*When you are asked questions, write down the solutions in your exercise books, OR in a Word document that can be printed off later.*

**Introduction: Autographing transformations**

The activities here will help you understand how to use Autograph to carry out some transformations. You need this skill for the main event later on.

**Reflection**

* Open your Autograph template.
* Select the ‘point mode’  from the left-hand menu. You can now left-click to plot a point on the grid.
* Plot three points at (1,2), (4,2) and (1,6)
* Now choose ‘select mode’ . Hold down ‘Shift’, and click on all three points to select them.
* Right-click, and choose ‘Group to Shape’ from the menu. This will draw a triangle.



* Now plot your mirror line. Press ‘Return’ to access the ‘Add Equation’ menu. Type ‘x=-1’ into the space. Click OK to plot the line.
* Using ‘select mode’ (and holding down ‘Shift’) select both the triangle and the line.
* Right-click, and choose ‘Reflection’. Autograph will reflect your triangle in the mirror line. **Write down the coordinates of the vertices of the image.**
* Experiment 1: Click and drag any vertex of the object triangle. Observe the impact on the image.
* Experiment 2: Try varying the equation of the mirror line.
* Choose ‘Page > Copy Page’. Paste this in to a Word document (but don’t print till the end of the lesson!)

**Rotation**

* Open another Autograph template.
* Make sure that degrees mode **** is selected on the top menu
* Draw a triangle exactly as before.
* Use ‘point mode’ to plot a point at (-1,1)
* You are now going to rotate this triangle 90° anticlockwise about the point (-1,1). Select the triangle and the point. Right-click and choose ‘Rotation.
* Autograph always rotates anticlockwise. Check that 90° is entered as the angle. You might prefer to deselect ‘show construction lines’. Click OK. **Write down the coordinates of the vertices of the image.**
* **How would you instruct Autograph to carry out a 90° clockwise rotation?**
* Experiment 1: Click and drag any vertex of the object triangle. Observe the impact on the image.
* Experiment 2: Select the image. Now select the animate option from the top menu. Vary the angle of rotation and observe the impact.
* Paste an example of a rotation in to your Word document



**Enlargement**

* Open another Autograph template.
* This time, choose to pre-select a shape from the top menu .
* Choose the flag (first option) and click OK
* Mark a point at (-1,2). This will be your centre of enlargement.
* Select the point and the flag. Right-click and choose ‘Enlargement’.
* Keep the scale factor as 2, and leave in the construction lines. Click OK. **Write down the coordinates of the vertices of the image.**
* Experiment 1: Click and drag the centre of enlargement. Observe the impact on the image.
* Experiment 2: Select the image. Now select the animate option from the top menu. Vary the scale factor and observe the impact (KEEP THE SCALE FACTOR GREATER THAN 1!)
* Paste an example of an enlargement in to your Word document

**The Main Event I: Reflecting and Rotating**

* Construct a triangle (A) with coordinates A (1,1), B (2,1) and C (2,3).
* Reflect this triangle in the line x = 4. Call this triangle B.
* Now reflect triangle B in the line y = x. Call this triangle C.
* **Write down the coordinates of triangle C**.
* Now return to the original triangle (A). Your challenge is to rotate this triangle so that it is moved onto triangle C. **Describe the rotation that you have carried out**.
* What do you notice about this centre of rotation? Investigate. **Write down what you notice using diagrams to help**.

**The Main Event II: Extending Enlargement**

* Construct a rectangle from the pre-selected shapes .
* Use a centre of enlargement at (-2,1) to enlarge the rectangle with scale factor 2.
* Now select the animate option and vary the scale factor again. This time, reduce the scale factor below 1, and then below 0.
* Observe the impact of a negative scale factor. Write about what you notice using diagrams to help.
* Repeat your experimenting using the pre-selected flag  and a negative scale factor.

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