49 Maths Knowledge Organiser Topic 9: Transformations

What must I be able to do? Key vocabulary You may need to revise the following: A quantity which has Vector Year 7 Topic 11: Constructions and Classifying 2D Shapes magnitude (how long it is) and direction. Year 7 Topic 17: Symmetry and Tesselation New content: Transformation The movement or Represent, add and subtract vectors manipulation of an On a coordinate grid, object. The four transformations we use o translate shapes using vectors are rotation, reflection, reflect shapes translation and o rotate shapes <u>enlargement.</u> o enlarge shapes (including fractional scale factors) Object The starting shape. Sparx M139, M290, M910, M178, M881 Describe a single transformation to map one shape to a second Image The transformed shape.

Vectors

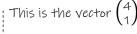
Vectors are often written as column vectors

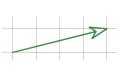
Left or right $\binom{3}{-4}$

Up or down.

Positive values are right and up. Negative values are left and down.

This is 3 right and 4 down.





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

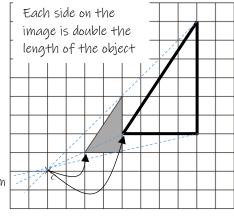
$$3\binom{4}{7} = \binom{12}{21}$$

Transformations

Enlargement: e.g. Enlarge the shaded shape by scale factor

of 2, centre C.

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 and paper and put the feature of rotations (5,3)

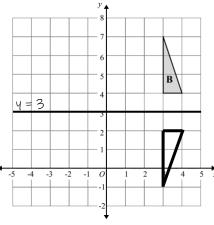
Then rotate the tracing paper as instructed and draw the image in its new position.

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

Draw on the line of reflection.

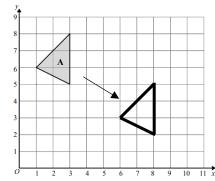
Reflect each point to the other side of the line of reflection.

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 $\begin{pmatrix} 5 \\ -3 \end{pmatrix}$

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.