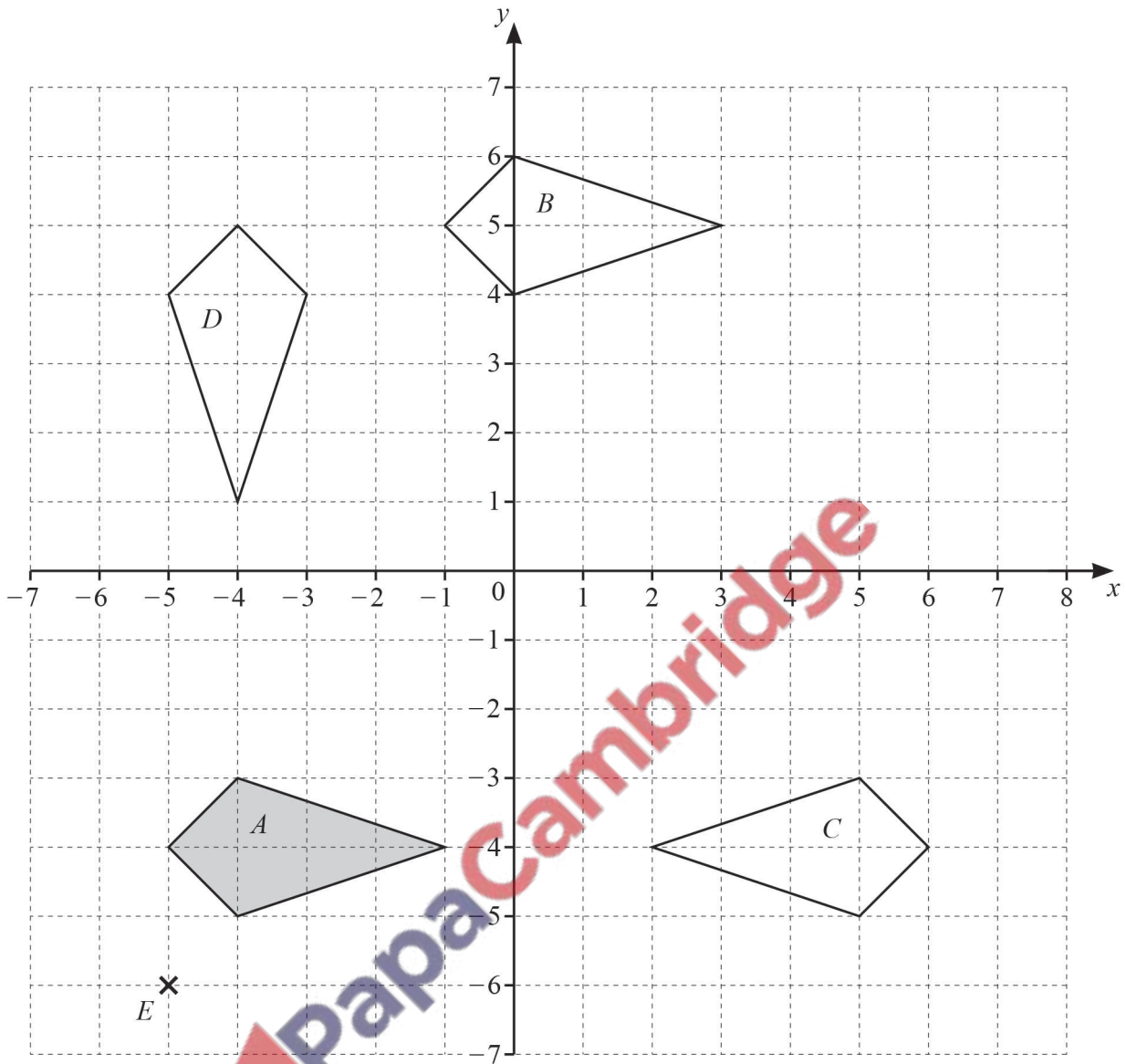# Topical Worksheets for Cambridge O LEVEL Mathematics D (4024)

Transformations

1st edition, for examination until 2025

1 The grid shows a point *E* and four quadrilaterals, *A*, *B*, *C* and *D*.

(a) Write down the mathematical name of shape *A*.

.... [1]

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

(i) shape *A* onto shape *B*,

....

.... [2]

(ii) shape *A* onto shape *C*,

....

.... [2]

(iii) shape *A* onto shape *D*.

....

.... [3]

(c) **(i)** Write down the coordinates of the point *E*.

(............................. , ...) [1]

(ii) On the grid, draw the image of shape *A* after an enlargement by scale factor 3, centre *E*.   [2]

[Total: 11]

2
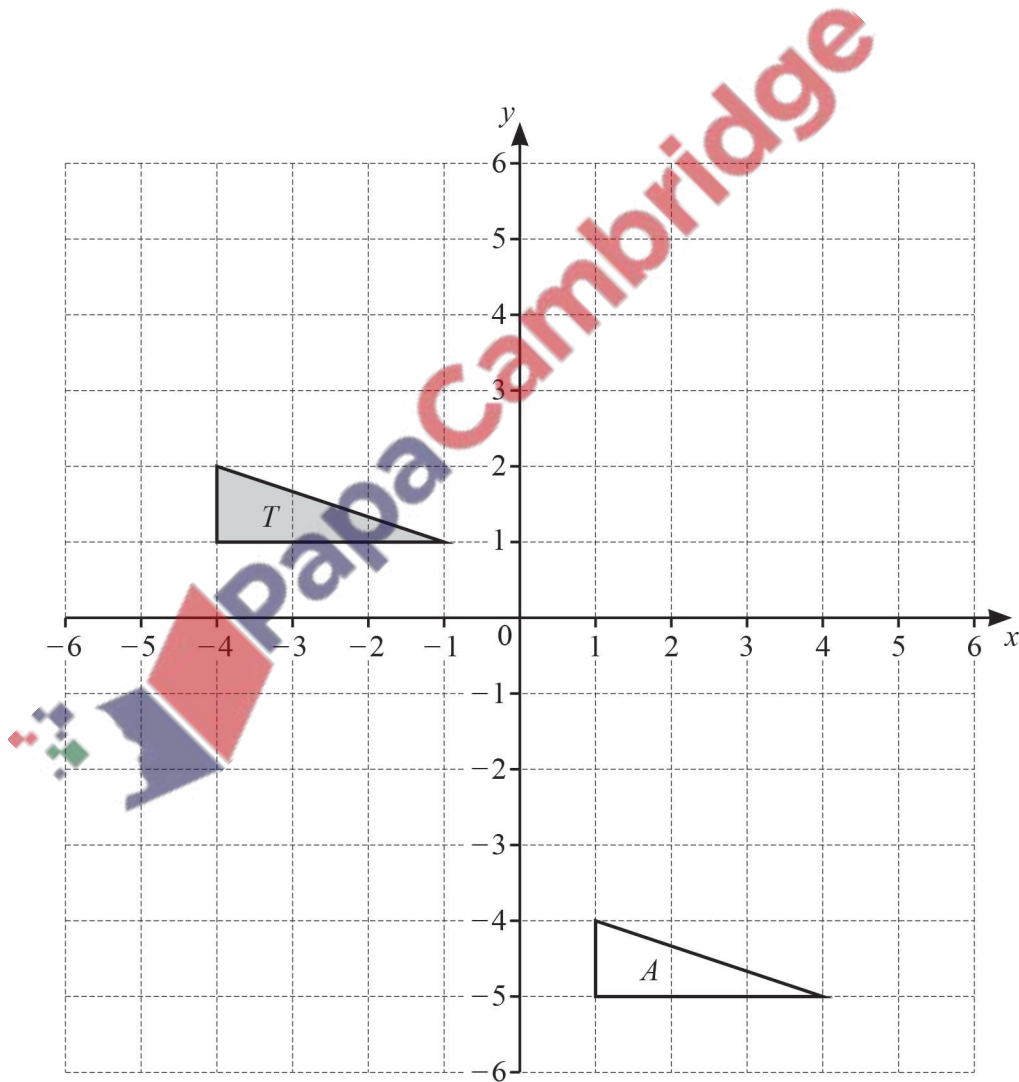
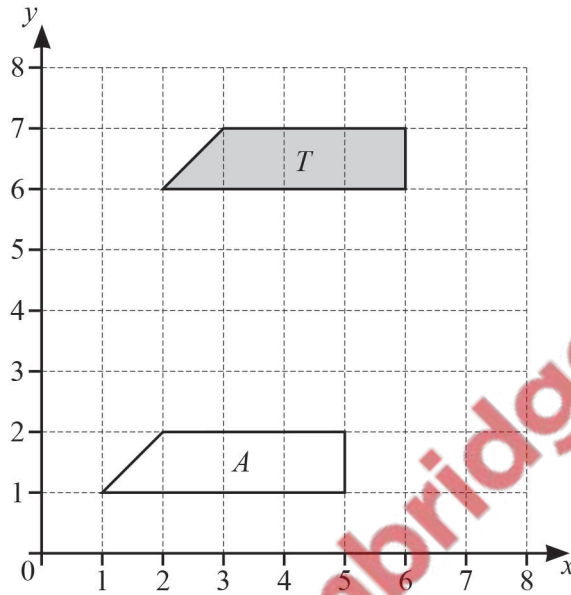**(a)** Draw the image of triangle *T* after a reflection in the line $y = -1$. [2]

(b) Draw the image of triangle *T* after a rotation through 90° clockwise about (0, 0). [2]

(c) Describe fully the **single** transformation that maps triangle *T* onto triangle *A*.

....

.... [2]

[Total: 6]

3

(a) Describe fully the **single** transformation that maps shape *T* onto shape *A*.

....

.... [2]
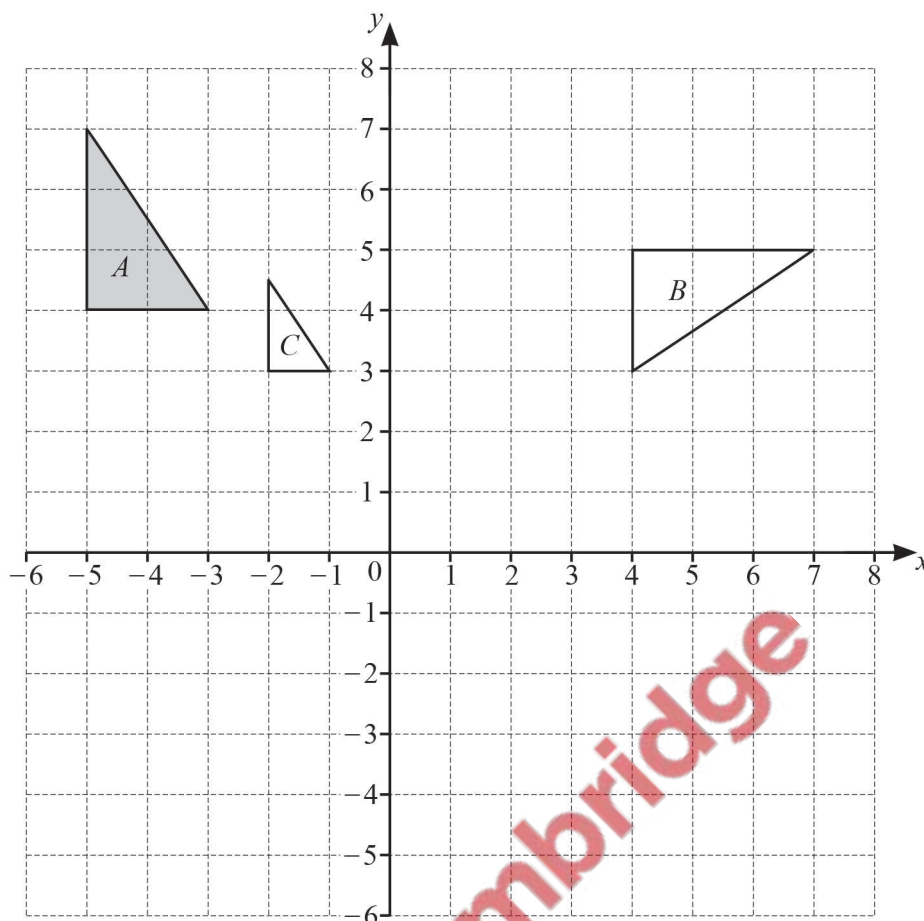
(b) On the grid, reflect shape *T* in the line $y = x$. [2]

[Total: 4]

4 Triangles *A*, *B* and *C* are shown on the grid.

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

    (i) triangle *A* onto triangle *B*,

....

.... [3]

    (ii) triangle *A* onto triangle *C*.

....

.... [3]
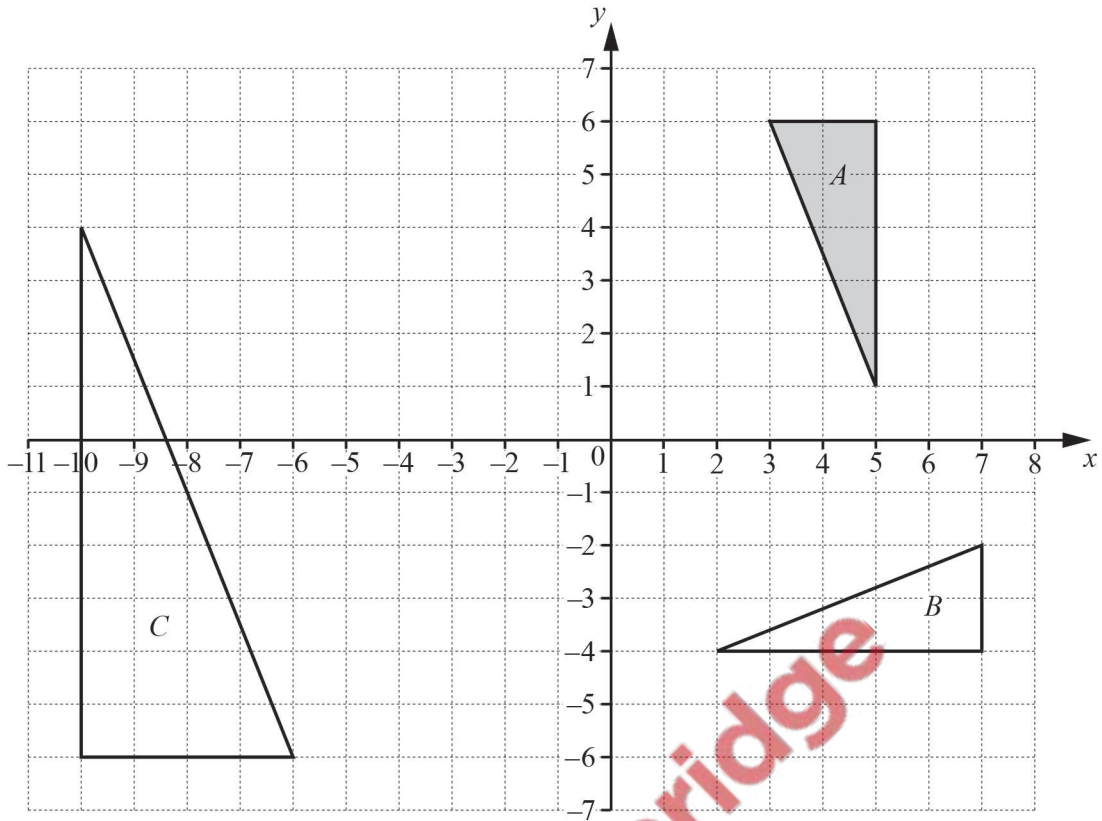
(b) On the grid,

    (i) translate triangle *A* by the vector $\begin{pmatrix} 6 \\ -2 \end{pmatrix}$, [2]

    (ii) reflect triangle *A* in the line $y = 1$. [2]

[Total: 10]

5

Describe fully the **single** transformation that maps
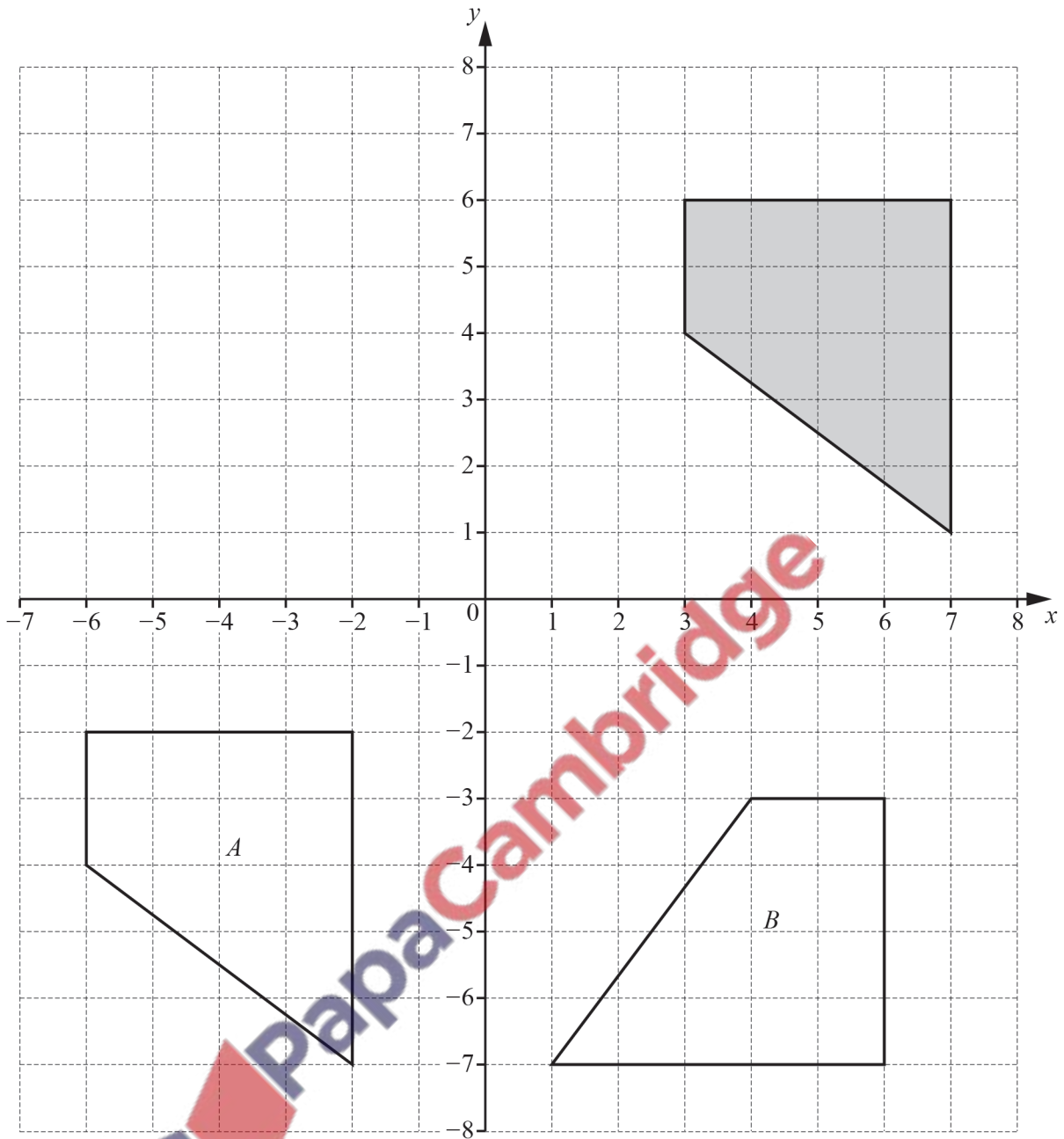
(a) triangle *A* onto triangle *B*,

....

.... [3]

(b) triangle *A* onto triangle *C*.

....

.... [3]

[Total: 6]

6 Three quadrilaterals are shown on a 1 cm² grid.

(a) Write down the mathematical name of the shaded quadrilateral.

.... [1]

(b) For the shaded quadrilateral

    (i) **measure** the perimeter,

.... cm   [1]

    (ii) work out the area.

.... cm^2 [1]

(c) Describe fully the **single** transformation that maps the shaded quadrilateral onto

    (i) quadrilateral *A*,

....

....   [2]

    (ii) quadrilateral *B*.

....

....   [3]
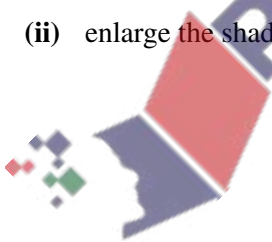
(d) On the grid,

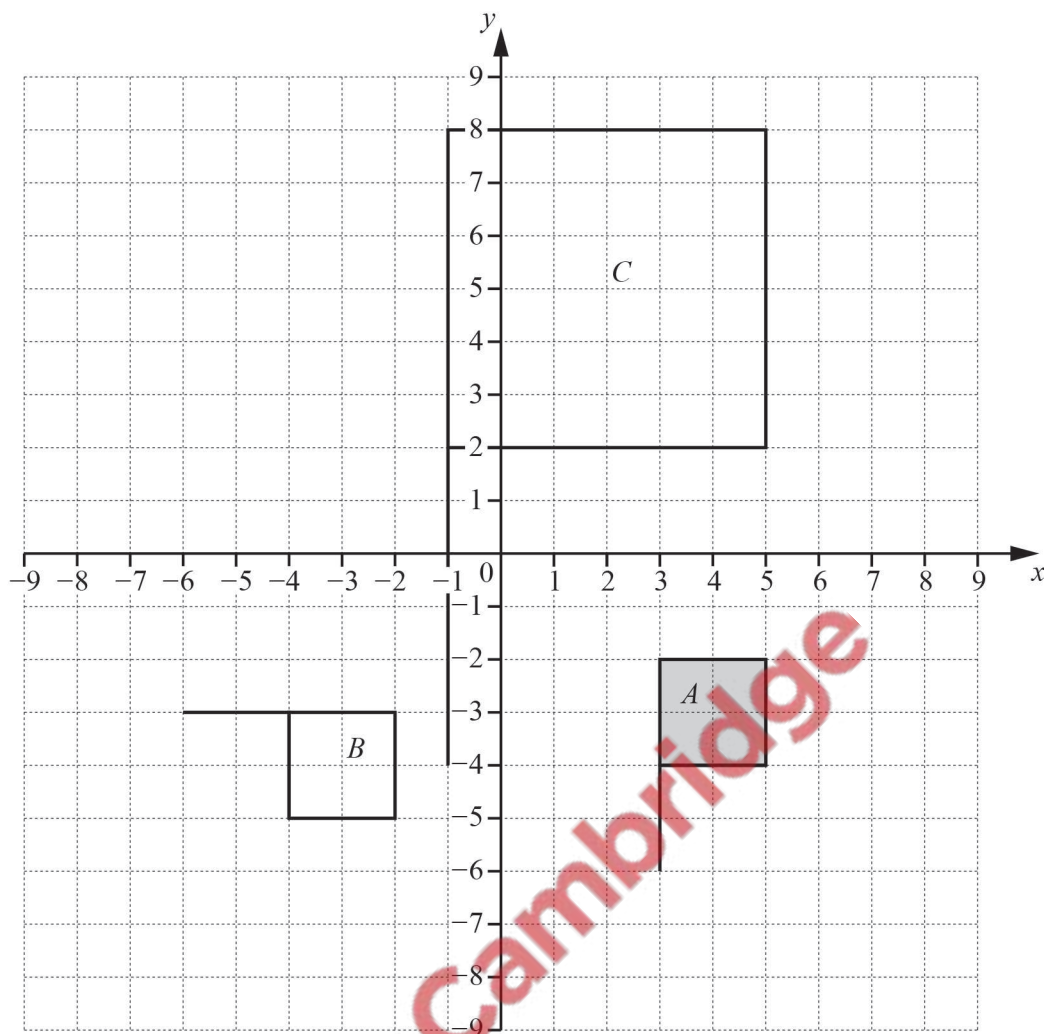   **(i)** reflect the shaded quadrilateral in the line $x = 1$,   [2]

    (ii) enlarge the shaded quadrilateral by scale factor $\dfrac{1}{2}$, centre $(-1, 0)$.   [2]

[Total: 12]

7

(a) Describe fully the **single** transformation that maps shape *A* onto shape *B*.

....

.... [3]

(b) Describe fully the **single** transformation that maps shape *A* onto shape *C*.

....

.... [3]
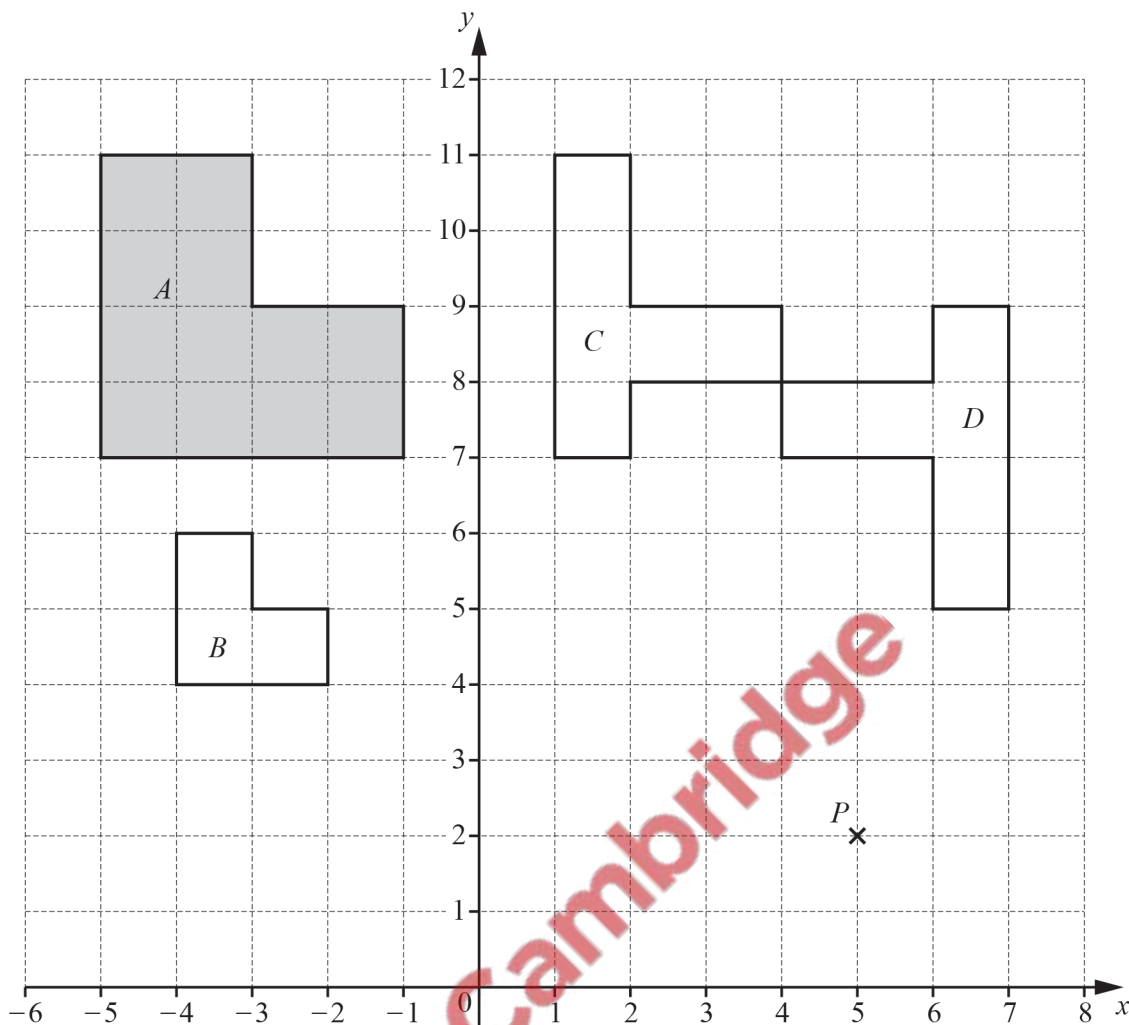
(c) On the grid, draw the image of shape *A* after a translation by the vector $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$. [2]

(d) On the grid, draw the image of **shape *B*** after a reflection in the line *y* = 1. [2]

[Total: 10]

8 The diagram shows four shapes *A*, *B*, *C* and *D* and a point *P* on a 1 cm^2 grid.

(a) Find

(i) the perimeter of shape *A*,

.... cm   [1]

(ii) the area of shape *A*.

.... cm^2 [1]

(b) **(i)** Write down the co-ordinates of point *P*.

(............................ , ...)   [1]

(ii) Find the co-ordinates of the image of point *P* when

A *P* is reflected in the *y*-axis,

(.............................. , ...) [1]

B *P* is reflected in the line *y* = 6.

(.............................. , ...) [2]

(iii) Find the vector that translates point *P* to the point (49, −12).

$$\begin{pmatrix} \\ \end{pmatrix}$$ [2]

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

(i) shape *A* onto shape *B*,

....

.... [3]

(ii) shape *C* onto shape *D*.

....

.... [3]
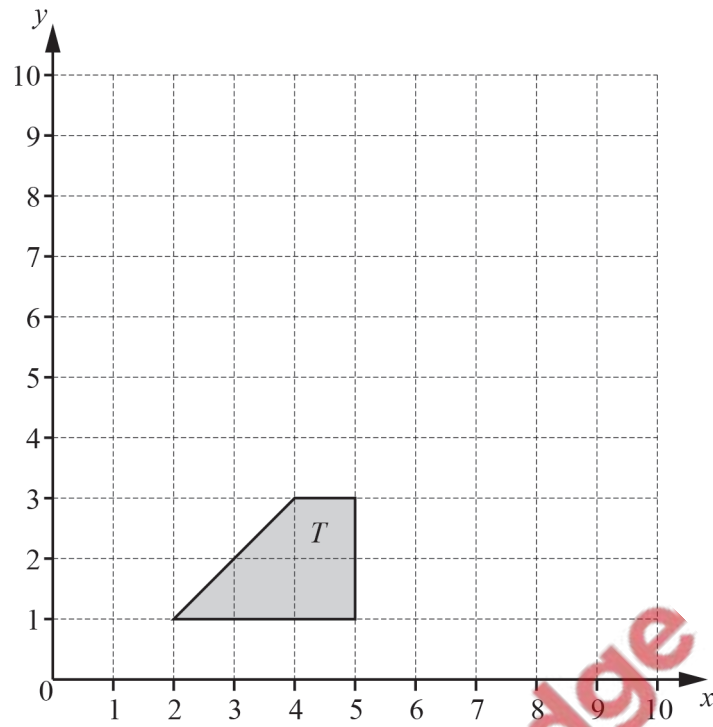
[Total: 14]
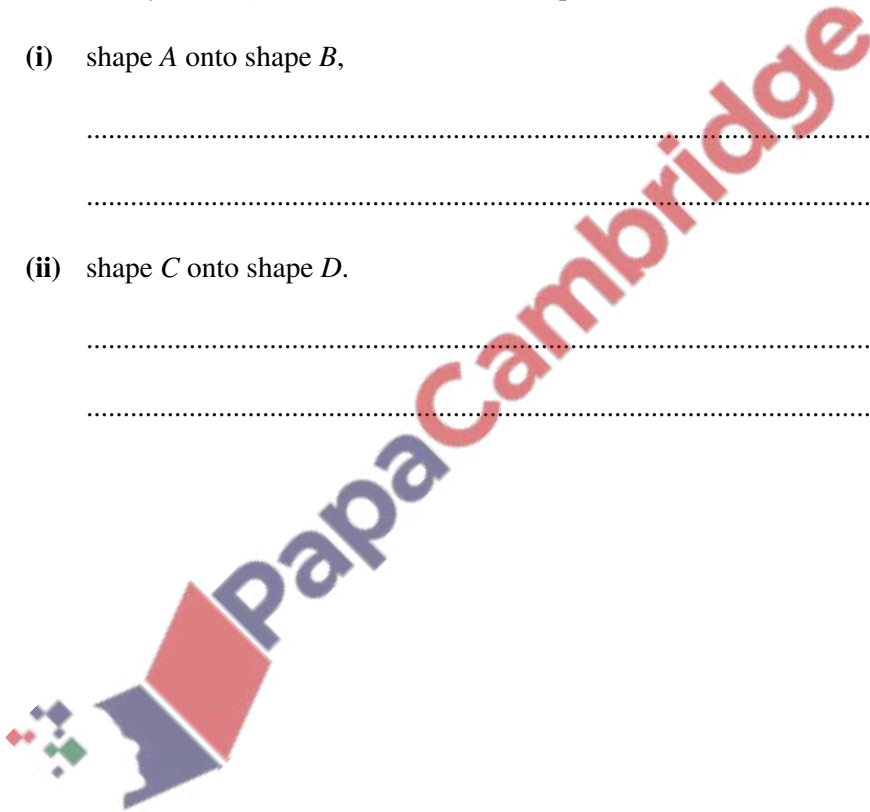
9

(a) Translate shape *T* by the vector $\begin{pmatrix} -1 \\ 6 \end{pmatrix}$.

Label the image *A*.

[2]

(b) Rotate shape *T* about the point (5, 3) through 180°.
Label the image *B*.

[2]

(c) Describe fully the **single** transformation that maps shape *A* onto shape *B*.
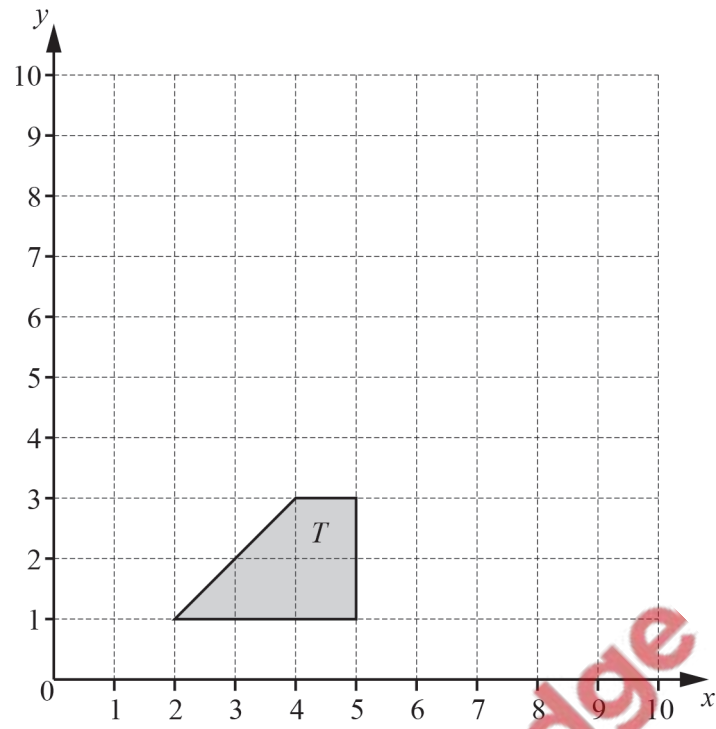
....

.... [3]

[Total: 7]

10

Reflect shape *T* in the line *y* = *x*. [2]

[Total: 2]