Vectors
Difficulty: Medium

Question Paper 2

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Vectors
Paper	Paper 4
Difficulty	Medium
Booklet	Question Paper 2

Time allowed: **109 minutes**

Score: **/95**

Percentage: **/100**

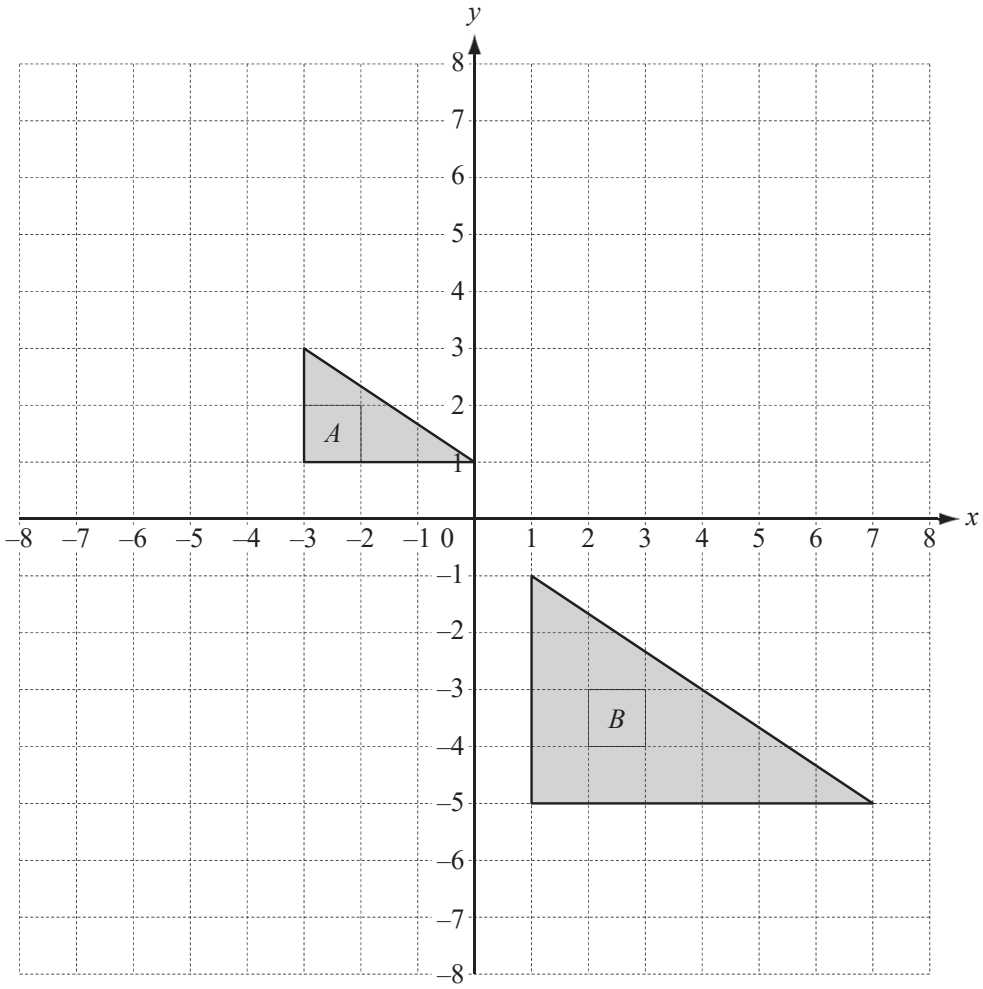
Grade Boundaries:

CIE IGCSE Maths (0580)

A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980)

9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%



(a) Draw the image when triangle A is reflected in the line $x = 0$. [1]

(b) Draw the image when triangle A is rotated through 90° anticlockwise about $(-4, 0)$. [2]

(c) (i) Describe fully the **single** transformation that maps triangle A onto triangle B. [3]

(ii) Complete the following statement.

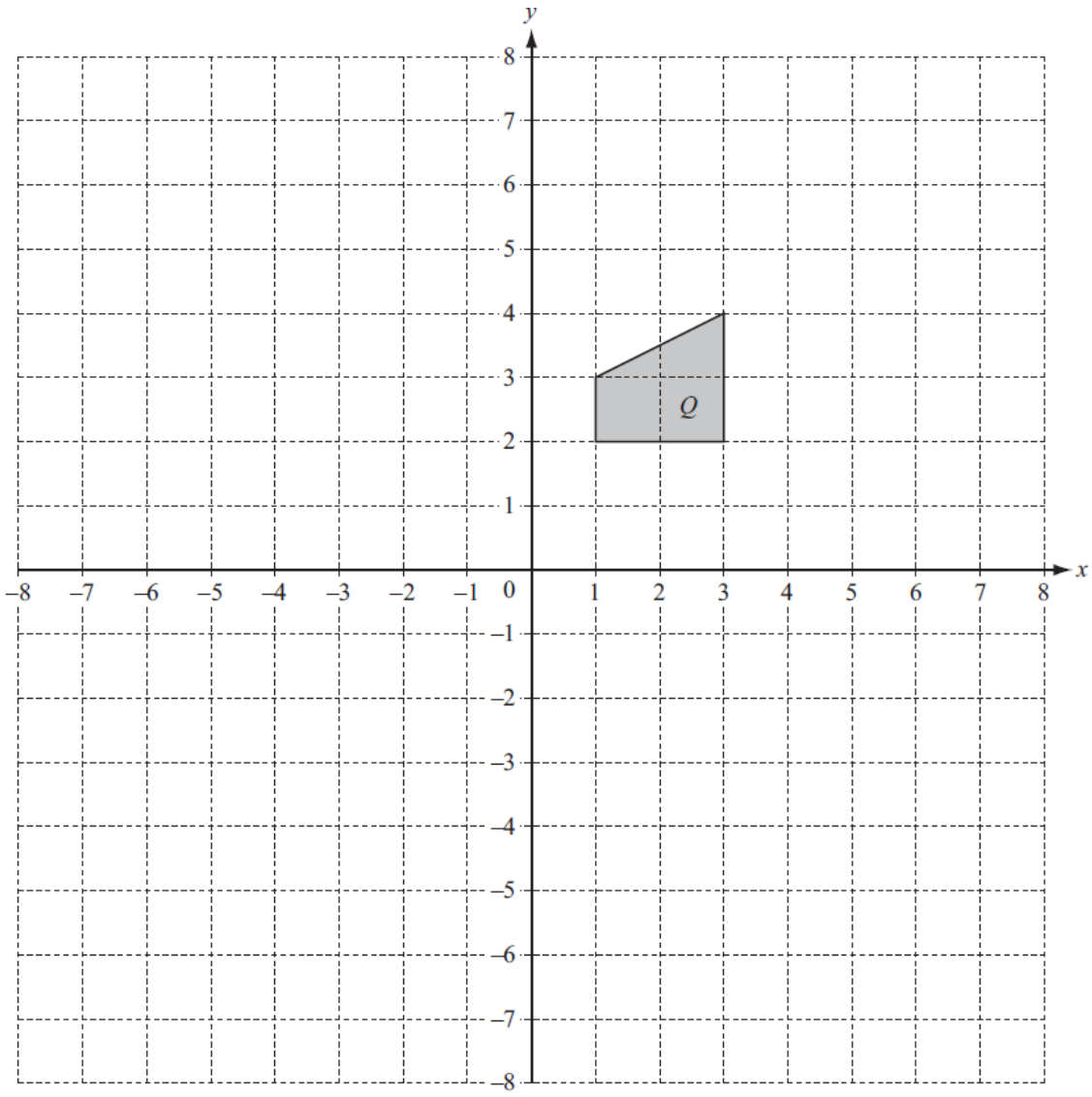
Area of triangle A : Area of triangle B = ... : ..... [2]

(d) Write down the matrix that represents a stretch, factor 4 with the y-axis invariant. [2]

(e) (i) On the grid, draw the image of triangle A after the transformation represented by the matrix $\begin{pmatrix} 1 & 0 \\ 2 & 1 \end{pmatrix}$. [3]

(ii) Describe fully this **single** transformation. [3]

(iii) Find the inverse of the matrix $\begin{pmatrix} 1 & 0 \\ 2 & 1 \end{pmatrix}$. [2]



(a) Draw the reflection of shape Q in the line $x = -1$. [2]

(b) (i) Draw the enlargement of shape Q, centre (0, 0), scale factor -2 . [2]

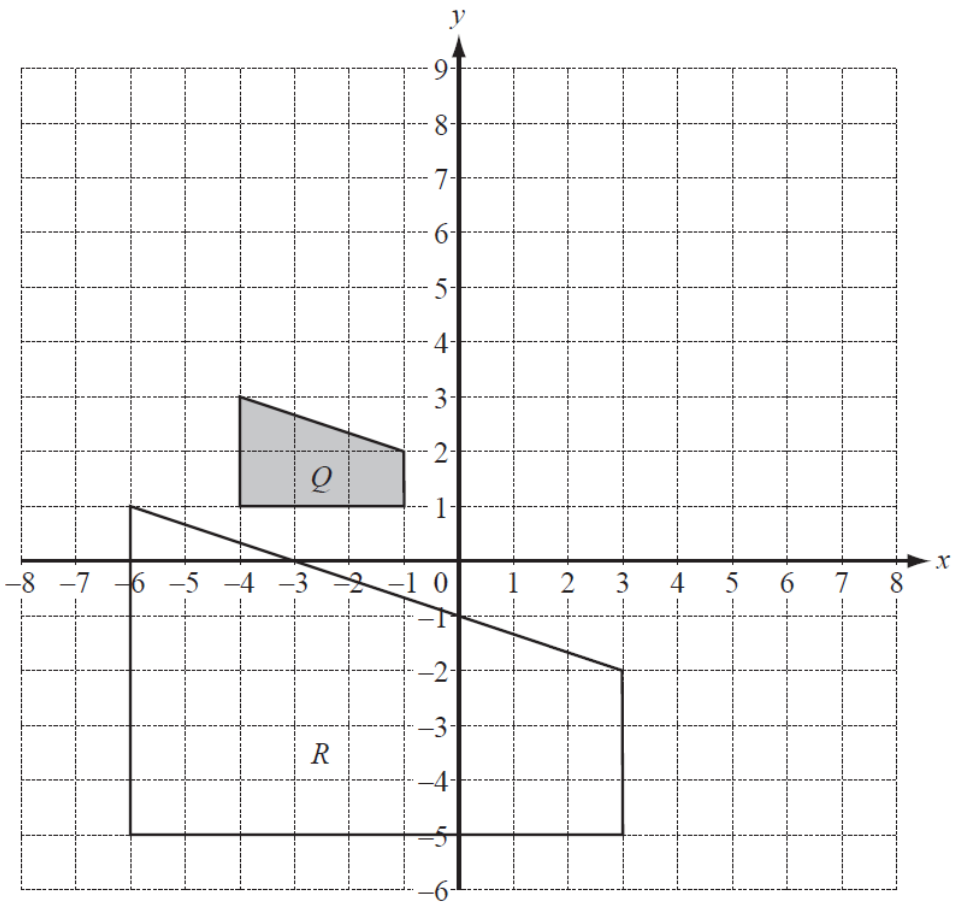
(ii) Find the 2×2 matrix that represents an enlargement, centre (0, 0), scale factor -2 . [2]

(c) **(i)** Draw the stretch of shape Q, factor 2, x-axis invariant. [2]

(ii) Find the 2×2 matrix that represents a stretch, factor 2, x-axis invariant. [2]

(iii) Find the inverse of the matrix in **part (c)(ii)**. [2]

(iv) Describe fully the **single** transformation represented by the matrix in **part (c)(iii)**. [3]



(a) Describe fully the **single** transformation that maps shape Q onto shape R. [3]

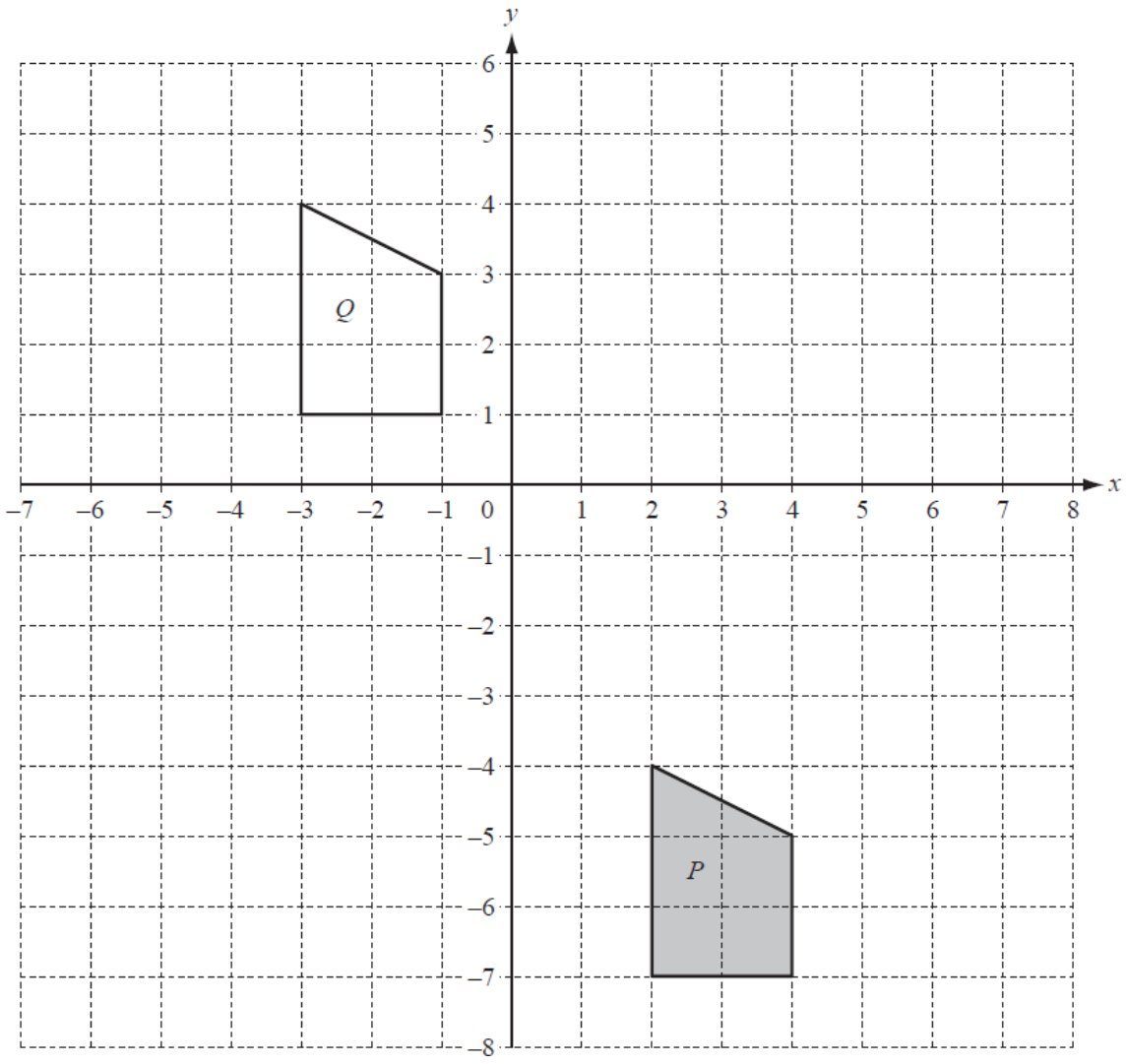
(b) (i) Draw the image when shape Q is translated by the vector $\begin{pmatrix} 5 \\ 4 \end{pmatrix}$. [2]

(ii) Draw the image when shape Q is reflected in the line $x = 2$. [2]

(iii) Draw the image when shape Q is stretched, factor 3, x-axis invariant. [2]

(iv) Find the 2×2 matrix that represents a stretch of factor 3, x-axis invariant. [2]

(c) Describe fully the **single** transformation represented by the matrix $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$. [2]

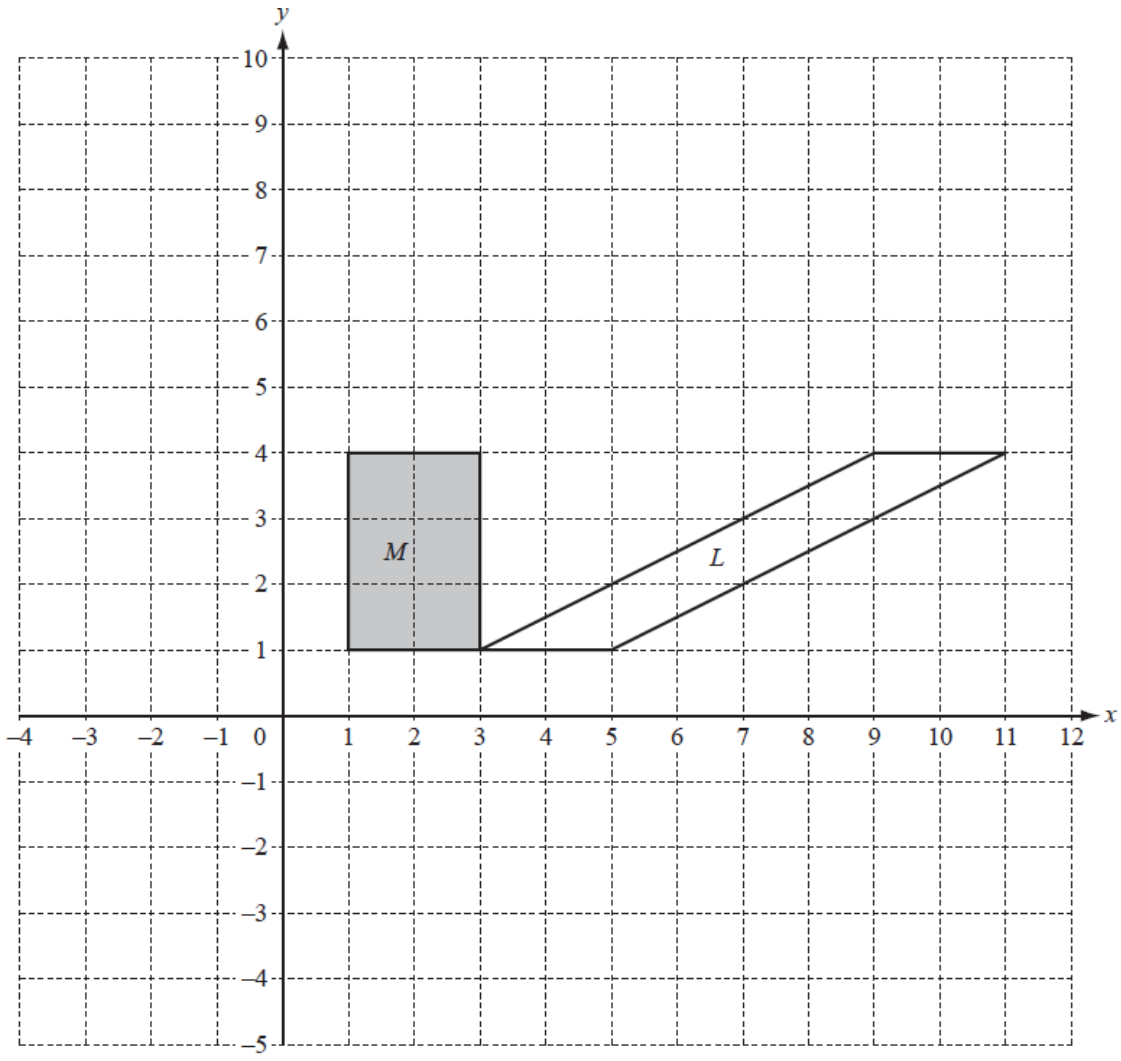


(i) Describe fully the **single** transformation which maps shape P onto shape Q. [2]

(ii) On the grid above, draw the image of shape P after reflection in the line $y = -1$. [2]

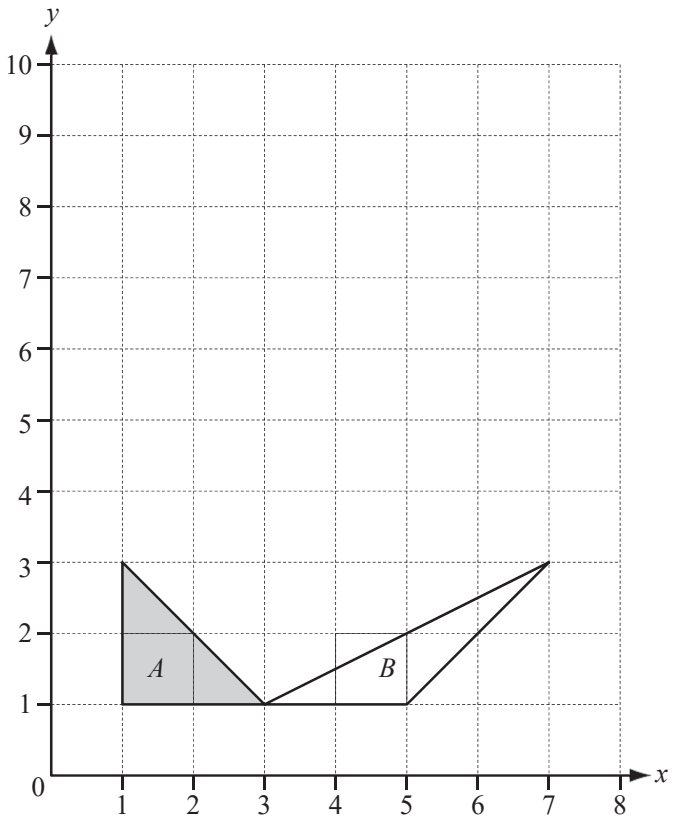
(iii) On the grid above, draw the image of shape P under the transformation represented by the matrix $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$. [3]

(b)



(i) Describe fully the **single** transformation which maps shape M onto shape L. [3]

(ii) On the grid above, draw the image of shape M after enlargement by scale factor 2, centre (5, 0). [2]



(a) (i) Draw the image of shape A after a stretch, factor 3, x-axis invariant. [2]

(ii) Write down the matrix representing a stretch, factor 3, x-axis invariant. [2]

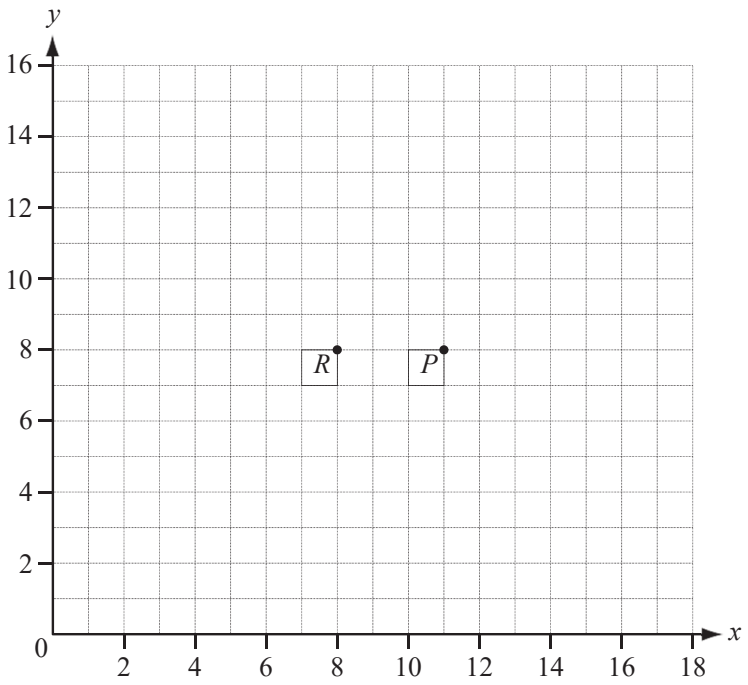
(b) (i) Describe fully the **single** transformation which maps shape A onto shape B. [3]

(ii) Write down the matrix representing the transformation which maps shape A onto shape B.

[2]

(a) Calculate the magnitude of the vector $\begin{pmatrix} 3 \\ -5 \end{pmatrix}$. [2]

(b)



(i) The points P and R are marked on the grid above.

$\overrightarrow{PQ} = \begin{pmatrix} 3 \\ -5 \end{pmatrix}$. Draw the vector $\overrightarrow{PQ}$ on the grid above. [1]

(ii) Draw the image of vector $\overrightarrow{PQ}$ after rotation by 90° anticlockwise about R. [2]

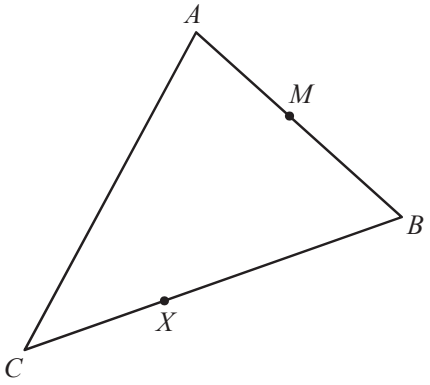
(c) $\overrightarrow{DE} = 2\mathbf{a} + \mathbf{b}$ and $\overrightarrow{DC} = 3\mathbf{b} - \mathbf{a}$.

Find $\overrightarrow{CE}$ in terms of $\mathbf{a}$ and $\mathbf{b}$. Write your answer in its simplest form. [2]

(d) $\overrightarrow{OT} = \begin{pmatrix} -2 \\ 5 \end{pmatrix}$ and $\overrightarrow{OV} = \begin{pmatrix} 5 \\ -1 \end{pmatrix}$.

Write $\overrightarrow{TV}$ as a column vector. [2]

(e)



NOT TO SCALE

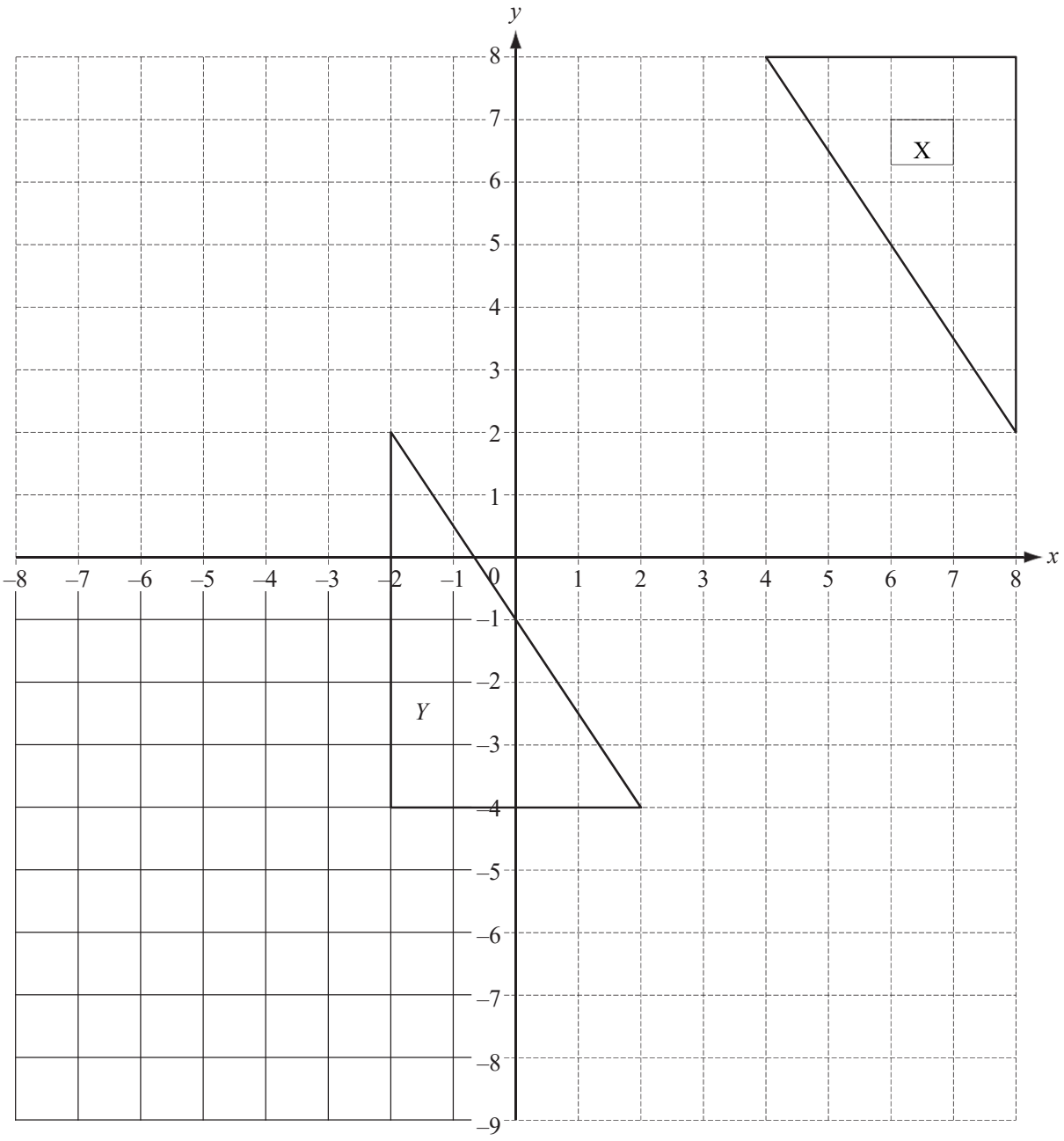
$\overrightarrow{AB} = \mathbf{b}$ and $\overrightarrow{AC} = \mathbf{c}$.

(i) Find $\overrightarrow{CB}$ in terms of $\mathbf{b}$ and $\mathbf{c}$. [1]

(ii) X divides CB in the ratio $1:3$.
M is the midpoint of AB.

Find $\overrightarrow{MX}$ in terms of $\mathbf{b}$ and $\mathbf{c}$.
Show all your working and write your answer in its simplest form. [4]

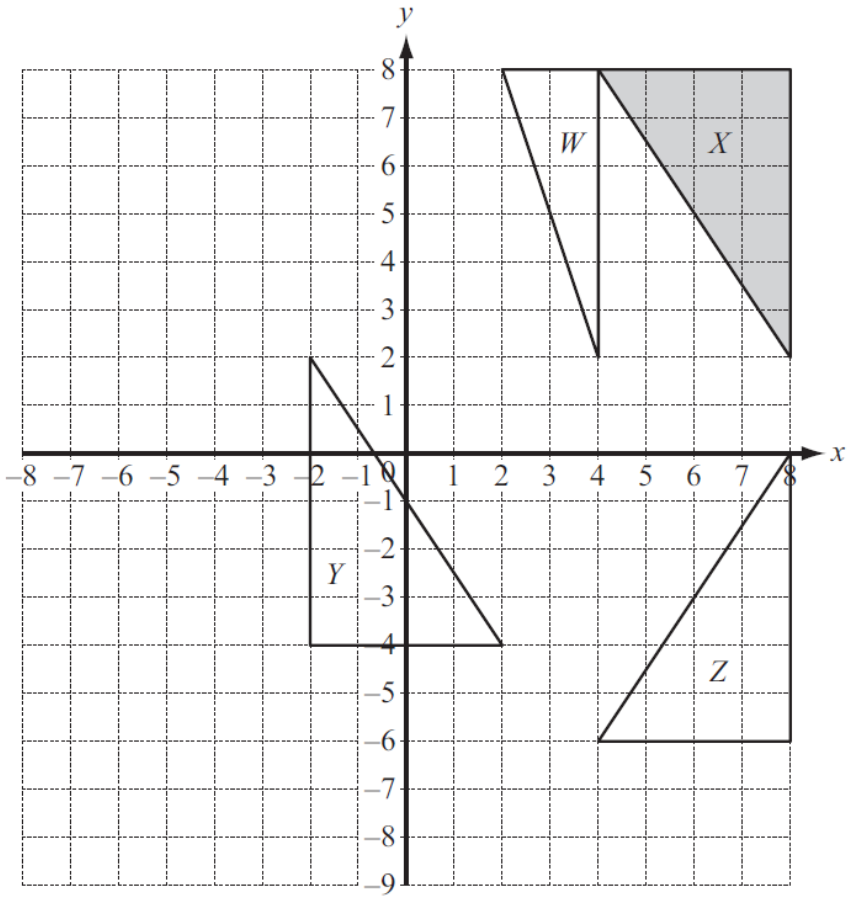
(a)



(i) Draw the translation of triangle X by the vector $\begin{pmatrix} -11 \\ -1 \end{pmatrix}$. [2]

(ii) Draw the enlargement of triangle Y with centre (–6, – 4) and scale factor $\frac{1}{2}$. [2]

(b)



Describe fully the **single** transformation that maps

(i) triangle X onto triangle Z, [2]

(ii) triangle X onto triangle Y, [3]

(iii) triangle X onto triangle W. [3]

(c) Find the matrix that represents the transformation in part (b)(iii). [2]