

## Section 2: Matrices and transformations

### Crucial points

1. **Make sure that you are familiar with the matrices for simple transformations**

You need to know the matrices for reflection in the  $x$  axis, the  $y$  axis and the lines  $y = x$  and  $y = -x$ , and the matrices for rotation through  $90^\circ$  or  $180^\circ$  about the origin. All these look a bit similar, with 0s, 1s and  $-1$ s, so make sure that you can work out what they are with a quick diagram if you're not sure.

2. **Make sure that you are also familiar with the matrices for enlargement and two-way stretches**

These are quite easy to remember, with the numbers on the leading diagonal giving you the scale factors, and zeros in the other two positions.

3. **Make sure that you know the general rotation matrix**

The matrix for a rotation of  $\theta$  anticlockwise about the origin is  $\begin{pmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{pmatrix}$ ,

and that you can recognise it even if  $\cos \theta$  and/or  $\sin \theta$  are negative. Check that you can find the angle of rotation from the matrix, including cases where the angle is not in the first quadrant.

4. **Remember the useful result about the columns of a matrix**

The image of the point I (1, 0) gives the first column of the matrix, and the image of the point J (0, 1) gives the second column of the matrix.

5. **Make sure you multiply matrices in the correct order for composite transformations**

Remember that "transformation **A** followed by transformation **B**" is represented by the matrix **BA**.