



Maths

Calculation Policy

Perimeter and area

2024

Year Three and Four → page 3

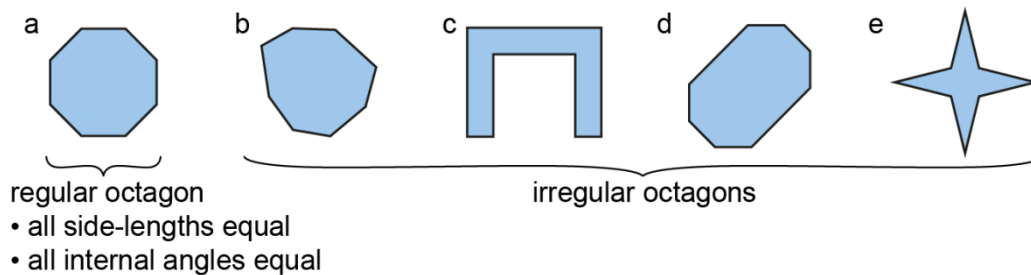
Year Five and Six → page 10

Year Three and Four (Both taught in Year Three)

https://www.ncetm.org.uk/media/dbwkd5mv/ncetm_spine2_segment16_y4.pdf#page=4
https://assets.publishing.service.gov.uk/media/6009a9888fa8f5296a72aad7/Maths_guidance_year_4.pdf

➡ I know that a regular polygon has sides that are all the same length

Language focus "This is a regular polygon, because all of the sides are the same length, and all of the interior angles are equal."



➡ I know that the perimeter is the distance around the edge of a 2-D shape

1. Explore real life examples:

'The caterpillar walks around the edge of the leaf.'



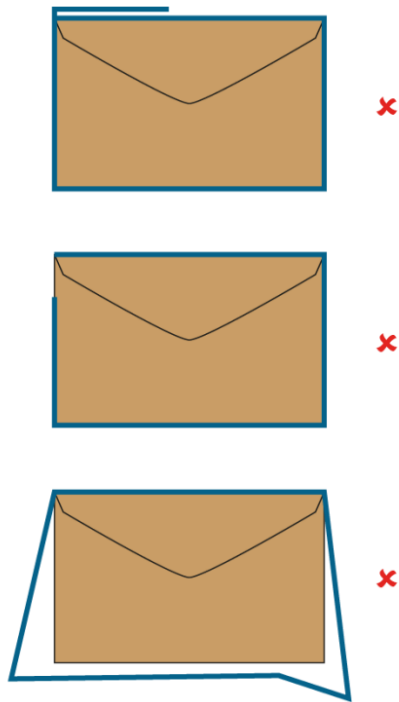
- 'The distance around the edge of the leaf is its perimeter.'

'Now the caterpillar walks around this leaf.'



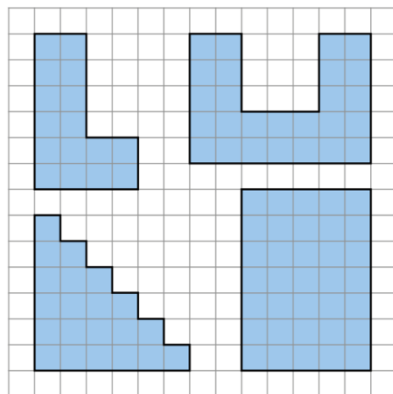
- 'The distance around the edge of the leaf is its perimeter.'

2. Understanding what a perimeter is and what it is not



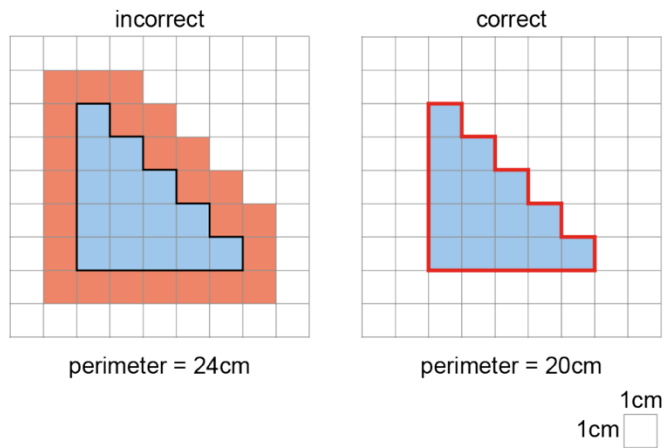
- ➡ I know that the perimeter is measured in units of length
- ➡ I know that different shapes can have the same perimeter
- ➡ I can calculate the perimeter of a 2D shape using squares

1. *'What is the perimeter of each shape? Count the squares.'*



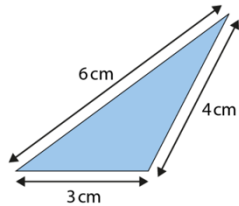
rectilinear shapes
on centimetre-
square-grids

count the number of centimetre lines around the shape



➡ I can calculate the perimeter by adding together the lengths of the sides of a 2D shape

'What is the perimeter of this triangle?'



$$\text{perimeter} = 6 \text{ cm} + 4 \text{ cm} + 3 \text{ cm} \\ = 13 \text{ cm}$$

• 'We can write the side-lengths in any order.'

$$6 \text{ cm} + 4 \text{ cm} + 3 \text{ cm} = 13 \text{ cm}$$

$$6 \text{ cm} + 3 \text{ cm} + 4 \text{ cm} = 13 \text{ cm}$$

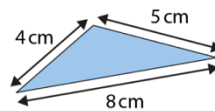
$$4 \text{ cm} + 6 \text{ cm} + 3 \text{ cm} = 13 \text{ cm}$$

$$4 \text{ cm} + 3 \text{ cm} + 6 \text{ cm} = 13 \text{ cm}$$

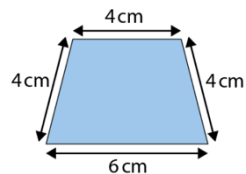
$$3 \text{ cm} + 4 \text{ cm} + 6 \text{ cm} = 13 \text{ cm}$$

$$3 \text{ cm} + 6 \text{ cm} + 4 \text{ cm} = 13 \text{ cm}$$

'What is the perimeter of each shape?'

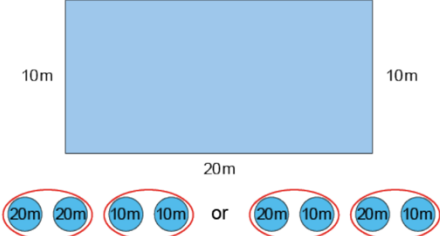


$$P = 8 \text{ cm} + 4 \text{ cm} + 5 \text{ cm} \\ = 17 \text{ cm}$$



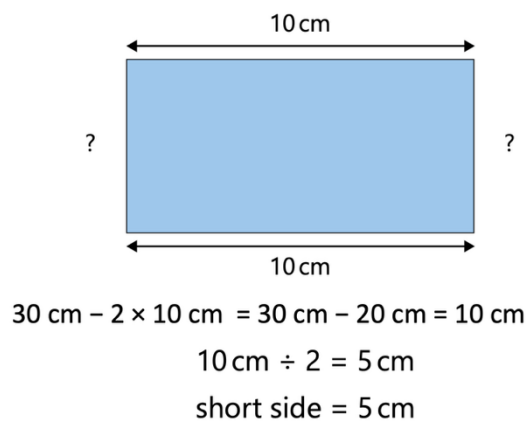
$$P = 4 \text{ cm} + 4 \text{ cm} + 4 \text{ cm} + 6 \text{ cm} \\ = 18 \text{ cm}$$

0 → I can use multiplication to calculate the perimeter of a rectangle

Shape type	Strategy for calculating the perimeter
rectangles	use doubling and addition: perimeter = $2 \times (\text{length} + \text{width})$ or perimeter = $(2 \times \text{length}) + (2 \times \text{width})$  Figure 44: 2 strategies for calculating the perimeter of a rectangle <i>Drawn to scale.</i>

Repeat these steps with other rectangles of different sizes. Work towards the following generalised statement: ***'The perimeter of a rectangle is equal to two times the length of the long side plus two times the length of the short side.'***

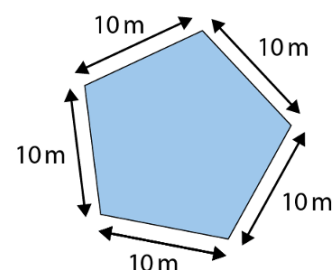
0 → I can calculate unknown lengths of rectangles using the perimeter



0 → I can use multiplication to calculate the perimeter of a regular polygon

polygons with equal side-lengths	use multiplication: perimeter = side-length $\times$ number of sides
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What is the perimeter of this regular pentagon?



Once children are confident with the steps, use the following generalised statement: ***'To find the perimeter of a regular polygon, you multiply the length of one of the sides by the number of sides.'***

$$\begin{aligned}
 P &= 10 \text{ m} + 10 \text{ m} + 10 \text{ m} + 10 \text{ m} + 10 \text{ m} \\
 &= 5 \times 10 \text{ m} \\
 &= 50 \text{ m}
 \end{aligned}$$

➔ I can calculate unknown lengths of regular polygons using perimeter

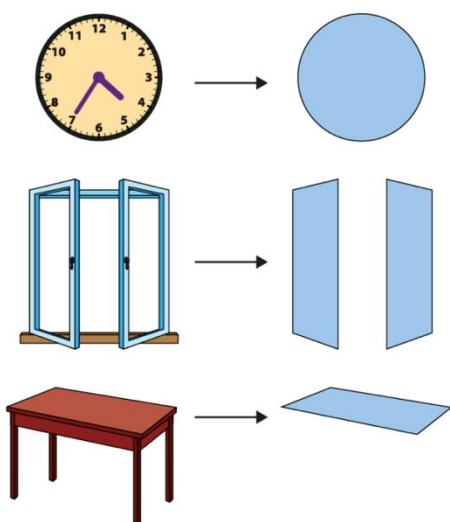
Now encourage children to make links to division. Show that if you know the perimeter of a regular polygon, you can use division to find the length of each side. Using a table such as the one opposite, discuss what calculation you may need to use, coming to the following generalisation: ***'If you know the perimeter of a regular polygon you divide it by the number of sides to find the length of one of its sides.'***

'Complete this table for regular polygons.'

Number of sides	Perimeter	Length of each side
3	24 cm	
4	24 cm	
6	24 cm	
8	24 cm	

➔ I know that area is the measurement of the surface of a flat item

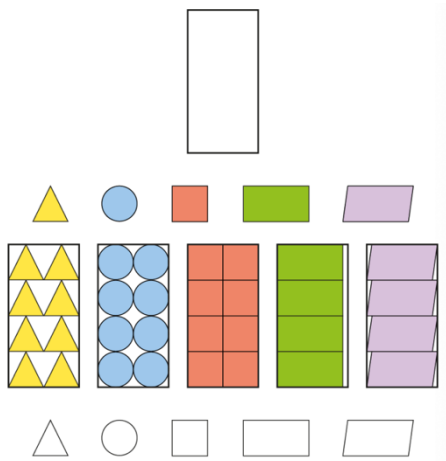
1. Using real life items



only. Conclude that area is the measurement of the *surface of a flat item*, as opposed to perimeter, which is the measurement of the distance *around the edge* of an item.

➔ I can calculate the area using squares

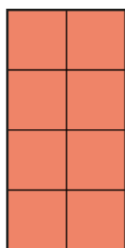
1. Use shapes to cover the surface



Next look at which shapes could be used to cover these surfaces. Lay a variety of paper shapes over the surface of a table and discuss which shapes cover the table most effectively, i.e. with the fewest gaps. From the discussion, draw out the conclusion that squares are the best shape to use.

2. Using squares

'What is the area of this table?'



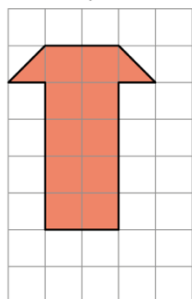
'This shape has an area of ____ square units.'

- *'This table has an area of eight square units.'*

3. Combining shapes

Combining two triangles to make a square:

'What is the area of this shape?'

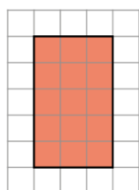
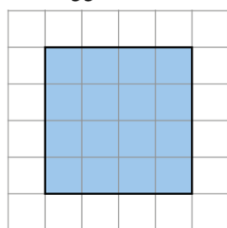


- *'This shape has an area of eleven square units.'*

4. Different sized grids

Different sized grids:

'Does one shape look bigger?'



0 → I know area is measured in square units

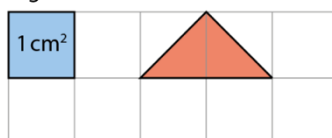
Work towards the following generalised statement: ***'We can measure area in square centimetres. We write this as "cm²".'***

0 → I can calculate area using square units

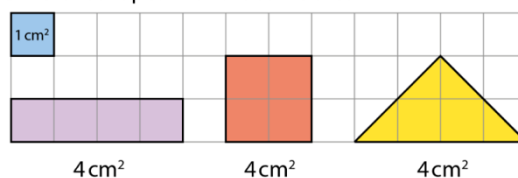
When learning to use a square centimetre to measure area, children must not overgeneralise and think that this is the only shape that has an area of one square centimetre. Show the children some other shapes that also have an area of one square centimetre.

To build on this point you may like to show children other shapes that have an equal area but are different shapes, such as the examples given opposite. Return to the idea that the scale must always be given so that we know the actual size.

Representing 1 cm²:



Different shapes with the same area:

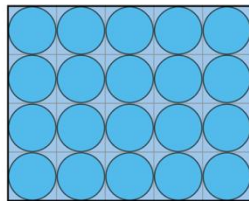
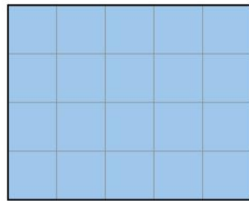
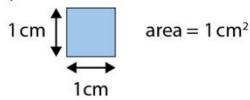


Use real life concepts:

Large sheets of paper to measure shapes drawn on playground using metres squared etc.

➡ I can calculate area using multiplication

'How many squares are there?'



• 'There are twenty 1 cm squares, so $A = 20 \text{ cm}^2$.'

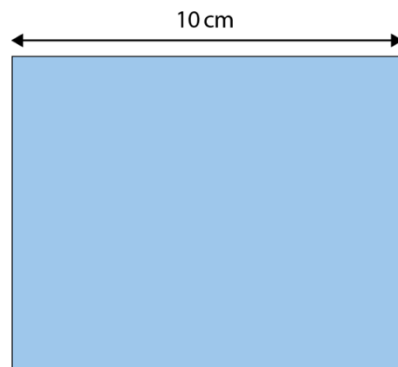
1. start by counting the counters
2. Using knowledge of arrays, how could you count them quicker? In 5s or 4s
3. Can count in either
4. $5 \text{ cm} \times 4 \text{ cm} =$
Or
 $4 \text{ cm} \times 5 \text{ cm} =$

Make sure children know what each number represents using the following stem sentence: '**The ____ represents the ____.**'

Work towards the following generalised statement: '**To find the area of a rectangle multiply the length by the width.**'

➡ I can calculate a missing length using area

'The area of this rectangle is 80 cm^2 . How long is the short side?'



$$\begin{aligned} A &= 80 \text{ cm}^2 \\ 80 \div 10 &= 8 \\ \text{short side} &= 8 \text{ cm} \end{aligned}$$

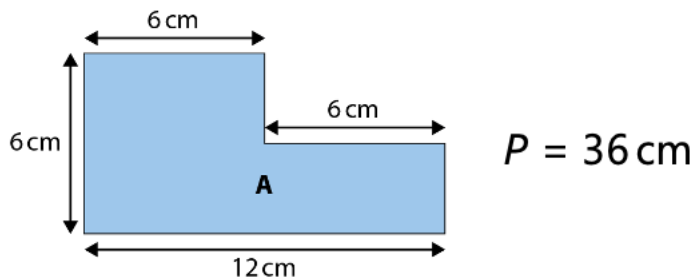
Year Five and Six (Both taught in Year Five)

https://www.ncetm.org.uk/media/mbmej2b2/ncetm_spine2_segment30_y6.pdf#page=4

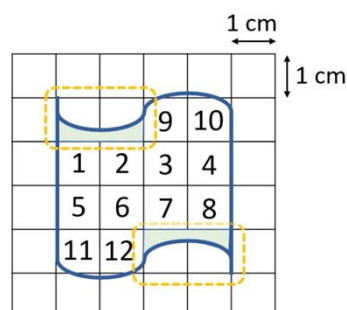
- ➡ I know that the perimeter is the distance around the edge of a 2-D shape
- ➡ I know that the perimeter is measured in units of length
- ➡ I know that different shapes can have the same perimeter

- 0 → I can calculate the perimeter of a 2D shape using squares
- 0 → I can calculate the perimeter by adding together the lengths of the sides of a 2D shape
- 0 → I can use multiplication to calculate the perimeter of a rectangle
- 0 → I can calculate unknown lengths of rectangles using the perimeter

- 0 → I can calculate the perimeter of composite rectilinear shapes using squares
- 0 → I can calculate the perimeter of composite rectilinear shapes using addition



- 0 → I can use multiplication to calculate the perimeter of a regular polygon
- 0 → I can calculate unknown lengths of regular polygons using perimeter
- 0 → I know that area is the measurement of the surface of a flat item
- 0 → I can calculate the area using squares
- 0 → I know area is measured in square units
- 0 → I can calculate area using square units
- 0 → I can estimate the area of irregular shapes using square units



Estimate the area of this shape.

➡ I can calculate area using multiplication

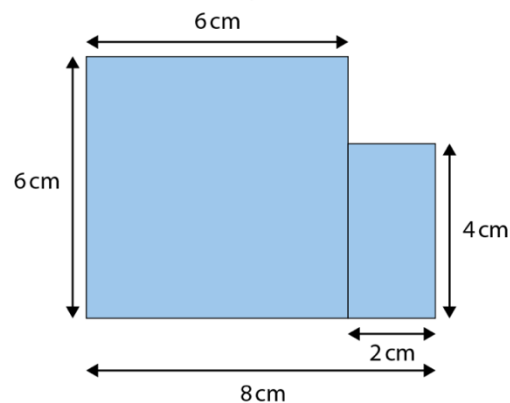
➡ I can calculate a missing length using area

➡ I can calculate the area of composite rectilinear shapes

1. Splitting it into multiple rectangles

Finding the area using two rectangles:

'What is the area of this shape?'

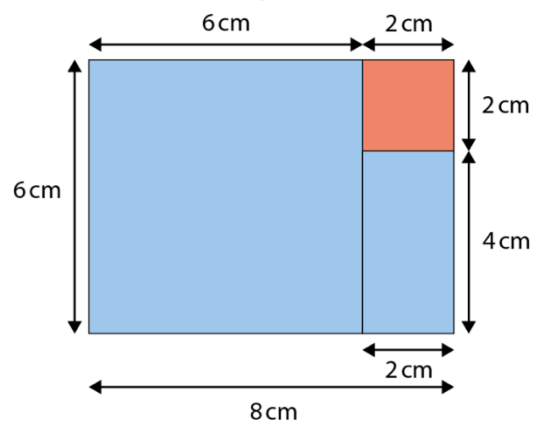


$$A = 6 \text{ cm} \times 6 \text{ cm} + 2 \text{ cm} \times 4 \text{ cm} = 44 \text{ cm}^2$$

2. Make one large rectangle and subtract the missing part

Finding the area by making one large rectangle:

'What is the area of this shape?'

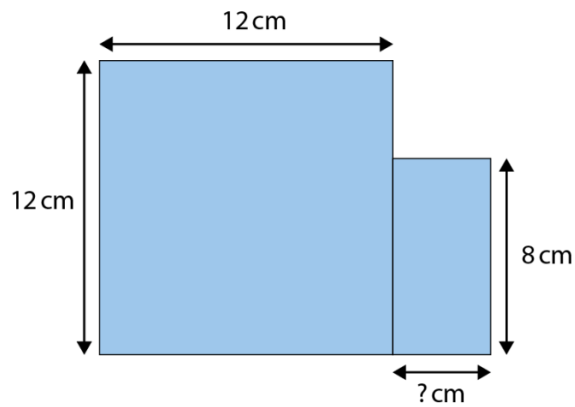


$$A = 8 \text{ cm} \times 6 \text{ cm} - 2 \text{ cm} \times 2 \text{ cm} = 44 \text{ cm}^2$$

➔ I can calculate a missing length of a composite rectilinear shape using area

Using known values to find a missing side-length:

- 'The area of this shape is 176 cm^2 . Find the length of the missing side.'

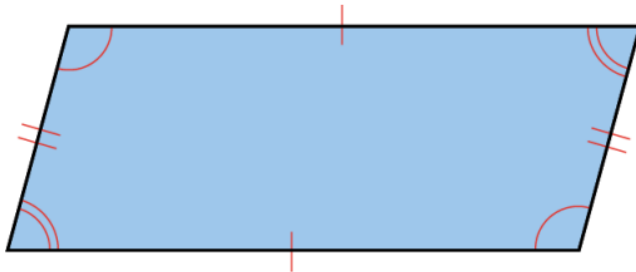


$$A = 176 \text{ cm}^2$$

$$12 \times 12 + \square \times 8 = 176 \text{ cm}^2$$

➔ I know the properties of a parallelogram

The properties of a parallelogram:

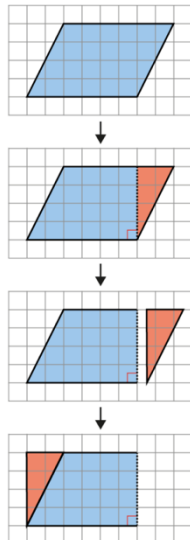


- Opposite sides are parallel.
- Opposite sides are equal in length.
- Opposite angles are equal.

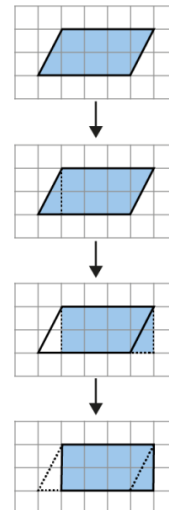
➔ I can calculate the area of a parallelogram

1. Changing a parallelogram into a rectangle

Changing a parallelogram into a rectangle by cutting shapes:



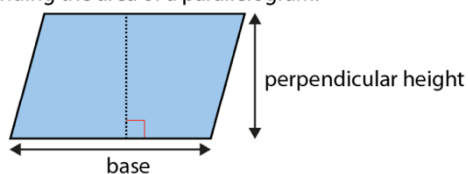
Changing a parallelogram into a rectangle by drawing lines:



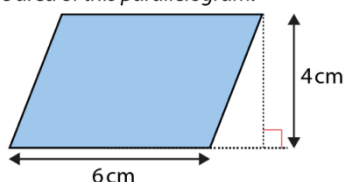
Work towards the following generalisation: **'A parallelogram can be made into a rectangle that has the same area.'**

2. Finding the area

Finding the area of a parallelogram:

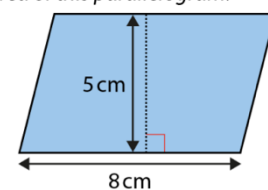


- 'To find the area of a parallelogram multiply the base by the perpendicular height.'
- 'Find the area of this parallelogram.'



- 'The base is 6 cm.'
- 'The perpendicular height is 4 cm.'
- 'The area is $6 \times 4 = 24 \text{ cm}^2$.'

- 'Find the area of this parallelogram.'

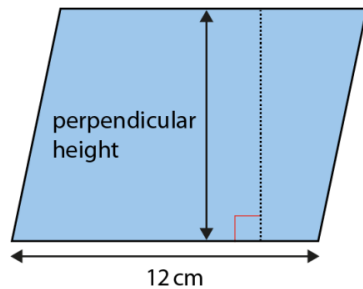


- 'The base is 8 cm.'
- 'The perpendicular height is 5 cm.'
- 'The area is $8 \times 5 = 40 \text{ cm}^2$.'

By the end of this step children should be confident with the following generalisation: **'To find the area of a parallelogram multiply the base by the perpendicular height.'**

➡ I can calculate the missing length of a parallelogram using area

- 'The area of this parallelogram is 108 cm^2 . What is the perpendicular height?'



$$\text{Area} \div \text{base} = \text{perpendicular height}$$

$$\text{Area} \div \text{perpendicular height} = \text{base}$$

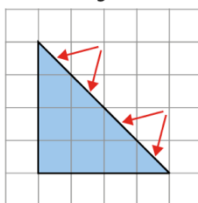
$$\text{area} \div \text{base} = \text{perpendicular height}$$

$$108 \div 12 = 9$$

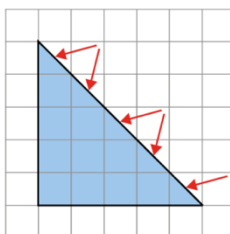
- 'The perpendicular height is 9 cm.'

➡ I can calculate the area of a triangle using square units

'Find the area of each triangle.'



- 'The area is eight square units.'



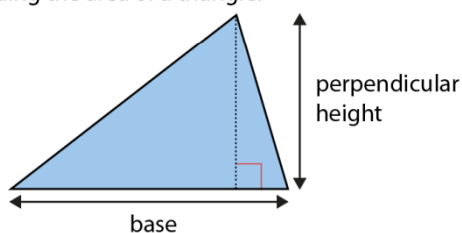
- 'The area is twelve and a half square units.'

and then counted. Use the stem sentence: **'The area is ___ square units.'**

Work towards the following generalisation: **'We can count squares to find the area of a triangle.'**

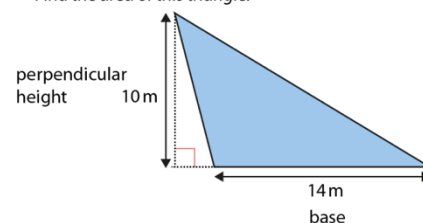
➡ I can calculate the area of a triangle

Finding the area of a triangle:



$$\text{area} = \text{base} \times \text{perpendicular height} \div 2$$

- 'Find the area of this triangle.'



- 'The base is 14 m.'
- 'The perpendicular height is 10 m.'
- 'The area is $14 \times 10 \div 2 = 140 \div 2 = 70 \text{ m}^2$.'

0→ I can find the link between area of rectangles and area of triangles

$$\begin{array}{ccc} \text{area of the} & \times 2 = & \text{area of the} \\ \text{triangle} & & \text{rectangle} \end{array}$$

0→ I know that shapes with the same area can have different perimeters

0→ I know that shapes with the same perimeter can have different areas