

# YEAR 9 — REASONING WITH GEOMETRY... Rotation & Translation

@whisto\_maths

## What do I need to be able to do?

By the end of this unit you should be able to:

- Identify the order of rotational symmetry
- Rotate a shape about a point on the shape
- Rotate a shape about a point not on a shape
- Translate by a given vector
- Compare rotations and reflections

## Keywords

**Rotate:** a rotation is a circular movement

**Symmetry:** when two or more parts are identical after a transformation

**Regular:** a regular shape has angles and sides of equal lengths

**Invariant:** a point that does not move after a transformation

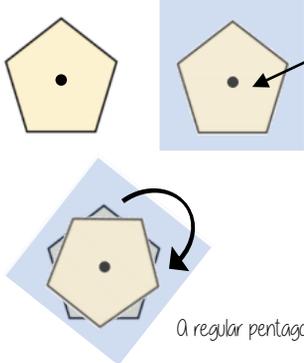
**Vertex:** a point two edges meet

**Horizontal:** from side to side

**Vertical:** from up to down

## Rotational Symmetry

Tracing paper helps check rotational symmetry



- 1 Trace your shape (mark the centre point)
- 2 Rotate your tracing paper on top of the original through  $360^\circ$
- 3 Count the times it fits back into itself

A regular pentagon has rotational symmetry of order 5

## Translation and vector notation

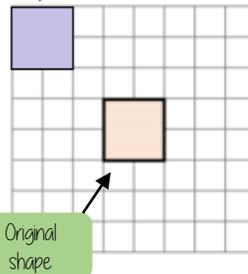
Vector Notation

$$\begin{pmatrix} 1 \\ -2 \end{pmatrix}$$

How far left or right to move  
Negative value (left)  
Positive value (right)

How far up or down to move  
Negative value (down)  
Positive value (up)

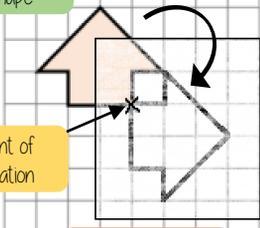
Translation  $\begin{pmatrix} -3 \\ 3 \end{pmatrix}$



Every vertex has been translated by the same amount

## Rotate from a point (in a shape)

Original shape



Point of rotation

Image  $90^\circ$  clockwise

1 Trace the original shape (mark the point of rotation)

2 Keep the point in the same place and turn the tracing paper

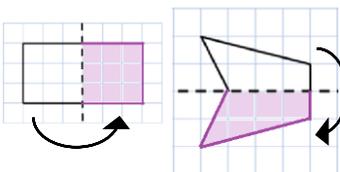
3 Draw the new shape



Clockwise

Anti-Clockwise

## Compare rotations and reflections



**R**

Reflections are a mirror image of the original shape

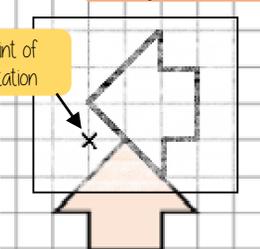
Information needed to perform a reflection:

- Line of reflection (Mirror line)

## Rotate from a point (outside a shape)

Image  $90^\circ$  anti-clockwise

Point of rotation



Original shape

1 Trace the original shape (mark the point of rotation)

2 Keep the point in the same place and turn the tracing paper

3 Draw the new shape

Rotations are the movement of a shape in a circular motion

Information needed to perform a rotation:

- Point of rotation
- Direction of rotation
- Degrees of rotation

