

5.

$$\mathbf{M} = \begin{pmatrix} 1 & -\sqrt{3} \\ \sqrt{3} & 1 \end{pmatrix}$$

(a) Show that \mathbf{M} is non-singular.

(2)

The hexagon R is transformed to the hexagon S by the transformation represented by the matrix \mathbf{M} .

Given that the area of hexagon R is 5 square units,

(b) find the area of hexagon S .

(1)

The matrix \mathbf{M} represents an enlargement, with centre $(0, 0)$ and scale factor k , where $k > 0$, followed by a rotation anti-clockwise through an angle θ about $(0, 0)$.

(c) Find the value of k .

(2)

(d) Find the value of θ .

(2)