

**Worksheet**  
**Application of Matrices in Geometric Transformation**

1. The transformation matrix  $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$  maps the point P to Q. The transformation matrix  $\begin{pmatrix} 2 & 1 \\ -1 & 0 \end{pmatrix}$  maps the point Q to R. The point P is (-1, 3).

Answer the following questions.

a. What is the matrix of the combination transformation?

$$\begin{pmatrix} & \\ & \end{pmatrix}$$

b. Work out the coordinates of point R.

$$(\quad, \quad)$$

2. Line  $2x + y - 1 = 0$  is transformed by matrix  $\begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix}$ , followed by a reflection over x-axis. Determine the equation of the image of line.

3. P(x, y) is transformed by the matrix  $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ , followed by further transformation by matrix  $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$ . Work out the matrix for the combined transformation.

$$\begin{pmatrix} & \\ & \end{pmatrix}$$