

www.mrc-papers.com



CLASSIFIED

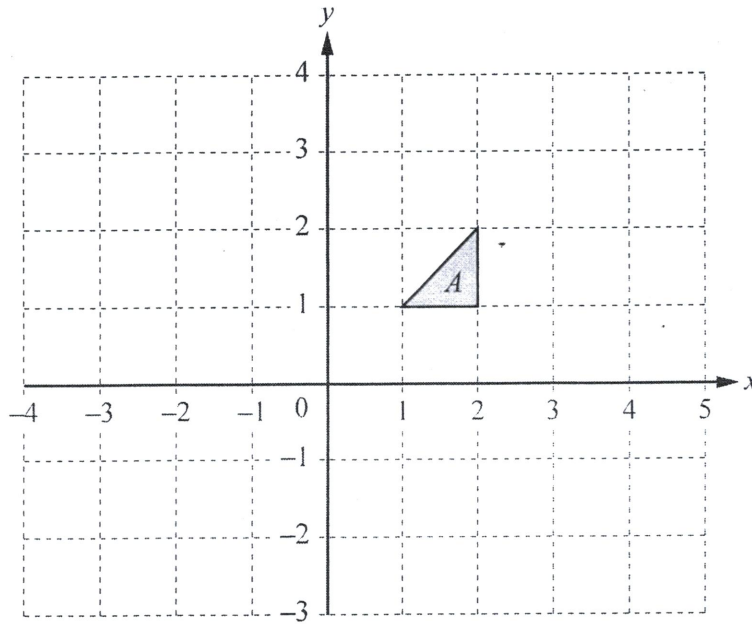
International Examinations Papers

Mob: +974 55249797 / 55258711

E-mail: rashed.saba@gmail.com

MATHEMATICS -CORE
TOPIC- TRANSFORMATIONS

01

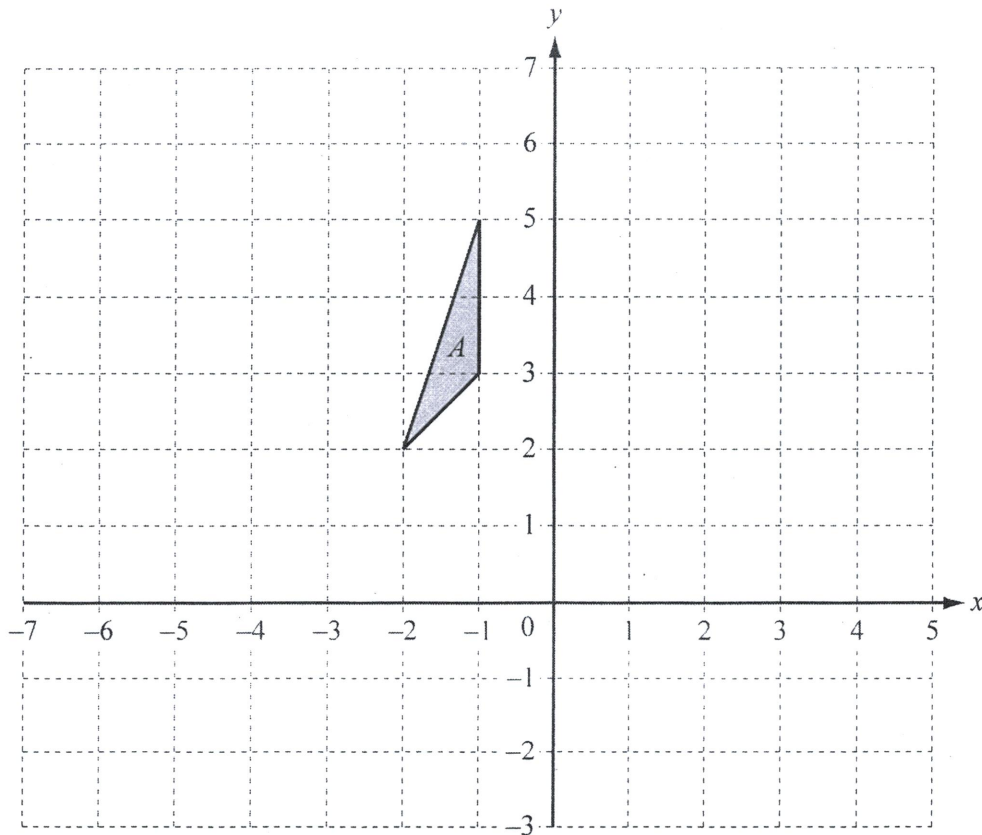


Draw the image of shape A after a translation by the vector $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$.

[2]

2

13-J-14

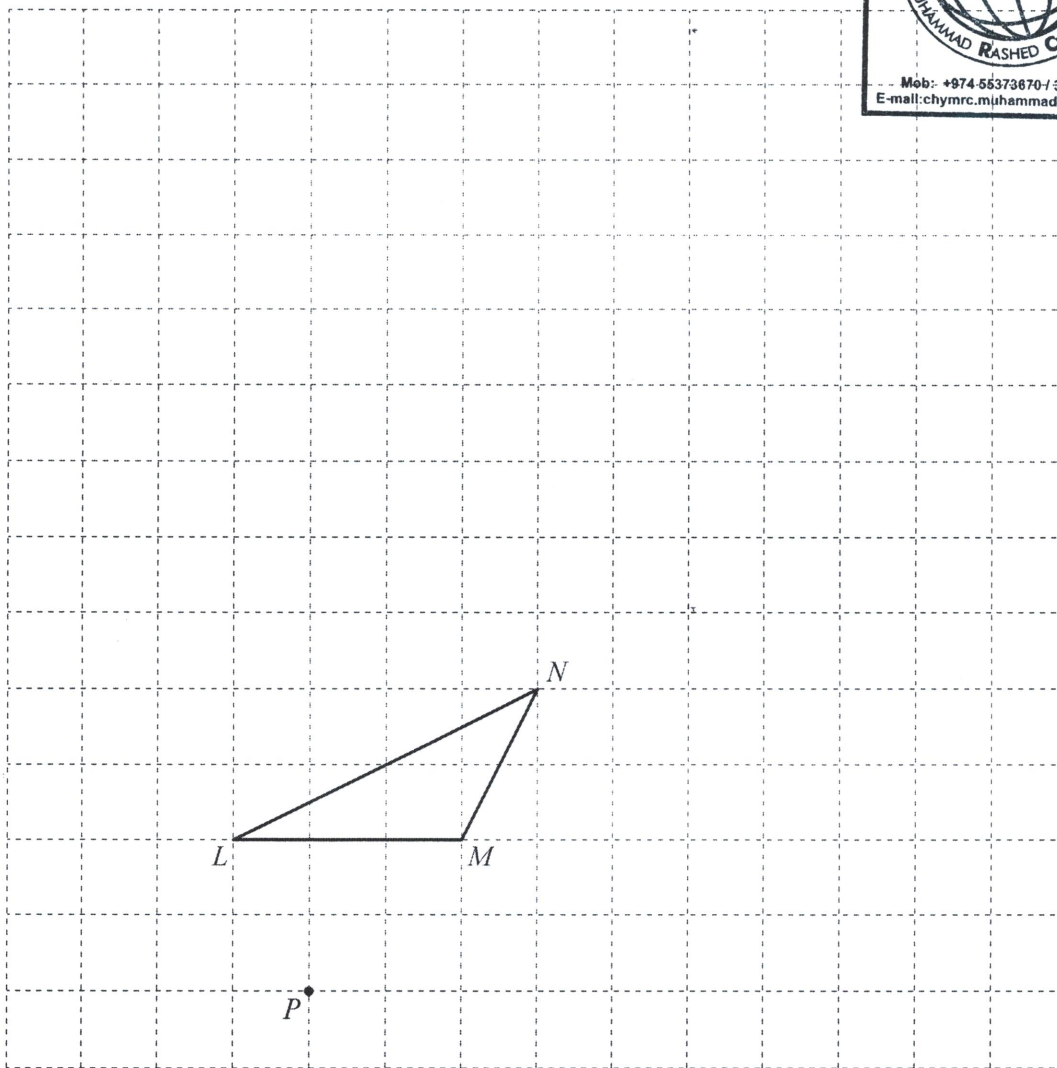


Draw the image of triangle A after a translation by the vector $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$.

[2]

3 (d) Triangle LMN is drawn on the 1 cm^2 grid below.

(i) Enlarge triangle LMN by scale factor 3 from the centre P .



[2]

(ii) Write down the length of the base, LM , and the height of triangle LMN .

Answer(d)(ii) $LM = \dots\dots\dots$ cm

Height = $\dots\dots\dots$ cm [2]

(iii) Calculate the area of triangle LMN .

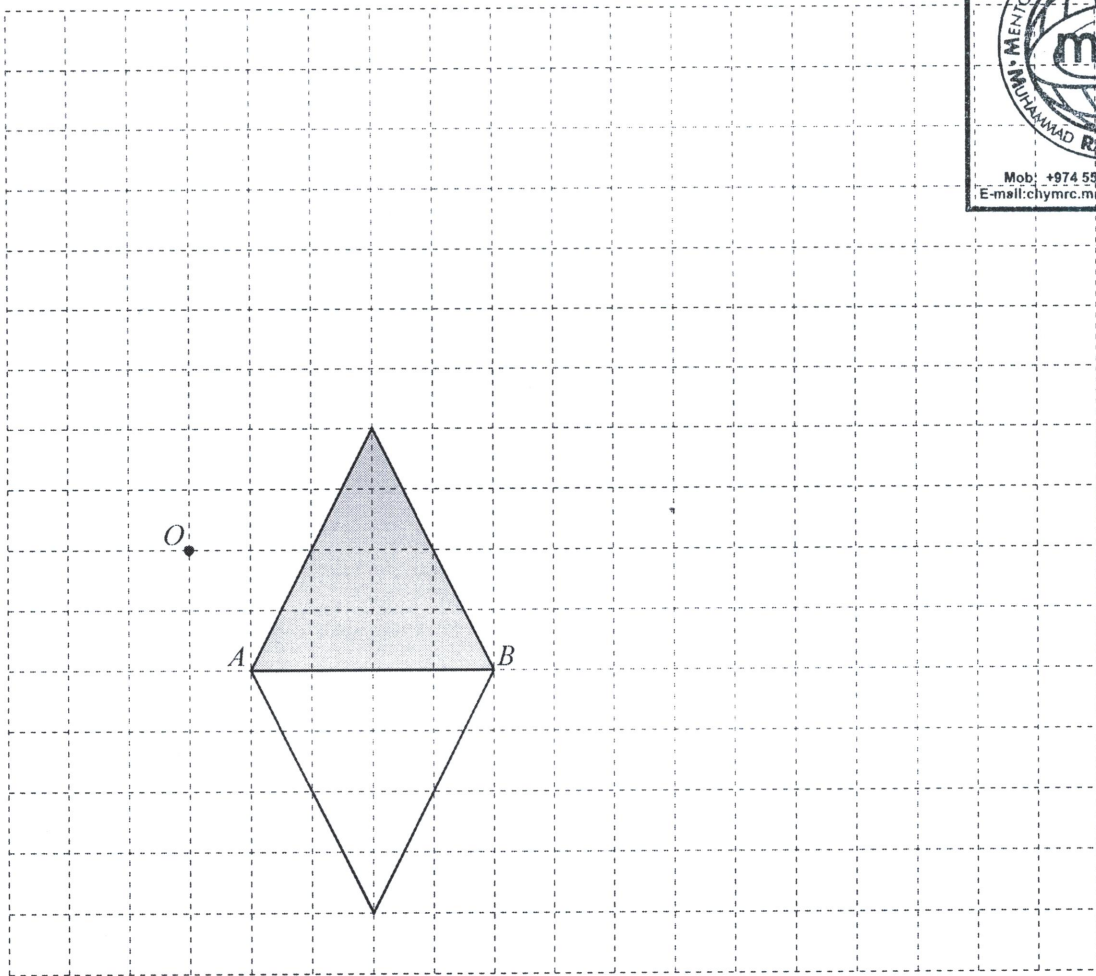
Answer(d)(iii) $\dots\dots\dots$ cm^2 [2]

(iv) Find the area of the **enlarged** triangle.

Answer(d)(iv) $\dots\dots\dots$ cm^2 [2]



For
Examiner's
Use



(a) Describe fully two **single** transformations that each map the shaded triangle onto the unshaded triangle.

Answer(a) Transformation 1

.....

Transformation 2

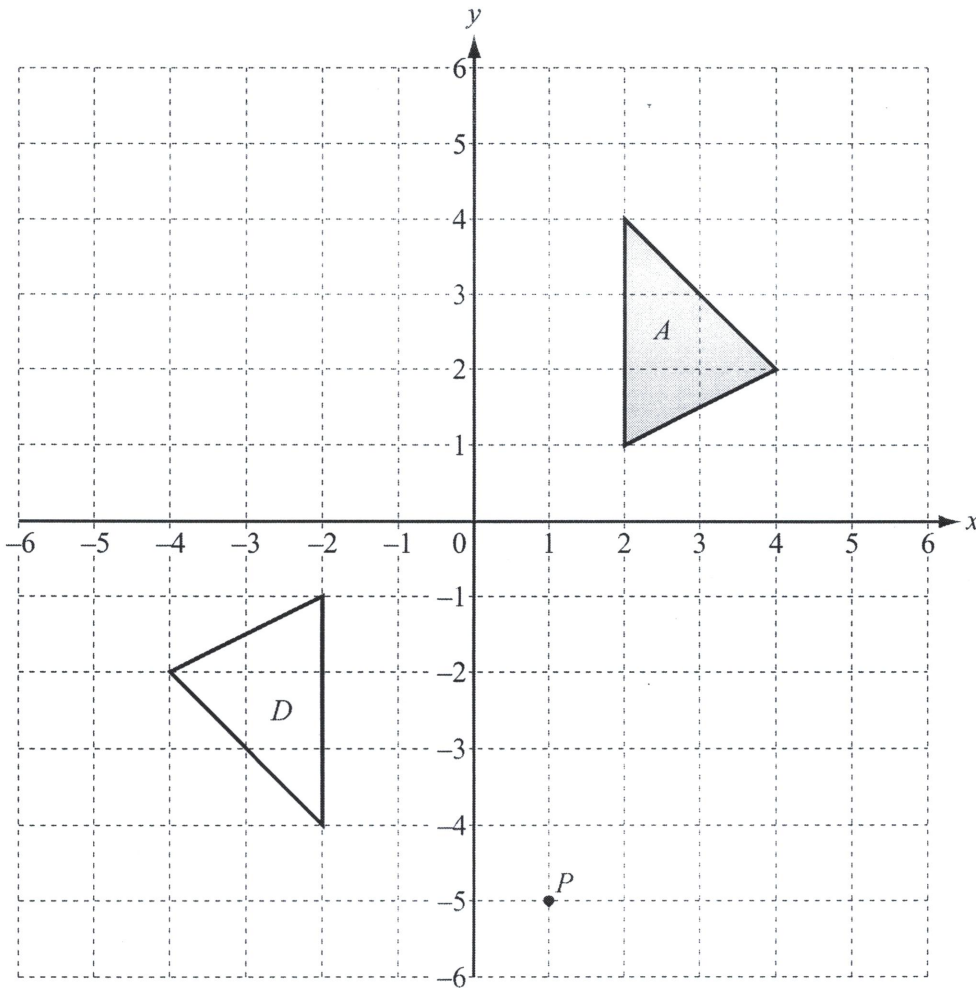
..... [5]

(b) On the grid, draw the image of

- (i) the shaded triangle after a translation by the vector $\begin{pmatrix} -2 \\ 7 \end{pmatrix}$, [2]
- (ii) the shaded triangle after an enlargement with scale factor 3 and centre O . [2]

(c) Draw the line of symmetry of the enlarged triangle in **part (b)(ii)**. [1]

(d)



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

Answer(d)(i) (..... ,) [1]

(ii) Reflect triangle *A* in the *y*-axis.
Label the image *B*.

[1]

(iii) Translate triangle *A* by the vector $\begin{pmatrix} 1 \\ -3 \end{pmatrix}$.

Label the image *C*.

[2]

(iv) Describe the **single** transformation that maps triangle *A* onto triangle *D*.

Answer(d)(iv) [3]

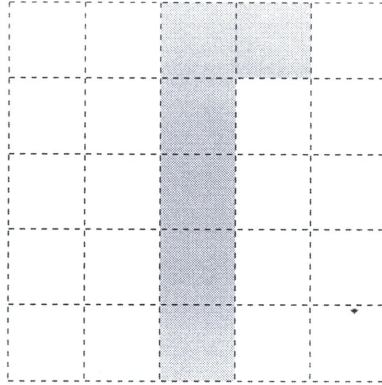


- 5 (a) Draw all the lines of symmetry on this rectangle.



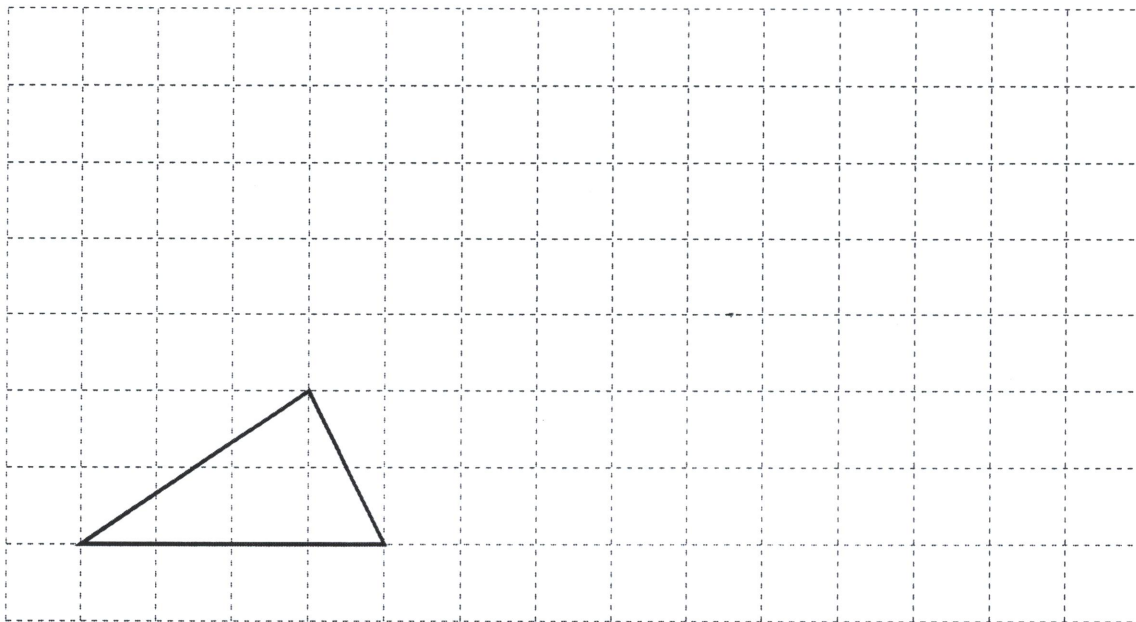
[2]

- (b) Shade **one** square so that the shaded shape has rotational symmetry of order 2.

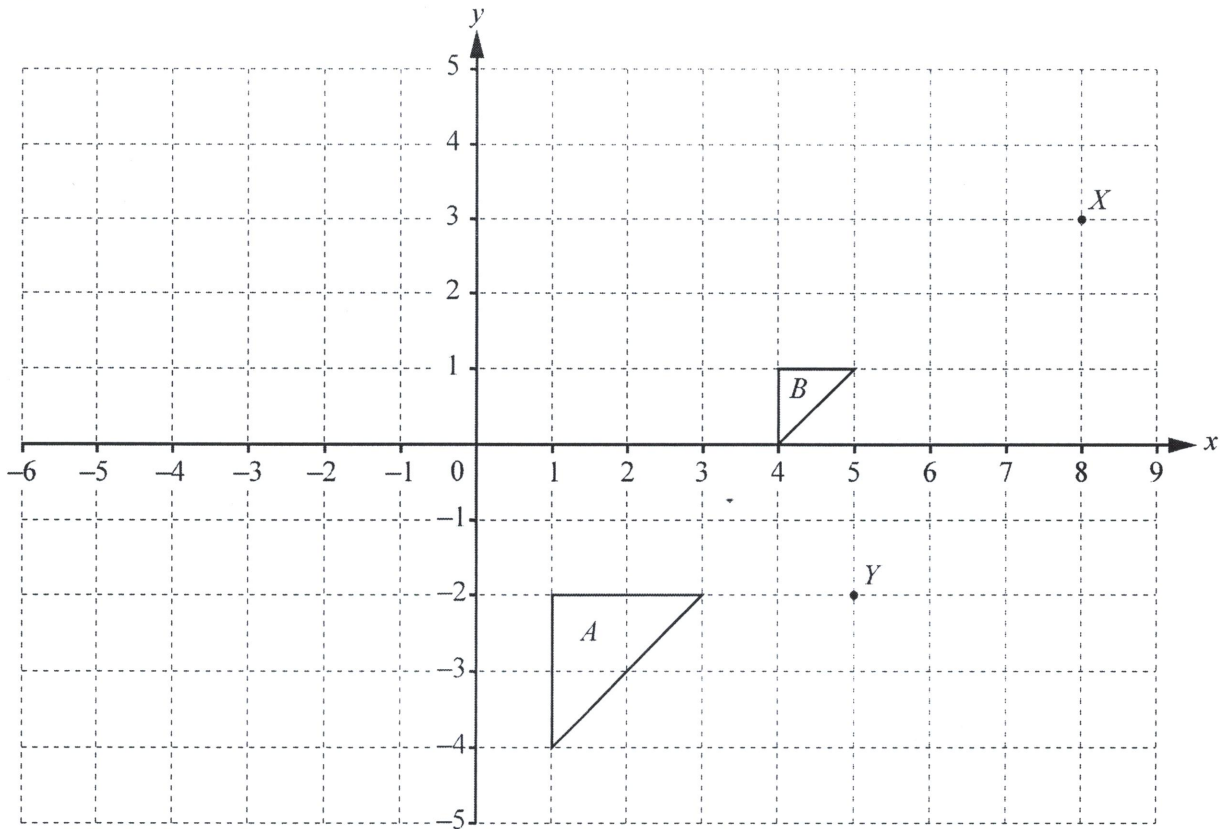


[1]

- (c) On the grid below, draw an enlargement of the triangle with a scale factor of 2.



[2]



- (a) (i) Rotate triangle *A* through 180° about $(0, 0)$. [2]
- (ii) Reflect triangle *A* in the line $x = -1$. [2]
- (iii) Describe fully the **single** transformation that maps triangle *A* onto triangle *B*.

Answer(a)(iii)
 [3]

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

Answer(b)(i) (.....,) [1]

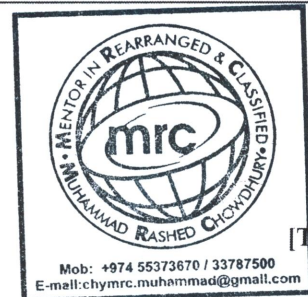
- (ii) Write \vec{XY} as a column vector.

Answer(b)(ii) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

- (iii) $\vec{XZ} = \begin{pmatrix} -5 \\ 1 \end{pmatrix}$

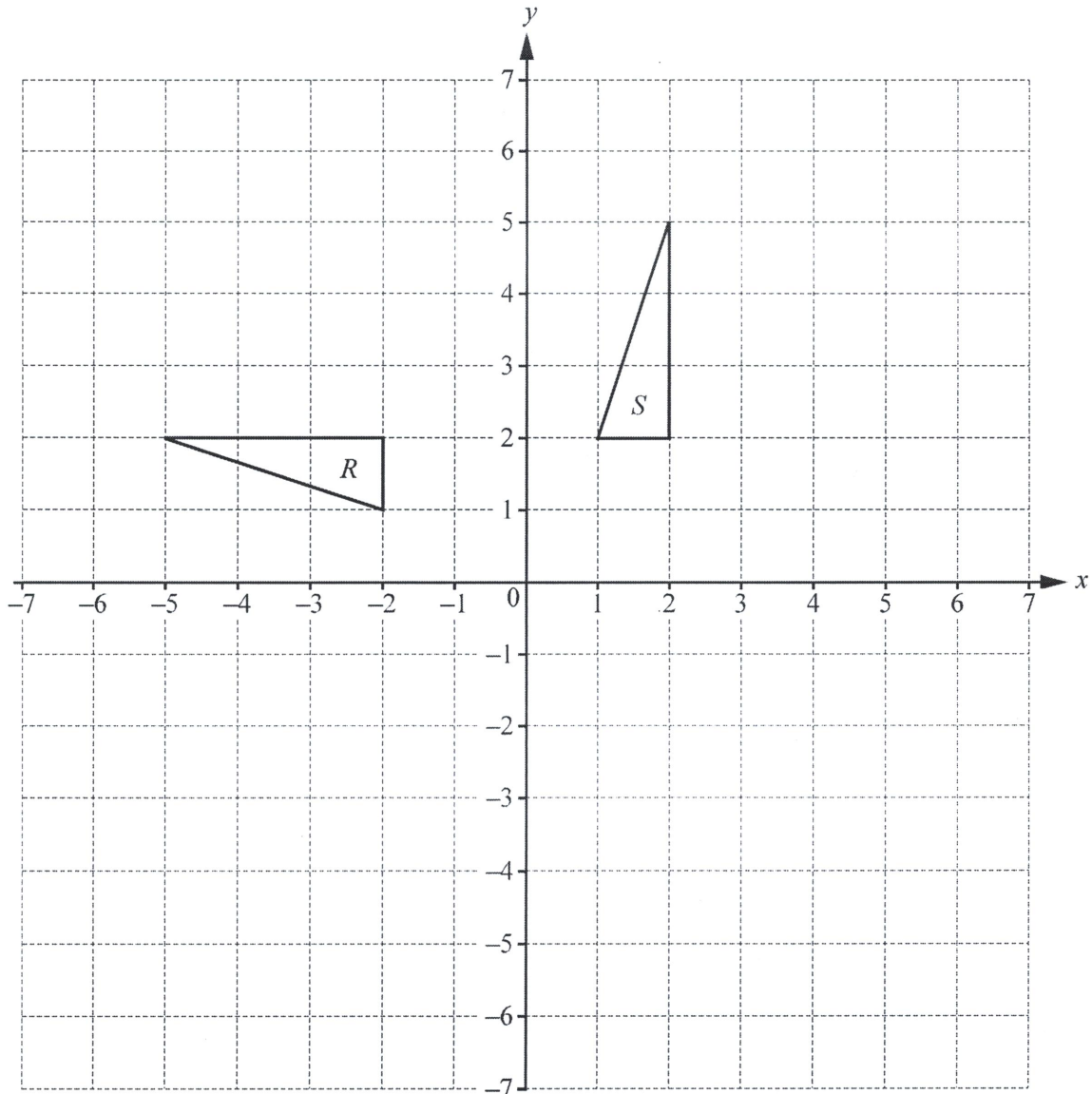
On the grid, plot the point *Z*. [1]

Question 10 is printed on the next page.



Turn over

(b) Triangle R and triangle S are shown on the grid.



(i) Describe fully the **single** transformation that maps triangle R onto triangle S .

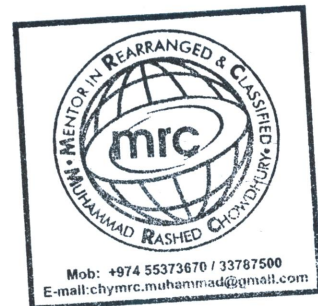
.....
 [3]

(ii) Reflect **triangle** R in the x -axis.

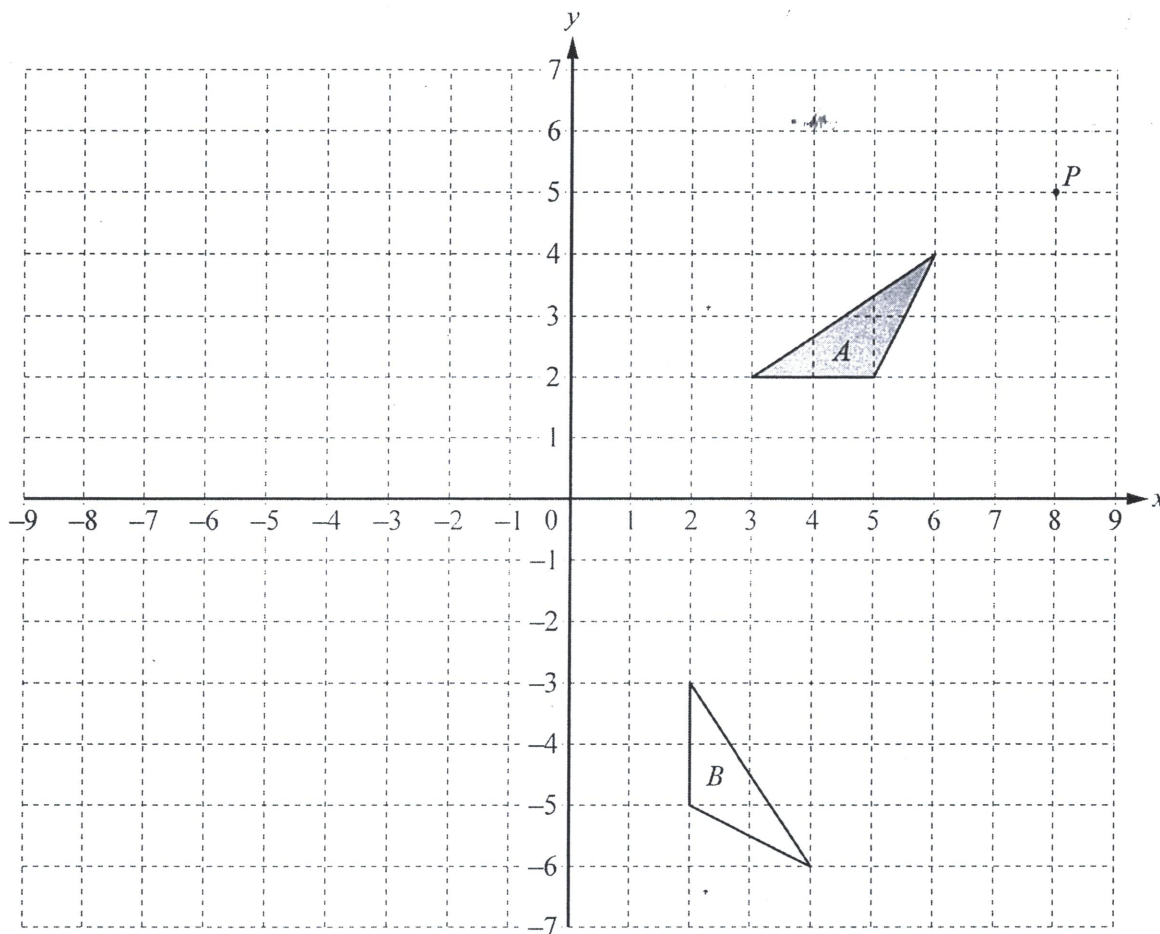
[1]

(iii) Translate **triangle** S by the vector $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$.

[2]



07

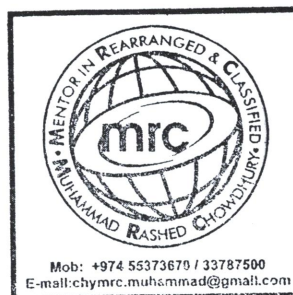


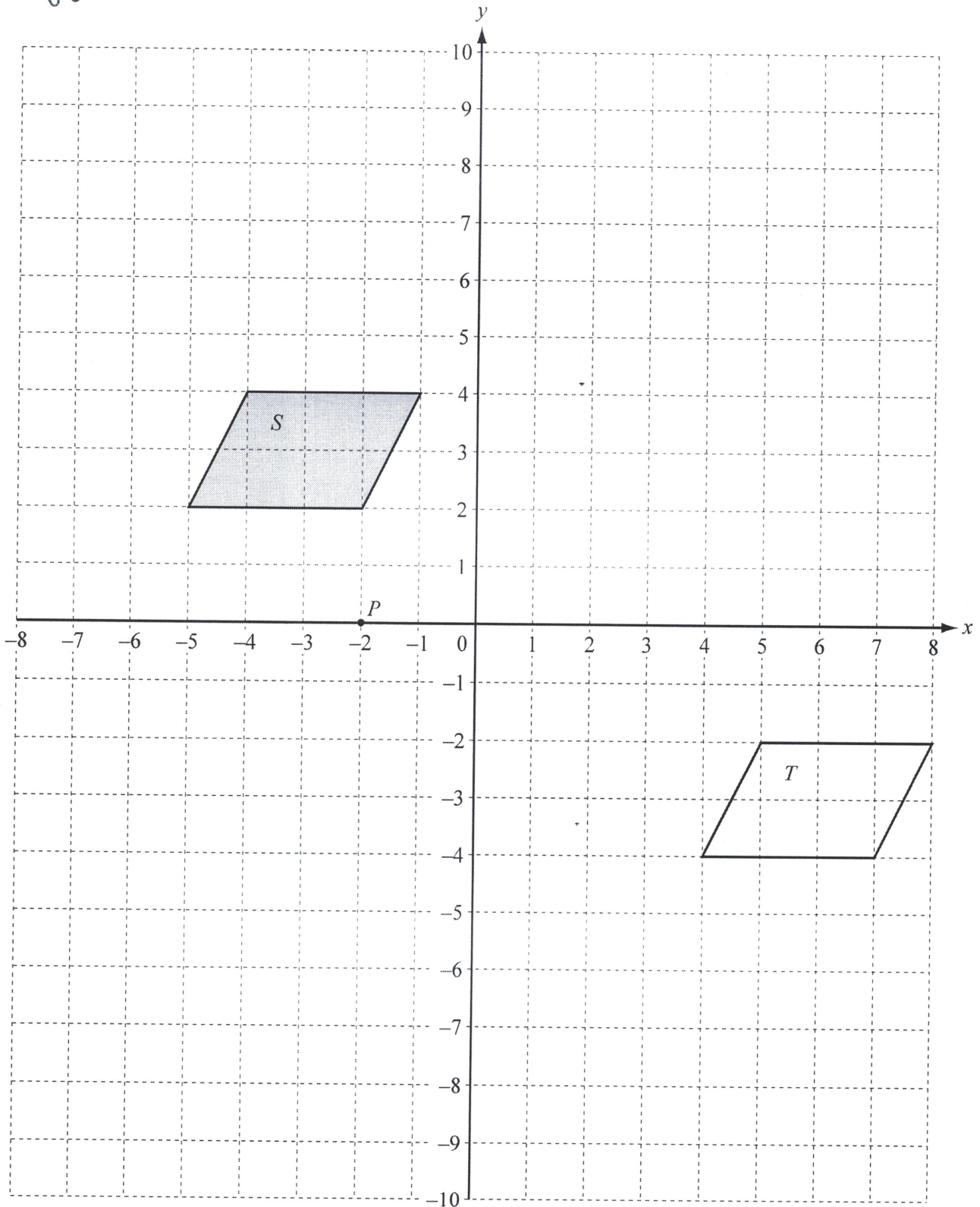
- (i) On the grid, reflect triangle A in the line $x = -1$. [2]
- (ii) On the grid, enlarge triangle A with centre P and scale factor 3. [2]
- (iii) Describe fully the **single** transformation that maps triangle A onto triangle B .

Answer(b)(iii)

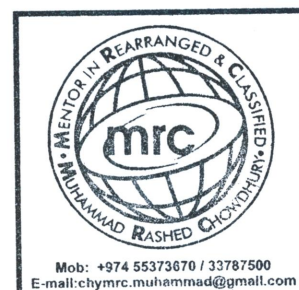
..... [3]

8-6





The diagram shows two shapes, S and T , on a 1 cm^2 grid.
 P is the point $(-2, 0)$.



(a) (i) Write down the mathematical name of shape S .

Answer(a)(i) [1]

(ii) How many lines of symmetry does shape S have?

Answer(a)(ii) [1]

(b) Describe the **single** transformation that maps shape S onto shape T .

Answer(b)
 [2]

(c) On the grid,

(i) draw the reflection of shape S in the y -axis, [2]

(ii) draw the rotation of shape S about $(0, 0)$ through 90° anti-clockwise. [2]

(d) On the grid, draw the enlargement of shape S with scale factor 2 and centre $P(-2, 0)$.
 Label the image E . [2]

(e) (i) Work out the area of shape S .

Answer(e)(i) cm^2 [2]

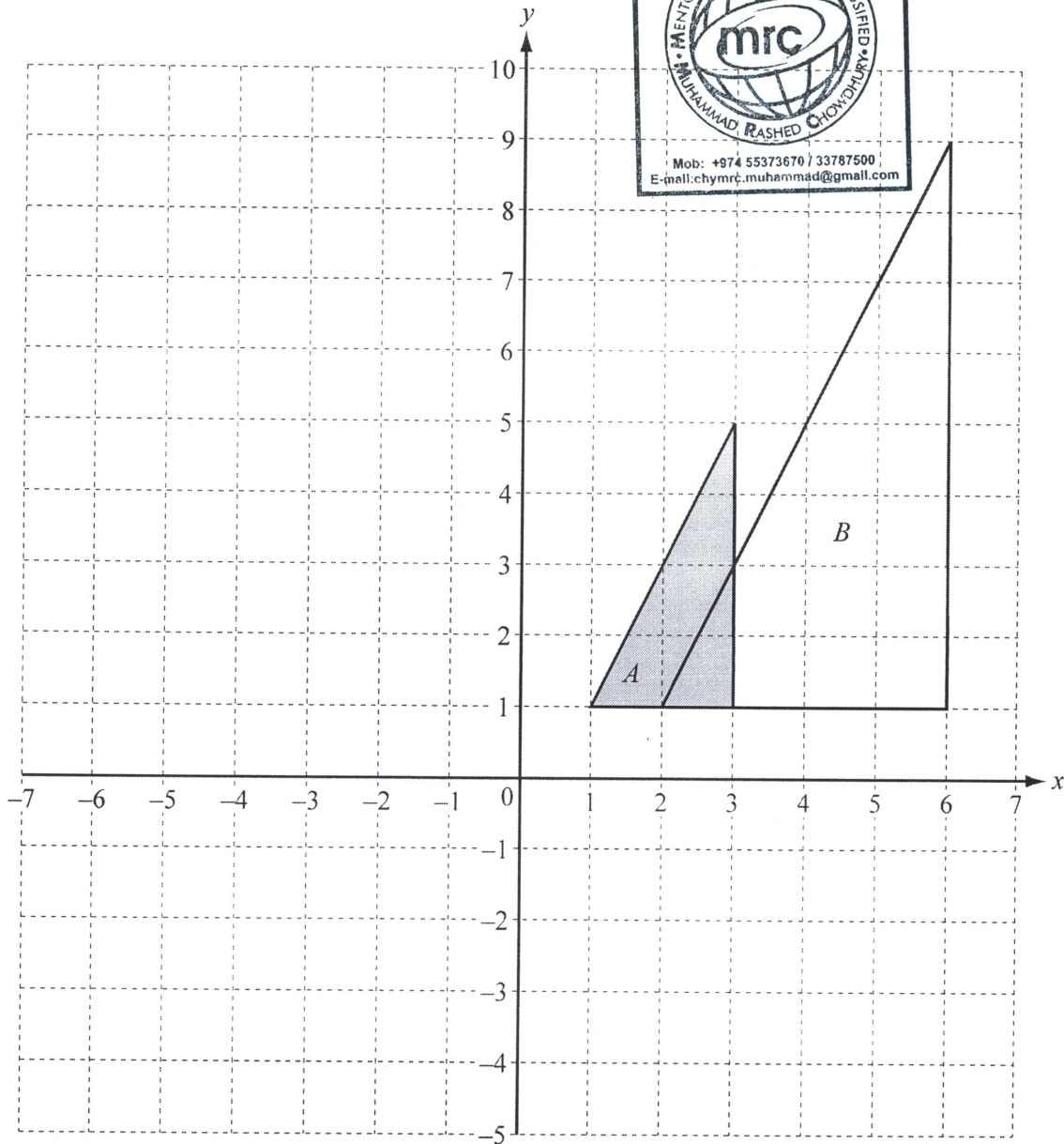
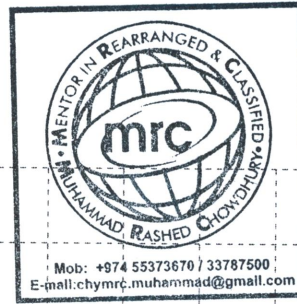
(ii) How many shapes, identical to shape S , will fill shape E completely?

Answer(e)(ii) [1]

(iii) Work out the area of shape E .

Answer(e)(iii) cm^2 [1]





(a) On the grid, draw the image of triangle *A* after the following transformations.

(i) Reflection in the *x*-axis. [1]

(ii) Rotation about (0, 0) through 180°. [2]

(iii) Translation by the vector $\begin{pmatrix} -5 \\ 3 \end{pmatrix}$. [2]

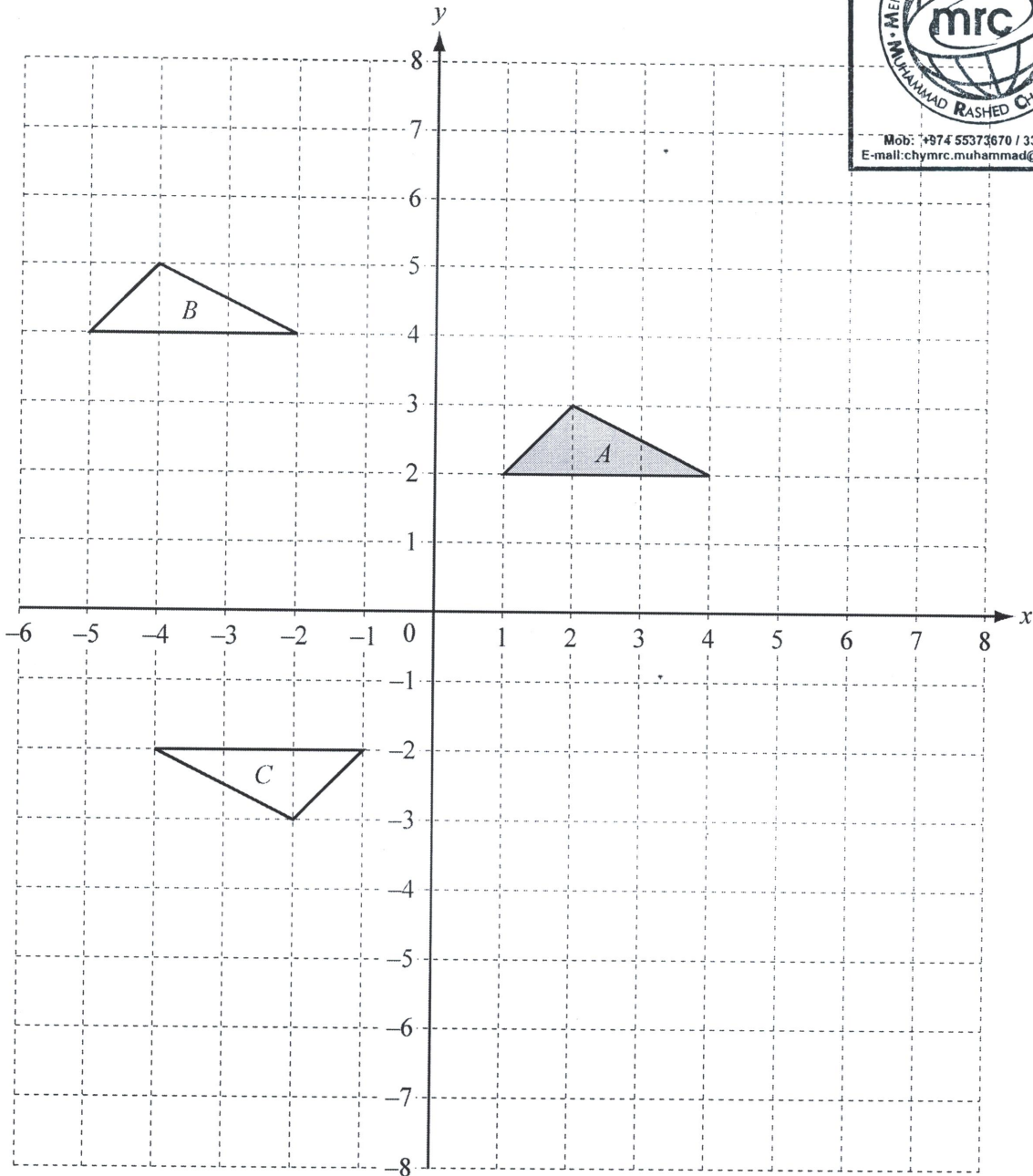
(b) Describe fully the **single** transformation that maps triangle *A* onto triangle *B*.

Answer(b)

..... [3]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included the publisher will be pleased to make amends at the earliest possible opportunity.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.



Triangles *A*, *B* and *C* are shown on a 1 cm² grid.

- (a) Write down the mathematical name for triangle *A*.

Answer(a) [1]

- (b) Complete the following statement.

Triangles *A*, *B* and *C* are triangles because they are the same shape and size.

[1]

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

(i) triangle A onto triangle B ,

Answer(c)(i)
..... [2]

(ii) triangle A onto triangle C .

Answer(c)(ii)
..... [3]

(d) Reflect triangle A in the x -axis.
Label the image P .

[1]

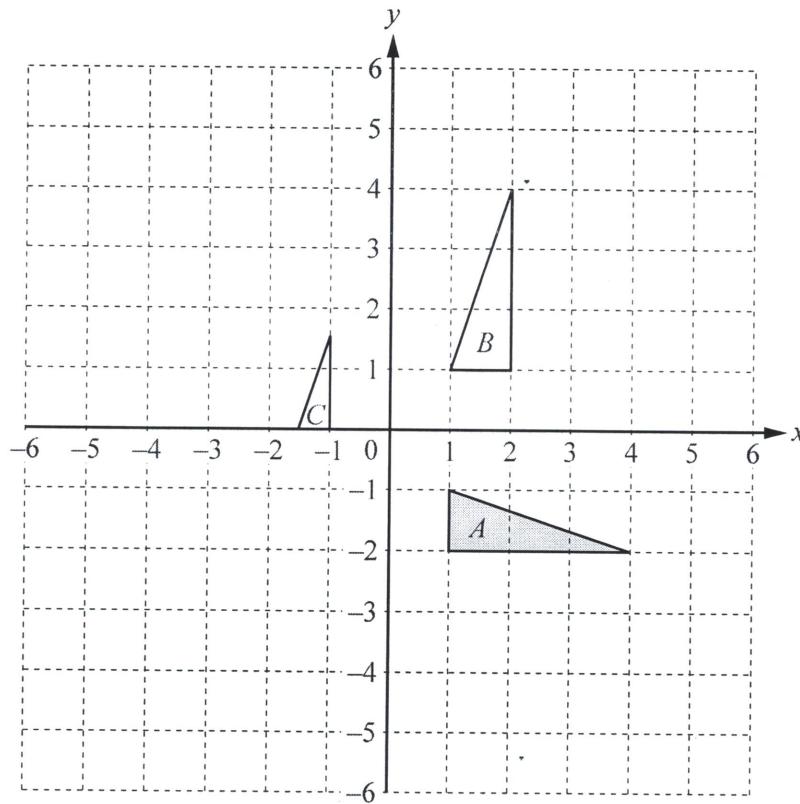
(e) Enlarge triangle A , scale factor 2, centre $(0, 0)$.
Label the image Q .

[2]

(f) Calculate the area of triangle Q .

Answer(f) cm^2 [2]





(a) Reflect triangle *A* in the line $y = -3$. [2]

(b) Translate triangle *A* by the vector $\begin{pmatrix} -5 \\ 4 \end{pmatrix}$. [2]

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

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

Answer(c)(i)

..... [3]

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

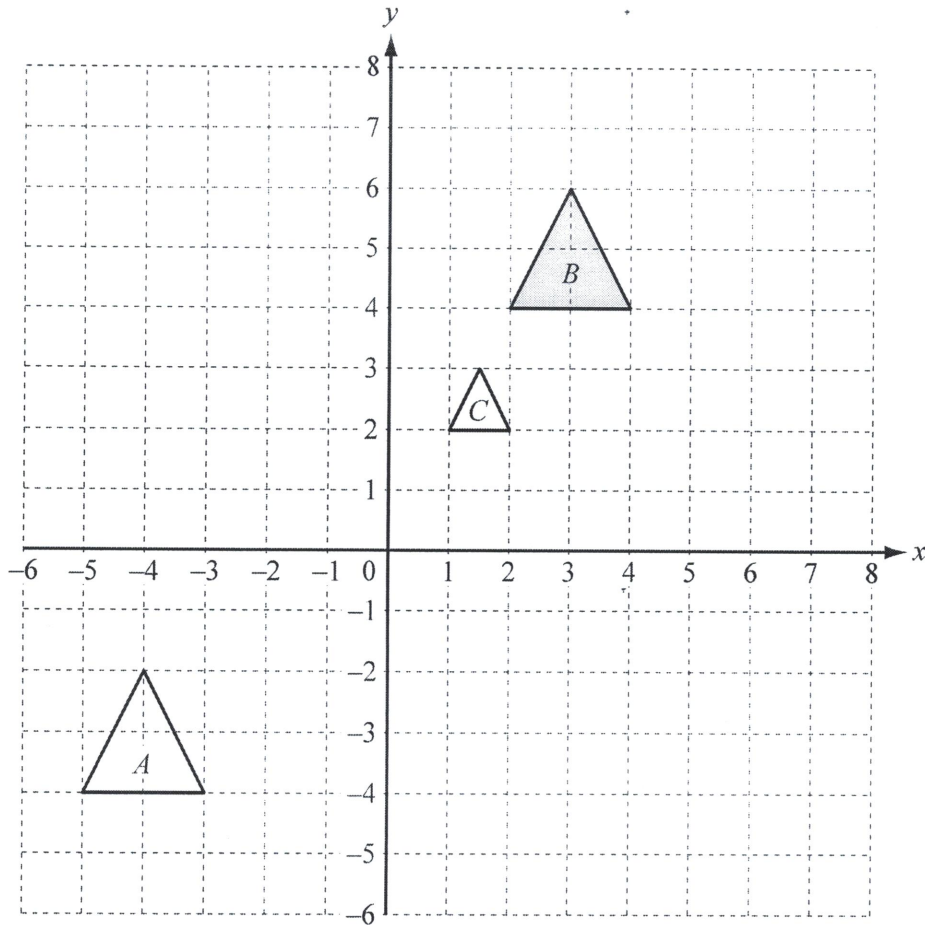
Answer(c)(ii)

..... [3]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.*



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

Answer(a)(i)
 [2]

(ii) Describe fully the **single** transformation which maps shape *B* onto shape *C*.

Answer(a)(ii)
 [3]

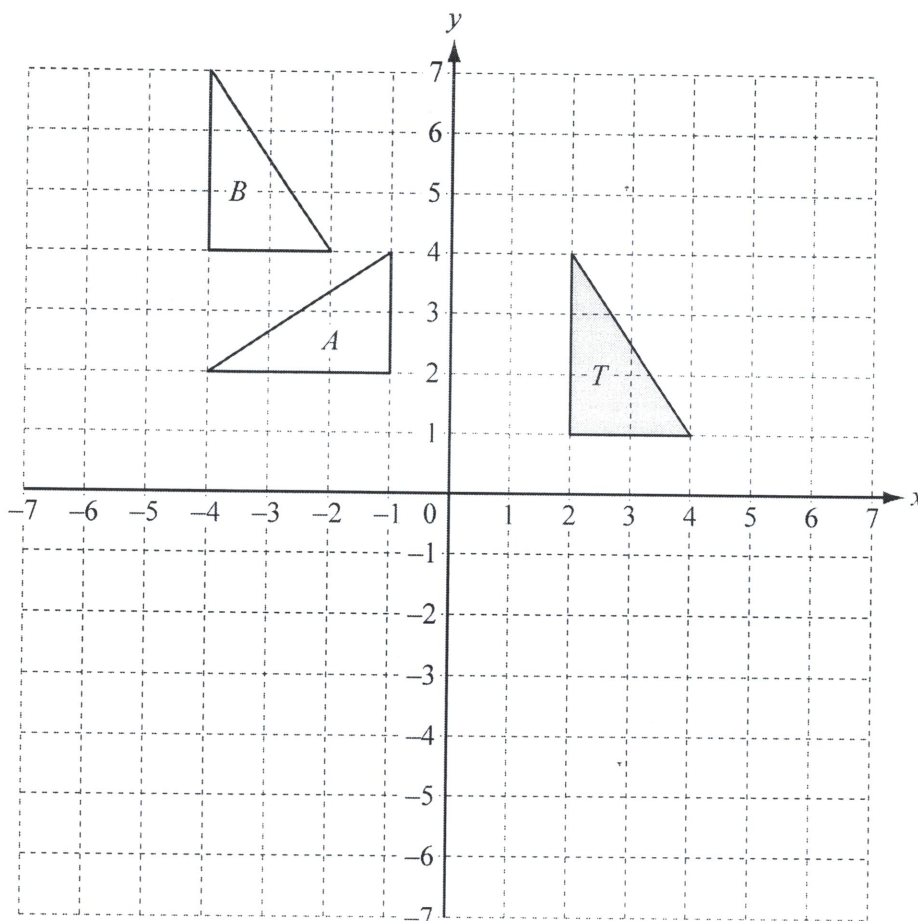
(b) (i) Reflect shape *B* in the *y*-axis. Label the image *D*. [1]

(ii) Rotate shape *B* through 90° anticlockwise about the origin. Label the image *E*. [2]



13 (c)

For
Examiner's
Use



On the grid, draw the image of triangle *T* after a

- (i) reflection in the line $x = 4$,
- (ii) translation by the vector $\begin{pmatrix} -5 \\ -4 \end{pmatrix}$,
- (iii) rotation, centre $(4, 1)$ through 180° .



[2]

[2]

[2]

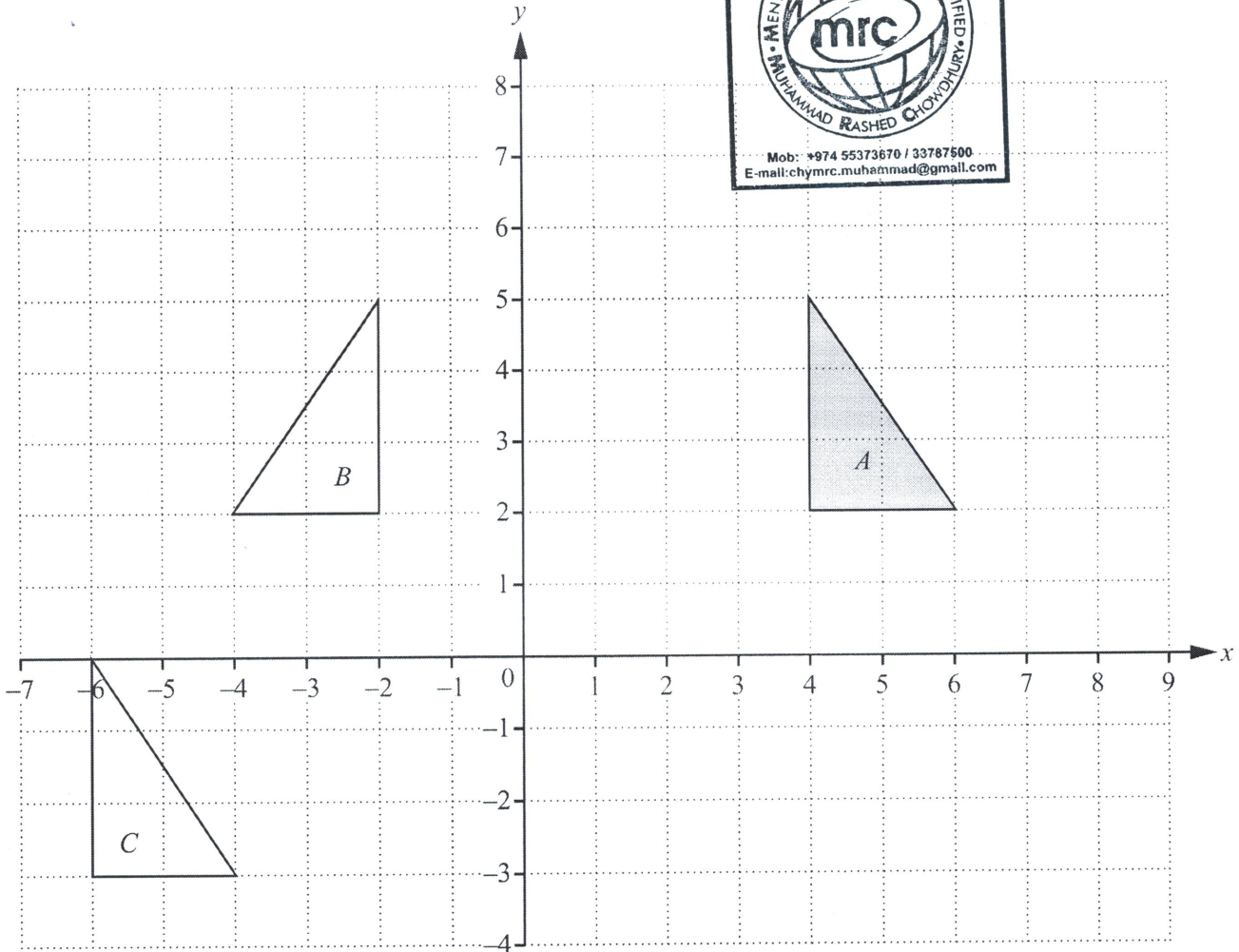
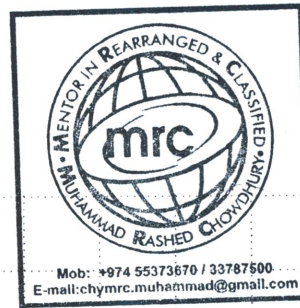
(d) Describe fully the **single** transformation that maps

- (i) triangle *T* onto triangle *A*,

Answer(d)(i) [3]

- (ii) triangle *T* onto triangle *B*.

Answer(d)(ii) [2]



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

.....
 [2]

(ii) Describe fully the **single** transformation that maps triangle *A* onto triangle *C*.

.....
 [2]

(b) On the grid, draw the image of

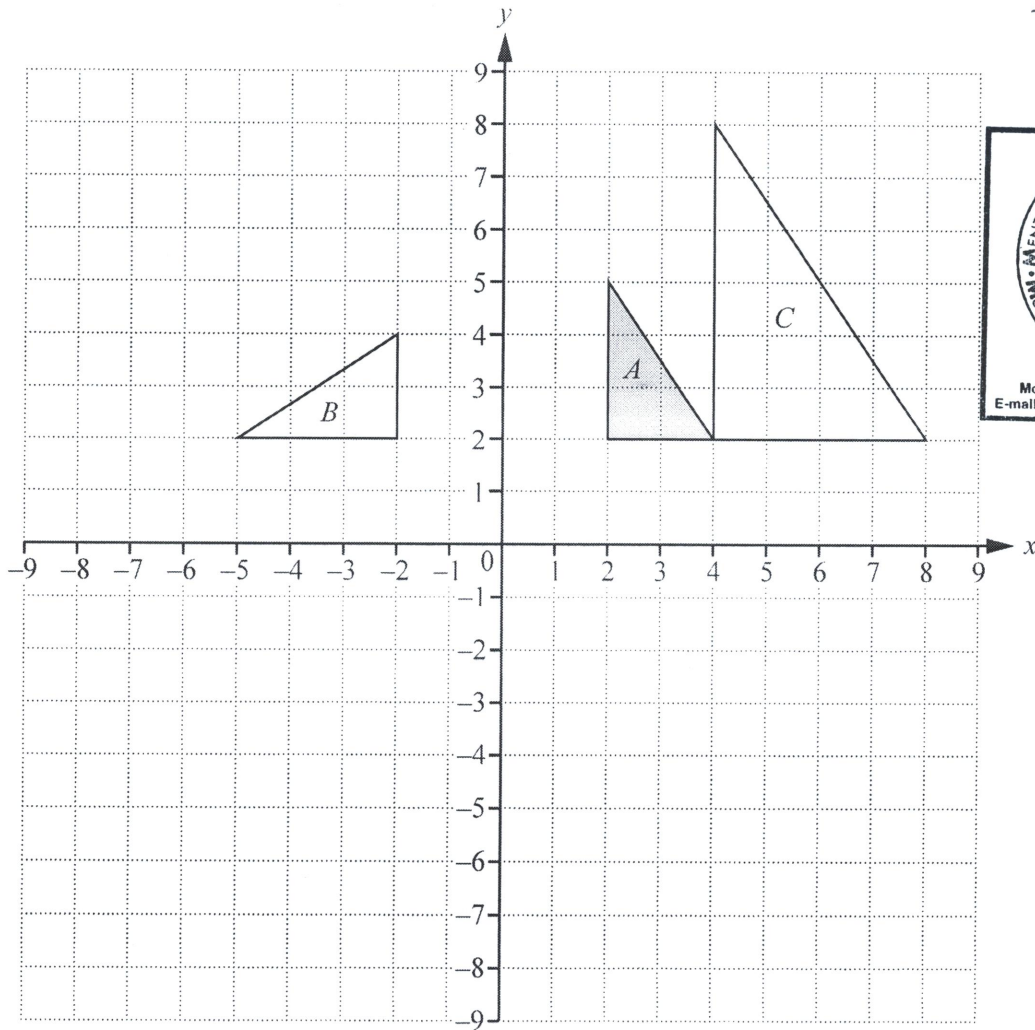
(i) triangle *A* after a rotation of 270° clockwise about $(4, 5)$, [2]

(ii) triangle *A* after an enlargement with scale factor 2, centre $(4, 7)$. [2]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.



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

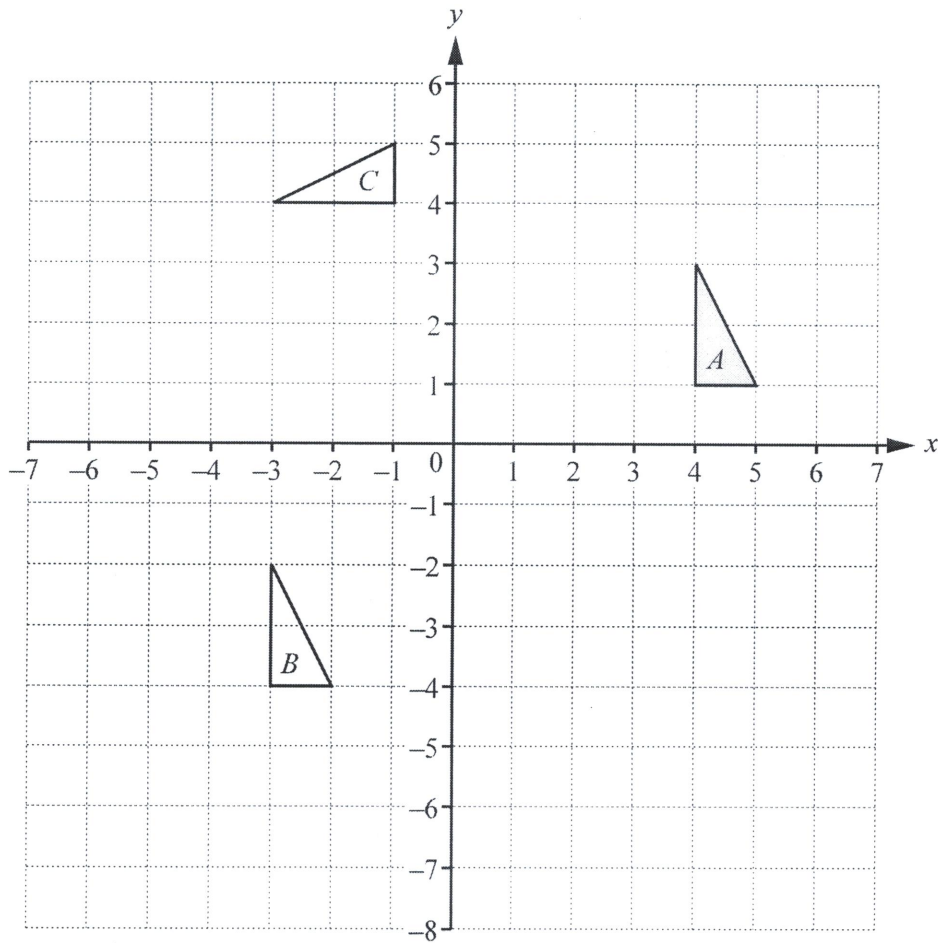
.....
 [3]

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

.....
 [3]

(c) On the grid, draw the image of

- (i) triangle *C* after a reflection in the *x*-axis, [1]
- (ii) triangle *B* after a translation by the vector $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$, [2]
- (iii) triangle *A* after a rotation of 180° about centre $(0, 0)$. [2]

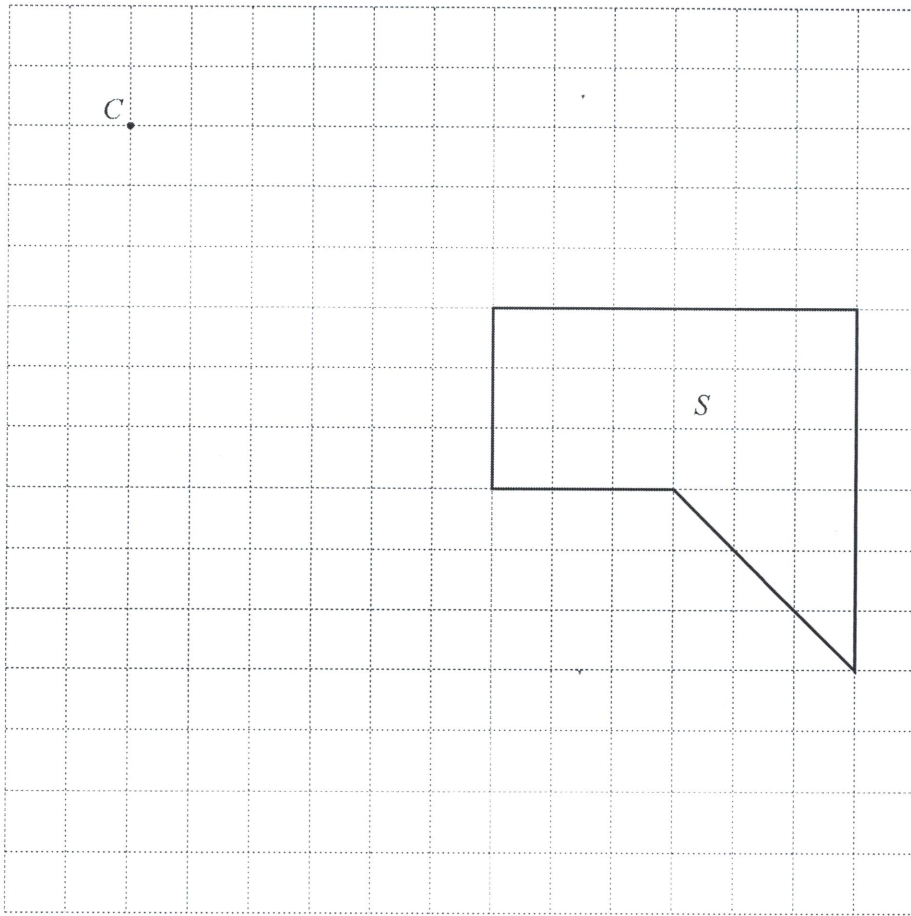


(i) On the grid, draw the image of triangle *A* after a reflection in the line $y = -2$. [2]

(ii) Describe fully the **single** transformation that maps triangle *A* onto triangle *B*.
 [2]

(iii) Describe fully the **single** transformation that maps triangle *A* onto triangle *C*.
 [3]

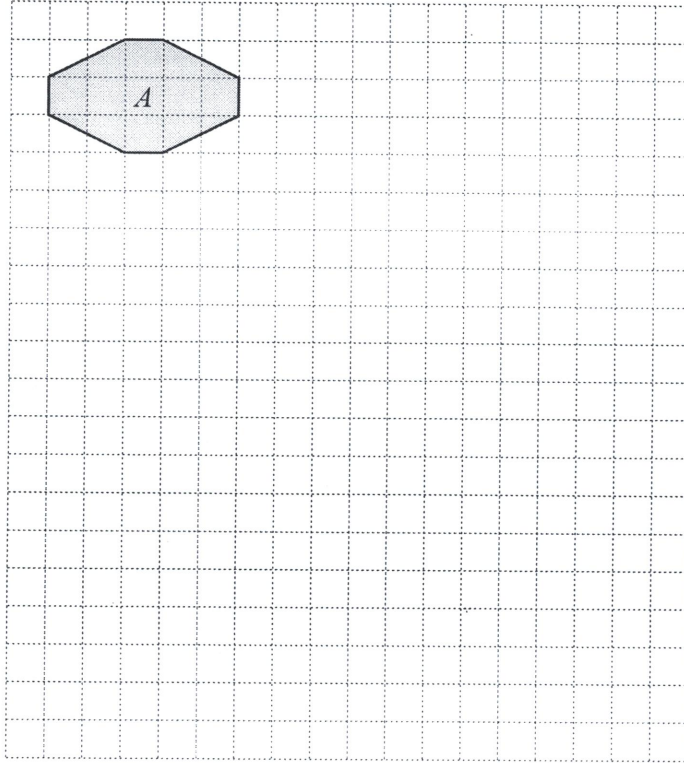
- (b) On the grid, draw the image of shape S after an enlargement with scale factor $\frac{1}{3}$, centre C .



[2]



(a) Polygon A is shown on the grid.



(i) Write down the mathematical name of polygon A .

..... [1]

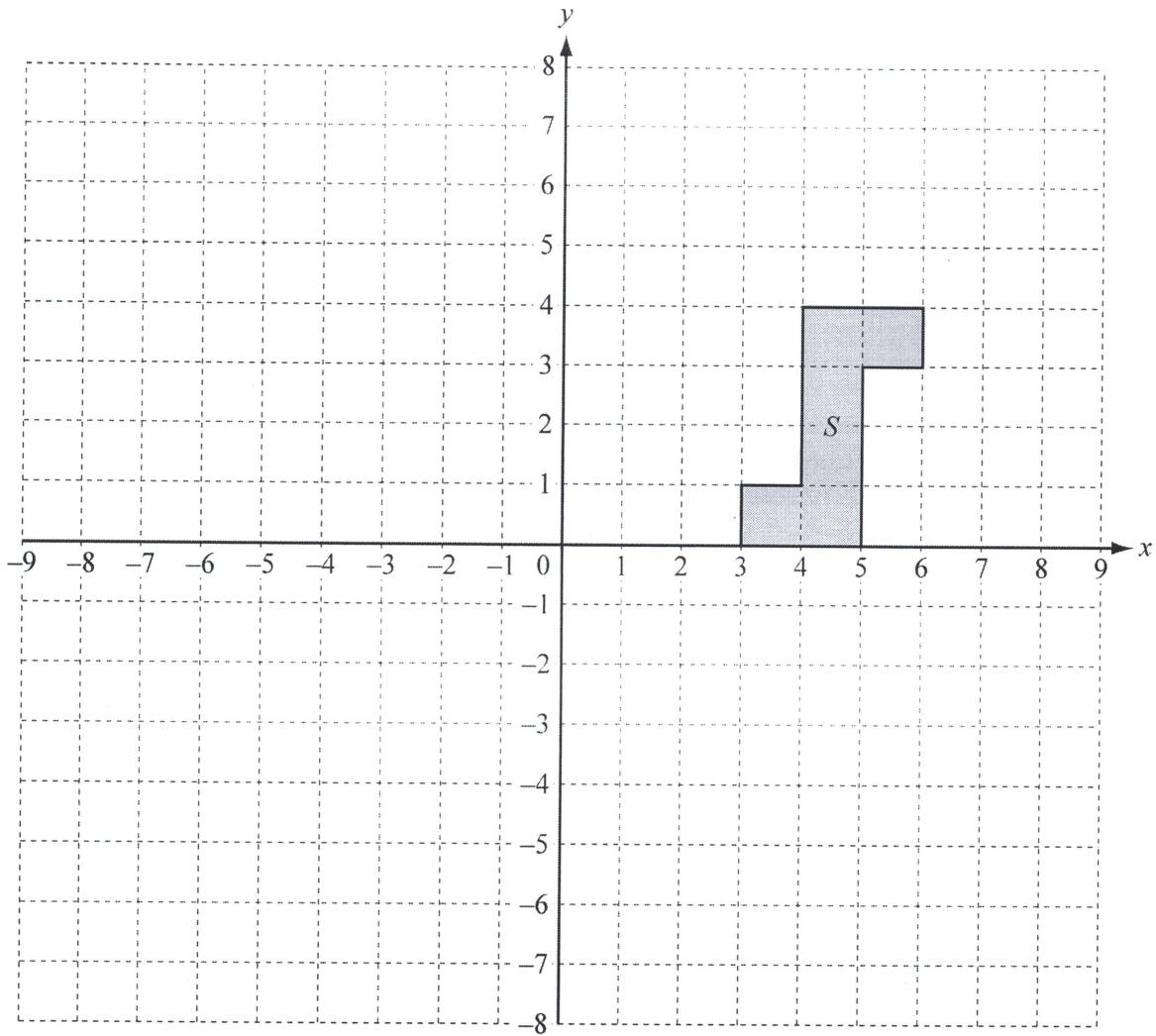
(ii) Write down the order of rotational symmetry of polygon A .

..... [1]

(iii) Polygon A is enlarged by scale factor 3 to give polygon B .

Draw polygon B on the grid.

[2]



(a) On the grid

(i) plot the point $(-5, -2)$ and label it P , [1]

(ii) draw the line $y = 2x$. [1]

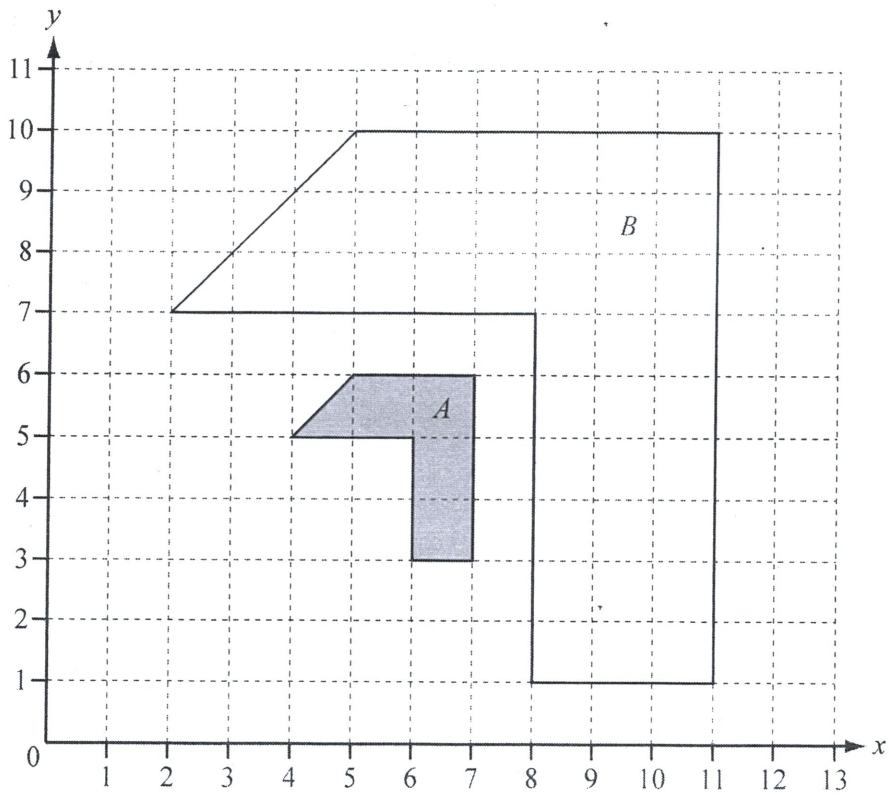
(b) (i) Write down the order of rotational symmetry of shape S .

Answer(b)(i) [1]

(ii) Draw the image of shape S after a rotation through 90° clockwise about $(0, 0)$. [2]



19

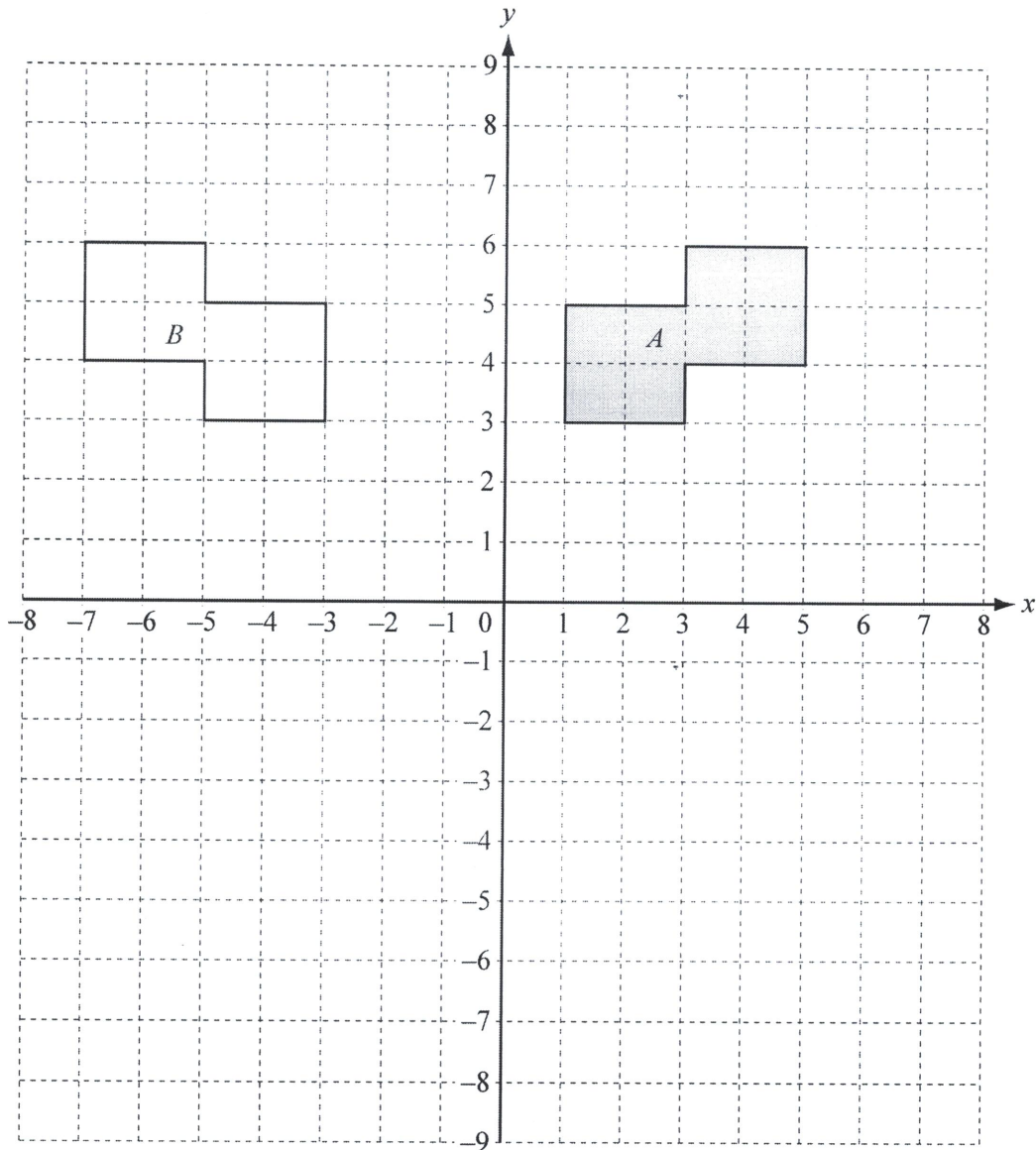


Describe fully the **single** transformation that maps shape *A* onto shape *B*.

Answer [3]



20



(a) Write down the order of rotational symmetry of shape *A*.

Answer(a) [1]

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

Answer(b) [2]

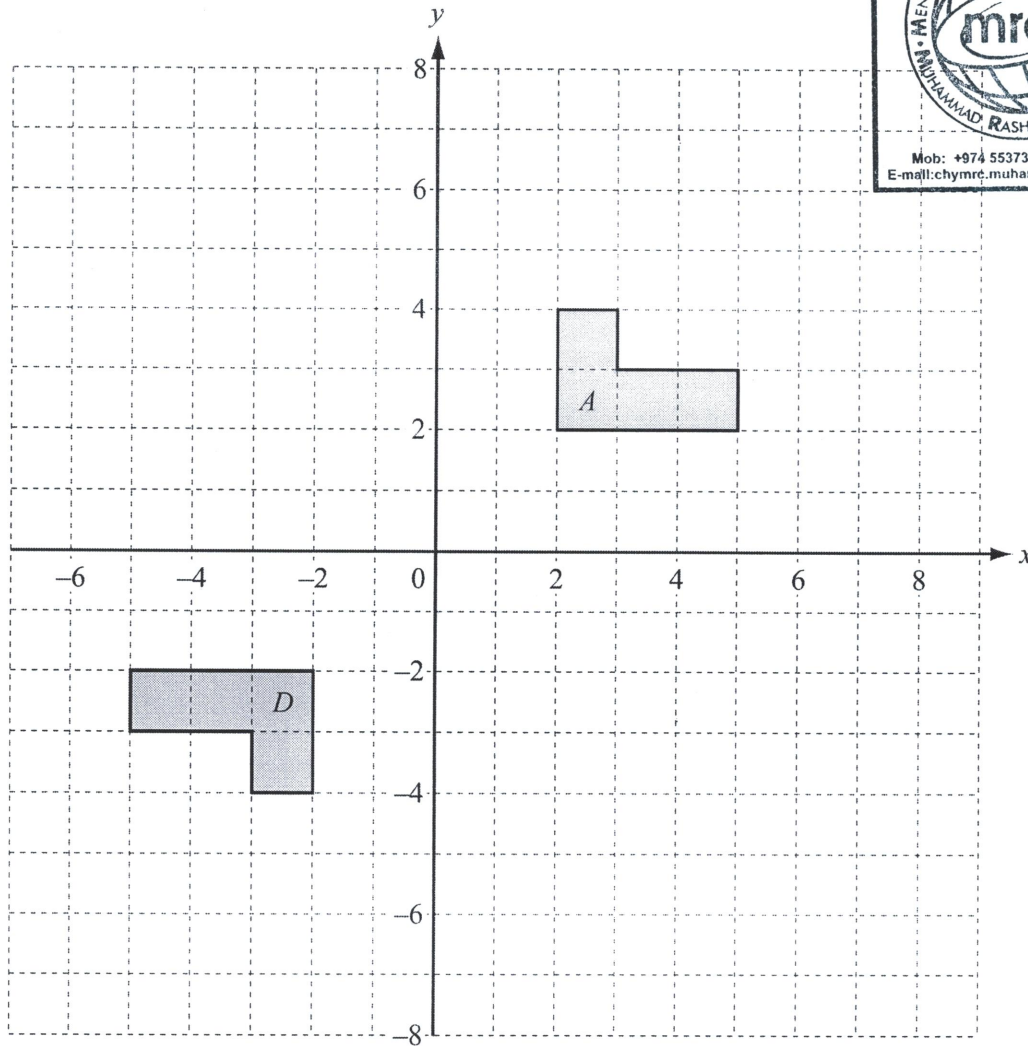
(c) (i) Translate shape *A* by the vector $\begin{pmatrix} -7 \\ -5 \end{pmatrix}$.
Label the image *C*.

[2]

(ii) Rotate shape *A* through 90° clockwise about the origin.
Label the image *D*.

[2]





Two shapes *A* and *D* are shown on the grid.

- (a) (i) Reflect **shape A** in the line $x = 0$. Label this image *B*. [2]
- (ii) Rotate **shape A** through 180° about $(2, 4)$. Label this image *C*. [2]
- (iii) Enlarge **shape A** with scale factor 2 and centre $(3, 7)$. Label this image *E*. [2]

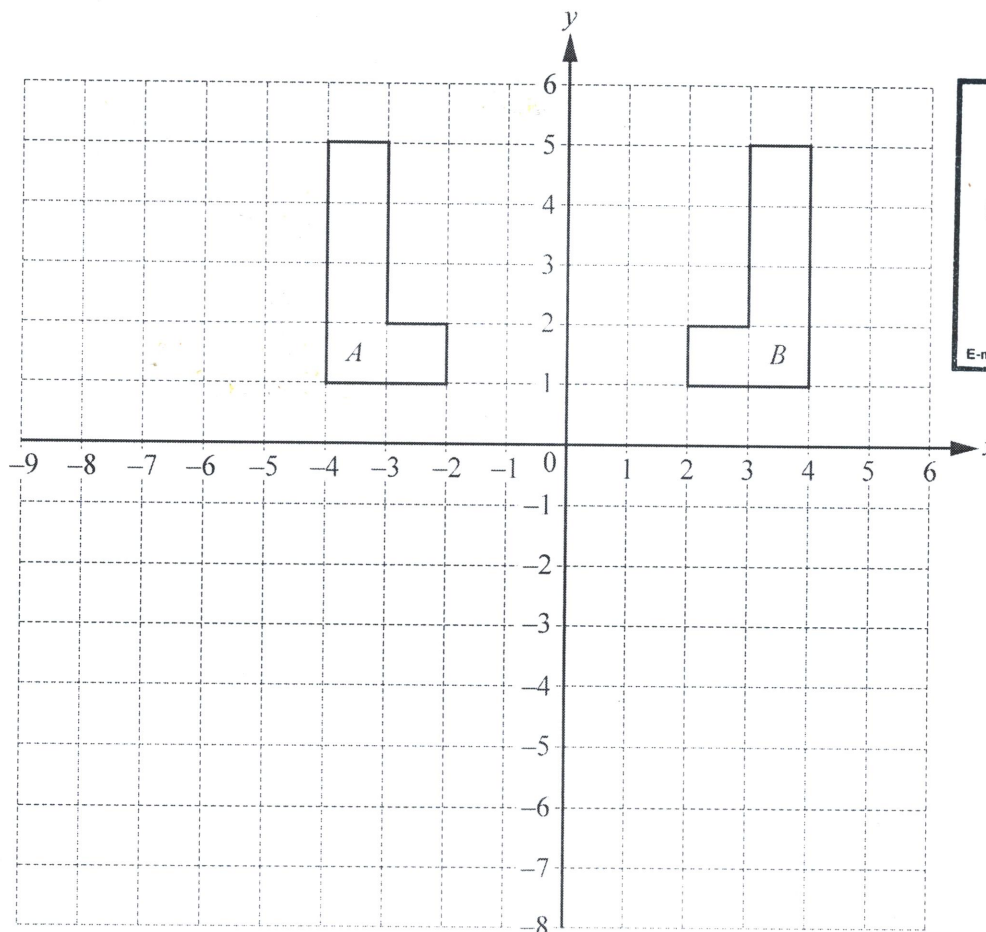
(b) Describe fully the **single** transformation that maps **shape D** onto

(i) **shape B**,

Answer(b)(i) [2]

(ii) **shape C**.

Answer(b)(ii) [2]



The diagram shows two shapes *A* and *B*.

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

.....
 [2]

- (b) (i) Reflect shape *B* in the line $y = 0$ and label this shape *C*. [2]

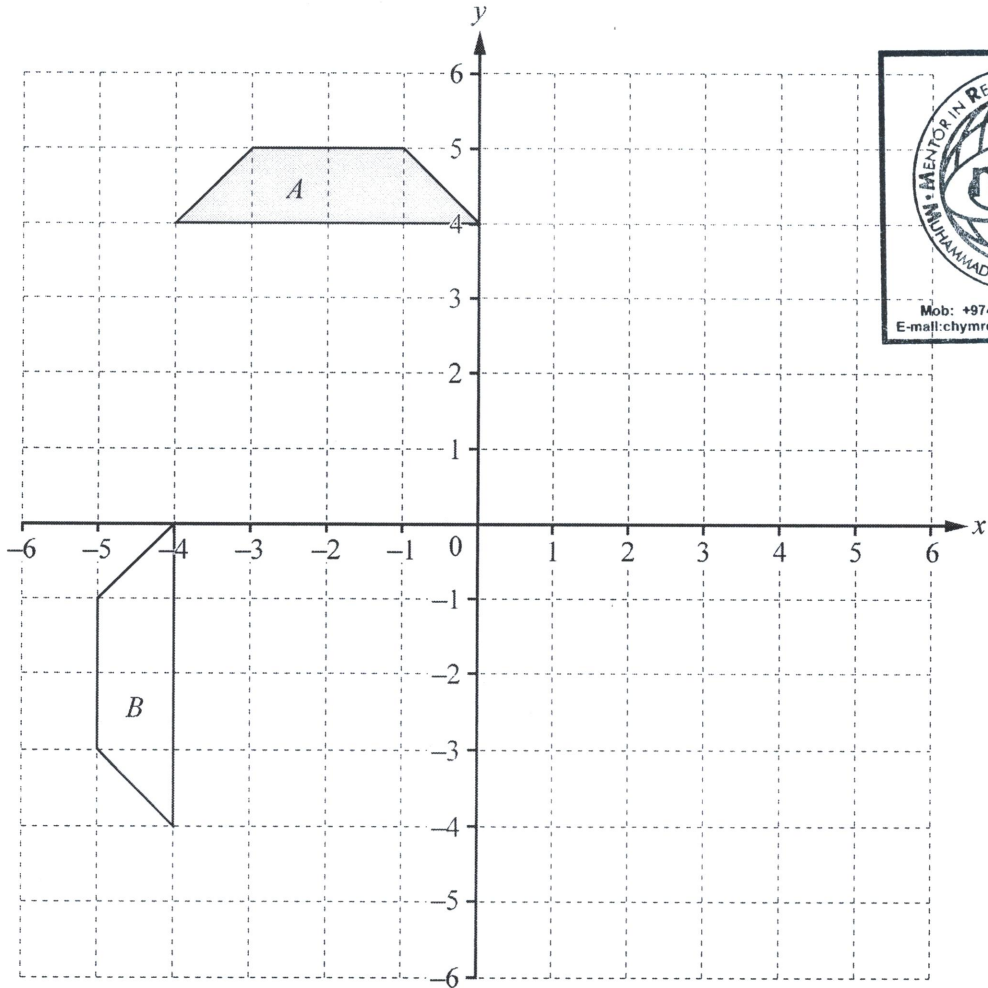
- (ii) Describe fully the **single** transformation that maps shape *A* onto shape *C*.

.....
 [3]

- (c) (i) Enlarge shape *A* by scale factor 3, centre $(-2, 5)$. Label this shape *D*. [2]

- (ii) How many times bigger is the area of shape *D* than the area of shape *A*?

..... [2]



The diagram shows two trapeziums, *A* and *B*, on a 1 cm² grid.

- (a) Find the area of trapezium *A*.
Give the units of your answer.

..... [2]

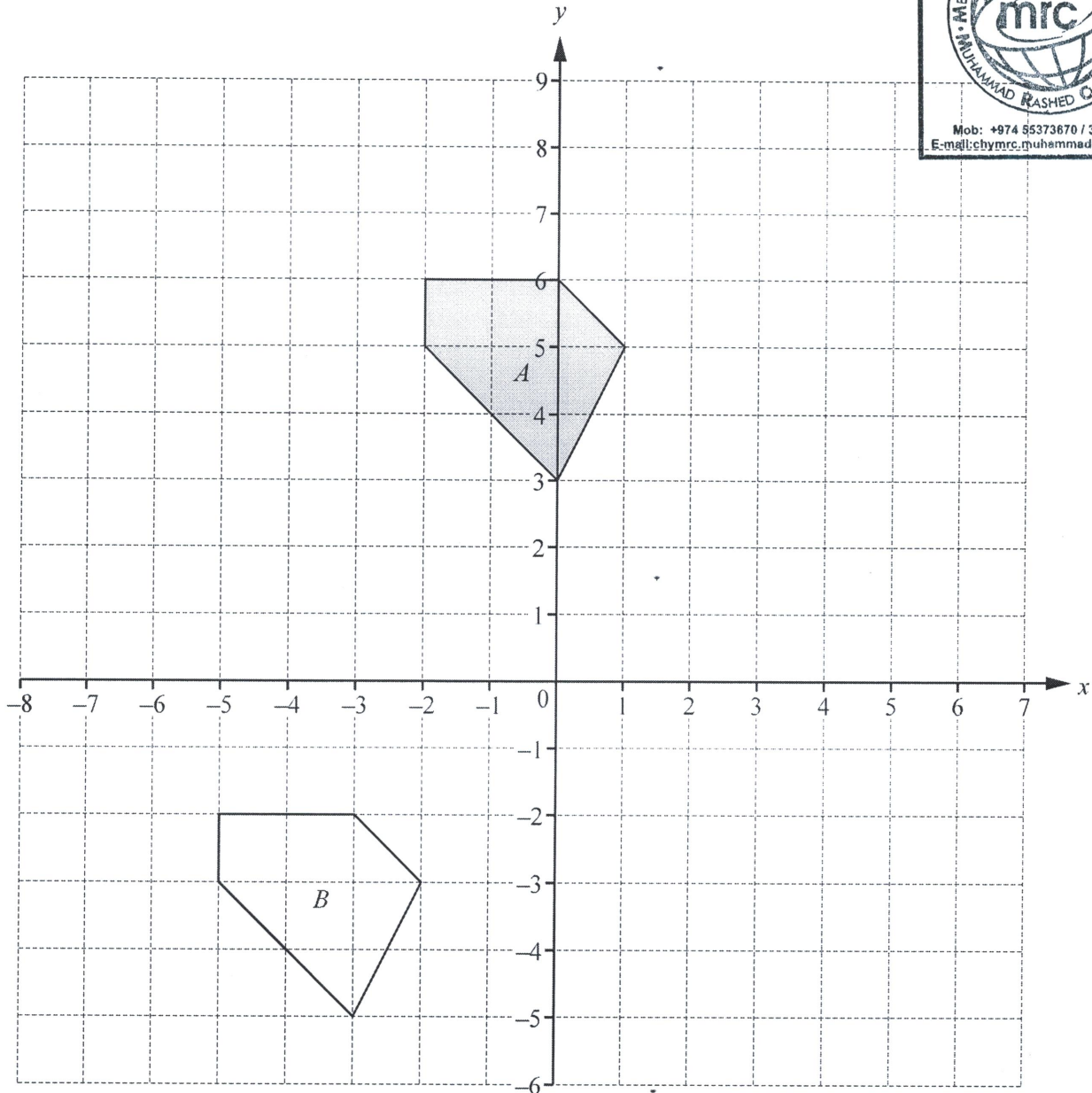
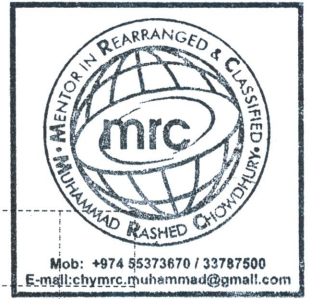
- (b) (i) Describe fully the **single** transformation that maps trapezium *A* onto trapezium *B*.

.....
..... [3]

- (ii) On the grid, translate trapezium *A* by the vector $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$. [2]

- (iii) On the grid, enlarge trapezium *A* with centre (0, 0) and scale factor 0.5. [2]

24 (b) The diagram shows two shapes, *A* and *B*, on a 1 cm² grid.



(i) Find the area of shape *A*.

..... cm² [1]

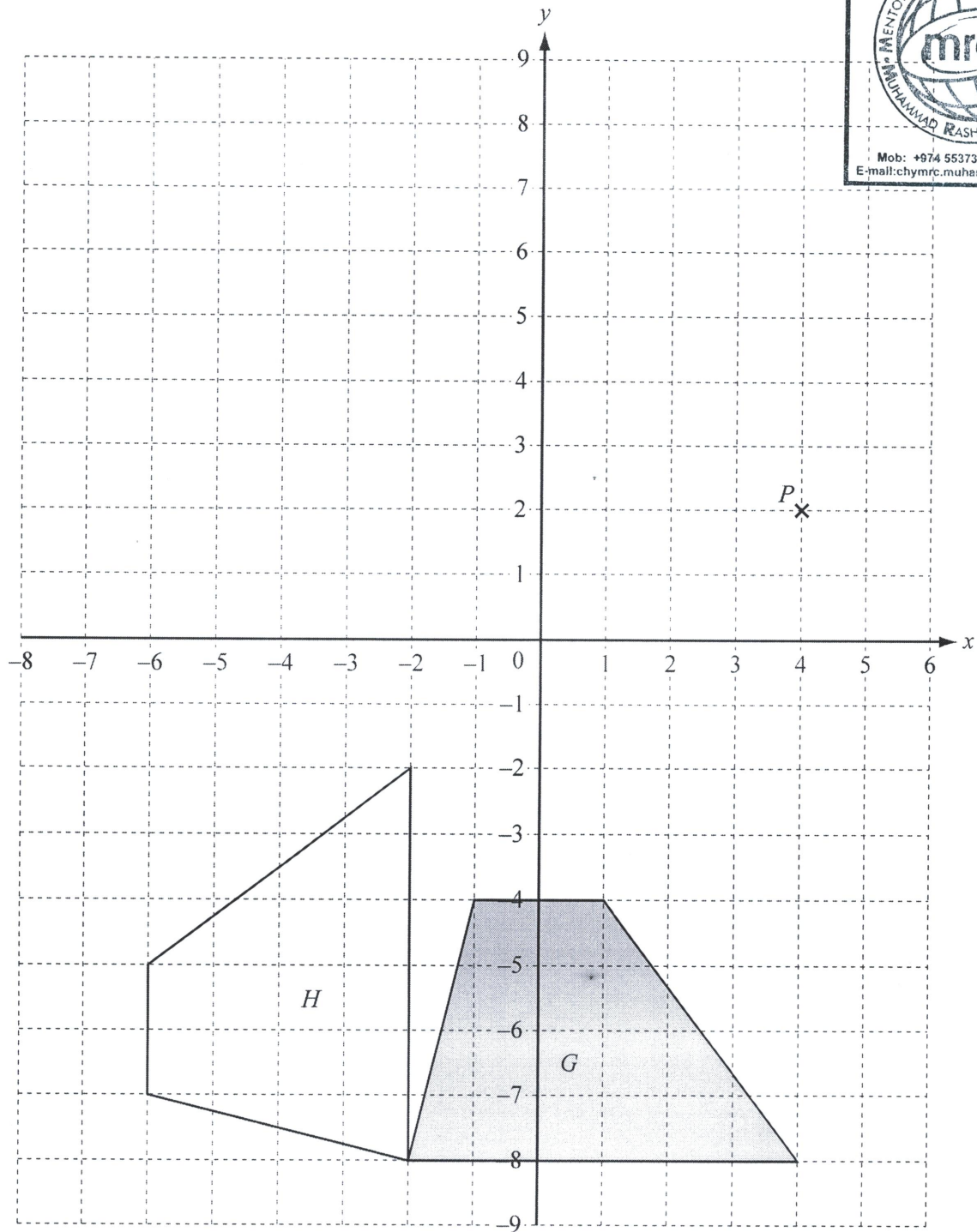
(ii) Describe fully the **single** transformation that maps shape *A* onto shape *B*.

.....
 [2]

(iii) On the grid,

(a) draw the reflection of shape *A* in the line $x = 2$, [2]

(b) draw the enlargement of shape *A* with scale factor 2 and centre (1, 5). [2]



Two congruent quadrilaterals, G and H , and a point P are shown on this 1 cm^2 grid.

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

Answer(a)(i) [1]

- (ii) Calculate the area of the shaded quadrilateral.
Give the units of your answer.



Answer(a)(ii) [3]

- (b) Describe fully the **single** transformation that maps quadrilateral G onto quadrilateral H .

Answer(b) [3]

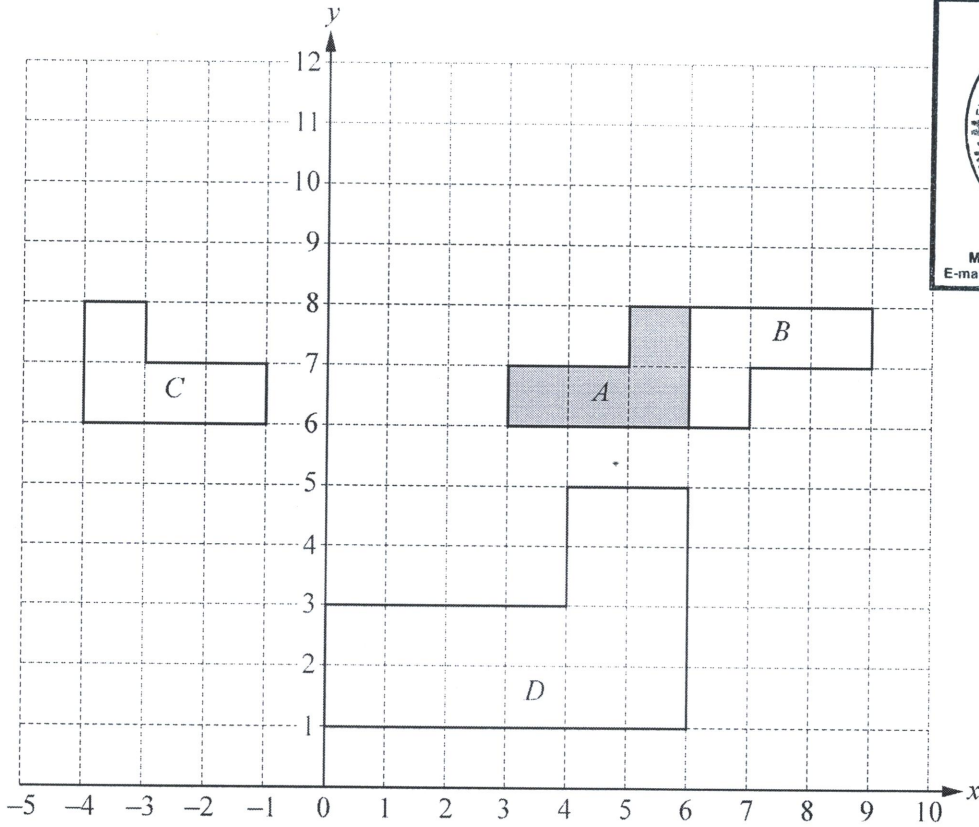
- (c) On the grid, draw the images of quadrilateral G after the following transformations.

(i) Reflection in the line $y = 0$. [2]

(ii) Translation by the vector $\begin{pmatrix} -5 \\ 7 \end{pmatrix}$. [2]

(iii) Enlargement by scale factor 0.5 with centre P . [2]

- (d) On quadrilateral H mark, with an arc, an obtuse angle. [1]



The diagram shows four shapes *A*, *B*, *C* and *D*.

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

(i) shape *B*,

.....
 [3]

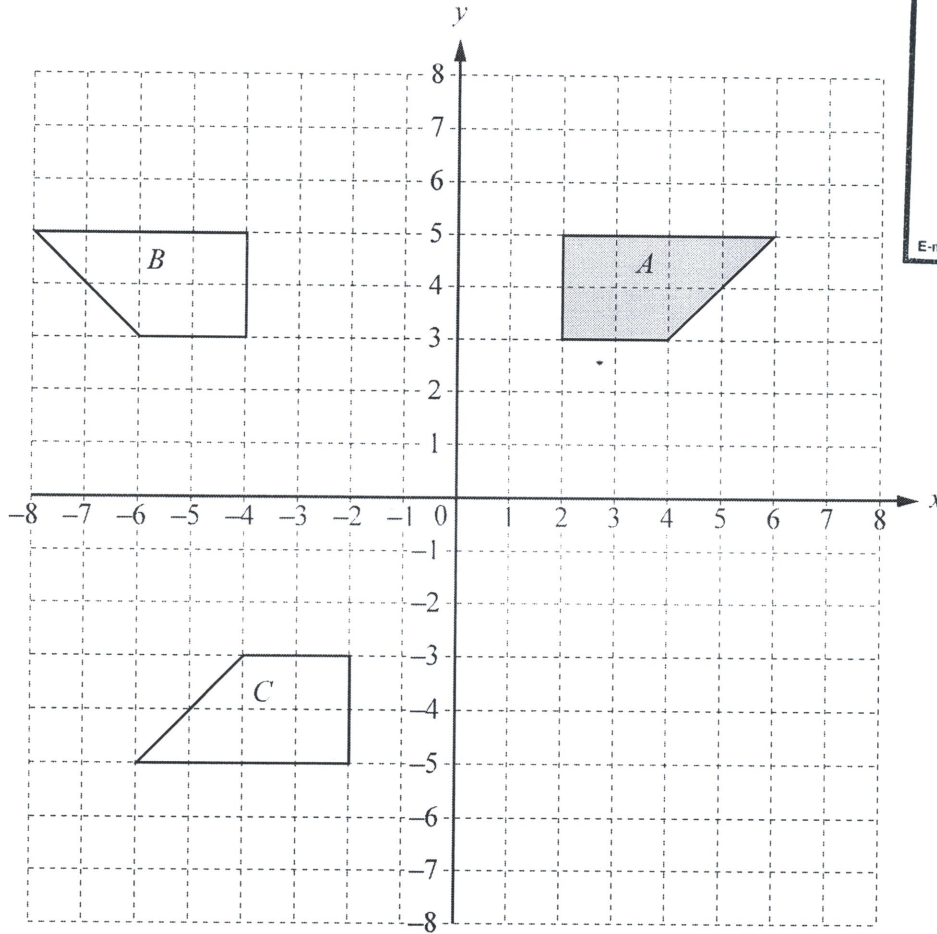
(ii) shape *C*,

.....
 [2]

(iii) shape *D*.

.....
 [3]

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



(a) On the grid, draw the image of shape *A* after a translation by the vector $\begin{pmatrix} -2 \\ -6 \end{pmatrix}$. [2]

(b) (i) On the grid, draw the image of shape *A* after an enlargement, scale factor 2, centre (4, 4). [2]

(ii) Write down the scale factor of the enlargement that maps the image in **part (b)(i)** back onto shape *A*.

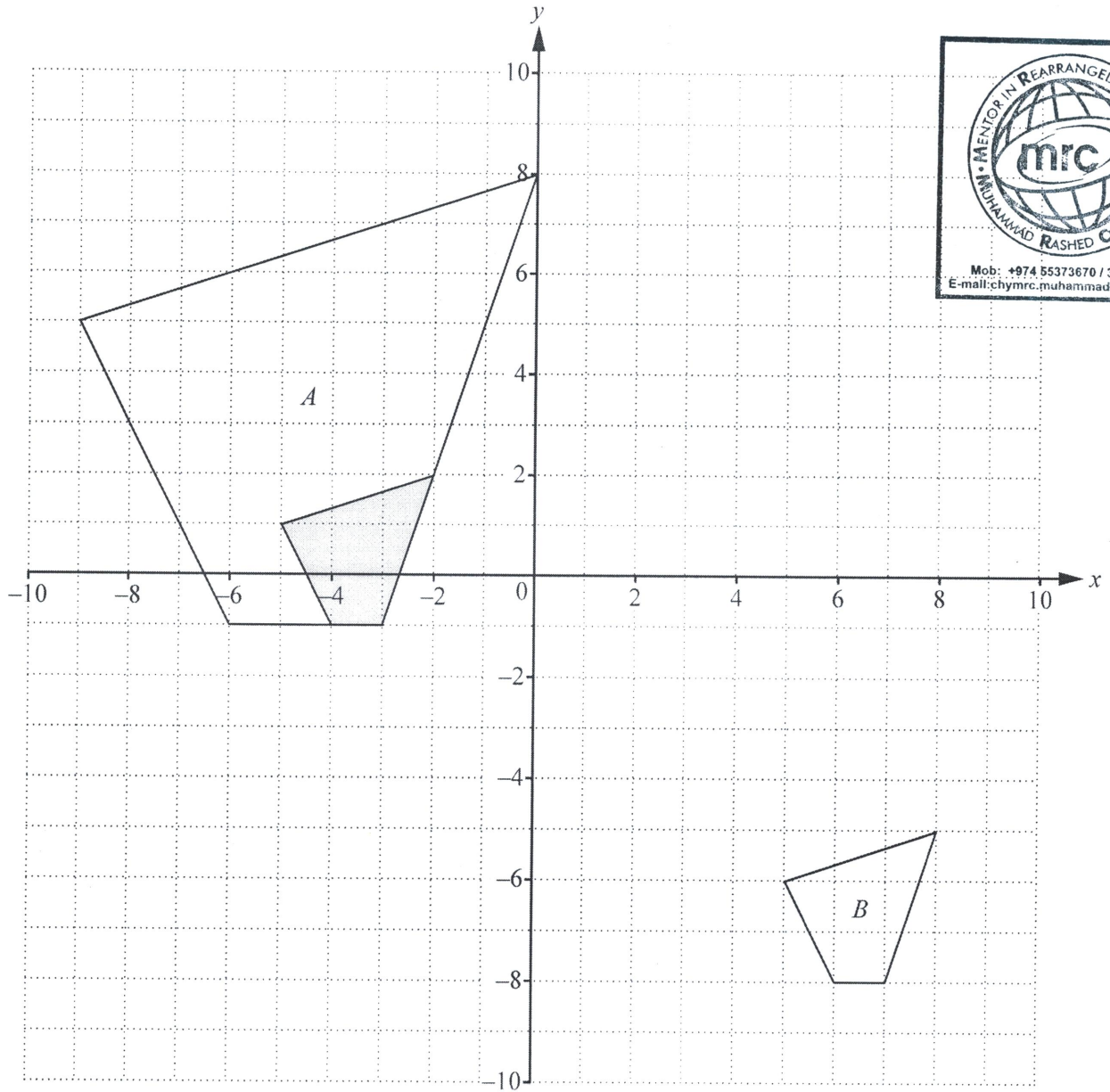
..... [1]

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

.....
 [2]

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

.....
 [3]



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

..... [1]

2 (b) Describe fully the **single** transformation that maps the shaded polygon onto polygon *A*.

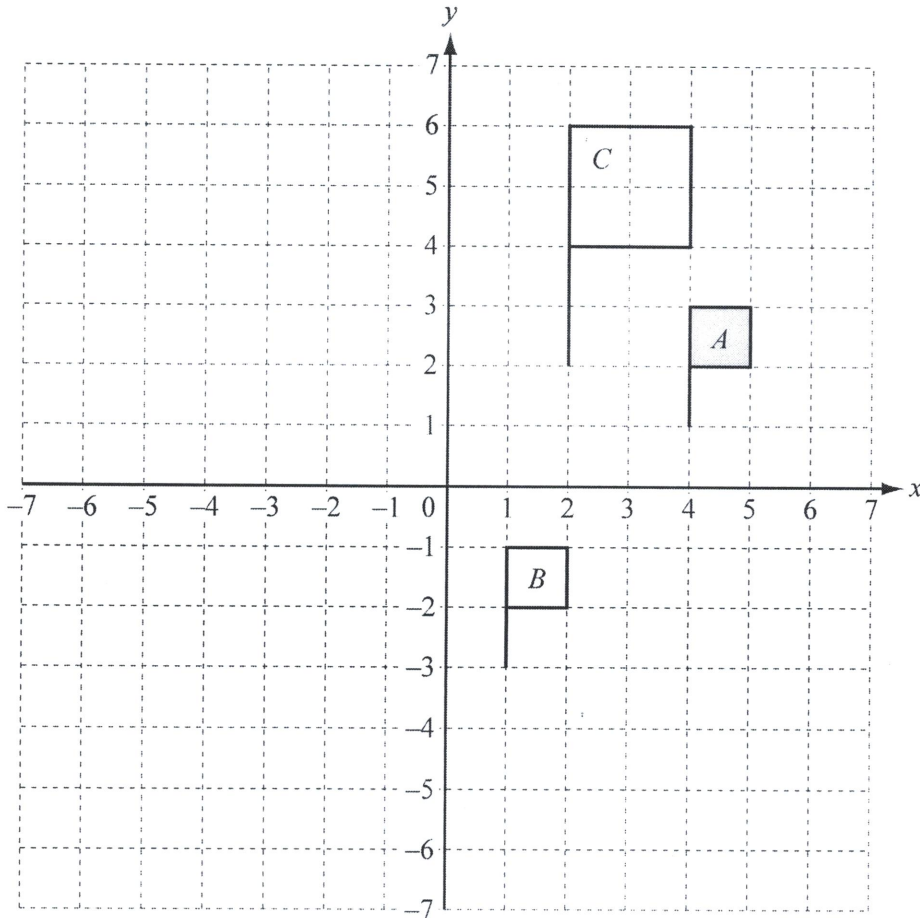
.....
..... [3]

(c) Describe fully the **single** transformation that maps the shaded polygon onto polygon *B*.

.....
..... [2]

(d) On the grid, draw the reflection of the shaded polygon in the line $x = 2$. [2]

(e) On the grid, draw the rotation of the shaded polygon through 90° anti-clockwise about the origin. [2]



- (a) On the grid,
- (i) draw the line $x = 1$,
 - (ii) reflect flag A in the line $x = 1$,
 - (iii) rotate flag A through 90° anticlockwise about the origin.



[1]
[1]
[2]

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

- (i) flag A onto flag B ,

Answer(b)(i)

..... [2]

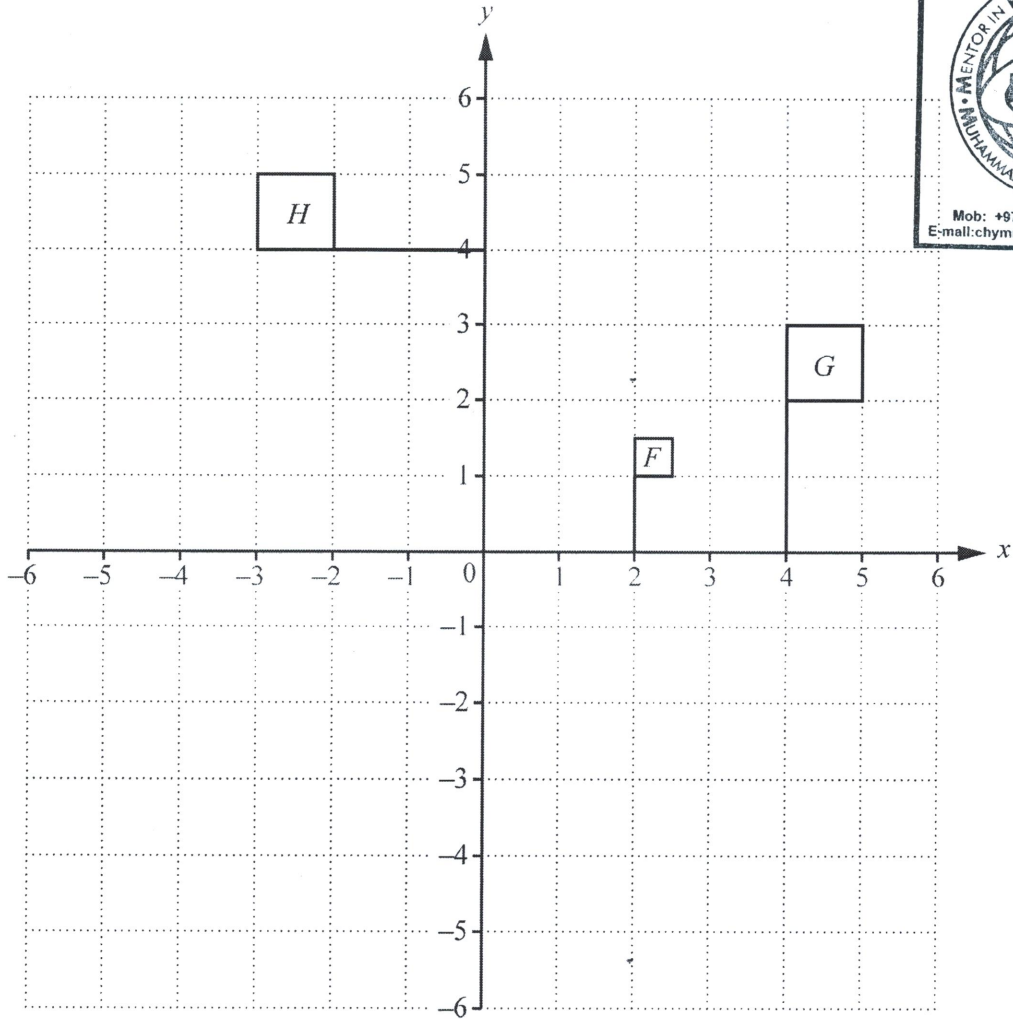
- (ii) flag A onto flag C .

Answer(b)(ii)

..... [3]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included the publisher will be pleased to make amends at the earliest possible opportunity.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

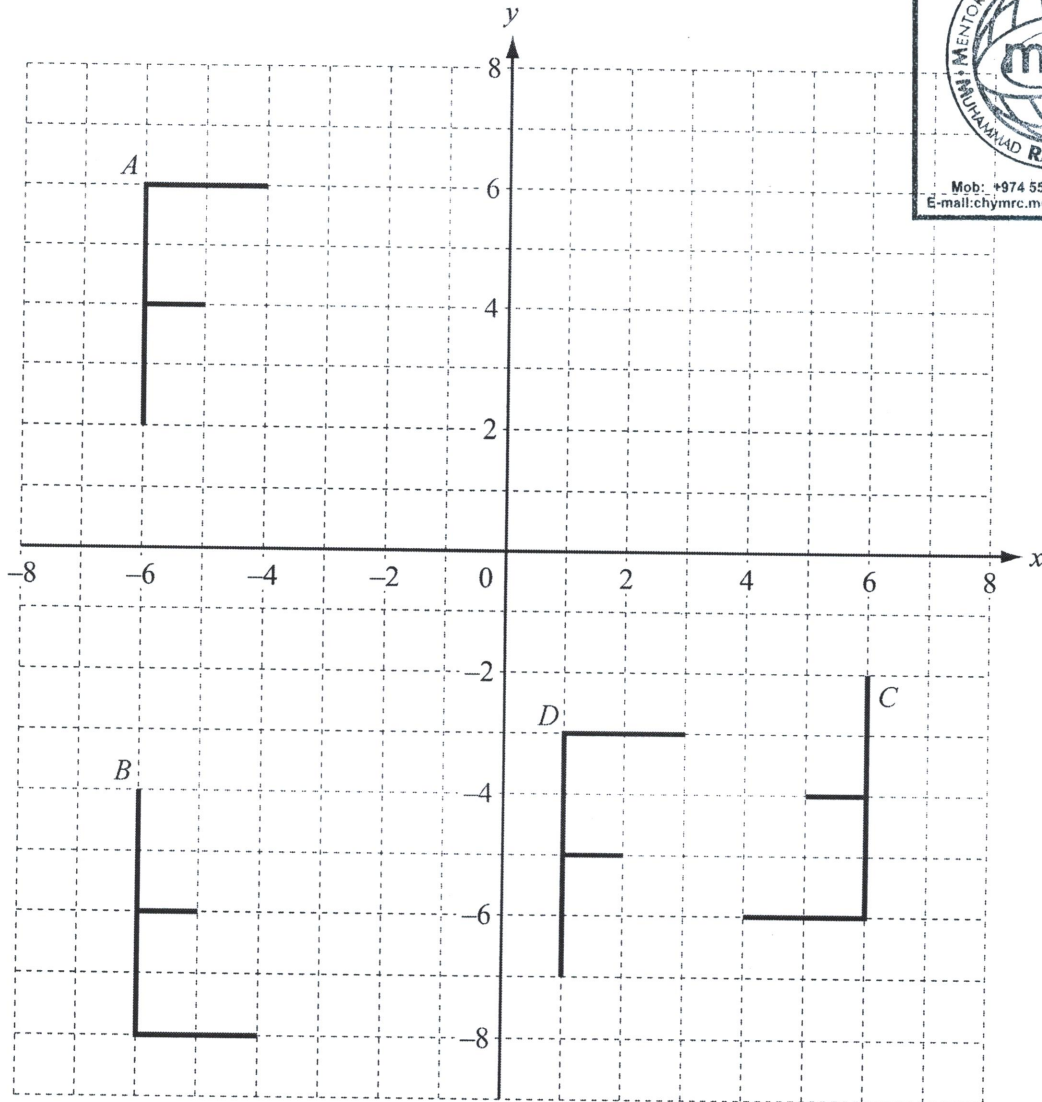


(a) Reflect flag *H* in the *x*-axis. [1]

(b) Translate flag *G* by the vector $\begin{pmatrix} 1 \\ -3 \end{pmatrix}$. [2]

(c) Describe fully the **single** transformation that maps flag *G* onto flag *H*.
 [3]

(d) Describe fully the **single** transformation that maps flag *F* onto flag *G*.
 [3]



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

(i) *B*,

Answer(a)(i) [2]

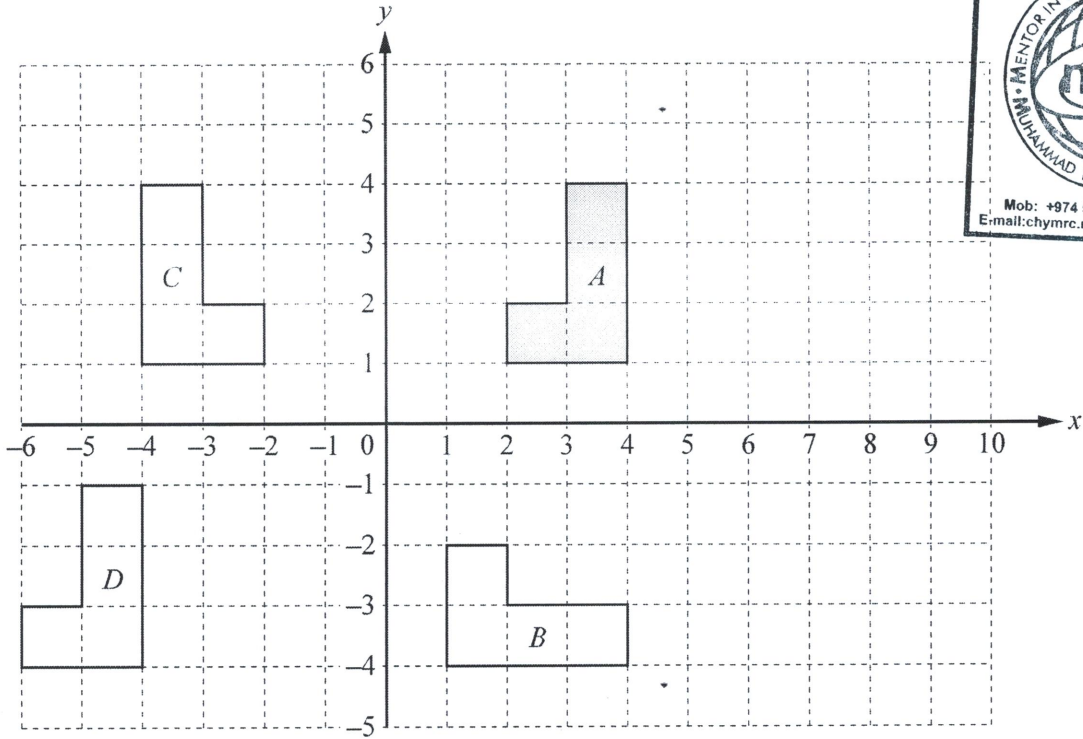
(ii) *C*,

Answer(a)(ii) [3]

(iii) *D*.

Answer(a)(iii) [2]

(b) On the grid, draw the enlargement of *A*, scale factor $\frac{1}{2}$, centre (0, 0). [2]



The diagram shows four shapes *A*, *B*, *C* and *D*.

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

(i) shape *B*,

Answer(a)(i)
 [3]

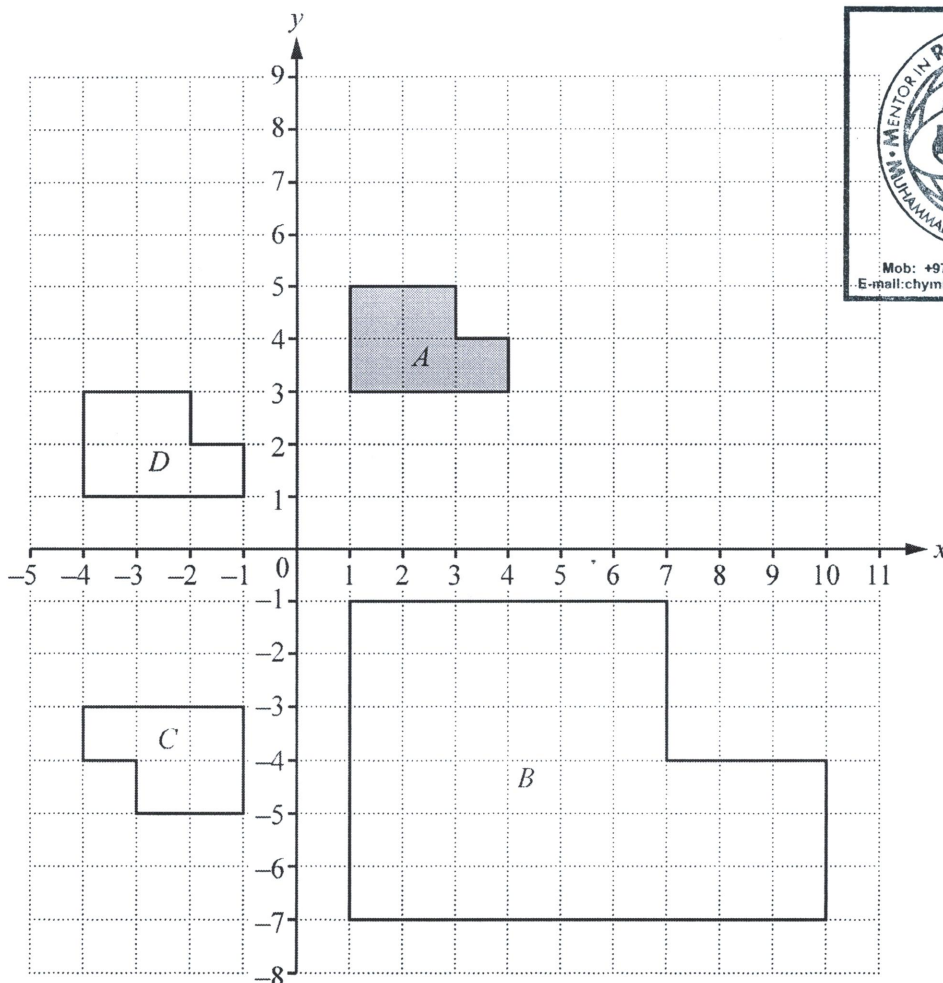
(ii) shape *C*,

Answer(a)(ii)
 [2]

(iii) shape *D*.

Answer(a)(iii)
 [2]

(b) On the grid, draw the enlargement of **shape A** by scale factor 2 and centre $(-1, 2)$. [2]



The diagram shows four shapes *A*, *B*, *C* and *D*.

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

(i) shape *B*,

Answer(a)(i)
 [3]

(ii) shape *C*,

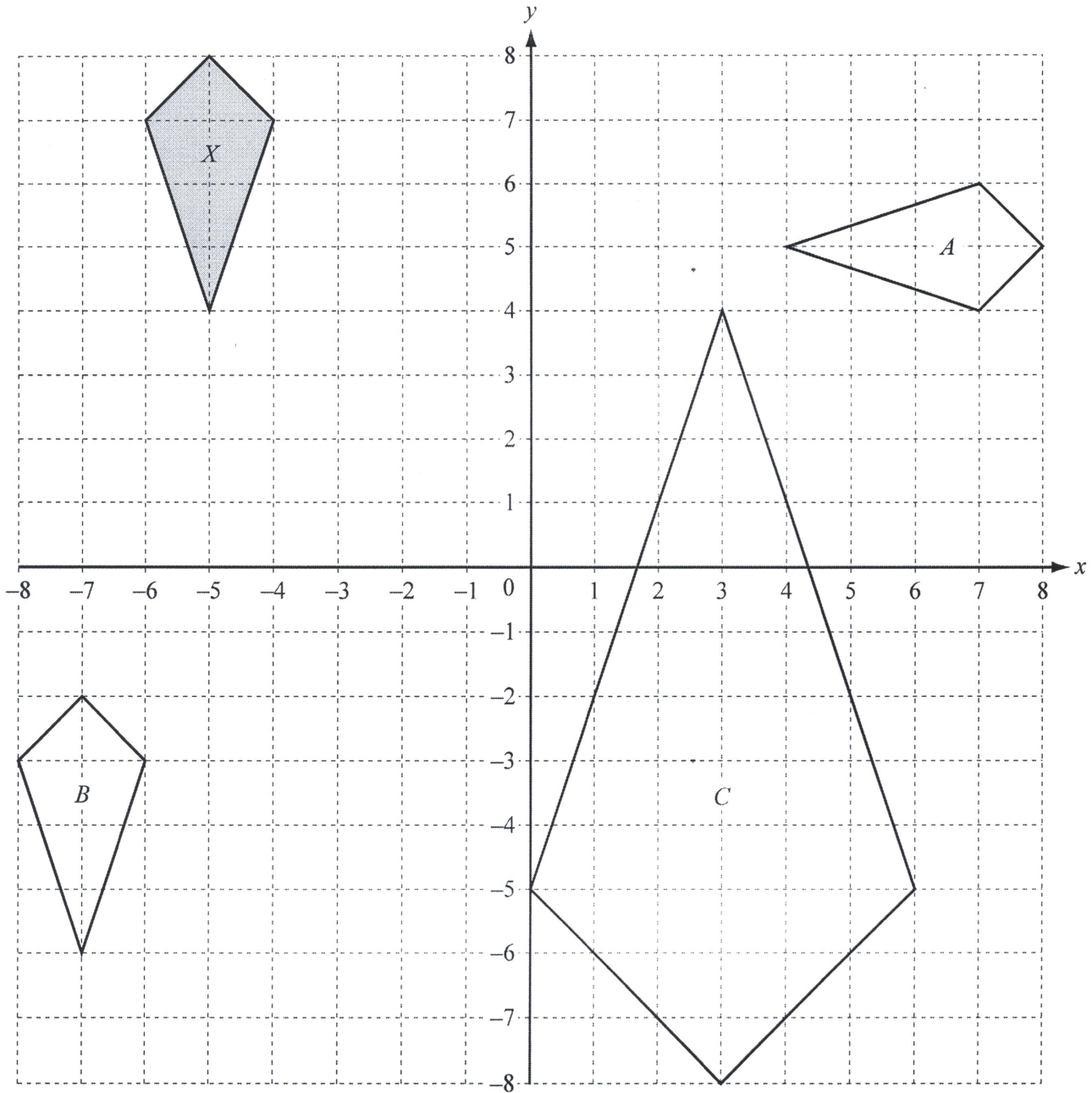
Answer(a)(ii)
 [3]

(iii) shape *D*.

Answer(a)(iii)
 [2]

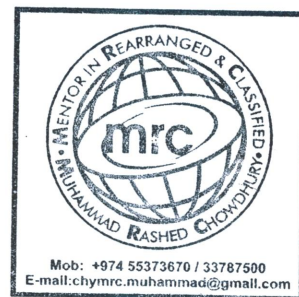
(b) On the grid, draw the reflection of shape *A* in the line $x = 5$. [2]

The diagram shows four quadrilaterals drawn on a 1 cm² grid.



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

Answer(a) [1]



(b) Describe fully the **single** transformation that maps quadrilateral X onto quadrilateral

(i) A ,

Answer(b)(i)
..... [3]

(ii) B ,

Answer(b)(ii)
..... [2]

(iii) C .

Answer(b)(iii)
..... [3]

(c) (i) Calculate the length of the longest side of quadrilateral X .
Show that your answer rounds to 3.16 cm, correct to 3 significant figures.

Answer(c)(i)



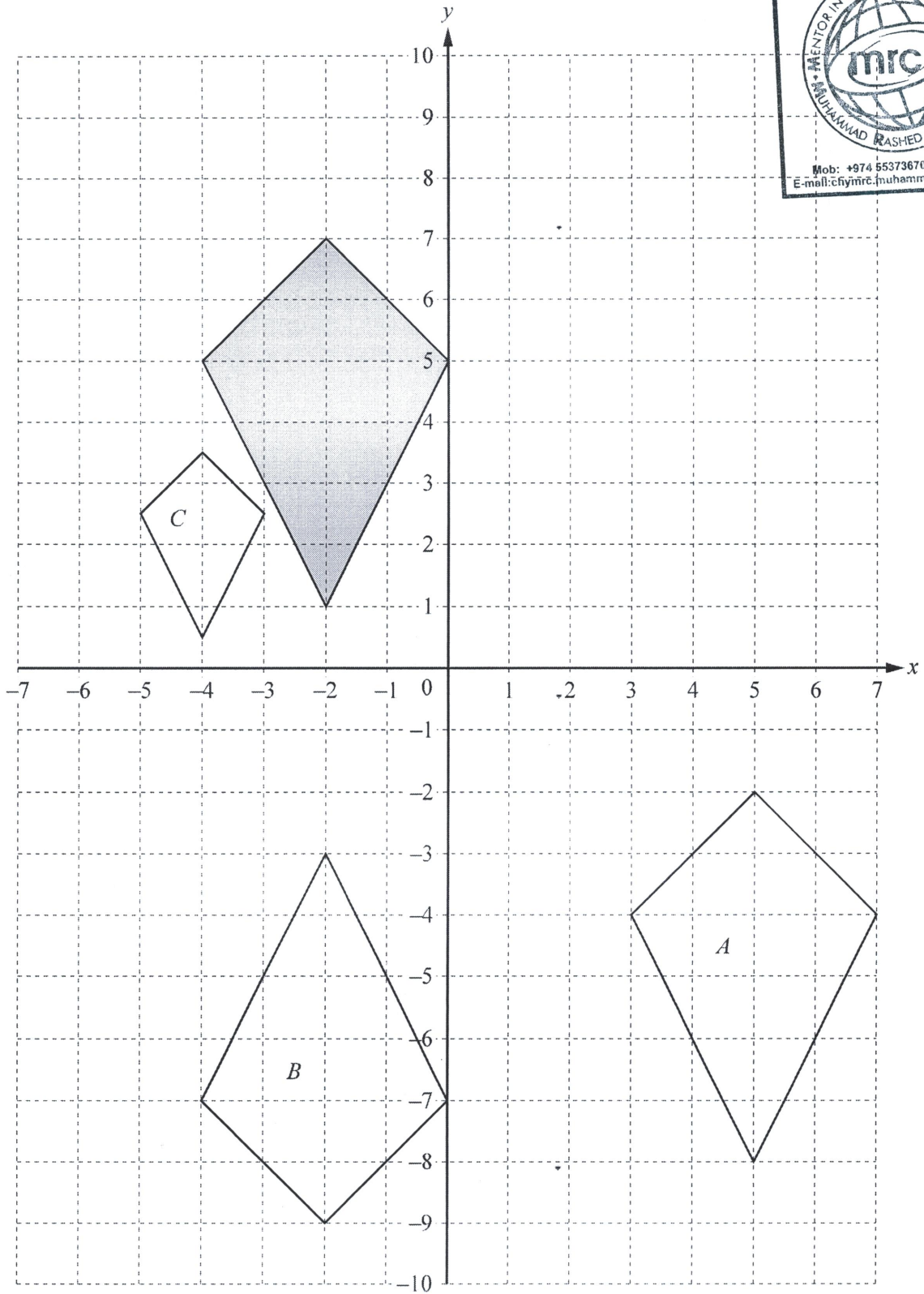
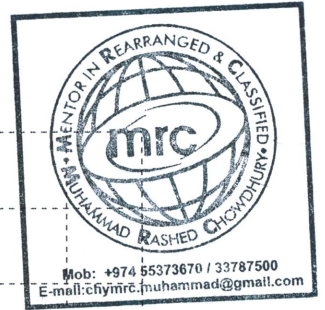
[2]

(ii) Calculate the perimeter of quadrilateral X .

Answer(c)(ii) cm [3]

(iii) Find the perimeter of quadrilateral C .

Answer(c)(iii) cm [1]



(a) For the shaded quadrilateral, write down

(i) its mathematical name,

Answer(a)(i) [1]

(ii) the number of lines of symmetry.

Answer(a)(ii) [1]

(b) The quadrilaterals are drawn on a 1 cm^2 grid.

Work out the area of the shaded quadrilateral.

Answer(b) cm^2 [1]

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

(i) quadrilateral A,

Answer(c)(i)
 [2]

(ii) quadrilateral B,

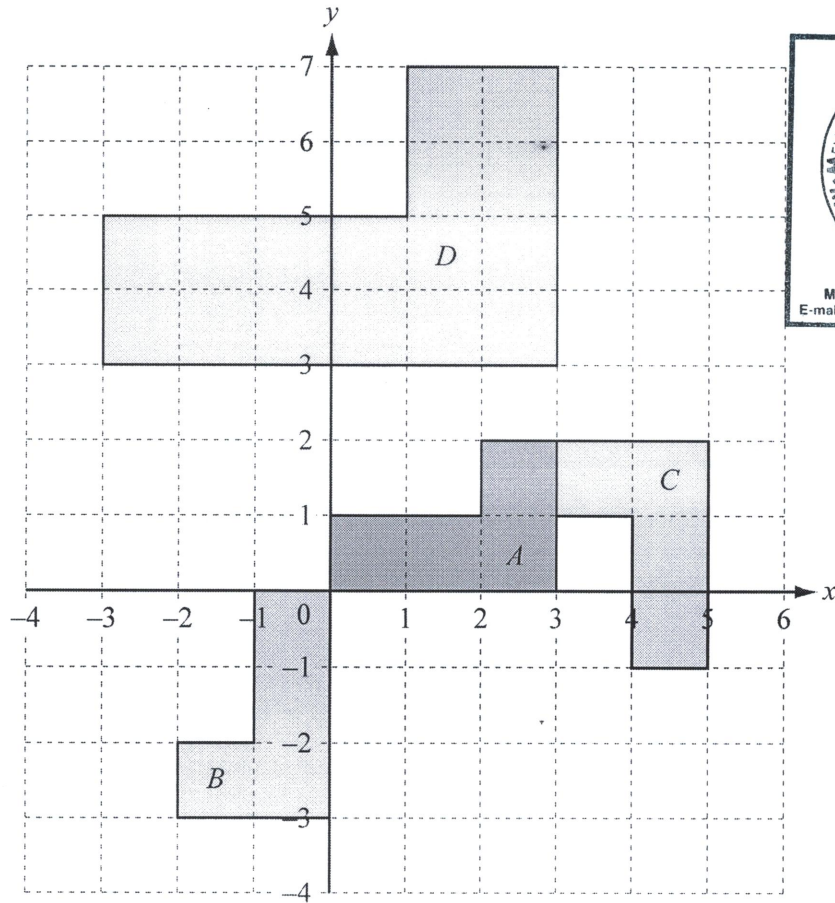
Answer(c)(ii)
 [2]

(iii) quadrilateral C.

Answer(c)(iii)
 [3]

(d) On the grid, draw the image of the shaded quadrilateral after a rotation of 90° clockwise about the origin. [2]





Four shapes, *A*, *B*, *C* and *D*, are shown on the grid.

Describe fully the **single** transformation that maps shape *A* onto

- (i) shape *B*,

Answer(a)(i)
 [2]

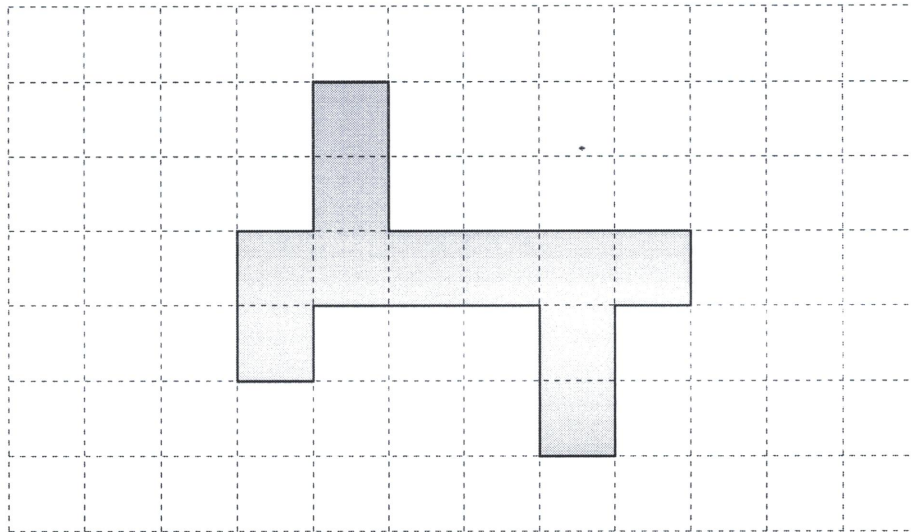
- (ii) shape *C*,

Answer(a)(ii)
 [3]

- (iii) shape *D*.

Answer(a)(iii)
 [3]

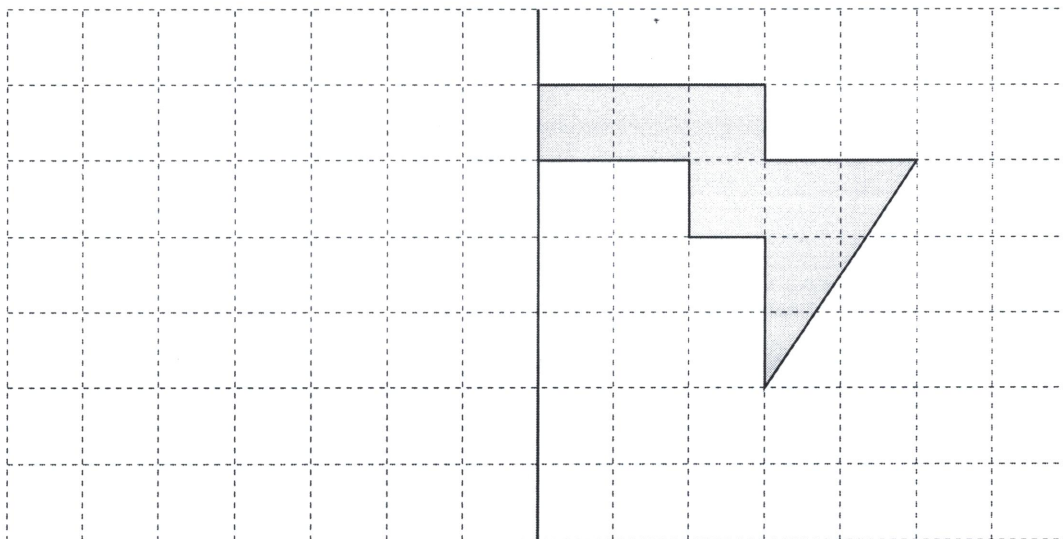
(b) (i)



Shade in **one more** square so that this shape has rotational symmetry of order 2.

[1]

(ii)



Reflect this shape in the line of symmetry shown.

[2]

