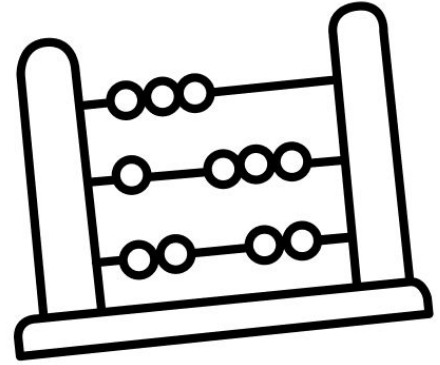


# Checking understanding of perimeter and area

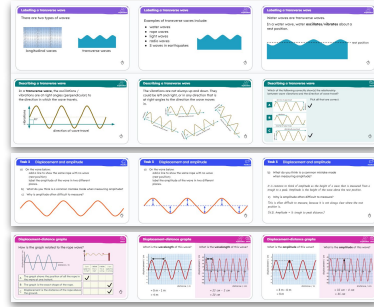
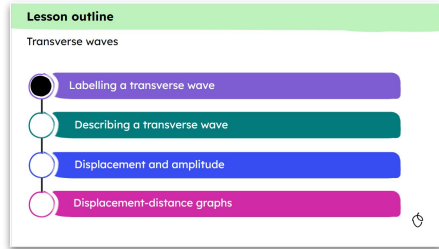
**Maths**

Unit: Perimeter and area

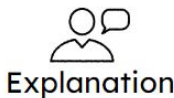


# Oak's lesson structure

Oak's lessons are structured around **learning cycles**. These are indicated through colour in the slide deck:



Each **learning cycle** covers several phases:



# Useful links

Advice on [how to use Oak lessons](#) to bring the lesson to life in your classroom and best fit the needs of your pupils.



# Outcome

You can explain the properties of various polygons.



# Keywords

**polygon**

**quadrilateral**

**regular**

**irregular**

**parallel**



## Keywords

A **polygon** is a flat (2D), closed figure made up of straight line segments.

**Quadrilaterals** are polygons that have 4 sides.

A **regular** polygon has sides that are all equal and interior (inside) angles that are all equal.

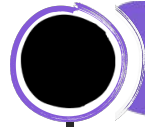
An **irregular** polygon has sides that are not equal or interior (inside) angles that are not equal.

Two lines are **parallel** if they are straight lines that are always the same (non-zero) distance apart.



# Lesson outline

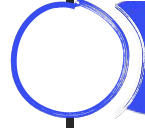
## Checking understanding of perimeter and area



Defining a shape



Grouping shapes by properties



Finding missing lengths with shape properties



Missing lengths in composite rectilinear shapes





There are an infinite number of shapes in the world.

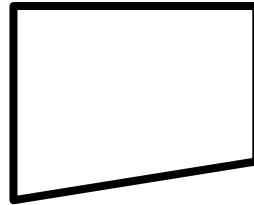
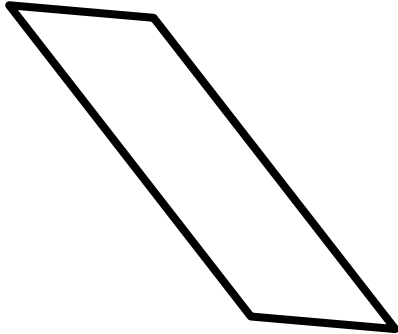
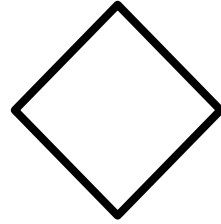
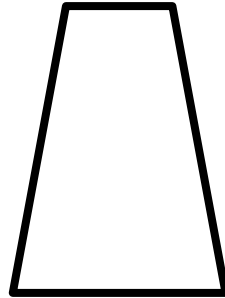
Some shapes can be grouped into 'families' because they share the same characteristics.

An example of this is the family of quadrilaterals. All polygons with four sides are quadrilaterals but they can look very different!



# Defining a shape

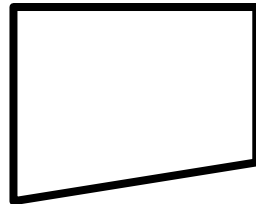
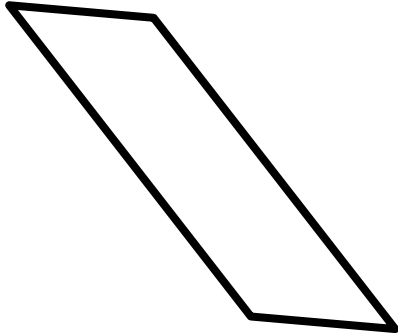
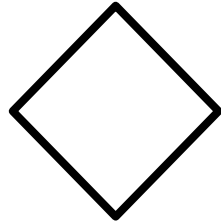
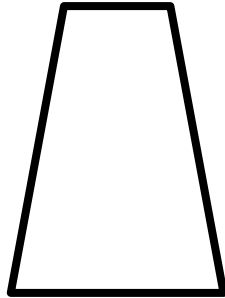
These are just a few examples of shapes that belong in the family of **quadrilaterals**.



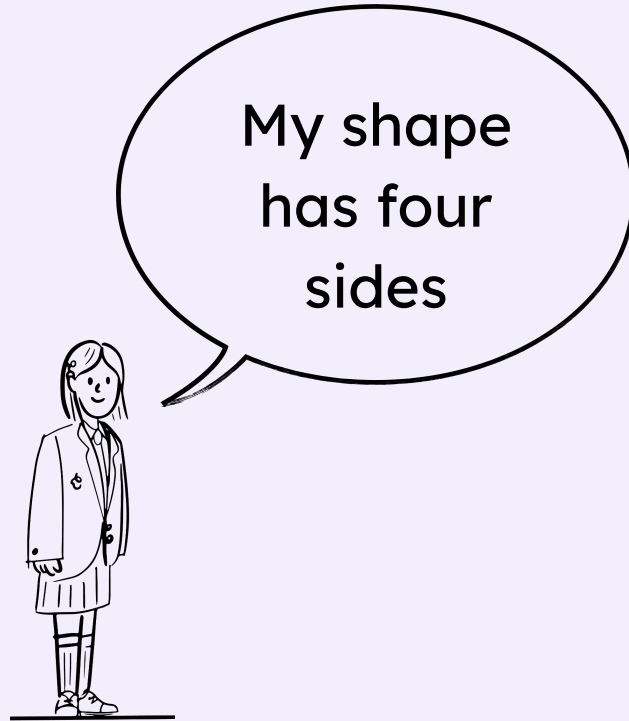


# Defining a shape

They fit in broader categories too, like the family of **polygons**.



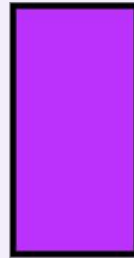
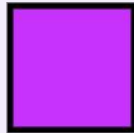
**What** shape might Sara be thinking of?



**What** shape am I thinking of?

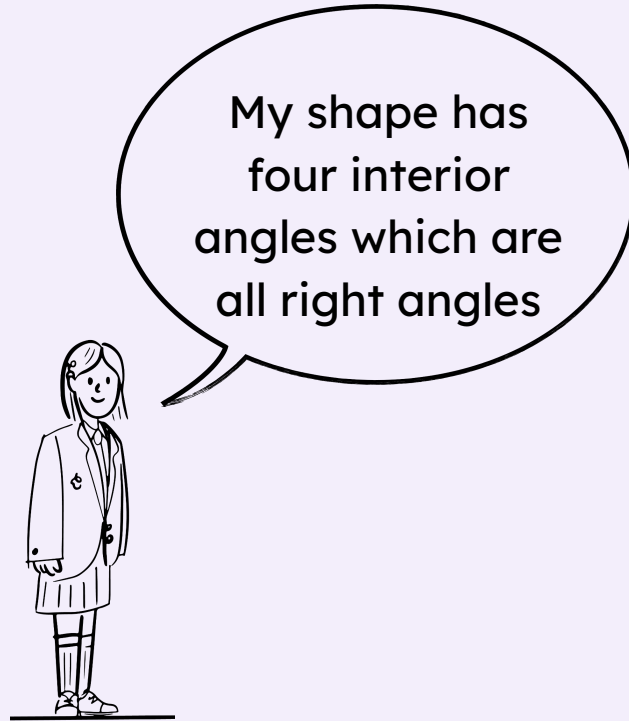
‘My shape has four sides’

*Could be any quadrilateral e.g.*





**What** shape might Sara be thinking of now?

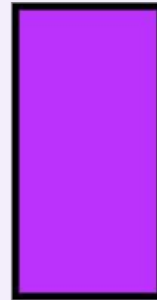
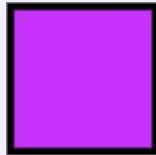




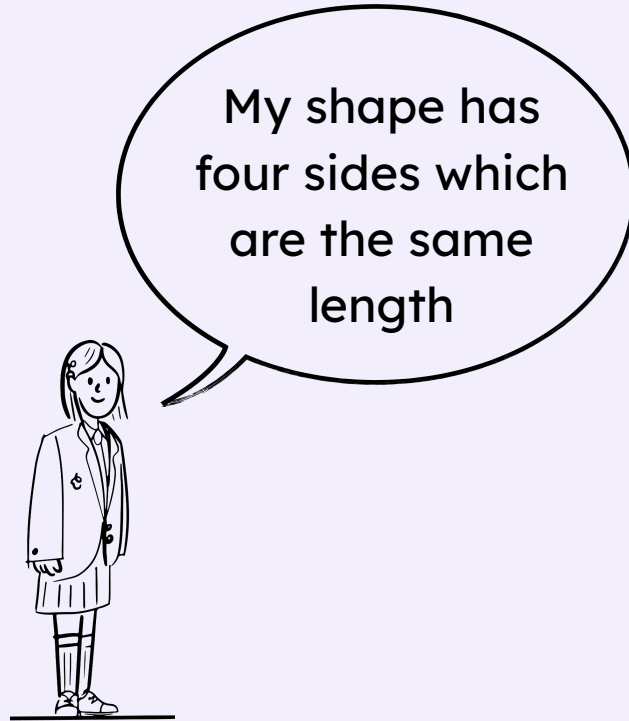
**What** shape am I thinking of?

‘My shape has four interior angles which are all right angles’

*Could be either a square or a rectangle e.g.*



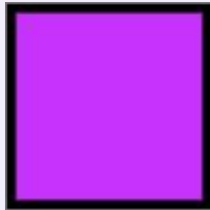
**What** shape might Sara be thinking of now?



**What** shape am I thinking of?

‘My shape has four sides which are the same length’

*The shape must be a square or a rhombus*

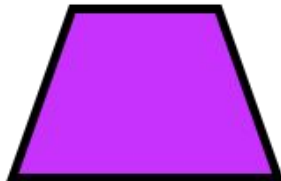
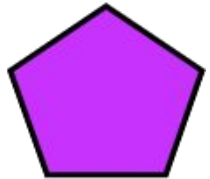
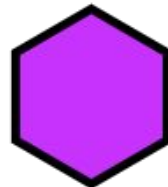
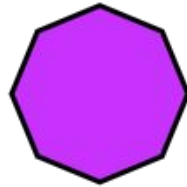
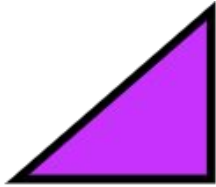
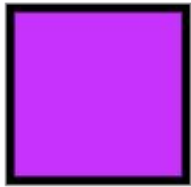


## Task 1 Defining a shape

**Pick one** of the shapes and **describe** it to your partner.

**How** many clues did it take?

**Which** shape required the most clues?




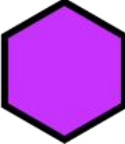



## Task 1 Defining a shape



Feedback

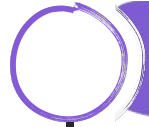
There are many possibilities. Here are some examples:

- My shape is not a polygon. 
- My shape has six sides. 
- My shape has four sides. There are two pairs of parallel, equal sides. The interior angles are not right angles. 



# Lesson outline

## Checking understanding of perimeter and area



Defining a shape



Grouping shapes by properties



Finding missing lengths with shape properties



Missing lengths in composite rectilinear shapes



Mathematicians group shapes based on properties such as:

- how many sides they have
- whether they are polygons
- whether they are regular





All triangles belong to the family of **polygons**.

An **equilateral** triangle belongs to the family of **regular** polygons.



All rectangles belong to the family of polygons.

A square belongs to the family of regular polygons.

In fact, a square can be thought of as a 'regular rectangle'.

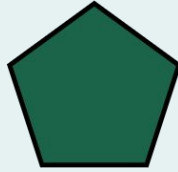


# Grouping shapes by properties



## True or false?

A pentagon has to be regular.



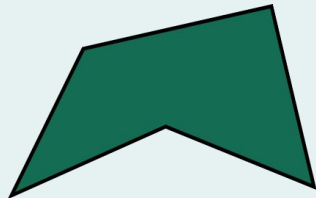
**T** True

**F** False ✓

## Justify your answer

**A** Pentagons have five straight sides.

**B**



# Grouping shapes by properties



Check

## True or false?

A kite is a regular quadrilateral.

**T** True

**F** False ✓

## Justify your answer

**A** A kite has four straight sides.

**B** A kite has two pairs of sides of the same length. ✓



## Task 2 Grouping shapes by properties



a) **Put** each polygon in the correct place.

Square

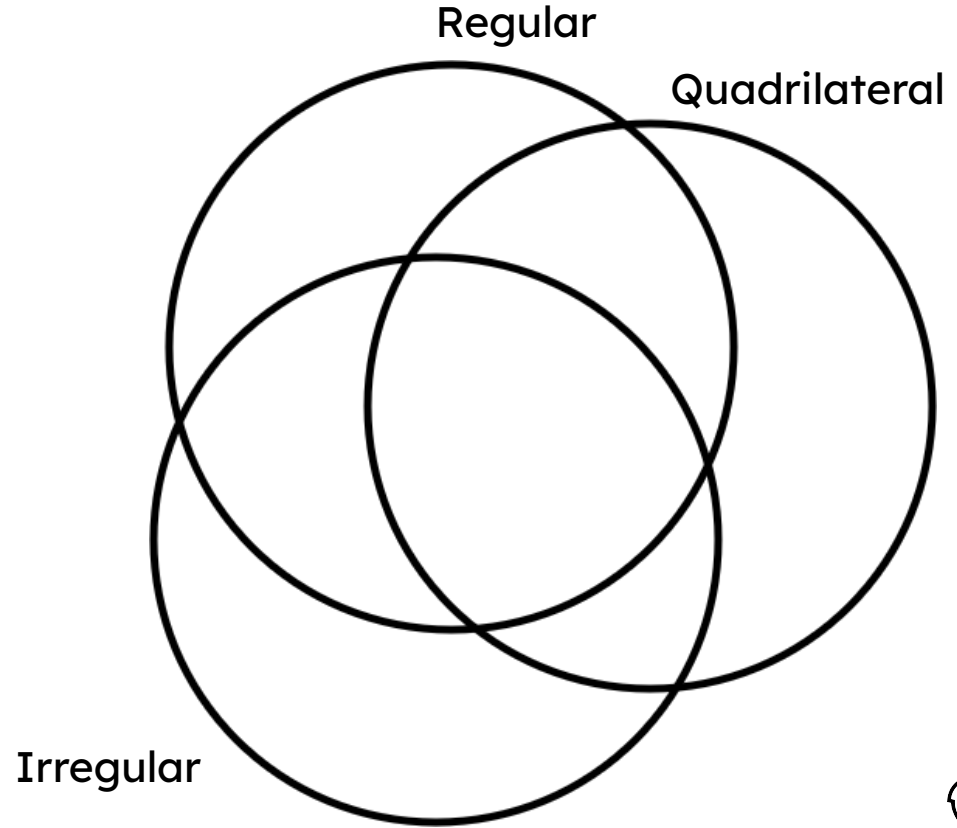
Trapezium

(Irregular) Octagon

Kite

Equilateral triangle

Rhombus





## Task 2 Grouping shapes by properties



Feedback

a) **Put** each polygon in the correct place.

Square

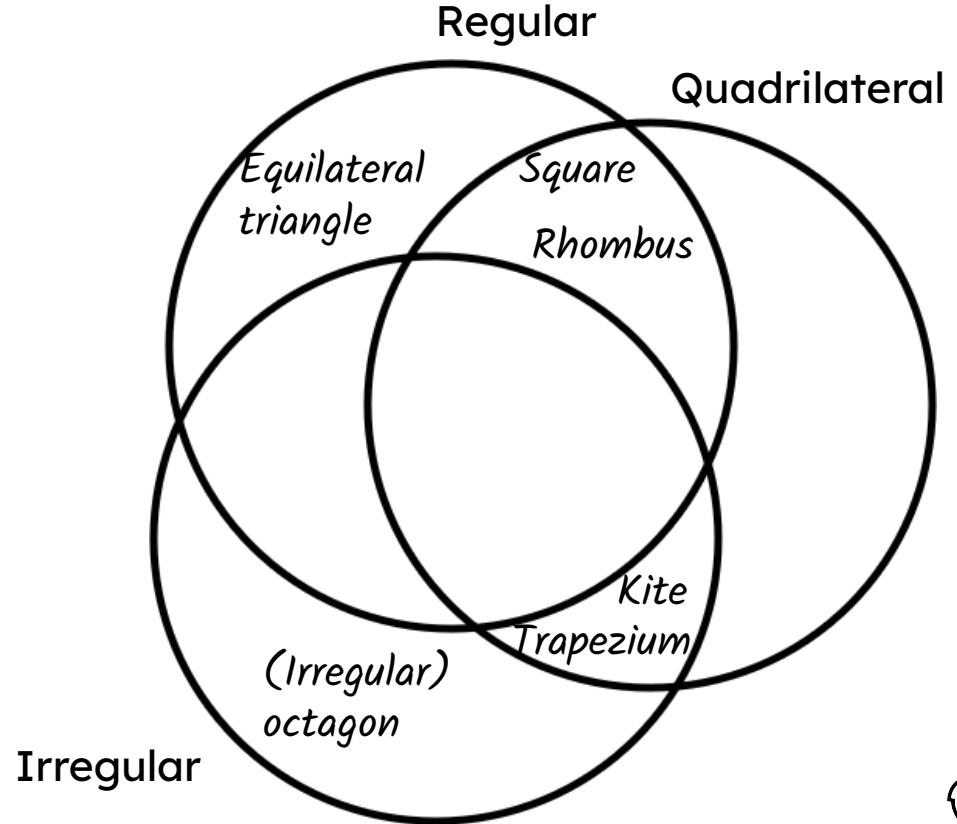
Trapezium

(Irregular) Octagon

Kite

Equilateral triangle

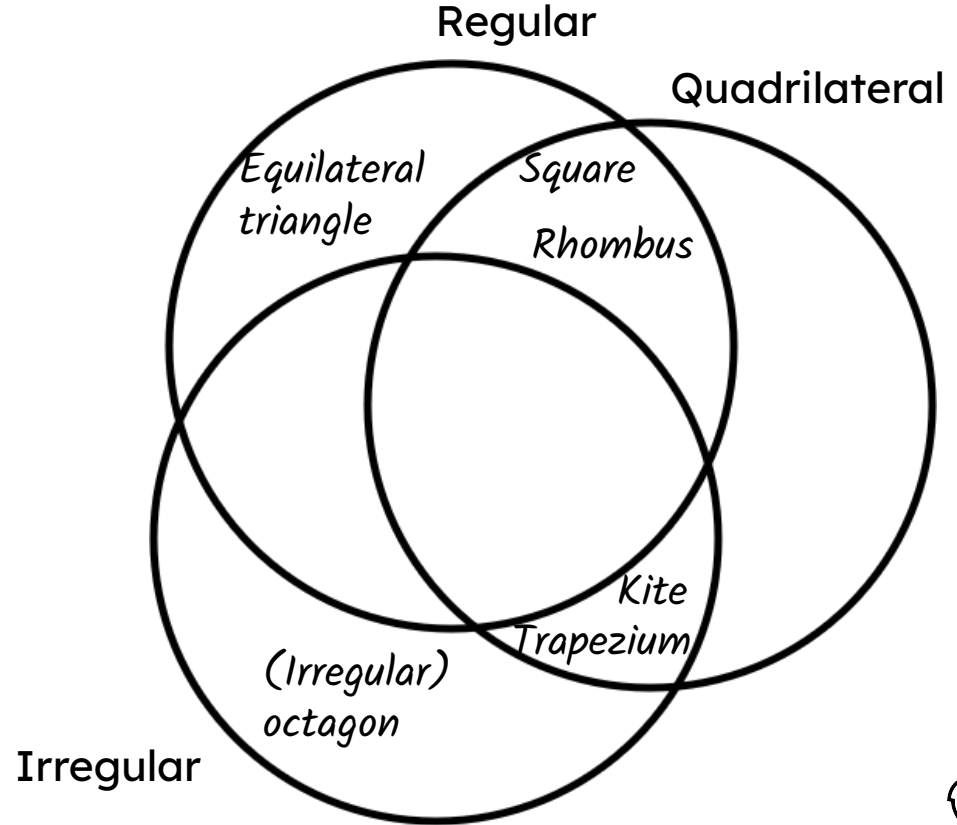
Rhombus



## Task 2 Grouping shapes by properties



b) **Why** are some of the spaces empty?



## Task 2 Grouping shapes by properties

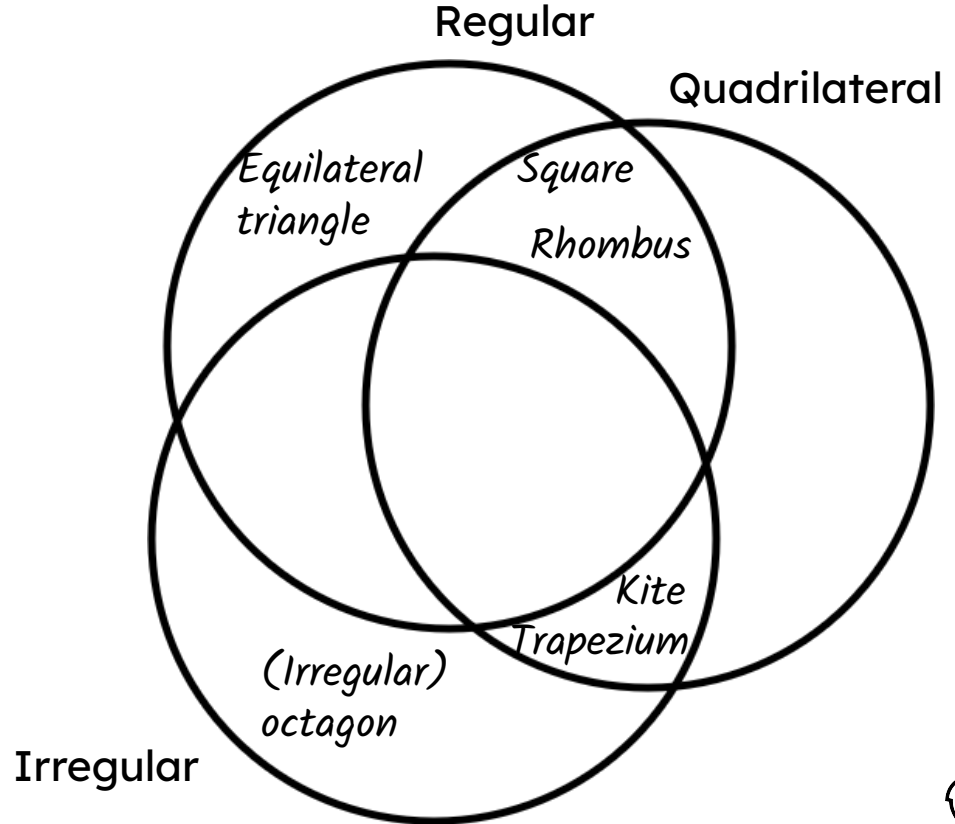


Feedback

b) **Why** are some of the spaces empty?

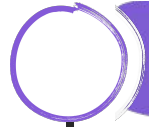
*Some of the spaces are empty because a shape cannot be regular and irregular at the same time.*

*Quadrilaterals must be either regular or irregular and so cannot be neither.*



# Lesson outline

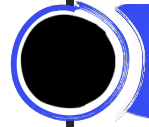
## Checking understanding of perimeter and area



Defining a shape



Grouping shapes by properties



Finding missing lengths with shape properties



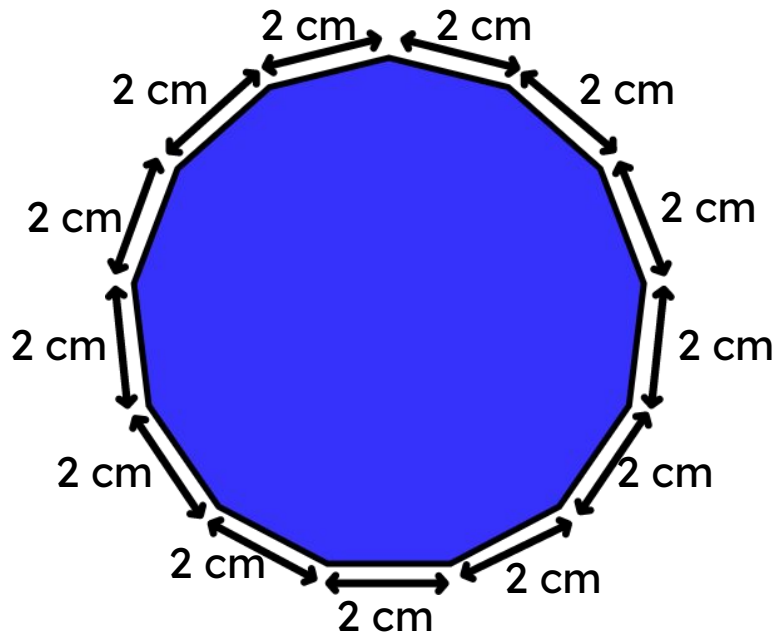
Missing lengths in composite rectilinear shapes



# Finding missing lengths with shape properties

For a shape to be regular, all of its sides must be the same length and all of its interior angles must be the same size.

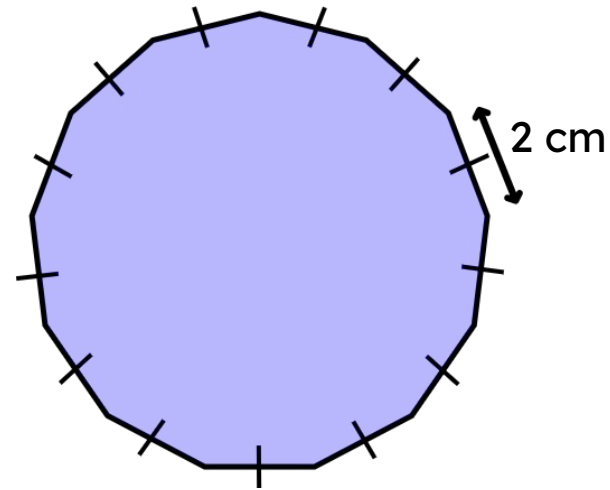
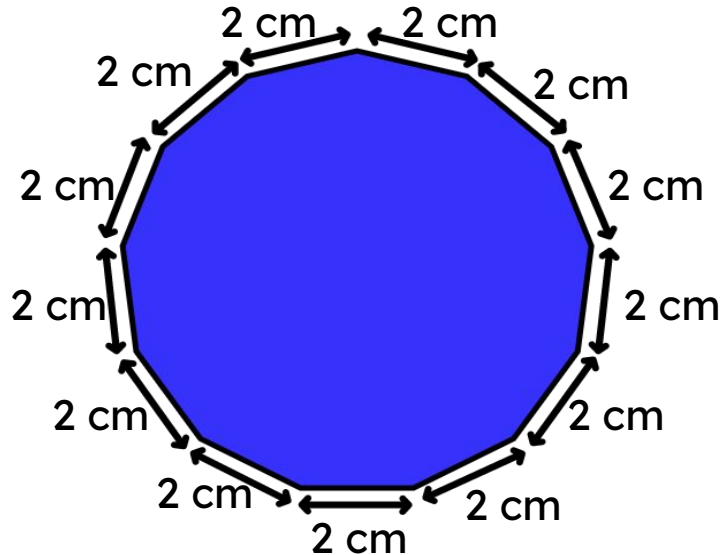
Showing the measurements for every side can produce a cluttered diagram:



# Finding missing lengths with shape properties

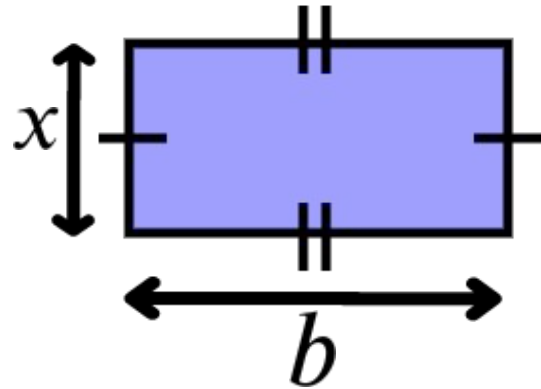
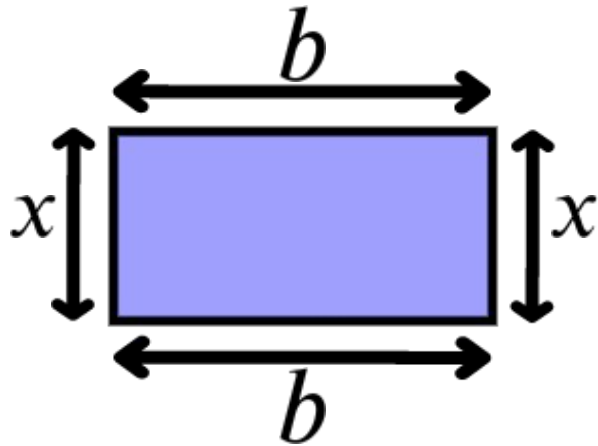
To overcome this, notation exists to show which lines are the same length.

Lines that are marked the same, have the same length.



# Finding missing lengths with shape properties

Each subsequent set of lines of the same length are marked in a similar way.



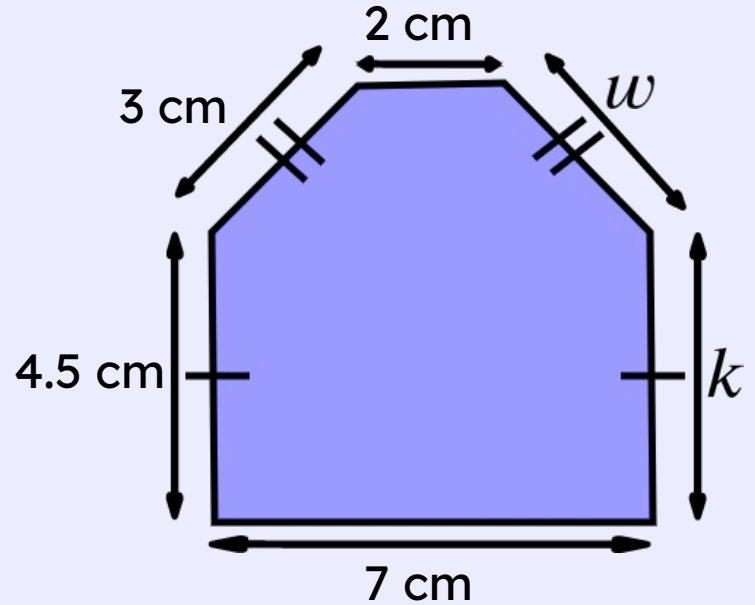
# Finding missing lengths with shape properties



**Fill** in the missing lengths.

The length marked  $w$  is \_\_\_ cm long.

The length marked  $k$  is \_\_\_ cm long.





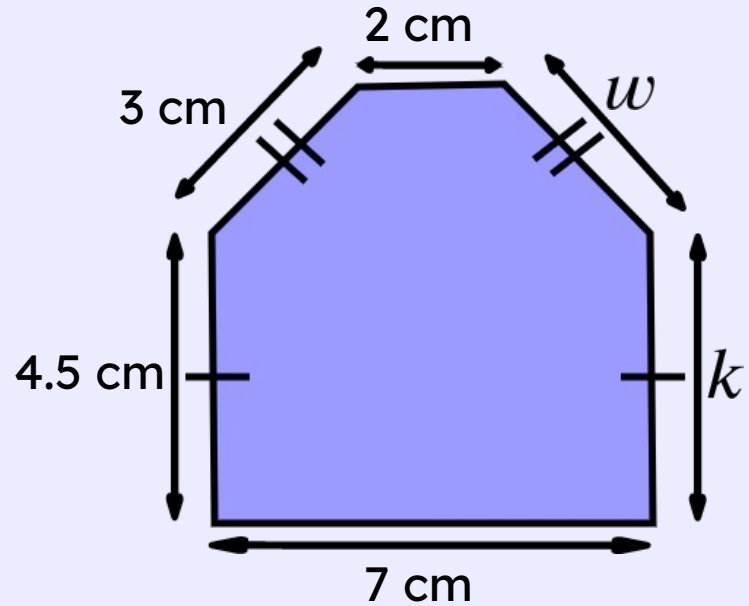
# Finding missing lengths with shape properties



**Fill** in the missing lengths.

The length marked  $w$  is 3 cm long.

The length marked  $k$  is 4.5 cm long.



Sometimes the lines to indicate the same length are not needed because we can use the properties of the shape.

For example, in a rectangle, we know that the pairs of sides are the same length.





## True or false?

If one side of a square is 4 cm long, then all the sides are 4 cm long.

**T** True ✓

**F** False

## Justify your answer

**A** A square is a regular shape. ✓

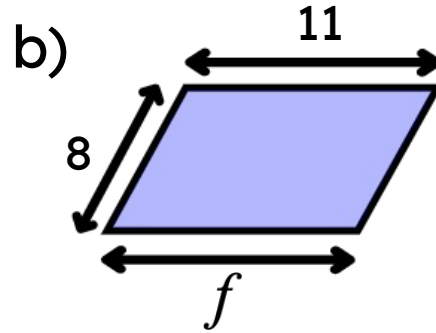
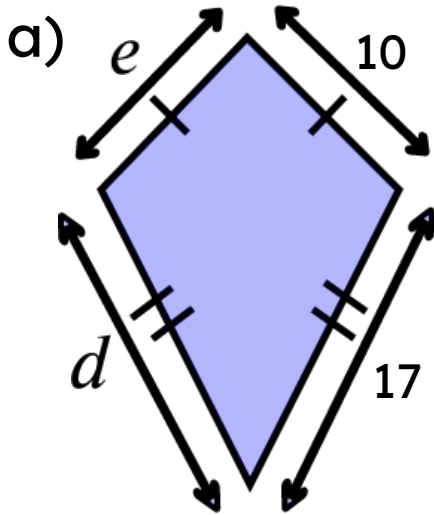
**B** A square is an irregular shape.



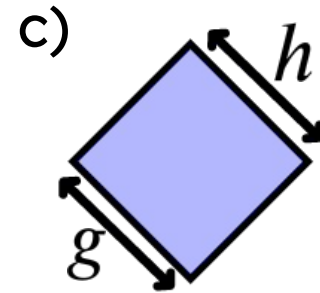
## Task 3 Finding missing lengths with shape properties



**State** the missing length for each shape.



This is a  
parallelogram.

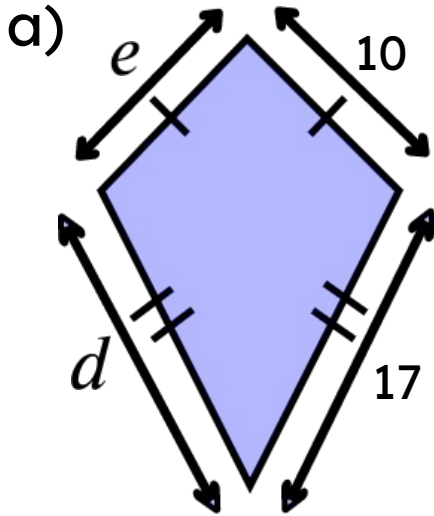


This is a  
3 unit square.

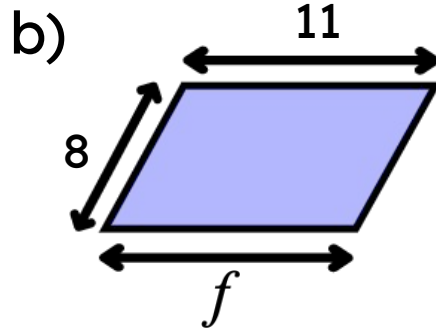


## Task 3 Finding missing lengths with shape properties

**State** the missing length for each shape.

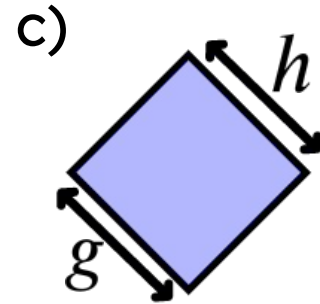


$$d = 17 \quad e = 10$$



This is a  
parallelogram.

$$f = 11$$



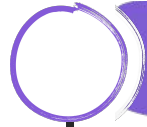
This is a  
3 unit square.

$$g = 3 \quad h = 3$$



# Lesson outline

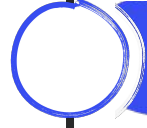
## Checking understanding of perimeter and area



Defining a shape



Grouping shapes by properties



Finding missing lengths with shape properties



Missing lengths in composite rectilinear shapes





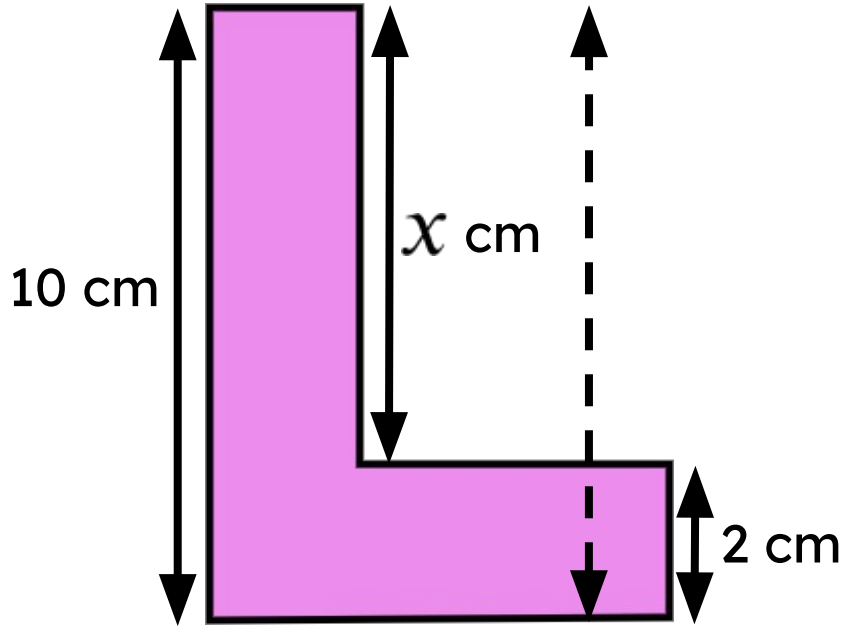
**Composite rectilinear shapes** are shapes made from two or more rectangles.

We can use our knowledge of the properties of rectangles to reason about missing side lengths.



# Missing lengths in composite rectilinear shapes

For example, we can work out the length of the side marked  $x$  in this shape.



The missing length must be 8 cm  
because  $10 = 2 + 8$



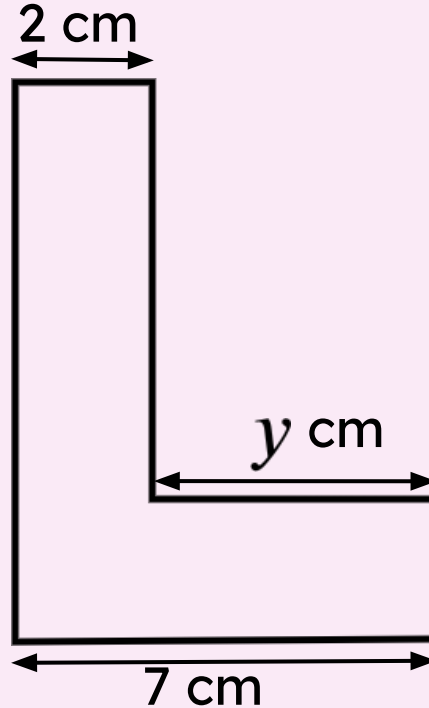


# Missing lengths in composite rectilinear shapes



**What** is the length of the side marked  $y$ ?

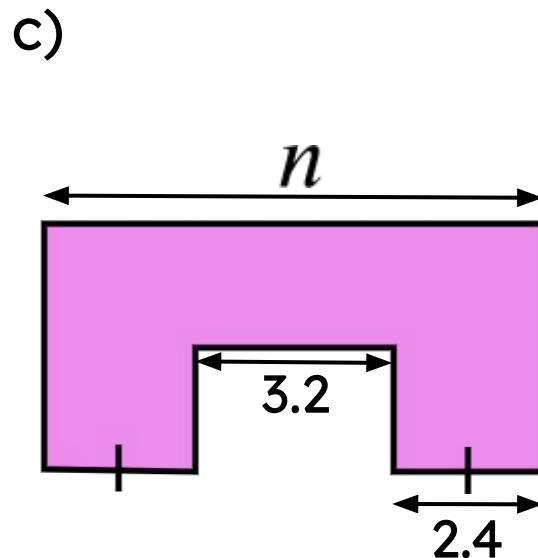
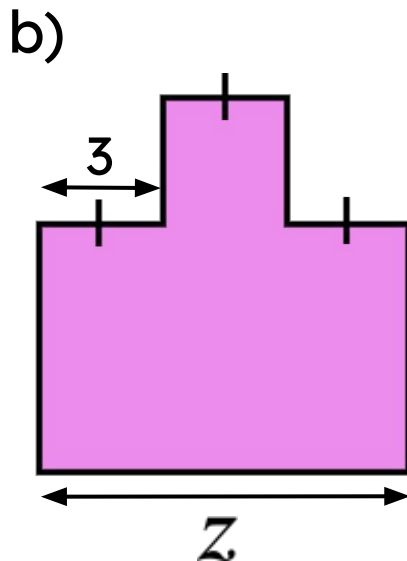
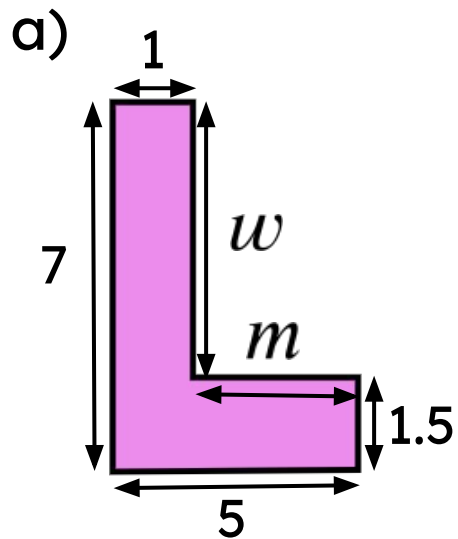
- A** 2 cm
- B** 5 cm ✓
- C** 7 cm
- D** 9 cm



## Task 4 Missing lengths in composite rectilinear shapes



**Calculate** the length of each marked side.



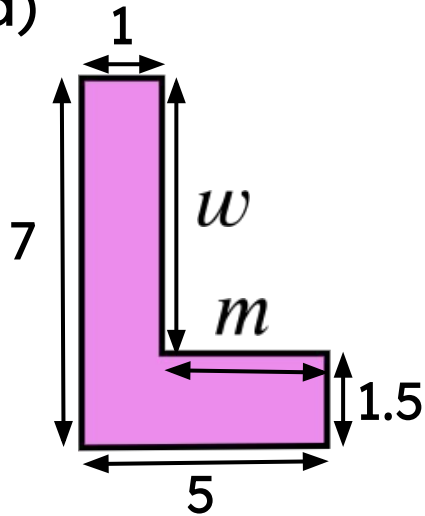
## Task 4 Missing lengths in composite rectilinear shapes



Feedback

**Calculate** the length of each marked side.

a)



$$m = 5 - 1$$

$$m = 4$$

$$w = 7 - 1.5$$

$$w = 5.5$$



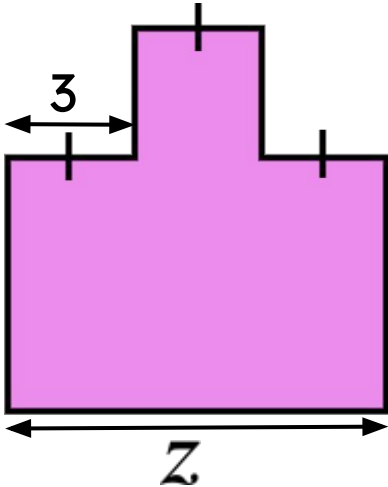
## Task 4 Missing lengths in composite rectilinear shapes



Feedback

**Calculate** the length of each marked side.

b)



$$z = 3 + 3 + 3$$

$$z = 9$$



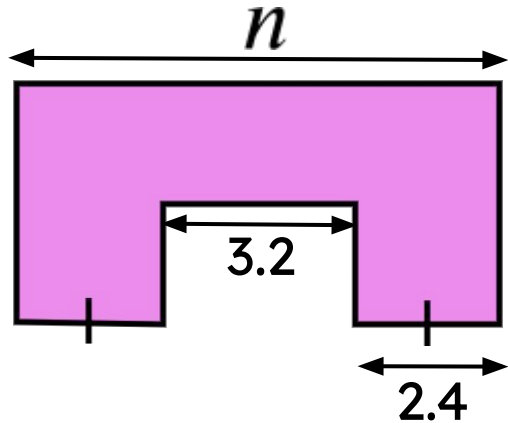
## Task 4 Missing lengths in composite rectilinear shapes



Feedback

**Calculate** the length of each marked side.

c)



$$n = 3.2 + 2 \times 2.4$$

$$n = 8$$



## **Summary** Checking understanding of perimeter and area

**Quadrilaterals** are a family of **polygons** that all have four sides.

A shape can belong to more than one family. It can be regular and/or a triangle for example.

The properties of a polygon can be used to calculate the length of unknown sides.



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**OGI**

