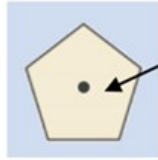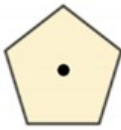# Y10 FOUNDATION HT3 Transformations
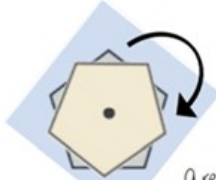
Rotational Symmetry

Tracing paper helps check rotational symmetry

1 Trace your shape (mark the centre point)

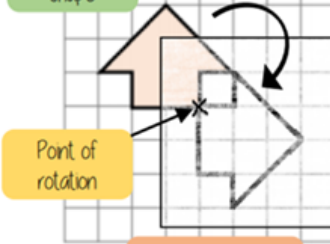2 Rotate your tracing paper on top of the original through 360°

3 Count the times it fits back into itself

A regular pentagon has rotational symmetry of order 5

Rotate from a point (in a shape)

Original shape

Point of rotation

Image: 90° 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

Rotate from a point (outside a shape)

Image: 90° 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

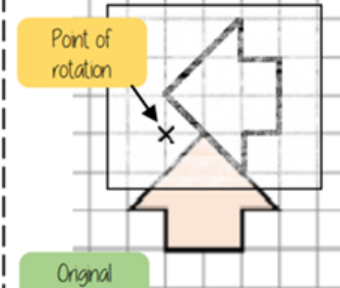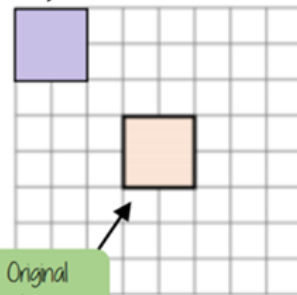## Translation and vector notation

Vector Notation → $\begin{pmatrix} 1 \\ -2 \end{pmatrix}$

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

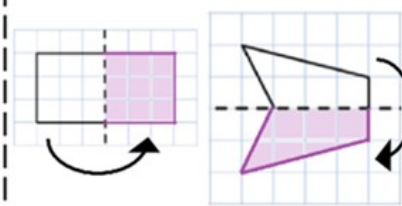How far up or down to move
Negative value (down)
Positive value (up)

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

Every vertex has been translated by the same amount
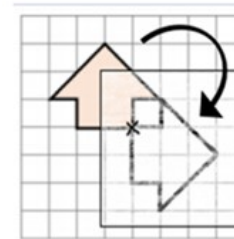
Original shape

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)

Rotations are the movement of a shape in a circular motion

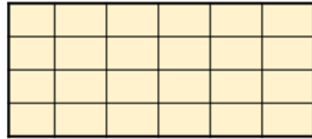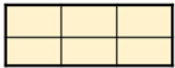Information needed to perform a rotation:
- Point of rotation
- Direction of rotation
- Degrees of rotation

Y10 FOUNDATION HT3 Transformations

Recognise enlargement & similarity

Shapes are similar if all pairs of corresponding sides are in the same ratio

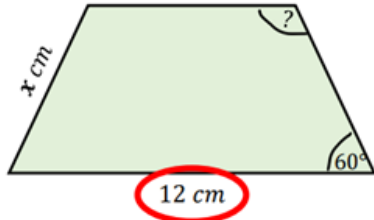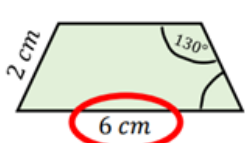These shapes are similar because all sides are increased by the same ratio

Enlargements are similar shapes with a ratio other than 1

Calculations in similar shapes

Don't forget that properties of shapes don't change with enlargements or in similar shapes

The two trapezium are similar find the missing side and angle

Corresponding sides identify the scale factor

$$\frac{12}{6} = 2 \qquad \text{Scale Factor} = 2$$

Calculate the missing side   Length (corresponding side) × scale factor
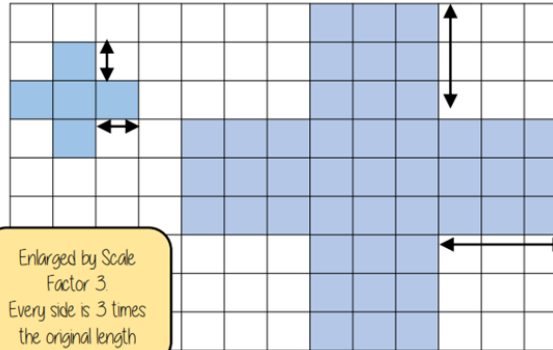
$$2cm \times 2$$
$$x = 4cm$$

Enlargement does not change angle size

Calculate the missing angle   Corresponding angles remain the same
130°

Enlarge by a positive scale factor

With a scale factor larger than 1 it makes the shape **bigger**

Enlarged by Scale Factor 3.
Every side is 3 times the original length

Positive fractional scale factor

With a scale factor between 0 and 1 it makes the shape **smaller**

5 cm   12cm   Scale Factor of $\frac{1}{5}$ 1 cm   2.4 cm

8 cm   10 cm   Scale Factor of $\frac{5}{2}$ 20 cm   25 cm
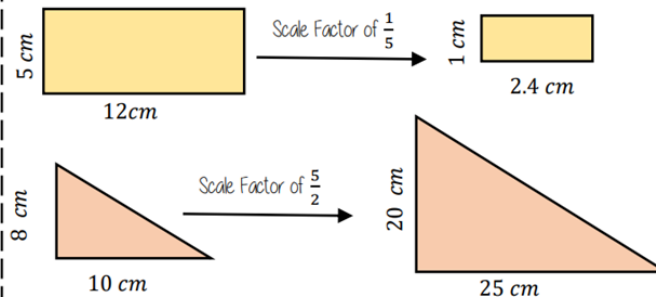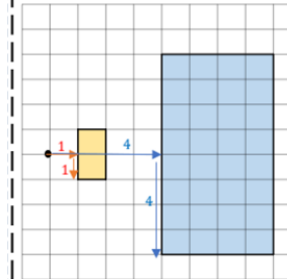
Keywords

Similar shapes: shapes of different sizes that have corresponding sides in equal proportion and identical corresponding angles.

Scale factor: the multiple describing how much a shape has been enlarged.
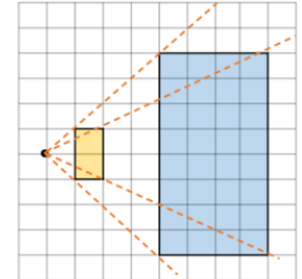
Enlarge: to change the size of a shape.

Enlarge a shape from a point

Scaled distances method   Rays method

Scale the distance between the point of enlargement and each corresponding vertices

Multiply the distance from the centre of corresponding vertices by the scale factor along the ray

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 size.

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

Vertex: a point where two edges meet.

Horizontal: from side to side.

Vertical: from up to down.