Y9 Maths Knowledge Organiser Topic 12: Transformations

What must I be able to do?

You may need to revise the following:
- ☐ [Year 7 Topic 12: Constructions and Classifying 2D Shapes](#)
- ☐ [Year 8 Topic 11: Symmetry and Tesselation](#)

New content:
- ☐ Represent, add and subtract vectors
- ☐ On a coordinate grid,
  - o translate shapes using vectors
  - o reflect shapes
  - o rotate shapes
  - o enlarge shapes (including fractional scale factors)
  - ➤ Sparx M139, M290, M910, M178, M881
- ☐ Describe a single transformation to map one shape to a second

Key vocabulary

Vector	A quantity which has <u>magnitude</u> (how long it is) and <u>direction</u>.
Transformation	The movement or manipulation of an object. The four transformations we use are <u>rotation, reflection, translation and enlargement</u>.
Object	The <u>starting</u> shape.
Image	The <u>transformed</u> shape.

Vectors

Vectors are often written as column vectors

Left or right → $\binom{3}{-4}$ ← Up or down

Positive values are right and up. Negative values are left and down.
This is 3 right and 4 down.

This is the vector $\binom{4}{1}$

It goes 4 units right and 1 unit up.

Add/subtract vectors:

$$\binom{8}{4} - \binom{3}{6} = \binom{5}{-2}$$

Multiply vectors by a constant

$$3\binom{4}{7} = \binom{12}{21}$$

Transformations

Enlargement: e.g. Enlarge the shaded shape by scale factor of 2, centre C.

Each side on the image is double the length of the object

Counting from C to the first vertex, it was 2 squares right and 1 square up, so the image will be double that (s.f. of 2) so 4 right and 2 up from the centre, C.

Rotation: e.g. rotate shape A 90° clockwise about (5,3)

Draw the object onto tracing paper and put the pencil on the centre of rotation (5,3)
Then rotate the tracing paper as instructed and draw the image in its new position.

Reflection: e.g. reflect shape B in the line y = 3

Draw on the line of reflection.

Reflect each point to the other side of the line of reflection.

Each point on the image is the same distance from the line of reflection as they are on the object.

Translation: e.g. translate triangle A by the vector $\binom{5}{-3}$

A translation is a movement, so in this instance it moves 5 squares right and 3 squares down.

Rotation, reflection and translation all leave a congruent (identical) shape to the object.