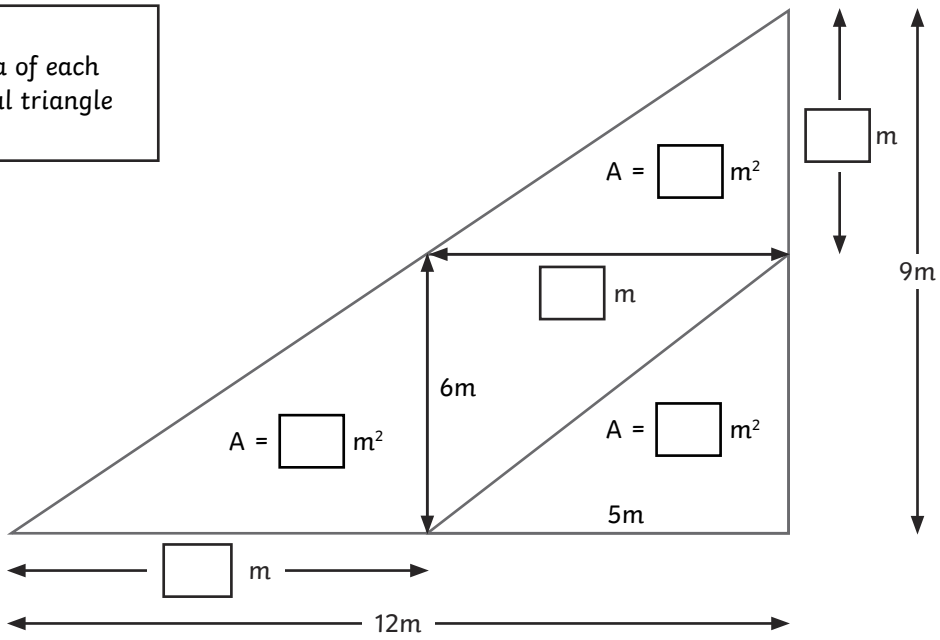


perpendicular height = 45cm

How many square centimetres of cardboard will they need to build the whole pyramid?

2) This shape is made from different triangles. Find each of the missing measurements.

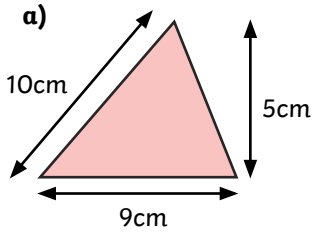
A = area of each individual triangle



Use the formula **base × height ÷ 2** to calculate the area of a triangle.

1) Calculate the area of each of these triangles. Remember to think carefully about which measurements represent the perpendicular height.

a)



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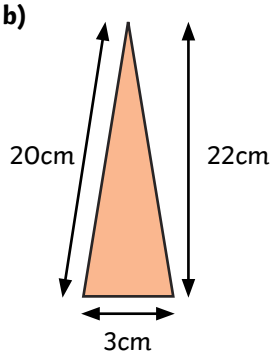
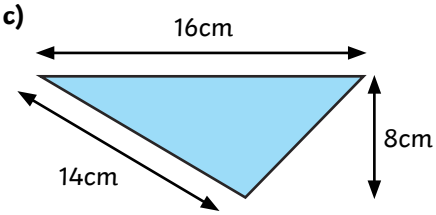
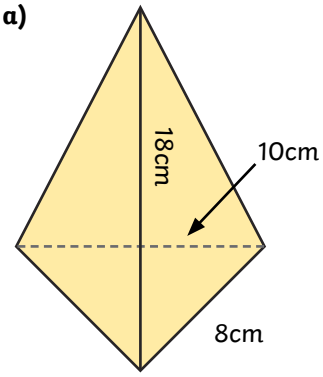


c)



2) Give the total area of each of these shapes.

a)



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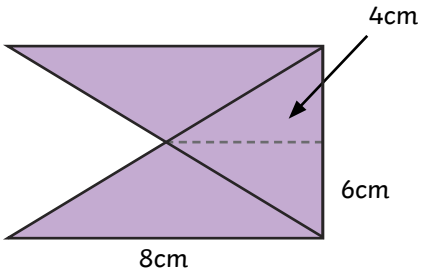
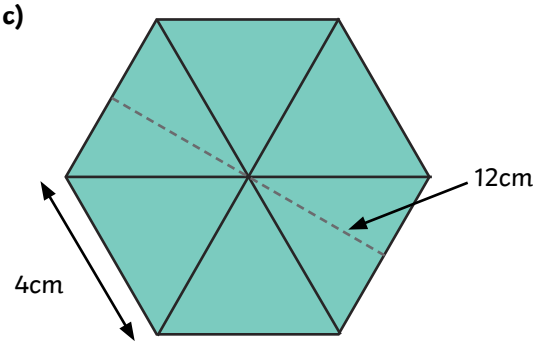


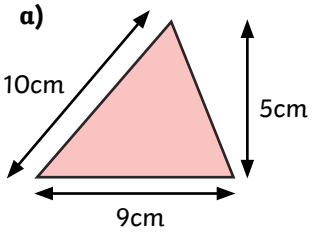
c)



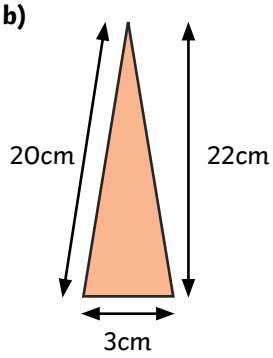
Use the formula **base × height ÷ 2** to calculate the area of a triangle.

1) Calculate the area of each of these triangles. Remember to think carefully about which measurements represent the perpendicular height.

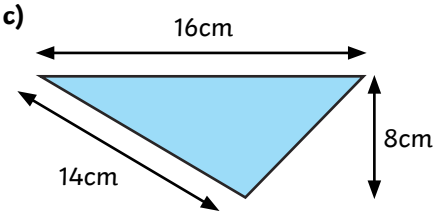
a)



b)

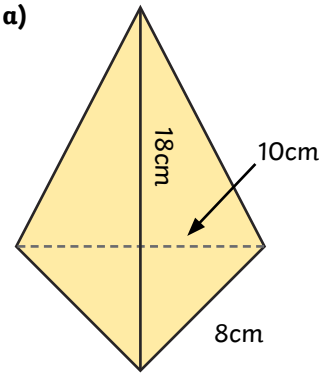


c)



2) Give the total area of each of these shapes.

a)



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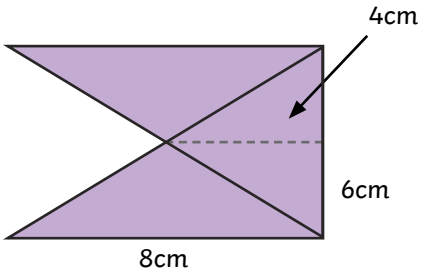
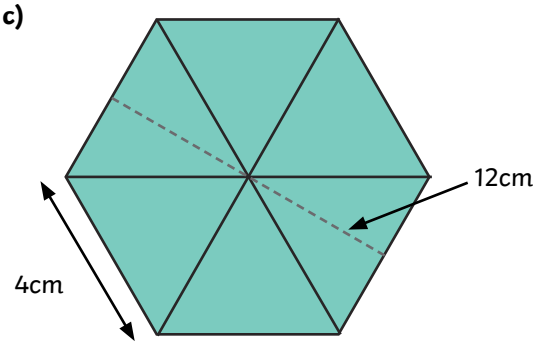
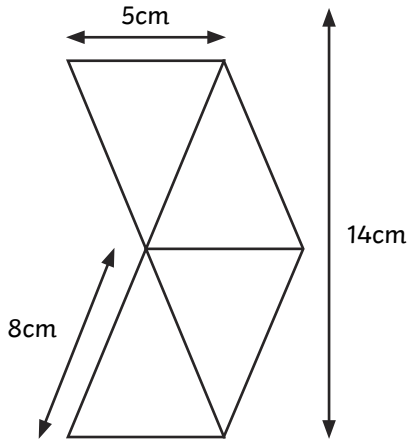


c)



Use the formula **base × height ÷ 2** to calculate the area of a triangle.

1) Anna, Jack and Pasha are working out the area of this shape that is made from four identical triangles.



They each start by calculating the area of one triangle.

a) Which child has used the correct calculation to find the area of one triangle? What mistakes have the other two children made?

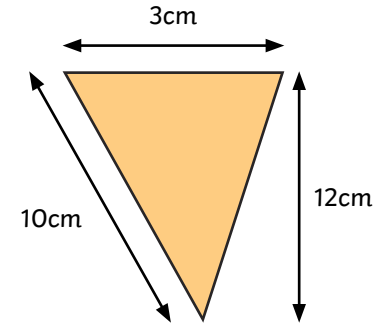
Anna: $5 \times 8 \div 2 = 15cm^2$

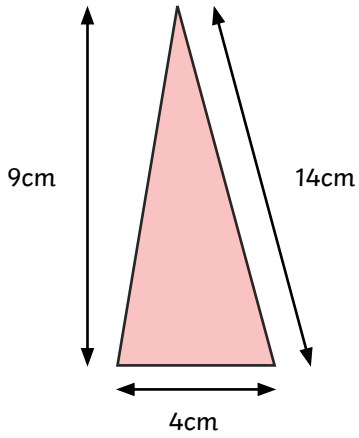
Jack: $5 \times 14 \div 2 = 35cm^2$

Pasha: $5 \times 7 \div 2 = 17.5cm^2$

b) What is the area of the whole shape?

2) True or false? Both triangles have the same area.





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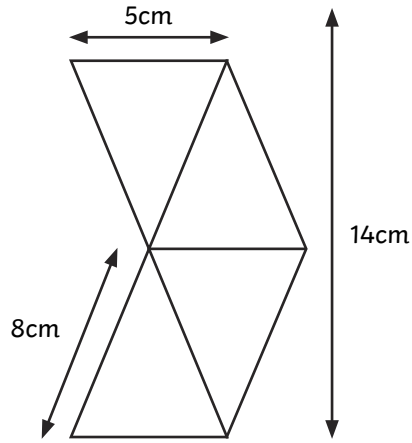

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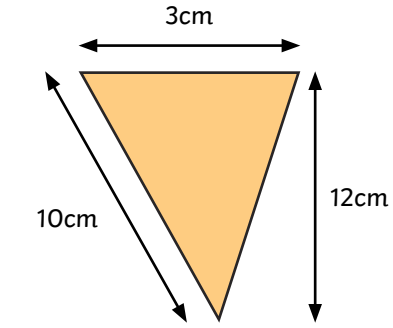
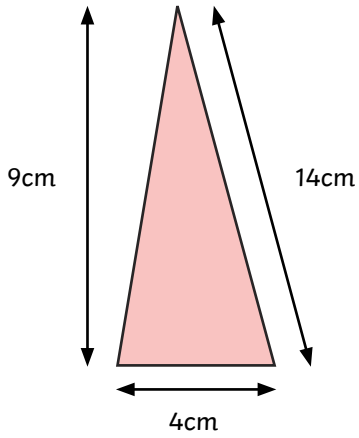
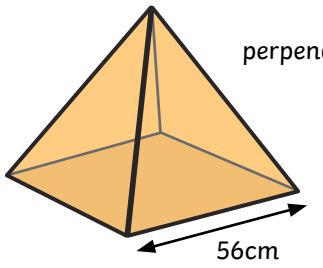




Use the formula **base × height ÷ 2** to calculate the area of a triangle.

1) Year 6 are making a pyramid out of cardboard for their ancient Egypt topic.

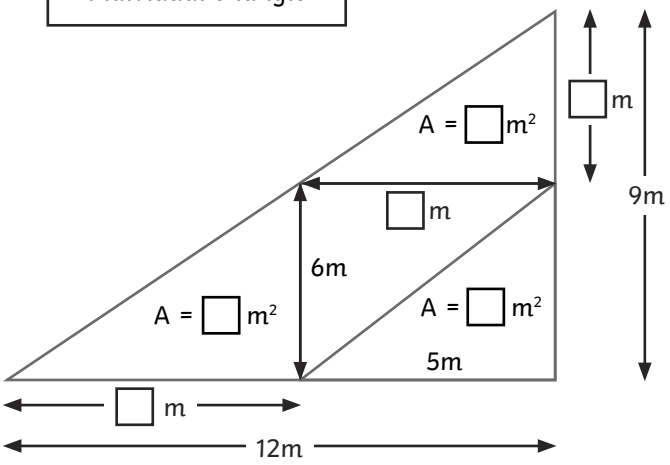


perpendicular height = 45cm

How many square centimetres of cardboard will they need to build the whole pyramid?

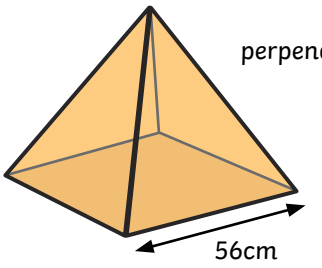
2) This shape is made from different triangles. Find each of the missing measurements.

A = area of each individual triangle



Use the formula **base × height ÷ 2** to calculate the area of a triangle.

1) Year 6 are making a pyramid out of cardboard for their ancient Egypt topic.



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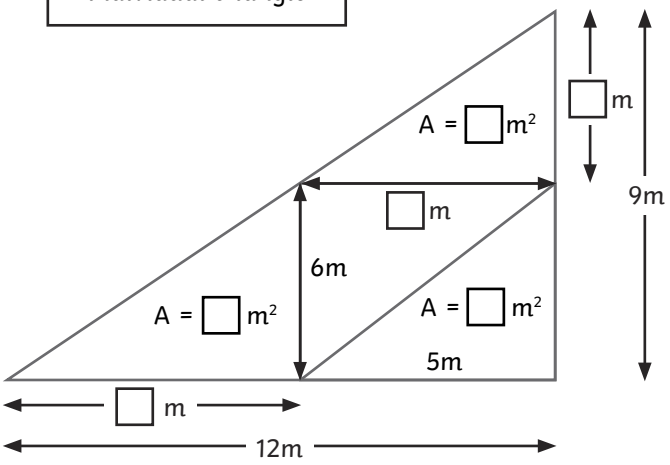
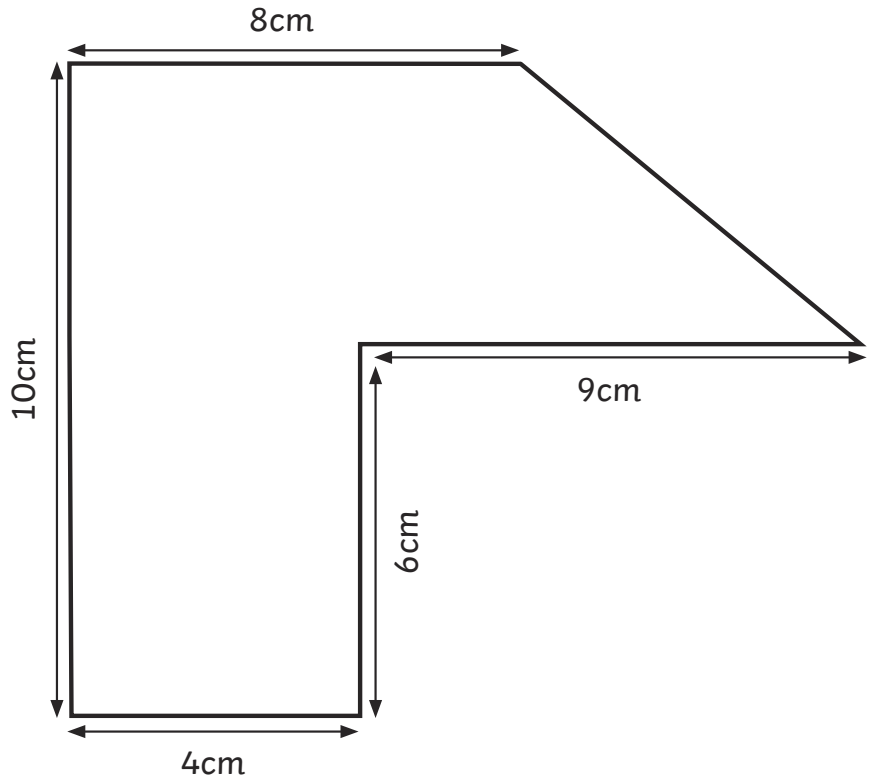


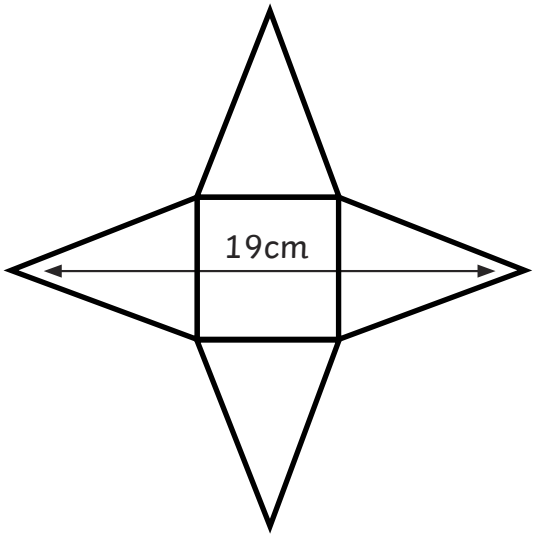
Find the Area of Composite Shapes

I can calculate the area of composite shapes.

1. Here is a composite shape. Calculate the area of the whole shape. Subdivide the shape into triangles and rectangles to help you calculate the total area.



2. This shape is made up of a square and 4 identical isosceles triangles. The square has an area of 25cm^2. The width from the point of one isosceles triangle to the opposite triangle (as shown) is 19cm. Work out the combined area of the shape.



Find the Area of Composite Shapes **Answers**

1. Here is a composite shape. Calculate the area of the whole shape. Subdivide the shape into triangles and rectangles to help you calculate the total area.
   66cm²

2. This shape is made up of a square and 4 identical isosceles triangles. The square has an area of 25cm². The width from the point of one isosceles triangle to the opposite triangle (as shown) is 19cm. Work out the combined area of the shape.
   95cm²

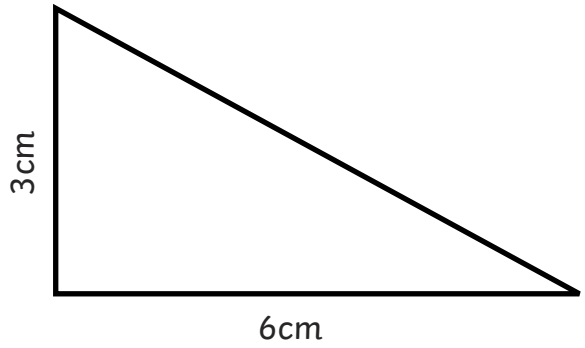
Find the Area of Triangles

I can calculate the area of a triangle.

To calculate the area of these triangles, multiply the base by the height and divide by 2.

(b × h) ÷ 2

1.



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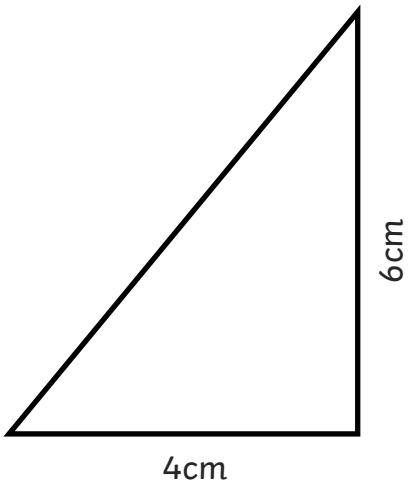
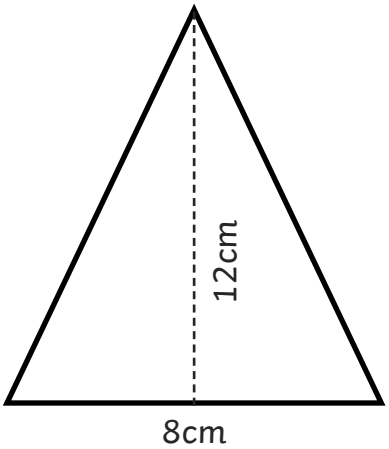
2.



area =

3.



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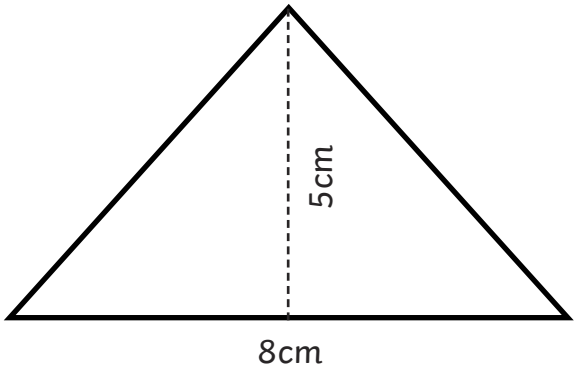

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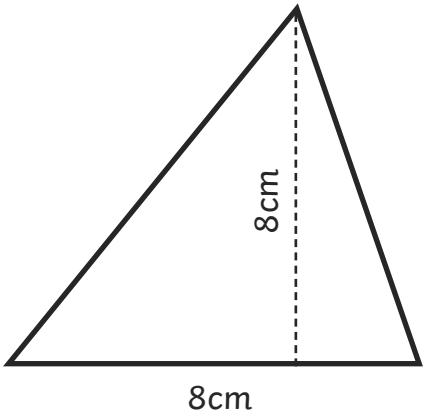

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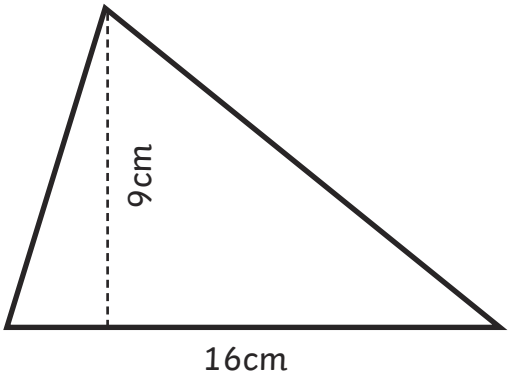

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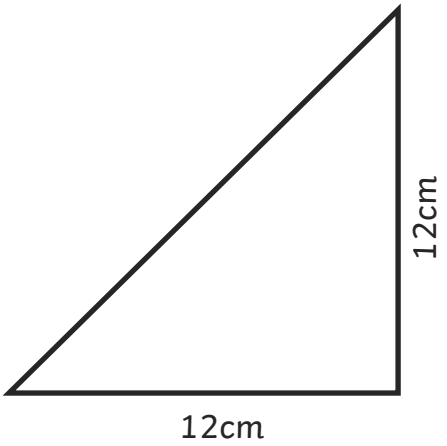

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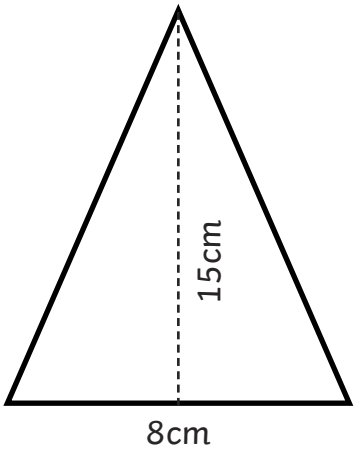
8.



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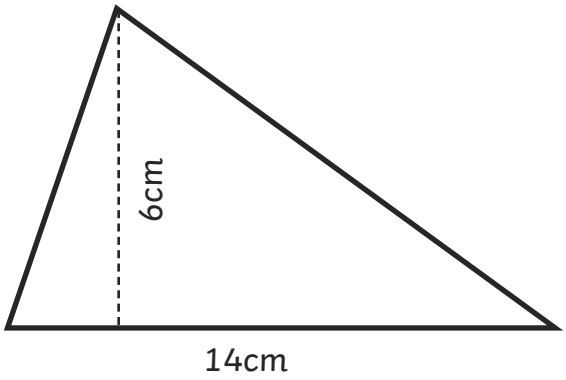
9.



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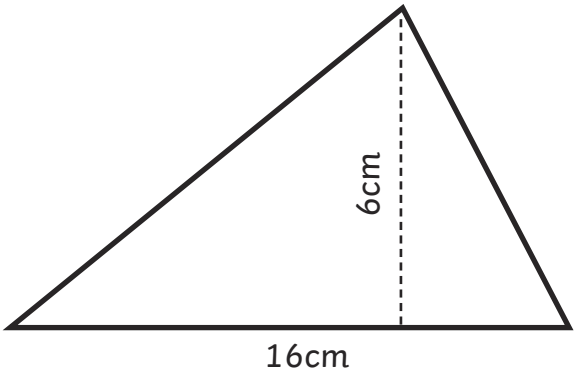


area =

11. Write an explanation to describe why finding the area of a right-angled triangle is **base multiplied by height, divided by 2**. You can draw diagrams to help your explanation.

Find the Area of Triangles **Answers**

Question	Answer
1.	*9cm²*
2.	*12cm²*
3.	*48cm²*
4.	*20cm²*
5.	*32cm²*
6.	*72cm²*
7.	*72cm²*
8.	*60cm²*
9.	*42cm²*
10.	*48cm²*
11.	Write an explanation to describe why finding the area of a right-angled triangle is **base multiplied by height, divided by 2**. You can draw diagrams to help your explanation.
	Explanation shows an understanding that a right-angled triangle is half of a rectangle and so the measurement needs to be halved.

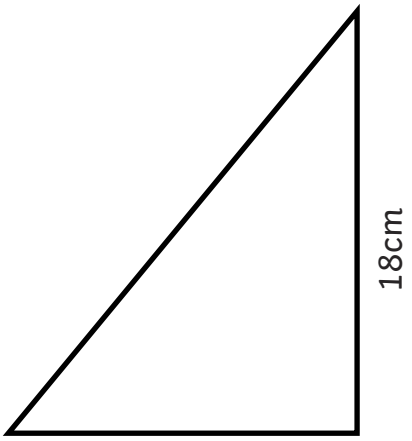
Find the Area of Triangles

I can calculate the area of a triangle.

To calculate the area of these triangles, multiply the base by the height and divide by 2.

(b × h) ÷ 2

1.



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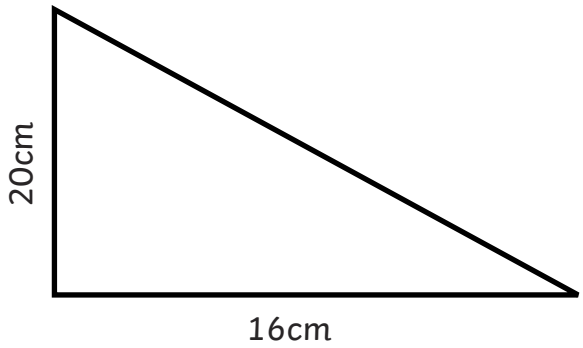

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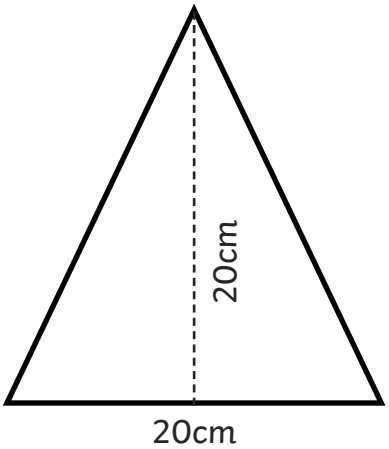

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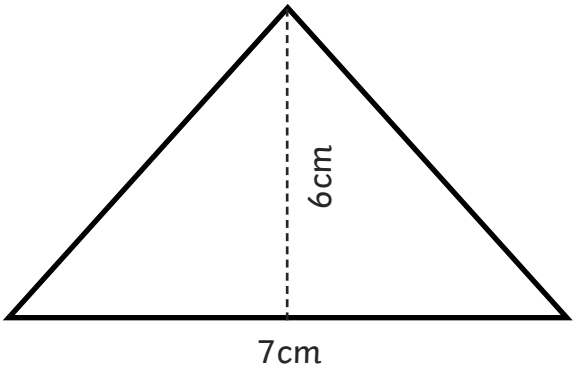
4.



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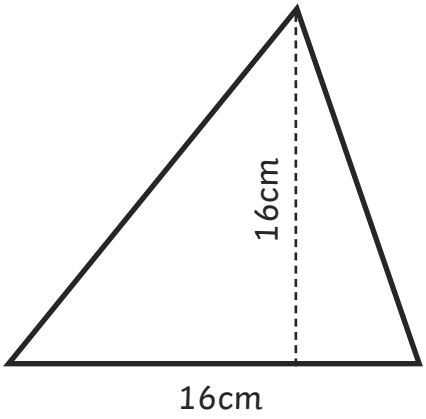

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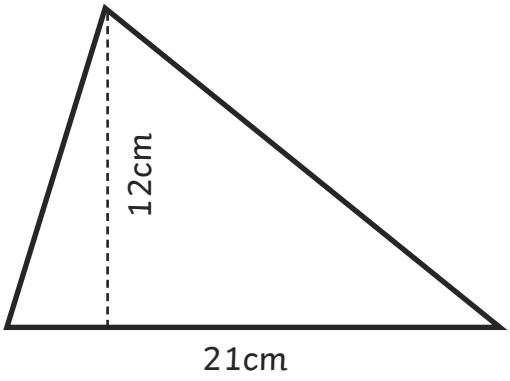

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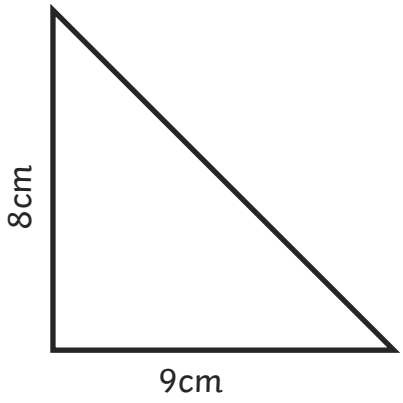

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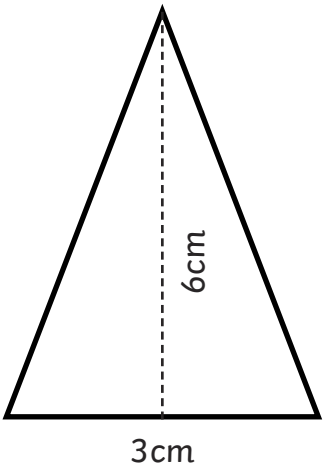

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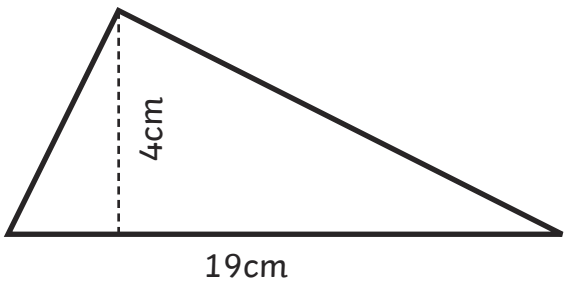

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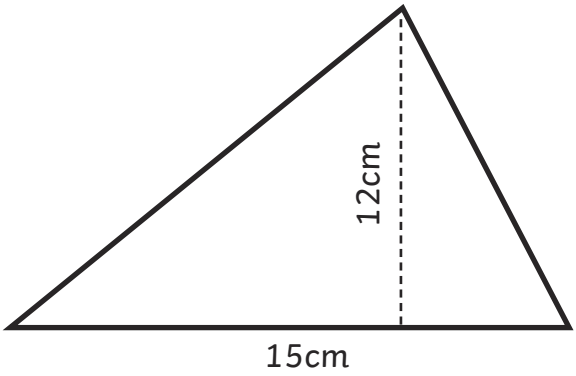
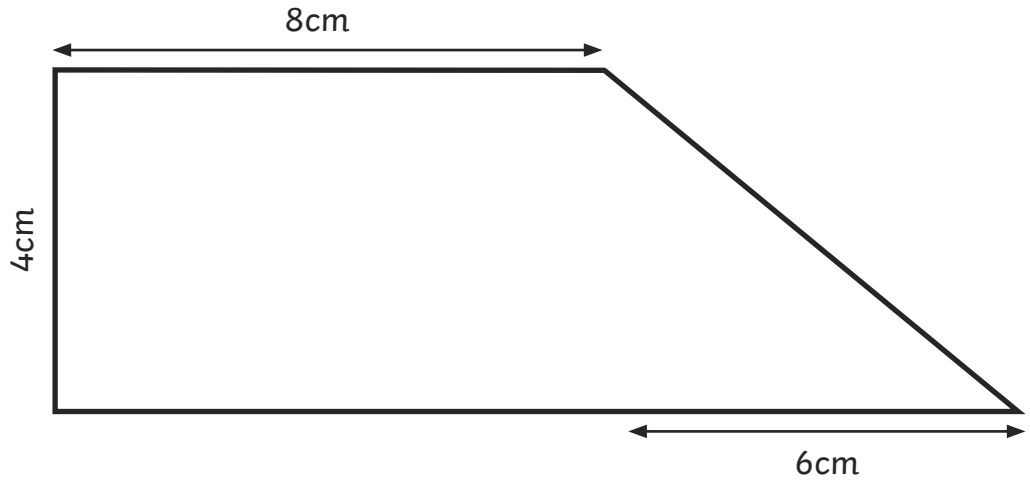


area =

11. Write an explanation to describe why finding the area of a right-angled triangle is **base multiplied by height, divided by 2**. You can draw diagrams to help your explanation.

12. What is the area of the whole of this shape? Show how you worked out the answer:



Find the Area of Triangles **Answers**

Question	Answer
1.	108cm²
2.	160cm²
3.	200cm²
4.	21cm²
5.	128cm²
6.	126cm²
7.	36cm²
8.	9cm²
9.	38cm²
10.	90cm²
11.	Write an explanation to describe why finding the area of a right-angled triangle is **base multiplied by height, divided by 2**. You can draw diagrams to help your explanation.
	Explanation shows an understanding that a right-angled triangle is half of a rectangle and so the measurement needs to be halved.
12.	What is the area of the whole of this shape? Show how you worked out the answer.
	44cm²

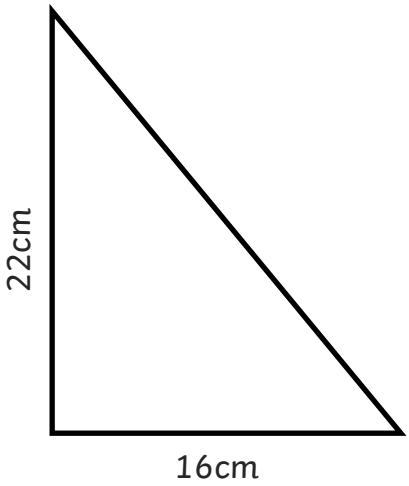
Find the Area of Triangles

I can calculate the area of a triangle.

To calculate the area of these triangles, multiply the base by the height and divide by 2.

(b × h) ÷ 2

1.



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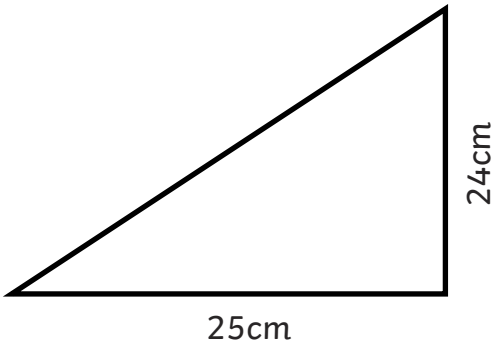
2.



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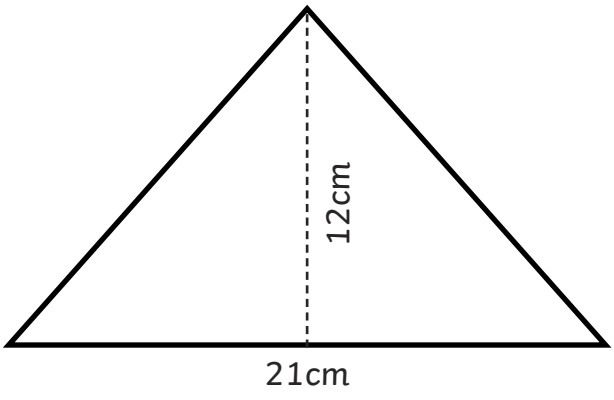

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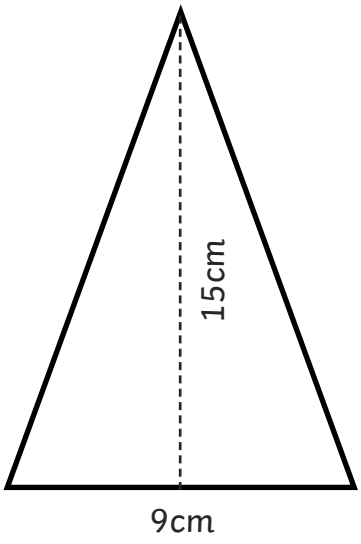

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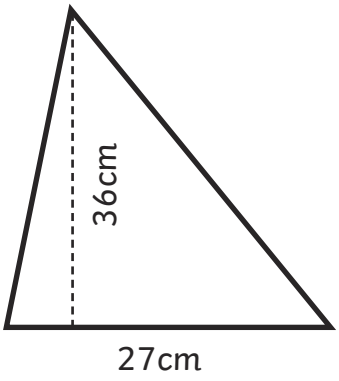

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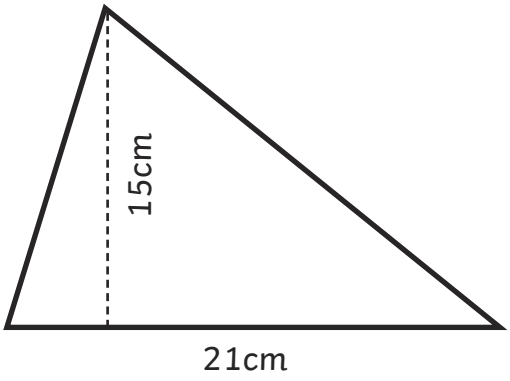

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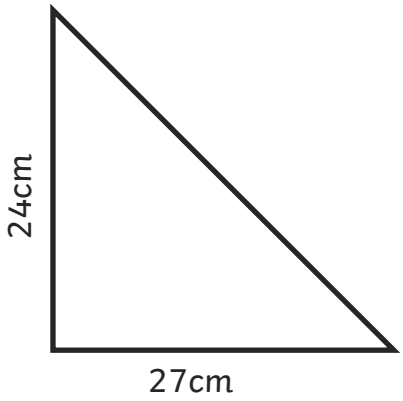

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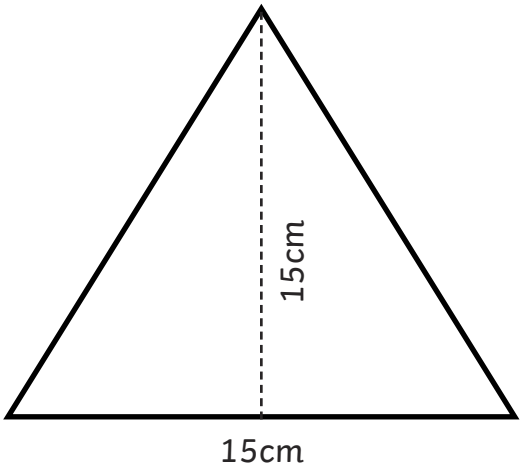

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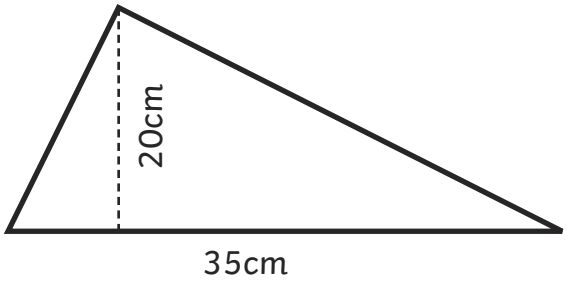

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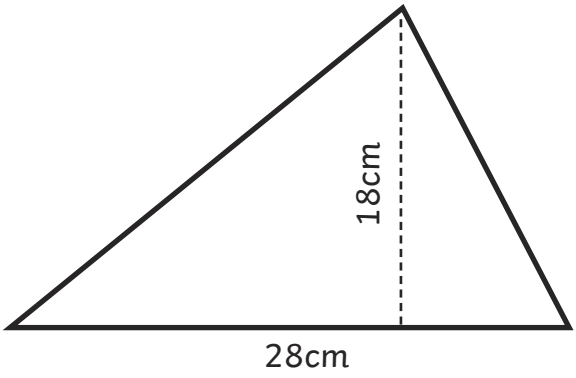
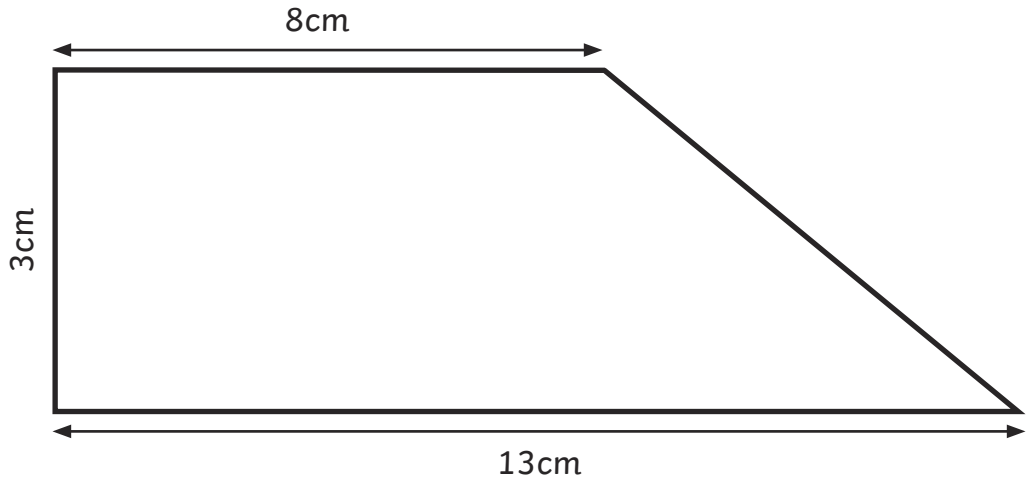


area =

11. Write an explanation to describe why finding the area of a right-angled triangle is **base multiplied by height, divided by 2**. You can draw diagrams to help your explanation.

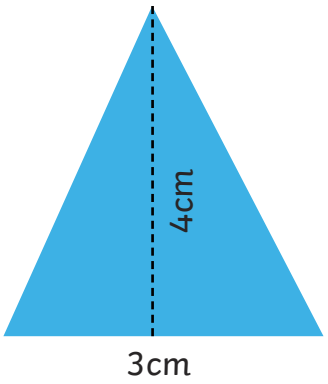
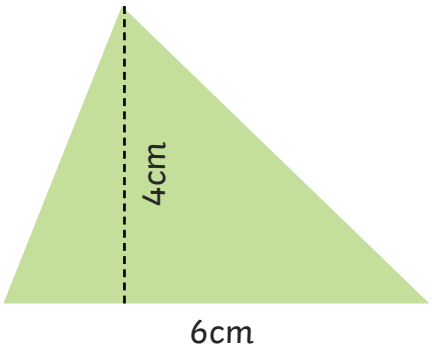
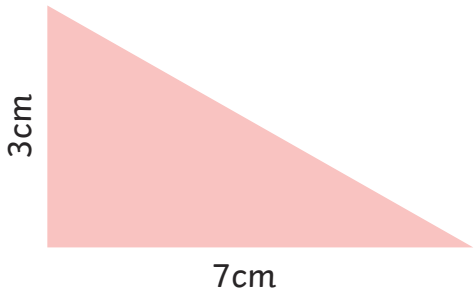
12. What is the area of the whole of this shape? Show how you worked out the answer:

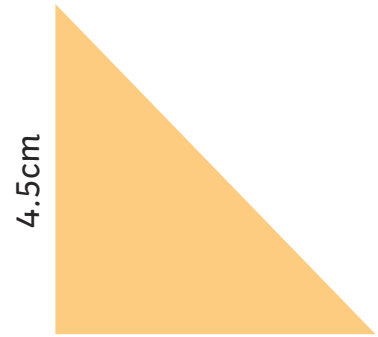


Find the Area of Triangles **Answers**

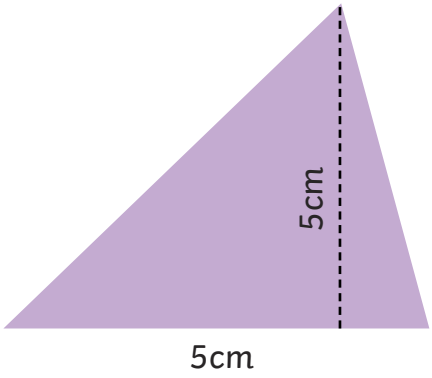
Question	Answer
1.	*176cm²*
2.	*300cm²*
3.	*126cm²*
4.	*67.5cm²*
5.	*486cm²*
6.	*157.5cm²*
7.	*324cm²*
8.	*112.5cm²*
9.	*350cm²*
10.	*252cm²*
11.	Write an explanation to describe why finding the area of a right-angled triangle is **base multiplied by height, divided by 2**. You can draw diagrams to help your explanation.
	Explanation shows an understanding that a right-angled triangle is half of a rectangle and so the measurement needs to be halved.
12.	What is the area of the whole of this shape? Show how you worked out the answer.
	31.5cm²

Matching Area of Triangles Cards

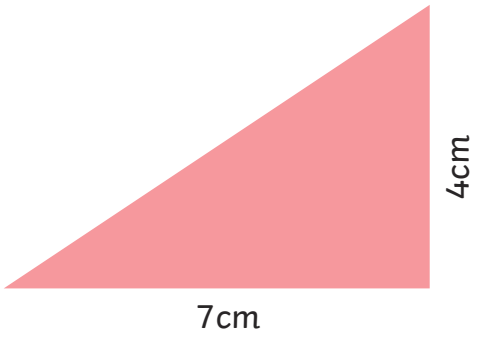
	$12cm^2$
	$9cm^2$
	$12.5cm^2$



$10.5cm^2$



$14cm^2$



$6cm^2$

Avery Template: Name Badge Label, 8 per sheet | **Compatible Products**: 15395, 25395, 42395, 45395, 48395, 5395, 8395, 88395, 85395.

Measurement | Area of Triangles

I can calculate the area of a triangle.		
I can use a formula to calculate the area of right-angled triangles.		
I can use a formula to calculate the area of isosceles and scalene triangles.		

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