

7D Multiple Transformations

1. The points $A(1,0)$, $B(0,1)$ and $C(2,0)$ are the vertices of a triangle T . The triangle T is rotated 90° anticlockwise around $(0,0)$ and then the image T' is reflected in the line $y = x$ to obtain the triangle T'' .

a) On separate diagrams, draw T , T' and T''

b) i) Find the matrix \mathbf{P} such that $\mathbf{P}(T) = T'$

ii) Find the matrix \mathbf{Q} such that $\mathbf{Q}(T') = T''$

c) By finding a matrix product, find the single matrix that will perform a 90° anticlockwise rotation followed by a reflection in $y = x$

2. The following matrices represent three different transformations:

$$\mathbf{P} = \begin{bmatrix} 1 & 1 \\ 2 & 3 \end{bmatrix} \quad \mathbf{Q} = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix} \quad \mathbf{R} = \begin{bmatrix} 3 & 7 \\ -1 & -2 \end{bmatrix}$$

Find the matrix representing the transformation represented by \mathbf{R} , followed by \mathbf{Q} , followed by \mathbf{P} and give a geometrical interpretation of this transformation.

3. $\mathbf{M} = \begin{bmatrix} -2\sqrt{2} & -2\sqrt{2} \\ 2\sqrt{2} & -2\sqrt{2} \end{bmatrix}$

The matrix \mathbf{M} represents an enlargement with scale factor k followed by an anticlockwise rotation through angle θ about the origin.

a) Find the value of k

b) Find the value of θ