Transformations 1 IGCSE
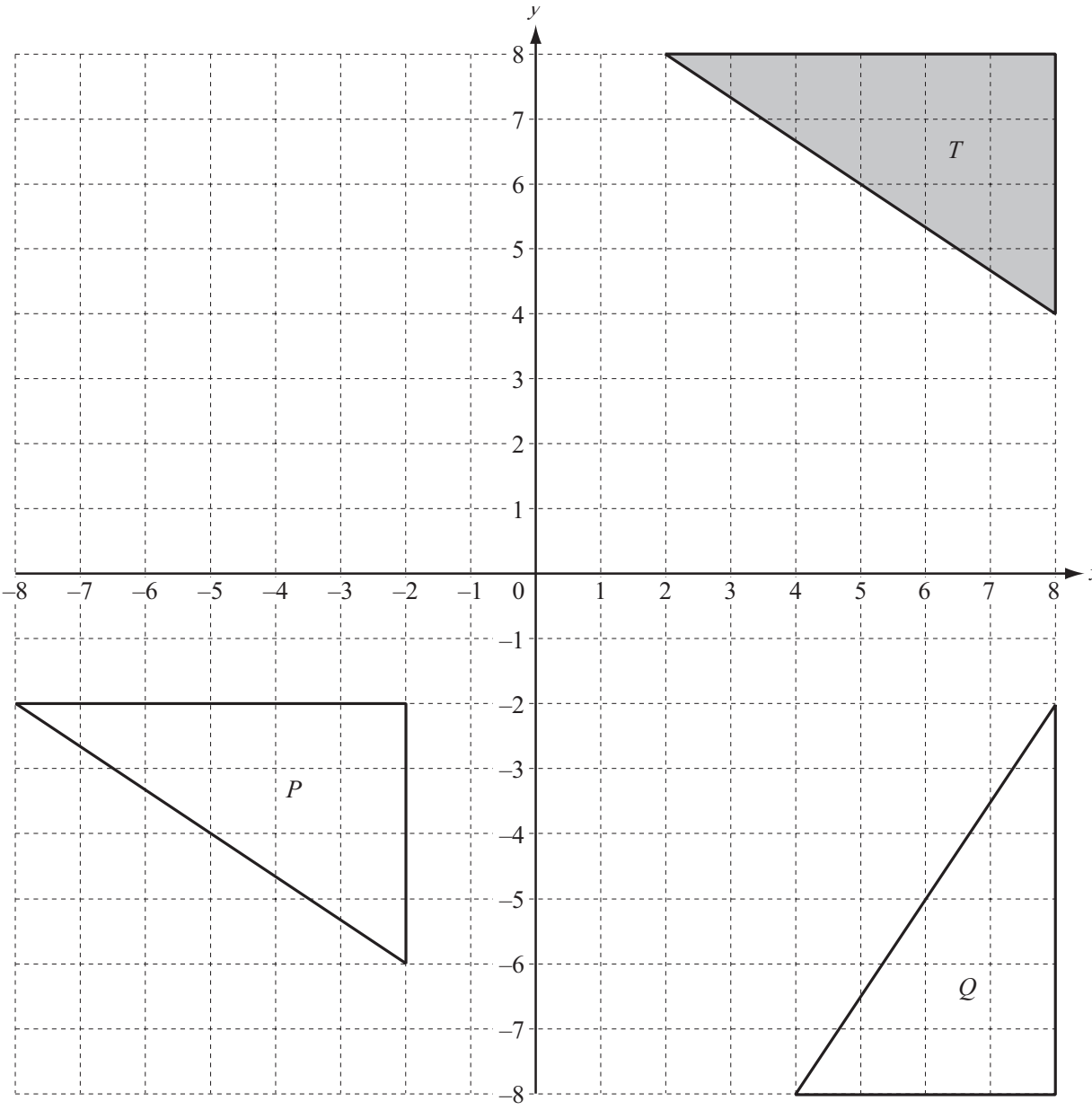
1)

(a) On the grid, draw the enlargement of the triangle T, centre $(0, 0)$, scale factor $\frac{1}{2}$. [2]

(b) The matrix $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$ represents a transformation.

    (i) Calculate the matrix product $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}\begin{pmatrix} 8 & 8 & 2 \\ 4 & 8 & 8 \end{pmatrix}$.

                                                       Answer(b)(i)   [2]

    (ii) On the grid, draw the image of the triangle T under this transformation.   [2]

    (iii) Describe fully this **single** transformation.

        Answer(b)(iii)   [2]

(c) Describe fully the **single** transformation which maps

    (i) triangle T onto triangle P,

        Answer(c)(i)   [2]

    (ii) triangle T onto triangle Q.

        Answer(c)(ii)   [3]
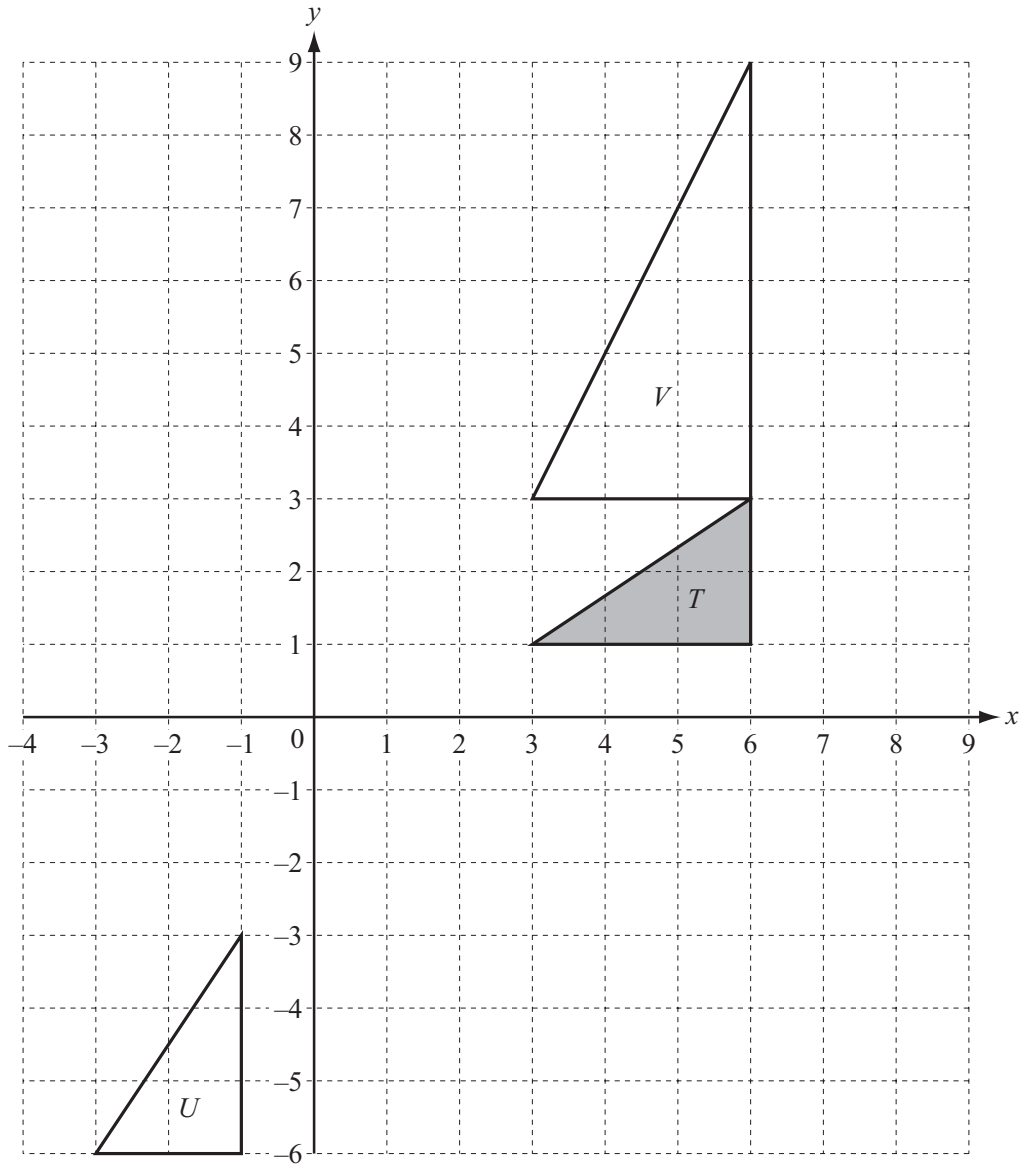
(d) Find the 2 by 2 matrix which represents the transformation in **part (c)(ii)**.

                                                         Answer(d) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

2)

(a) On the grid, draw

  (i) the translation of triangle T by the vector $\begin{pmatrix} -7 \\ 3 \end{pmatrix}$,   [2]

  (ii) the rotation of triangle T about (0, 0), through 90° clockwise.   [2]

(b) Describe fully the **single** transformation that maps

  (i) triangle T onto triangle U,

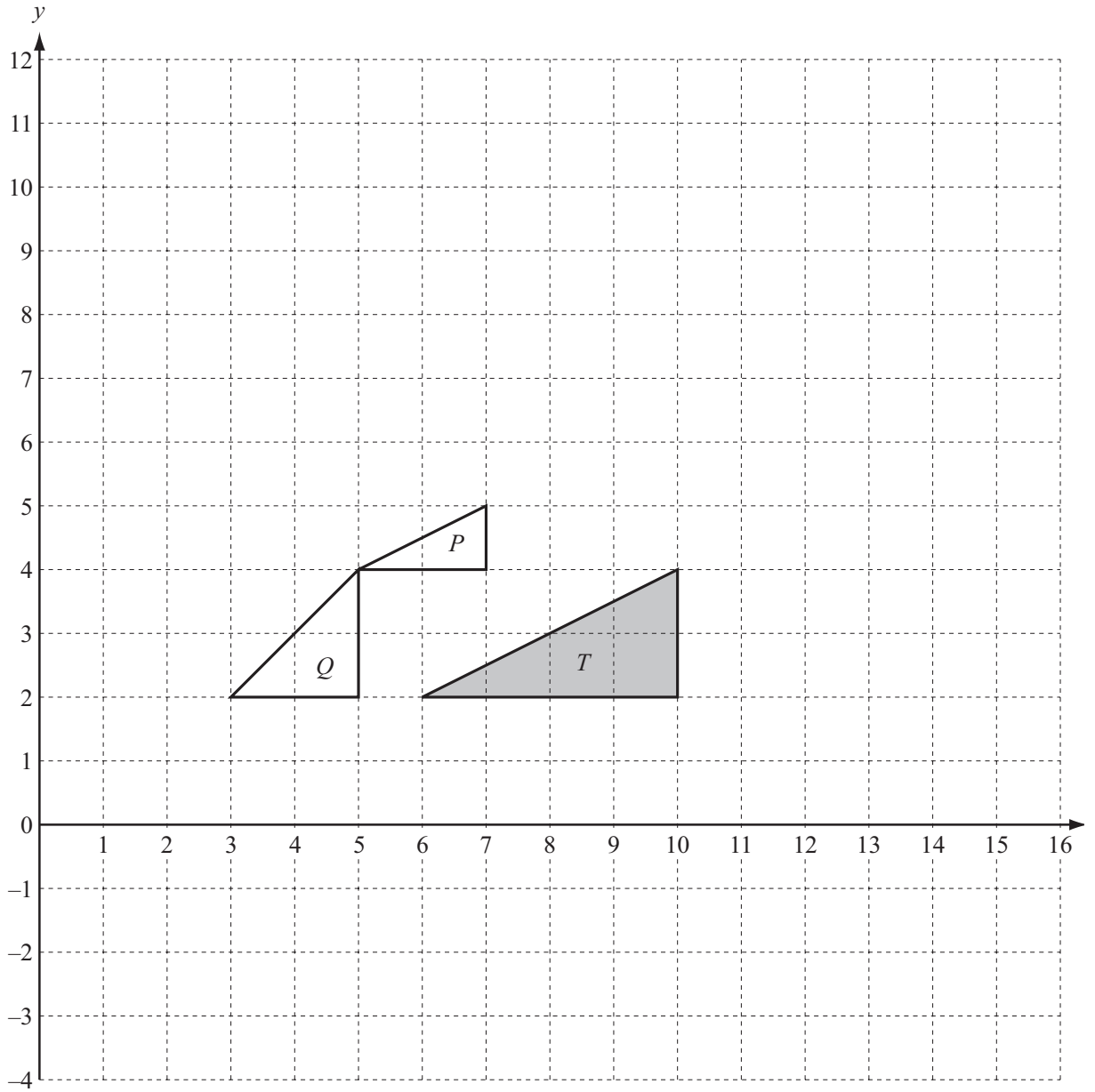 *Answer(b)*(i)   [2]

(c) Find the 2 by 2 matrix which represents the transformation that maps

    (i) triangle T onto triangle U,

Answer(c)(i) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

3)

(a) Draw the reflection of triangle T in the line $y = 6$.

Label the image A. [2]

(b) Draw the translation of triangle T by the vector $\begin{pmatrix} -4 \\ 6 \end{pmatrix}$.

Label the image B. [2]

(c) Describe fully the **single** transformation which maps triangle *B* onto triangle *T*.

Answer(c) [2]

(d) (i) Describe fully the **single** transformation which maps triangle *T* onto triangle *P*.
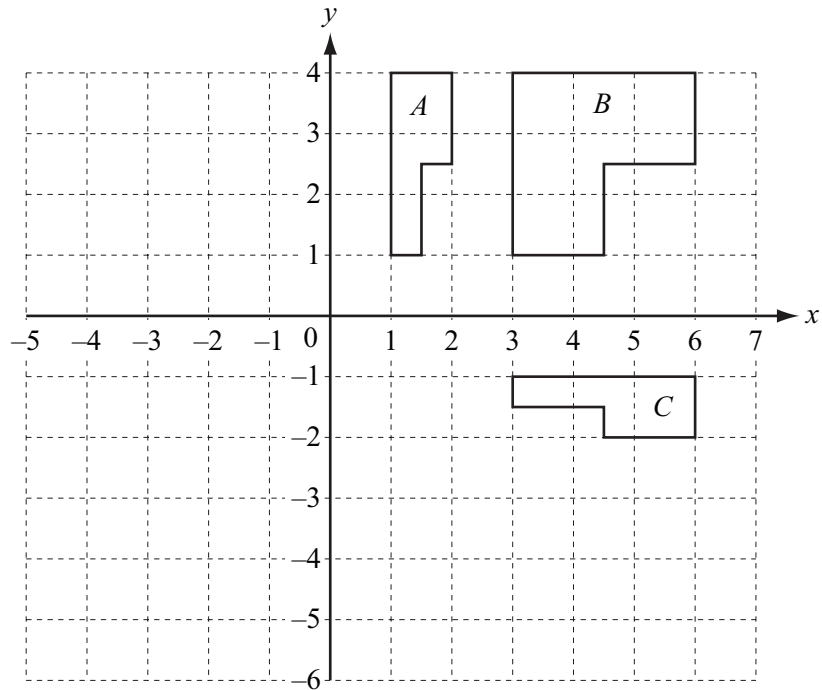
Answer(d)(i) [3]

(ii) Complete the following statement.

Area of triangle *P* =   × Area of triangle *T* [1]

4)

(a) On the grid above, draw the image of

(i) shape A after translation by the vector $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$, [2]

(ii) shape A after reflection in the line $x = -1$. [2]
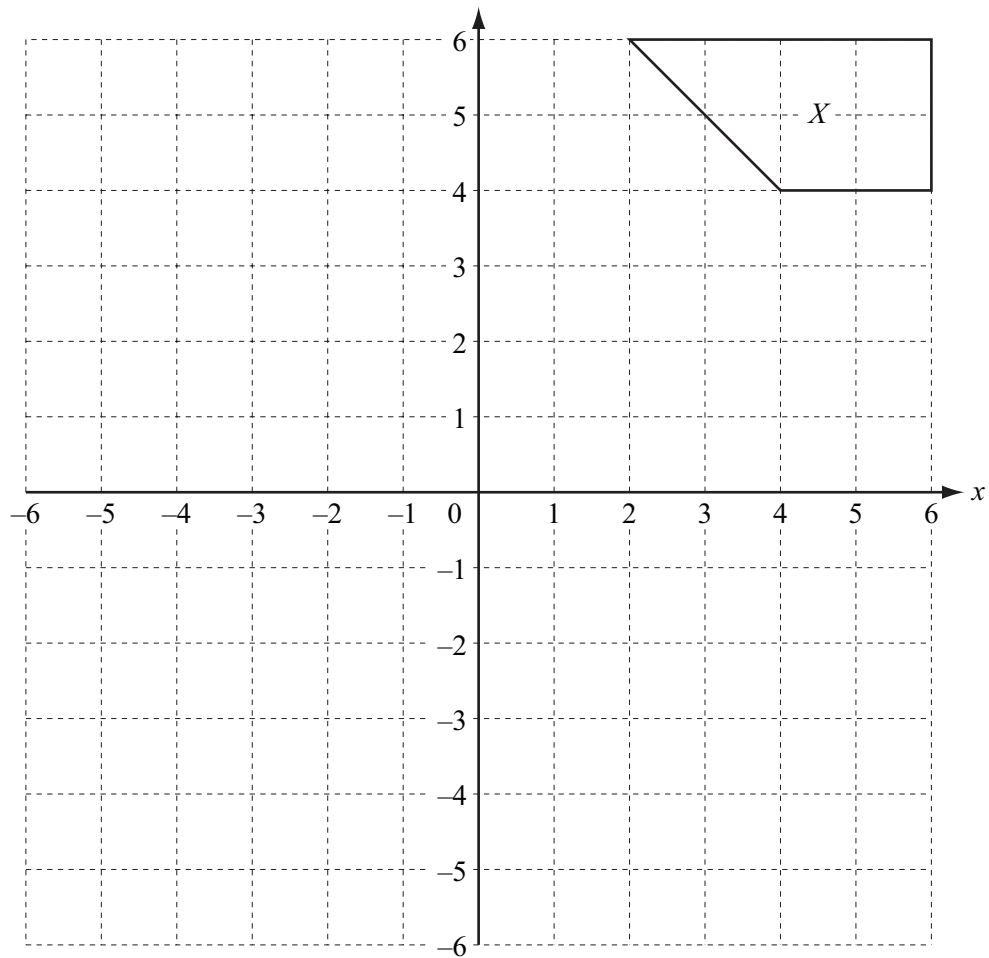
(b) **(ii)** shape A onto shape C.

Answer(b)(ii) [3]

(d) Describe fully the **single** transformation represented by the matrix $\begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$.

Answer(d) [3]

5)

(a) **(i)** Draw the reflection of shape X in the x-axis. Label the image Y. [2]

(ii) Draw the rotation of **shape Y**, 90° clockwise about (0, 0). Label the image Z. [2]

(iii) Describe fully the **single** transformation that maps shape Z onto shape X.

Answer(a)(iii) [2]

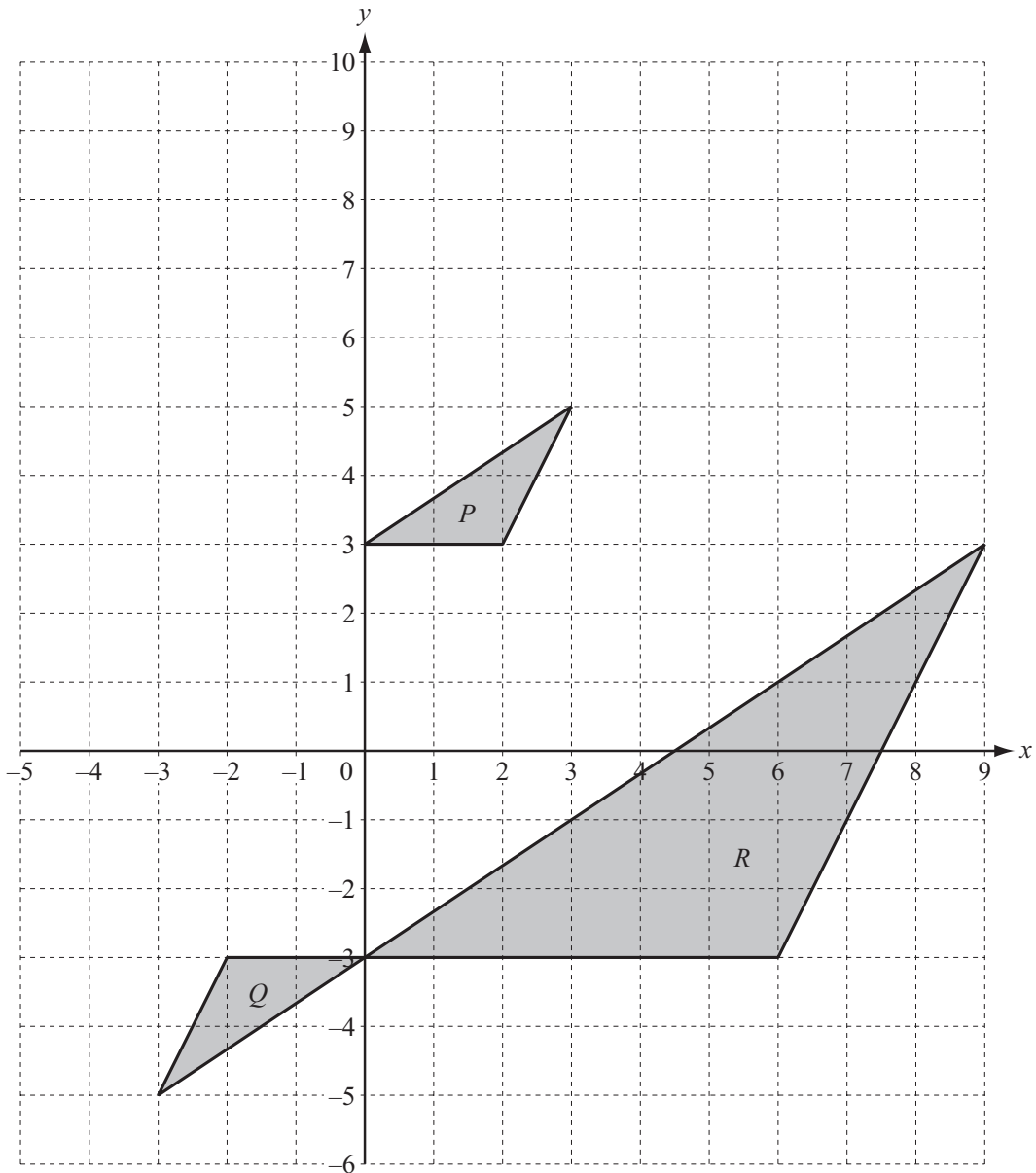**(b)** **(i)** Draw the enlargement of shape X, centre (0, 0), scale factor $\dfrac{1}{2}$. [2]

(ii) Find the matrix which represents an enlargement, centre (0, 0), scale factor $\dfrac{1}{2}$.

Answer(b)(ii) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

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6)

(a) Describe fully

    (i) the **single** transformation which maps **triangle P** onto triangle Q,

    Answer(a)(i)   [3]

    (ii) the **single** transformation which maps **triangle Q** onto triangle R,

    Answer(a)(ii)   [3]

    (iii) the **single** transformation which maps **triangle R** onto triangle P.

    Answer(a)(iii)   [3]

(b) On the grid, draw the image of

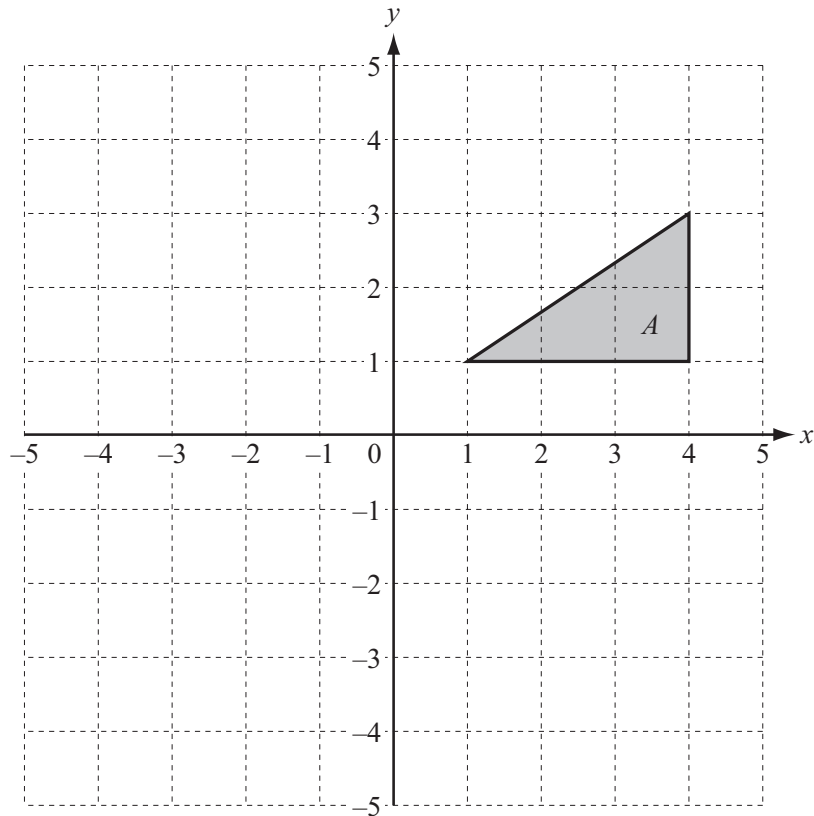   **(i)** **triangle P** after translation by $\begin{pmatrix} -4 \\ -5 \end{pmatrix}$,   [2]

    (ii) **triangle P** after reflection in the line $x = -1$.   [2]

7)   **(a)**

(i) Draw the image when triangle *A* is reflected in the line *y* = 0.
Label the image *B*.   [2]

(ii) Draw the image when triangle *A* is rotated through 90° anticlockwise about the origin.
Label the image *C*.   [2]

(iii) Describe fully the **single** transformation which maps triangle *B* onto triangle *C*.

Answer(a)(iii)   [2]

(b) Rotation through 90° anticlockwise about the origin is represented by the matrix $\mathbf{M} = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$.

(i) Find $\mathbf{M}^{-1}$, the inverse of matrix **M**.

Answer(b)(i) $\mathbf{M}^{-1} = \begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(ii) Describe fully the **single** transformation represented by the matrix $\mathbf{M}^{-1}$.

Answer(b)(ii)   [2]