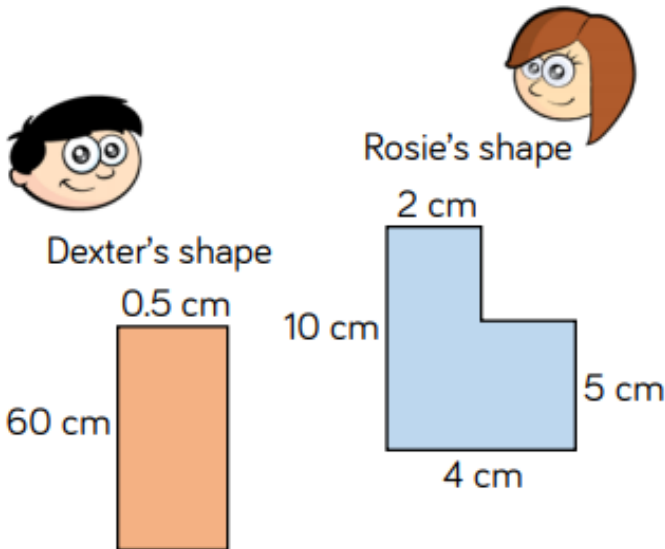


01.03.21 Shapes—Same Area

Reasoning and problem solving—Maths extension

Answer and reason the questions below to deepen your mathematical understanding. Once complete, self-mark using the answer sheet.

- 1) Rosie and Dexter are drawing shapes with an area of 30cm^2



Who is correct?

Explain your reasoning.

- 2) Three children are given the same rectilinear shape to draw.

Amir says, "The smallest length is 2 cm."

Alex says, "The area is less than 30cm^2 ."

Annie says, "The perimeter is 22 cm."

What could the shape be?

How many possibilities can you find?

- 3) **Always, Sometimes, Never?**

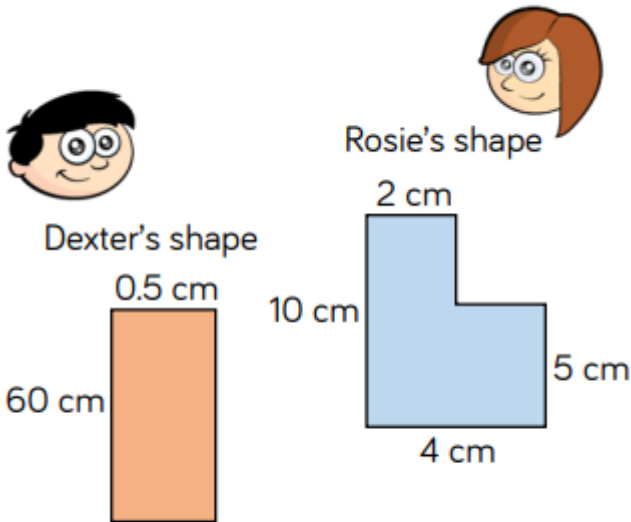
If the area of a rectangle is odd then all of the lengths are odd.

Answers can be found on the next page.

01.03.21 Shapes—Same Area

ANSWER SHEET

- 1) Rosie and Dexter are drawing shapes with an area of 30cm^2



Who is correct?

Explain your reasoning.

Both are correct.

Dexter's shape:
 $60\text{ cm} \times 0.5\text{ cm}$
 $= 30\text{ cm}^2$

Rosie's shape:
 $2\text{ cm} \times 10\text{ cm}$
 $= 20\text{ cm}^2$
 $5\text{ cm} \times 2\text{ cm}$
 $= 10\text{ cm}^2$
 $20\text{ cm}^2 + 10\text{ cm}^2$
 $= 30\text{ cm}^2$
Could be split differently.

- 2) Three children are given the same rectilinear shape to draw.

Amir says, "The smallest length is 2 cm."

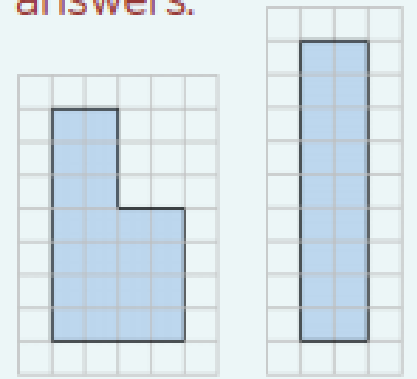
Alex says, "The area is less than 30 cm^2 ."

Annie says, "The perimeter is 22 cm."

What could the shape be?

How many possibilities can you find?

Children can use squared paper to explore. Possible answers:



- 3) **Always, Sometimes, Never?**

If the area of a rectangle is odd then all of the lengths are odd.

Sometimes –
 15 cm^2 could be
5 cm and 3 cm or
60 cm and
0.25 cm

Answers can be found on the next page.

02.03.21 Area and Perimeter

Reasoning and problem solving—Maths extension

Answer and reason the questions below to deepen your mathematical understanding. Once complete, self-mark using the answer sheet.

1) True or false?

Two rectangles with the same perimeter can have different areas.

Explain your answer.

2) A farmer has 60 metres of perimeter fencing.

For every 1 m² he can keep 1 chicken.



How can he arrange his fence so that the enclosed area gives him the greatest area?

3) Tommy has a 8 cm × 2 cm rectangle. He increases the length and width by 1 cm.

Length	Width	Area
8	2	
9	3	

He repeats with a 4 cm × 6 cm rectangle.

Length	Width	Area
4	6	

What do you notice happens to the areas?

Can you find any other examples that follow this pattern?

Are there any examples that do not follow the pattern?

02.03.21 Area and Perimeter

ANSWER SHEET

1) True or false?

Two rectangles with the same perimeter can have different areas.

True. Children explore this by drawing rectangles and comparing both area and perimeter.

Explain your answer.

2) A farmer has 60 metres of perimeter fencing.

For every 1 m² he can keep 1 chicken.



How can he arrange his fence so that the enclosed area gives him the greatest area?

The greatest area is a 15 m × 15 m square, giving 225 m²

Children may create rectangles by increasing one side by 1 unit and decreasing one

side by 1 unit e.g.
 $16 \times 14 = 224 \text{ m}^2$
 $17 \times 13 = 221 \text{ m}^2$

3) Tommy has a 8 cm × 2 cm rectangle. He increases the length and width by 1 cm.

Length	Width	Area
8	2	
9	3	

He repeats with a 4 cm × 6 cm rectangle.

Length	Width	Area
4	6	

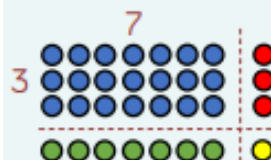
What do you notice happens to the areas?

Can you find any other examples that follow this pattern?

Are there any examples that do not follow the pattern?

If the sum of the length and width is 10, then the area will always increase by 11

Children may use arrays to explore this:



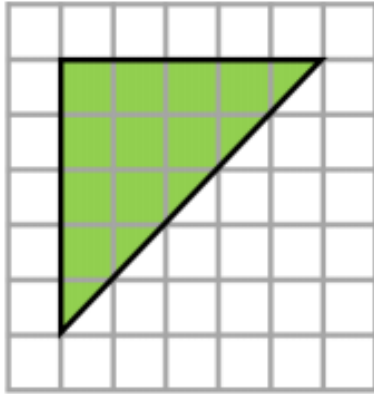
The red and green will always total 10 and the yellow will increase that by 1 to 11

03.03.21 Area of a triangle (1)

Reasoning and problem solving—Maths extension

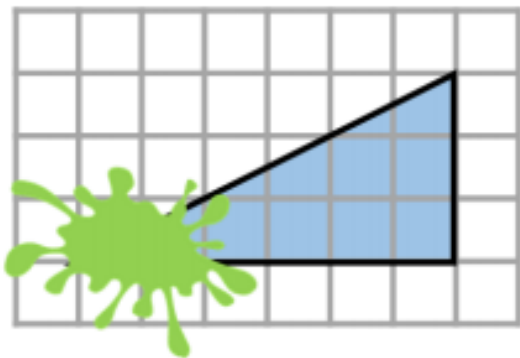
Answer and reason the questions below to deepen your mathematical understanding. Once complete, self-mark using the answer sheet.

1)



Mo says the area of this triangle is 15cm^2
Is Mo correct? If not, explain his mistake.

- 2) Part of a triangle has been covered.
Estimate the area of the whole triangle.



- 3) What is the same about these two triangles?

What is different?



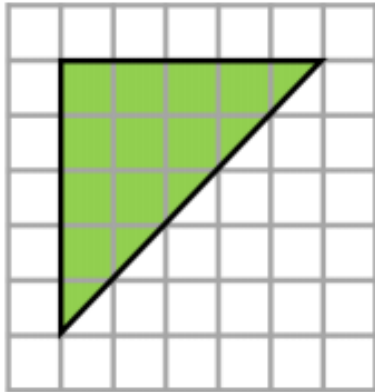
Can you create a different right angled triangle with the same area?

Answers can be found on the next page.

03.03.21 Area of a triangle (1)

ANSWER SHEET

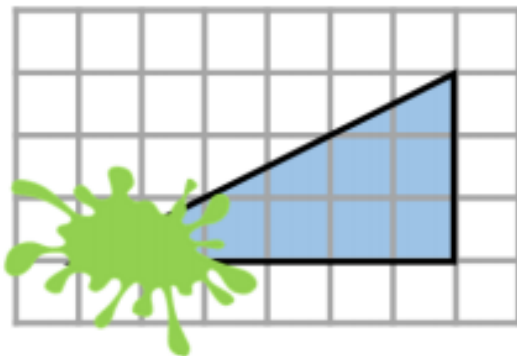
1)



Mo says the area of this triangle is 15cm^2
Is Mo correct? If not, explain his mistake.

Mo is incorrect because he has counted the half squares as whole squares.

- 2) Part of a triangle has been covered.
Estimate the area of the whole triangle.



9 cm^2

Both triangles have an area of 15 cm^2
The triangle on the left is a right angled triangle and the triangle on the right is an isosceles triangle.

- 3) What is the same about these two triangles?
What is different?



Can you create a different right angled triangle with the same area?

Children could draw a triangle with a height of 10 cm and a base of 3 cm, or a height of 15 cm and a base of 2 cm.

04.03.21 Area of a triangle (2)

Reasoning and problem solving—Maths extension

Answer and reason the questions below to deepen your mathematical understanding. Once complete, self-mark using the answer sheet.

1)

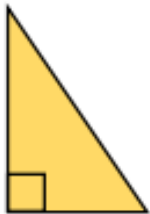
Annie is calculating the area of a right-angled triangle.



I only need to know the length of any two sides to calculate the area of a triangle.

Do you agree with Annie? Explain your answer.

2)



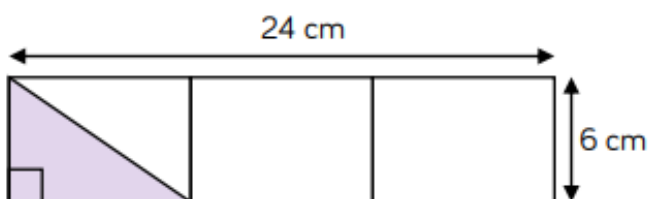
$$\text{Area} = 54 \text{ cm}^2$$

What could the length and the height of the triangle be?

How many different integer possibilities can you find?

3)

Calculate the area of the shaded triangle.



Mo says,



I got an answer of 72 cm^2

Do you agree with Mo?

If not, can you spot his mistake?

Answers can be found on the next page.

04.03.21 Area of a triangle (2)

ANSWER SHEET

- 1) Annie is calculating the area of a right-angled triangle.

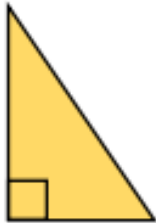


I only need to know the length of any two sides to calculate the area of a triangle.

Do you agree with Annie? Explain your answer.

Annie is incorrect as it is not sufficient to know **any** two sides, she needs the base and perpendicular height. Children could draw examples and non-examples.

2)



$$\text{Area} = 54 \text{ cm}^2$$

What could the length and the height of the triangle be?

How many different integer possibilities can you find?

Possible answers:

Height: 18 cm

Base: 6 cm

Height: 27 cm

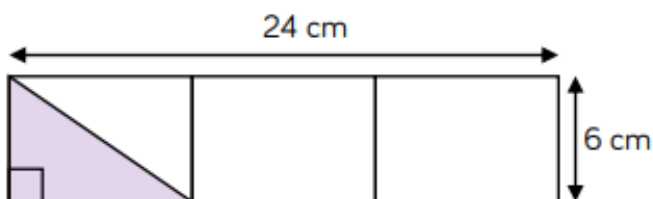
Base: 4 cm

Height: 12 cm

Base: 9 cm

Calculate the area of the shaded triangle.

3)



Mo says,



I got an answer of 72 cm^2

Do you agree with Mo?

If not, can you spot his mistake?

The area of the shaded triangle is 24 cm^2

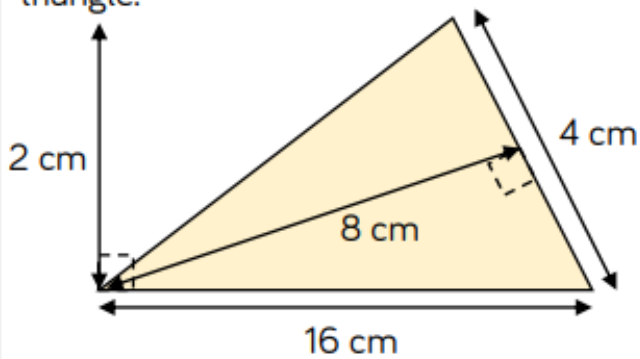
Mo is incorrect as he has just multiplied the two numbers given and divided by 2, he hasn't identified the correct base of the triangle.

05.03.21 Area of a triangle (3)

Reasoning and problem solving—Maths extension

Answer and reason the questions below to deepen your mathematical understanding. Once complete, self-mark using the answer sheet.

- 1) Class 6 are calculating the area of this triangle.



Here are some of their methods.

$$4 \times 8 \times 16 \times 2 \div 2$$

$$4 \times 8 \div 2$$

$$16 \times 2 \div 2$$

$$16 \times 4 \div 2$$

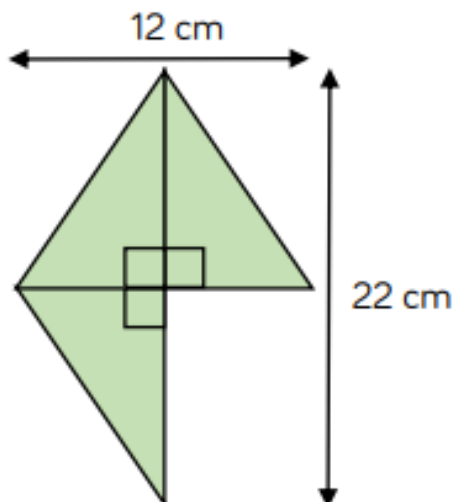
$$16 \times 8 \div 2$$

$$8 \times 1$$

Tick the correct methods.

Explain any mistakes.

- 2) The shape is made of three identical triangles.



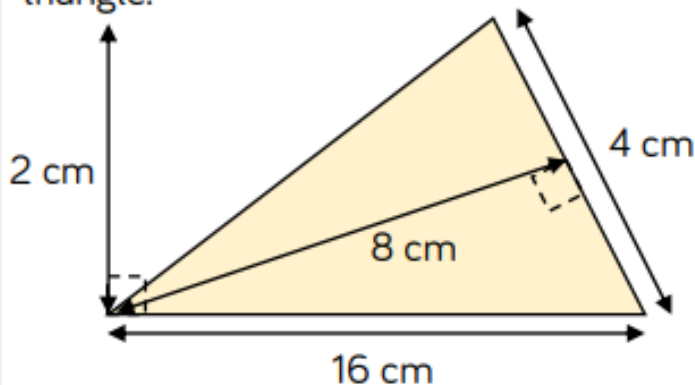
What is the area of the shape?

Answers can be found on the next page.

05.03.21 Area of a triangle (3)

ANSWER SHEET

- 1) Class 6 are calculating the area of this triangle.



Here are some of their methods.

$$4 \times 8 \times 16 \times 2 \div 2$$

$$4 \times 8 \div 2$$

$$16 \times 2 \div 2$$

$$16 \times 4 \div 2$$

$$16 \times 8 \div 2$$

$$8 \times 1$$

Tick the correct methods.

Explain any mistakes.

The correct methods are:

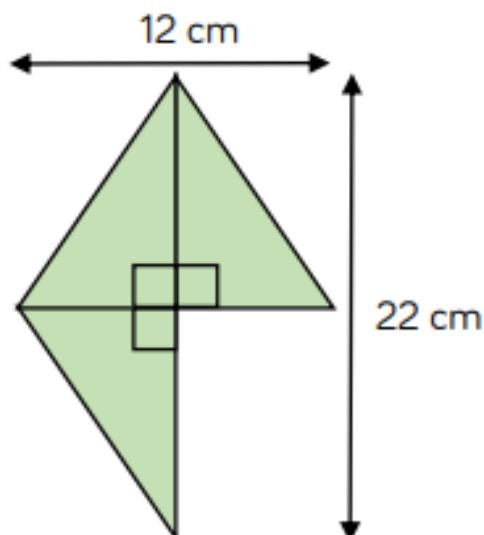
$$16 \times 2 \div 2$$

$$4 \times 8 \div 2$$

All mistakes are due to not choosing a pair of lengths that are perpendicular.

Children could explore other methods to get to the correct answer e.g. halving the base first and calculating 8×2 etc.

- 2) The shape is made of three identical triangles.



Each triangle is 6 cm by 11 cm so area of one triangle is 33 cm^2

Total area = 99 cm^2

What is the area of the shape?