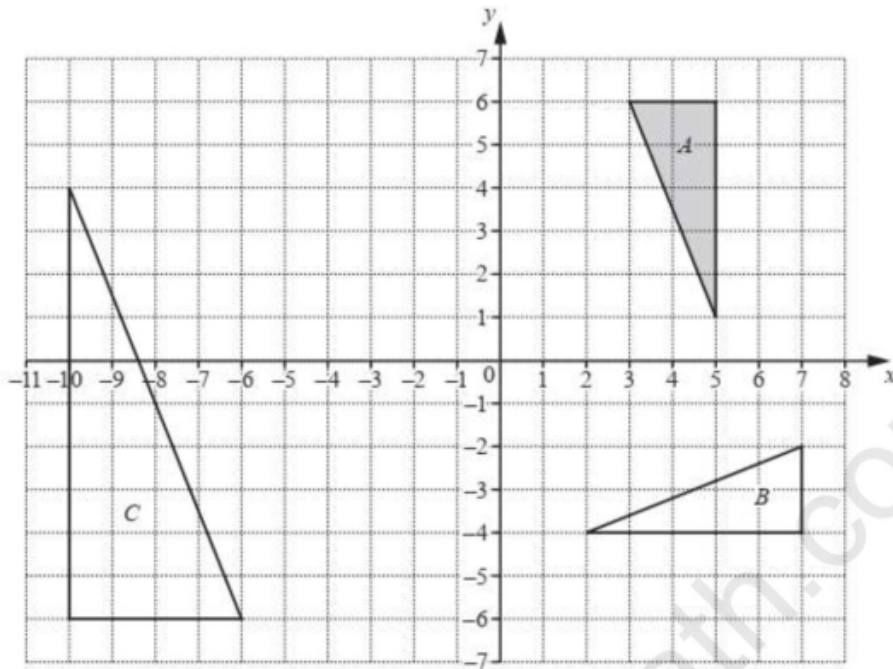


1. Describe fully the **single** transformation that maps

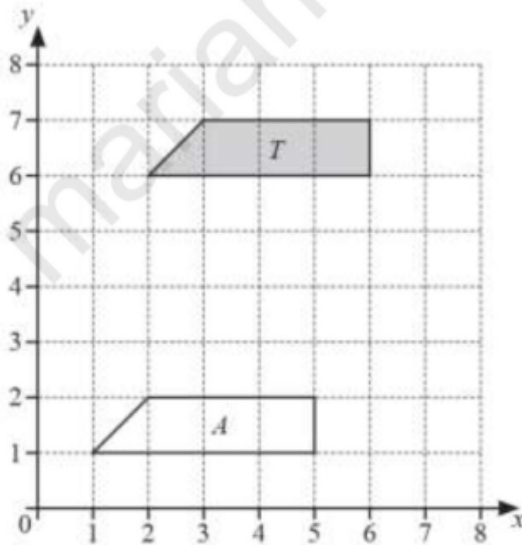


(a) triangle A onto triangle B, [3]

(b) triangle A onto triangle C. [3]

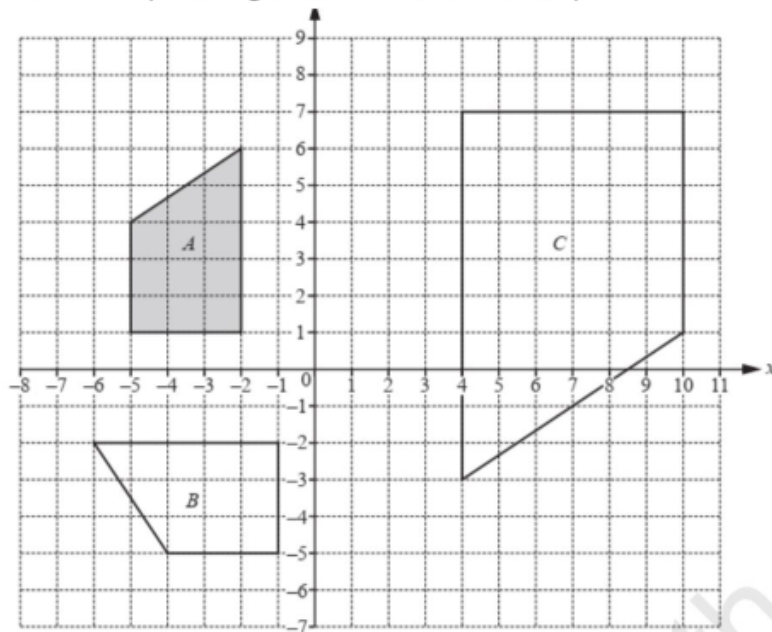
0580/22/M/J/19 Q25)

2. (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]



0580/21/O/N/19 Q21)

3. Describe fully the **single** transformation that maps

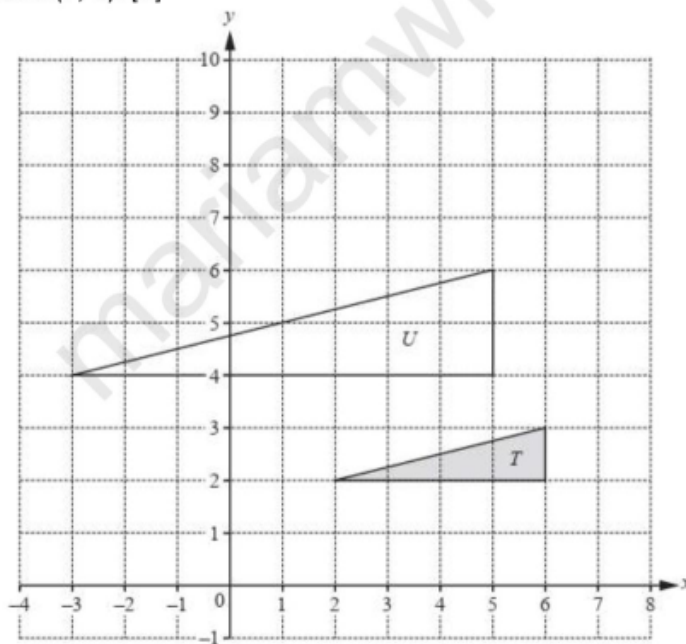


(a) shape A onto shape B, [3]

(b) shape A onto shape C [3]

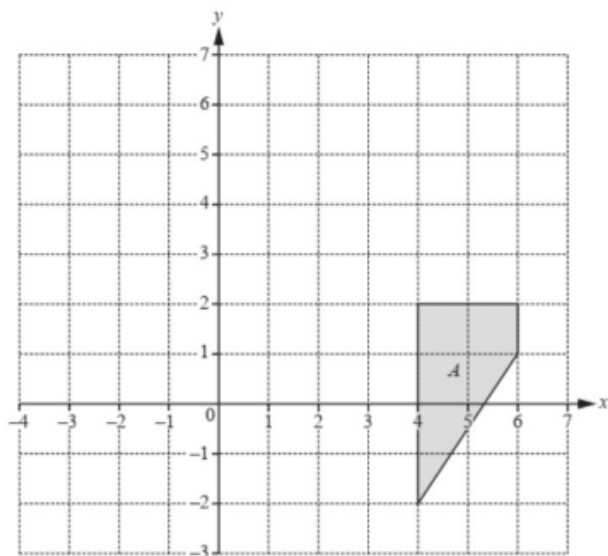
0580/22/F/M/18 Q20)

4. (a) Describe fully the **single** transformation that maps triangle T onto triangle U. [3]
 (b) On the grid, draw the image of triangle T after a rotation through 90° clockwise about the point (7, 3). [3]



0580/23/M/J/18 0580/23/M/J/18 Q26)

5. $T(X)$ is the image of the shape X after translation by the vector $\begin{pmatrix} -1 \\ 3 \end{pmatrix}$.

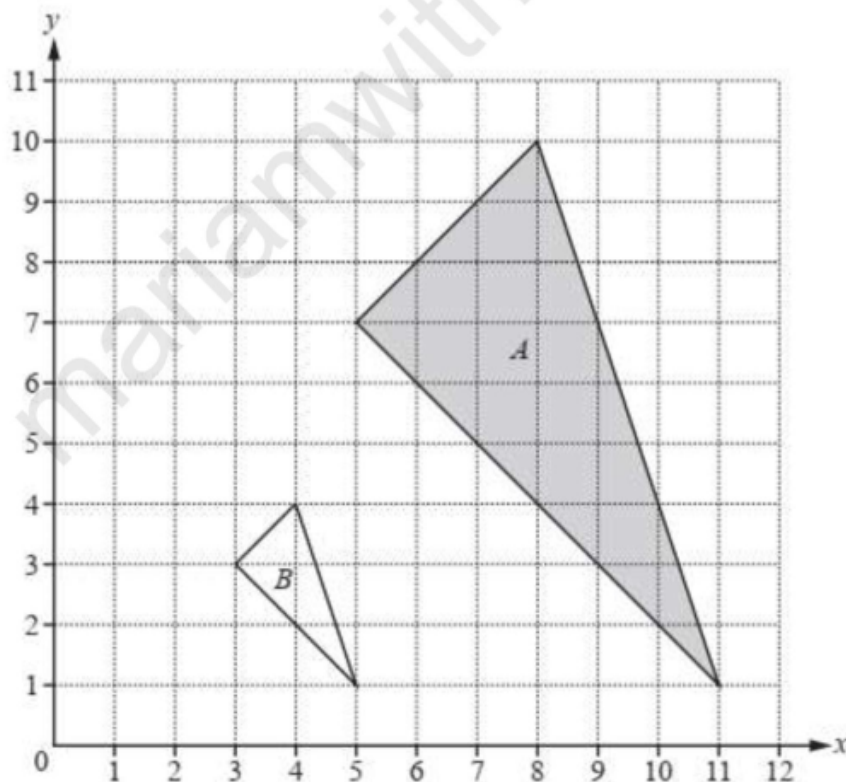


$M(Y)$ is the image of the shape Y after reflection in the line $x = 2$.

On the grid, draw $MT(A)$, the image of shape A after the transformation MT . [3]

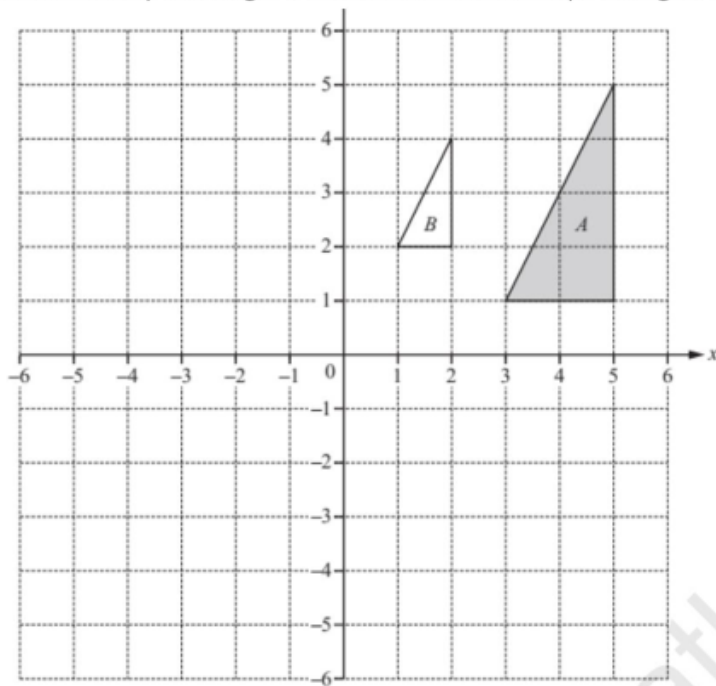
0580/22/F/M/17 Q11)

6. Describe fully the **single** transformation that maps triangle A onto triangle B [3]



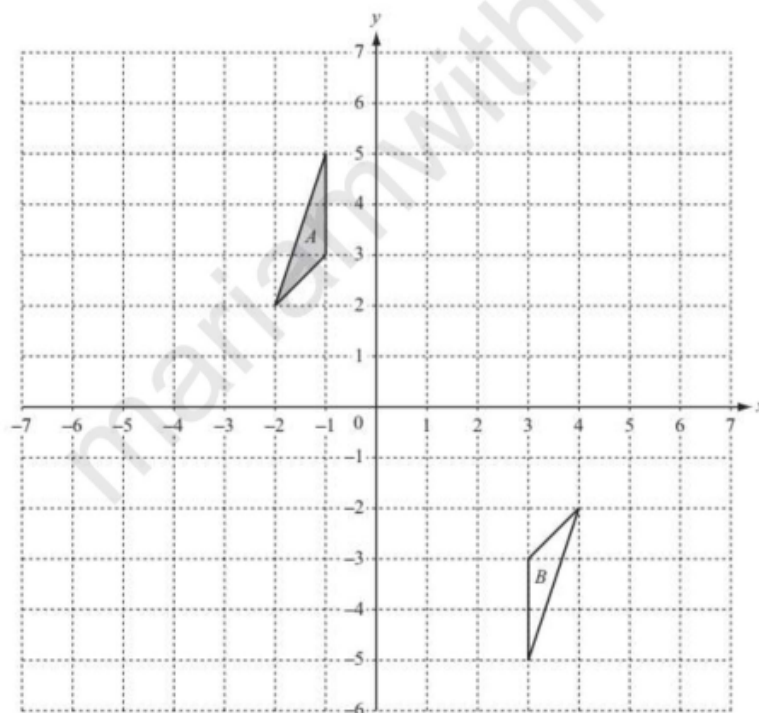
0580/21/O/N/17 Q16)

7. Describe fully the single transformation that maps triangle A onto triangle B. [3]



0580/22/O/N/16 Q18)

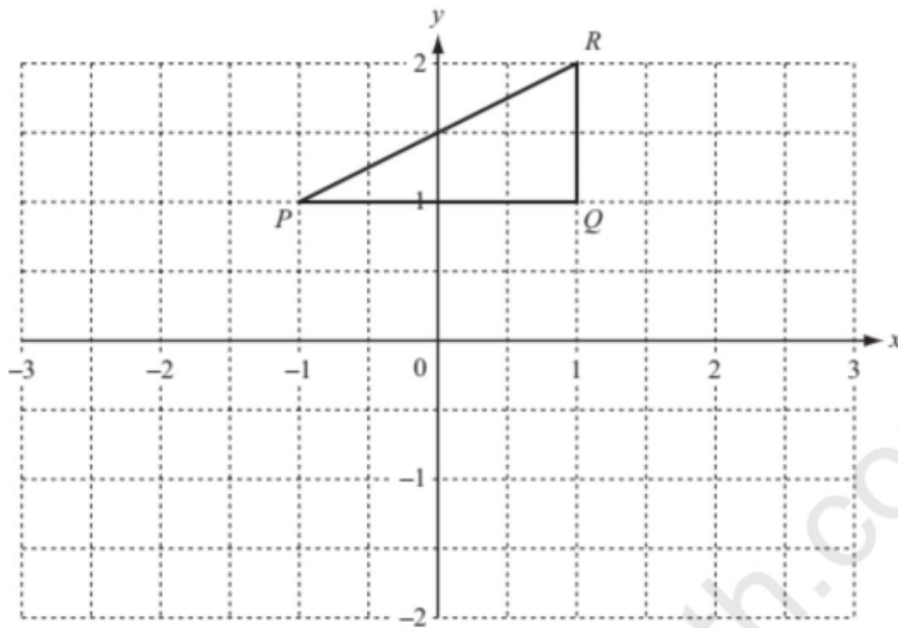
8. (a) Draw the image of triangle A after a translation by the vector $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$. [2]



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

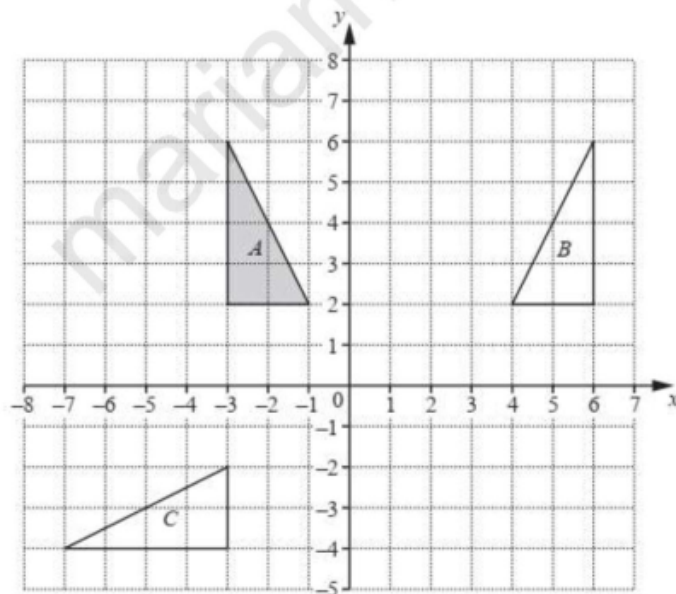
0580/23/M/J/14 Q22)

9. The triangle PQR has co-ordinates $P(-1, 1)$, $Q(1, 1)$ and $R(1, 2)$.



- (a) Rotate triangle PQR by 90° clockwise about $(0, 0)$.
Label your image $P'Q'R'$. [2]
(b) Reflect your triangle $P'Q'R'$ in the line $y = -x$.
Label your image $P''Q''R''$. [2]
(c) Describe fully the single transformation which maps triangle PQR onto triangle $P''Q''R''$.
0580/21/O/N/12 Q21)

10. (a) Describe fully the single transformation that maps



- (i) triangle A onto triangle B, [2]

(ii) triangle A onto triangle C. [3]

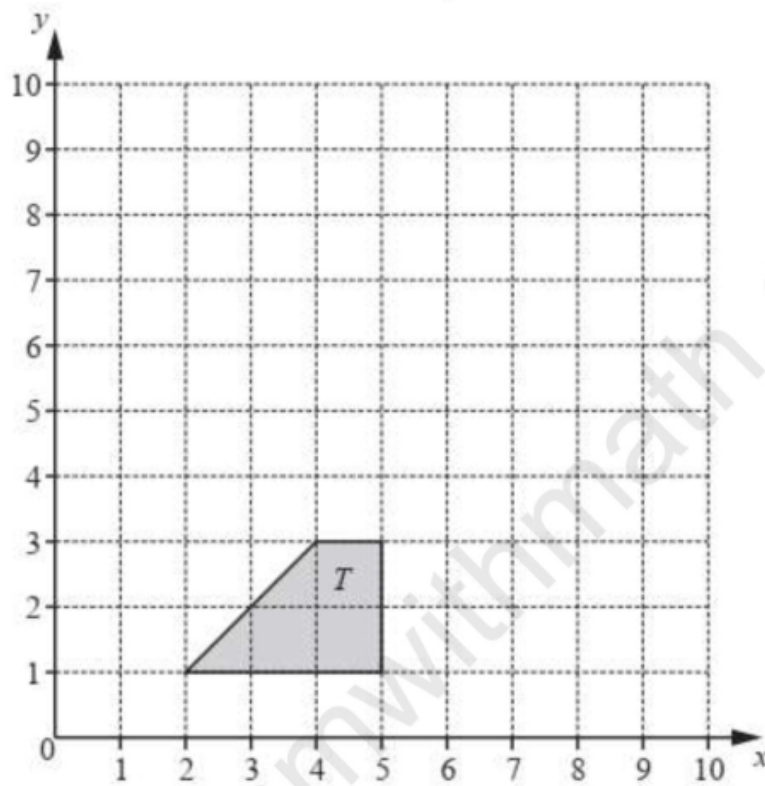
(b) On the grid, draw the image of

(i) triangle A after an enlargement, scale factor $-\frac{1}{2}$, centre (3, 0), [2]

(ii) triangle A after a translation by the vector $\begin{pmatrix} -3 \\ 1 \end{pmatrix}$. [2]

0580/42/F/M/19 Q2

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



Label the image A. [2]

(ii) Rotate shape T about the point (5, 3) through 180° .

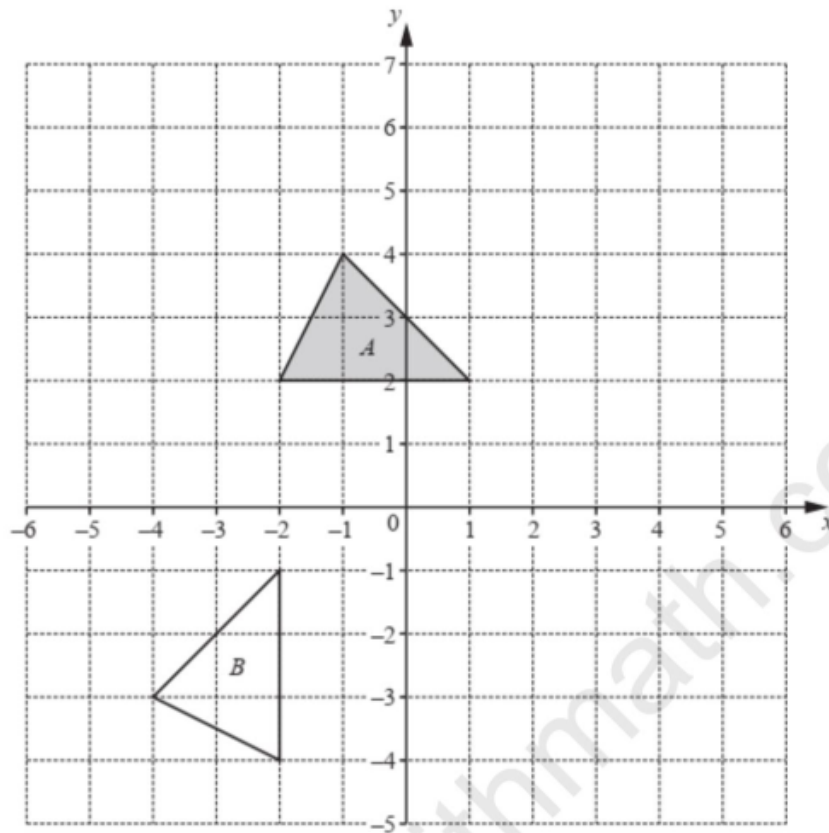
Label the image B. [2]

(iii) Describe fully the single transformation that maps shape A onto shape B. [3]

(b) (i) Reflect shape T in the line $y = x$. [2]

0580/41/M/J/19 Q1

12. (a) On the grid, draw the image of



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

(ii) triangle A after a reflection in the line $y = x$. [2]

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

0580/43/M/J/19 Q3)

13. A line joins A (1, 3) to B (5, 8)

The line AB is transformed to the line PQ.

Find the co-ordinates of P and the co-ordinates of Q after AB is transformed by

(i) a translation by the vector $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$. [2]

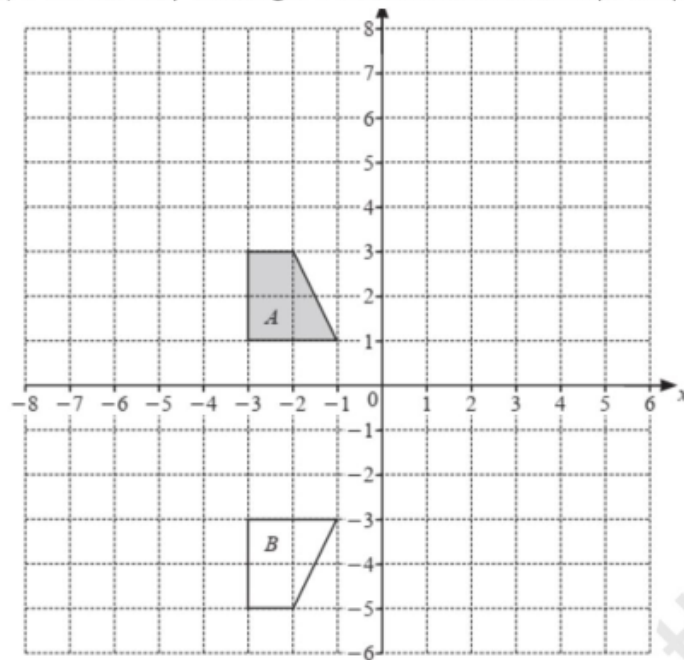
(ii) a rotation through 90° anticlockwise about the origin, [2]

(iii) a reflection in the line $x = 2$, [2]

(c) Describe fully the single transformation that maps the line AB onto the line PQ where P is the point (-2, -6) and Q is the point (-10, -16) [3]

0580/42/O/N/19 Q3)

14. (a) Describe fully the **single** transformation that maps shape A onto shape B. [2]

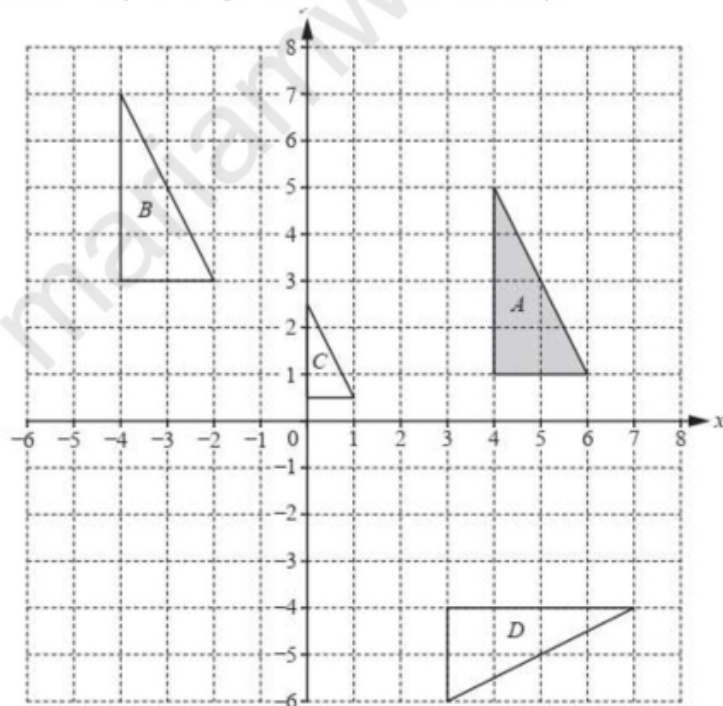


(b) On the grid, draw the image of

- (i) shape A after a translation by the vector $\begin{pmatrix} -3 \\ 4 \end{pmatrix}$ [2]
- (ii) shape A after a rotation through 180° about $(0, 0)$, [2]
- (iii) shape A after an enlargement, scale factor 2, centre $(-7, 0)$. [2]

0580/43/O/N/19 Q7)

15. (a) Describe fully the single transformation that maps



(i) triangle A onto triangle B, [2]

(ii) triangle A onto triangle C, [3]

(iii) triangle A onto triangle D. [3]

(b) On the grid, draw the image of triangle A after an enlargement by scale factor 2, centre (7,3)[2]

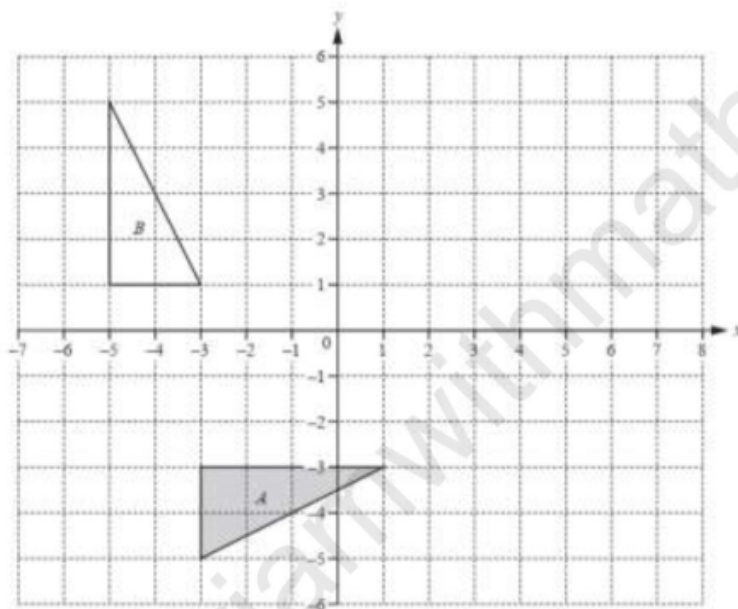
0580/41/M/J/18 Q4)

16. (a) (i) Draw the image of triangle A after a reflection in the line $x = 2$. [2]

(ii) Draw the image of triangle A after a translation by the vector $\begin{pmatrix} -2 \\ 4 \end{pmatrix}$ [2]

(iii) Draw the image of triangle A after an enlargement by scale factor $-1/2$, centre (3, 1). [3]

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



0580/42/M/J/18 Q3)

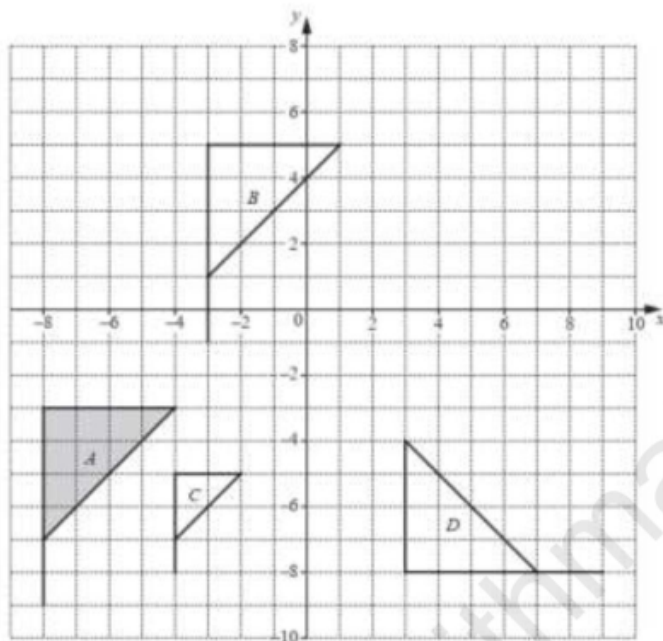
17. (a) Describe fully the **single** transformation that maps

(i) flag A onto flag B, [2]

(ii) flag A onto flag C, [3]

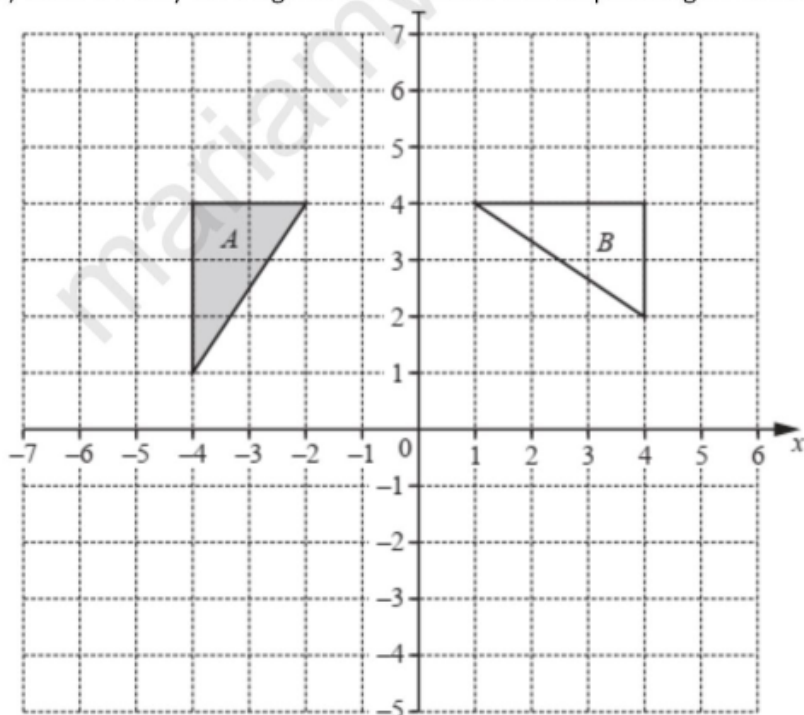
(iii) flag A onto flag D. [3]

(b) Draw the reflection of flag A in the line $y = -1$. [2]



0580/41/O/N/18 Q2)

18. (a) Describe fully the single transformation that maps triangle A onto triangle B. [3]



(b) On the grid, draw the image of

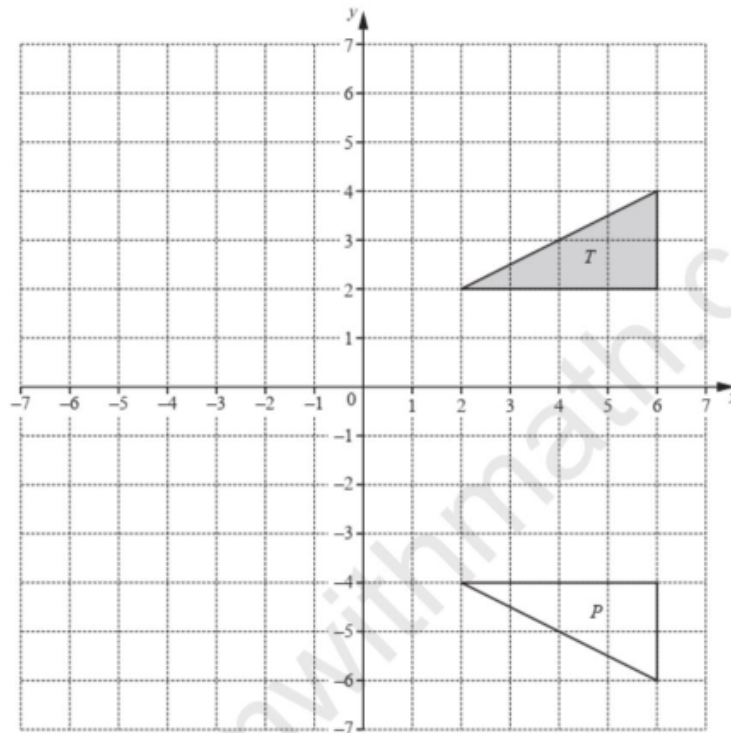
(i) triangle A after a reflection in the x -axis, [1]

(ii) triangle A after a translation by the vector $\begin{pmatrix} 7 \\ -5 \end{pmatrix}$, [2]

0580/42/O/N/18 Q3)

19. (i) Describe fully the single transformation that maps triangle T onto triangle P. [2]

(ii) Translate triangle T by the vector $\begin{pmatrix} -2 \\ -5 \end{pmatrix}$. [2]



(iii) Rotate triangle T through 90° anticlockwise about $(0, 0)$. [2]

(iv) Enlarge triangle T by scale factor $-1/2$ with centre $(0, 0)$. [2]

0580/43/O/N/18 Q1

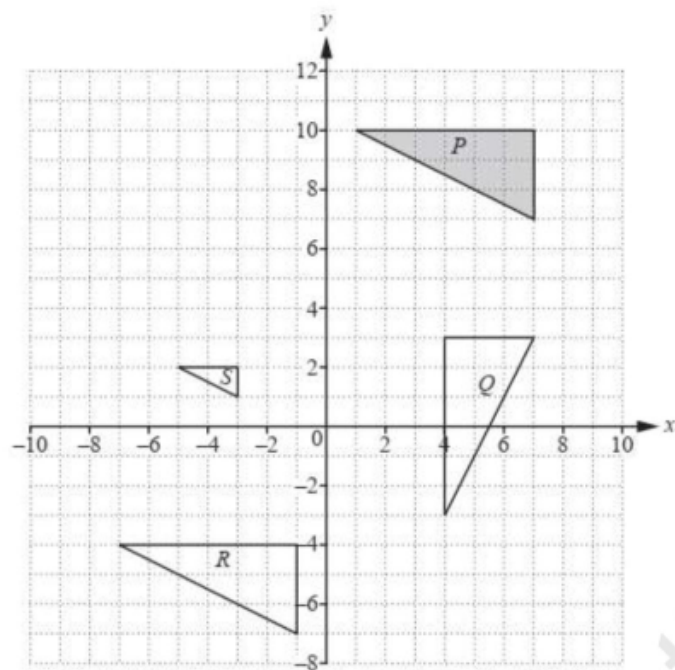
20. (a) Describe fully the **single** transformation that maps

(i) shape P onto shape Q, [3]

(ii) shape P onto shape R, [2]

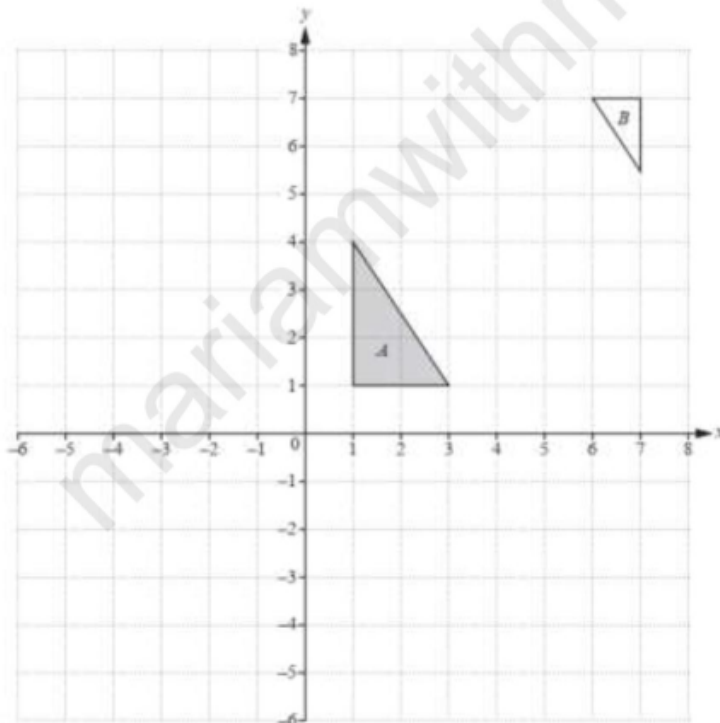
(iii) shape P onto shape S. [3]

(b) (i) Draw the reflection of **shape S** in the line $y = x$ [2]



0580/42/F/M/17 Q2)

21. (a) (i) Draw the image of triangle A after reflection in the line $x = 4$. [2]



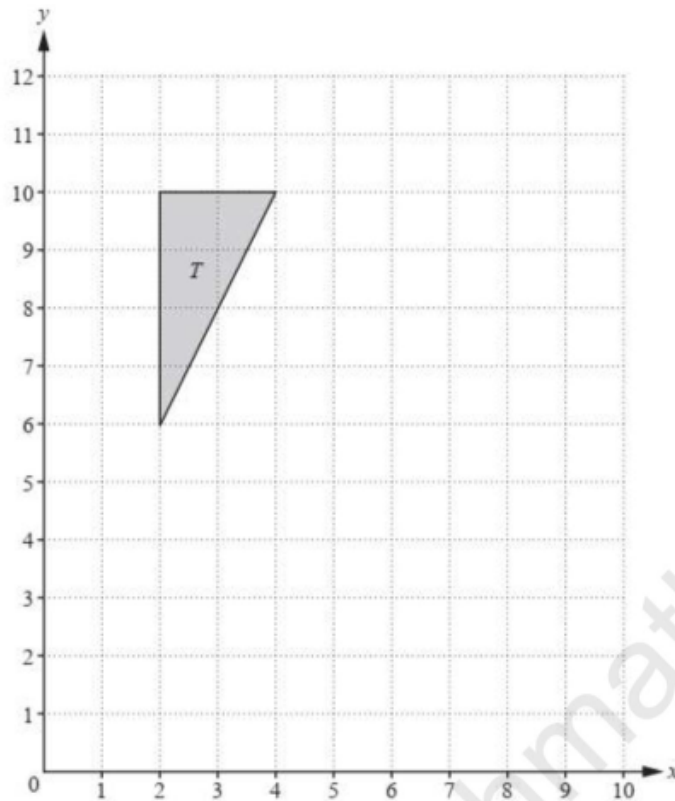
- (ii) Draw the image of triangle A after rotation of 90° anticlockwise about $(0, 0)$. [2]

- (iii) Draw the image of triangle A after translation by the vector $\begin{pmatrix} 1 \\ -5 \end{pmatrix}$. [2]

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

0580/41/M/J/17 Q3)

22. On the grid, draw the image of

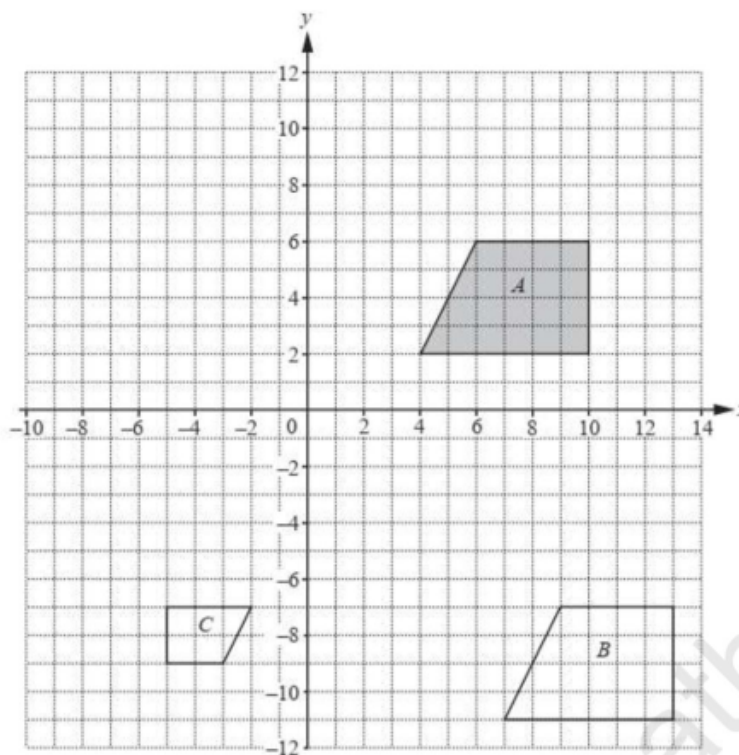


- (i) triangle T after translation by the $\begin{pmatrix} 6 \\ -5 \end{pmatrix}$. [2]
- (ii) triangle T after rotation through 90° anticlockwise with centre (4, 10). [2]
- (iii) triangle T after enlargement with scale factor $1/2$, centre (10, 0). [2]

0580/42/M/J/17 Q2

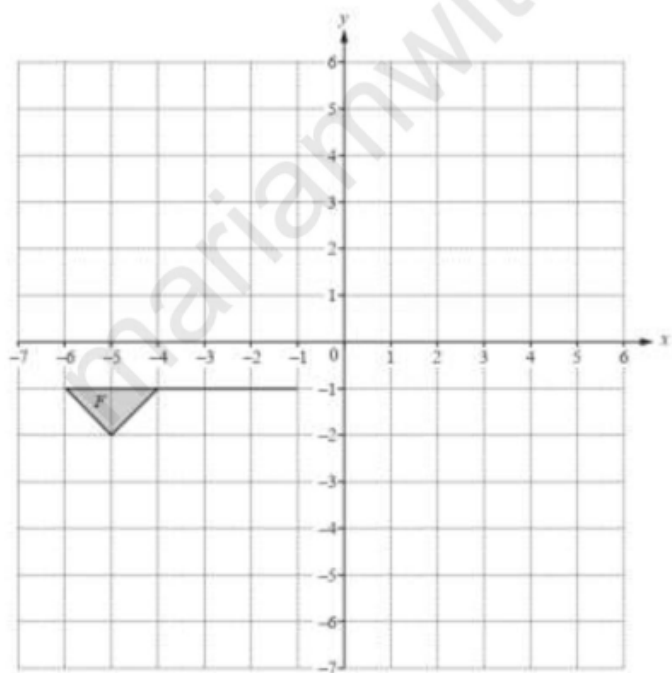
23. (a) Describe fully the single transformation that maps shape A onto

- (i) shape B. [2]
 - (ii) shape C. [3]
- (b) Draw the image of shape A after rotation through 90° anticlockwise about the point (3, -1). [2]
- (c) Draw the image of shape A after reflection in $y = 1$. [2]



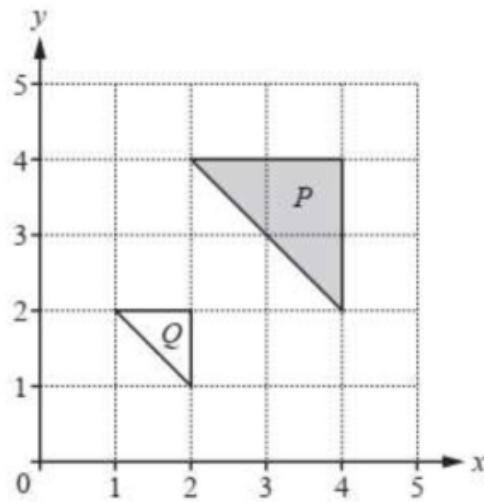
0580/43/M/J/17 Q6)

24. (a) Draw the image of



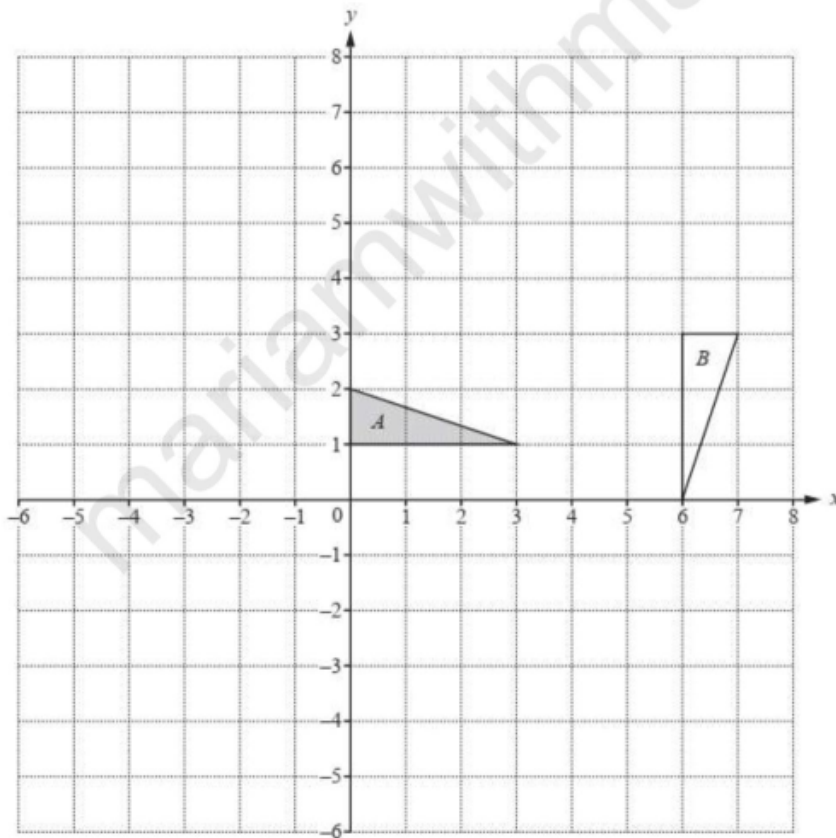
(i) flag F after translation by the vector $\begin{pmatrix} 6 \\ -2 \end{pmatrix}$ [2]

- (ii) flag F after rotation through 180° about $(-2, 0)$, [2]
 (iii) flag F after reflection in the line $y = x$. [2]
 (b) (i) Describe fully the **single** transformation that maps triangle P onto triangle Q. [3]



0580/42/O/N/17 Q4)

25. (a) Draw the image of



- (i) triangle A after a reflection in the line $x = 0$, [2]
 (ii) triangle A after an enlargement, scale factor 2, centre $(0, 4)$, [2]

(iii) triangle A after a translation by the vector $\begin{pmatrix} -5 \\ 3 \end{pmatrix}$ [2]

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

0580/43/O/N/17 Q5)

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

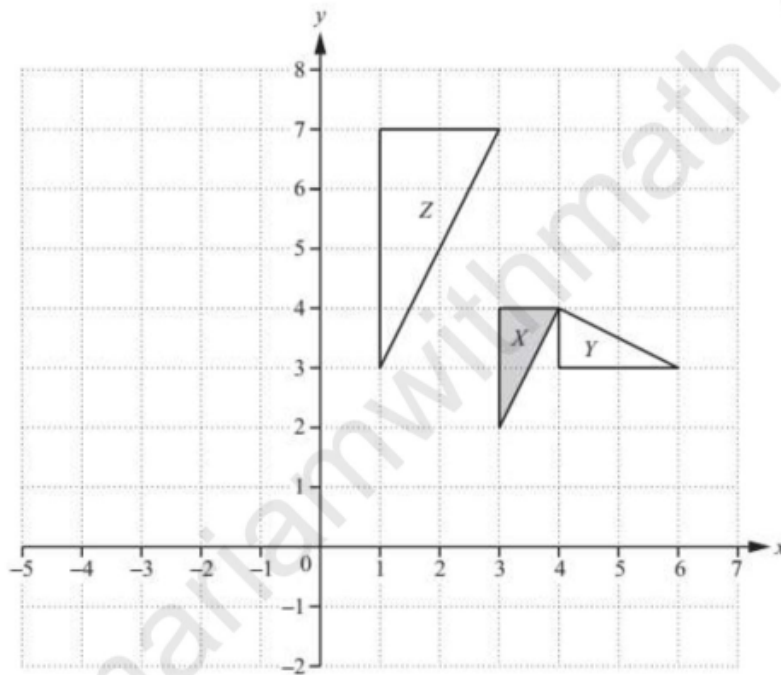
(i) triangle X onto triangle Y, [3]

(ii) triangle X onto triangle Z. [3]

(b) (i) Draw the image of triangle X after a translation by the vector $\begin{pmatrix} -5 \\ 3 \end{pmatrix}$

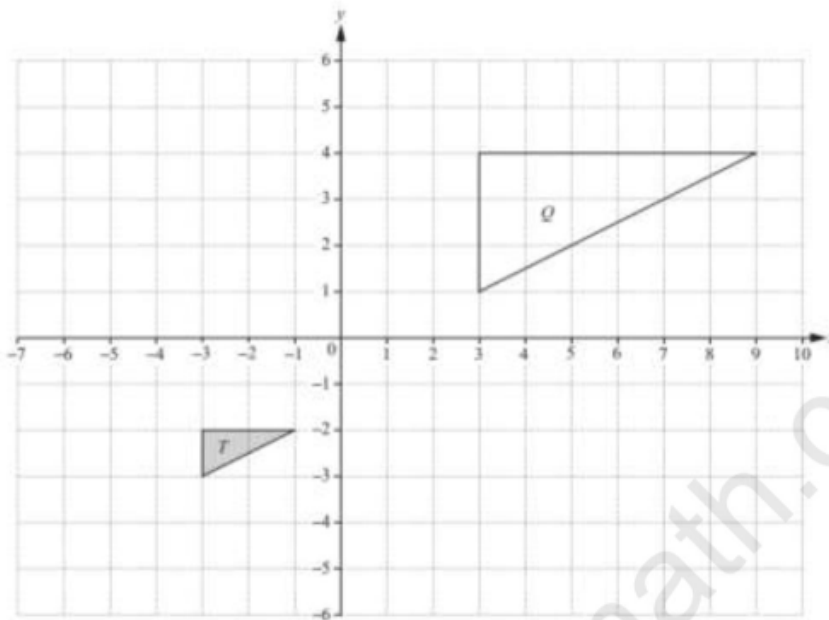
Label this triangle P. [2]

(ii) Draw the reflection of triangle P in the line $y = 3$. [2]



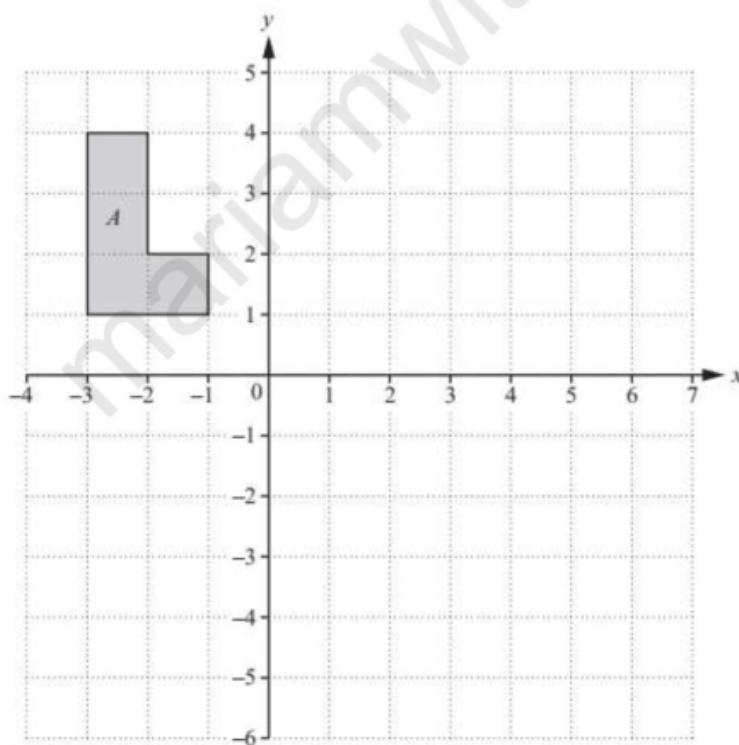
0580/42/F/M/16 Q6)

27. (i) Draw the image of triangle T after a translation by the vector $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$ [2]
 (ii) Draw the image of triangle T after a reflection in the line $y = 1$. [2]
 (iii) Describe fully the **single** transformation that maps triangle T onto triangle Q . [3]



0580/41/M/J/16 Q2)

28. On the grid, draw the image of

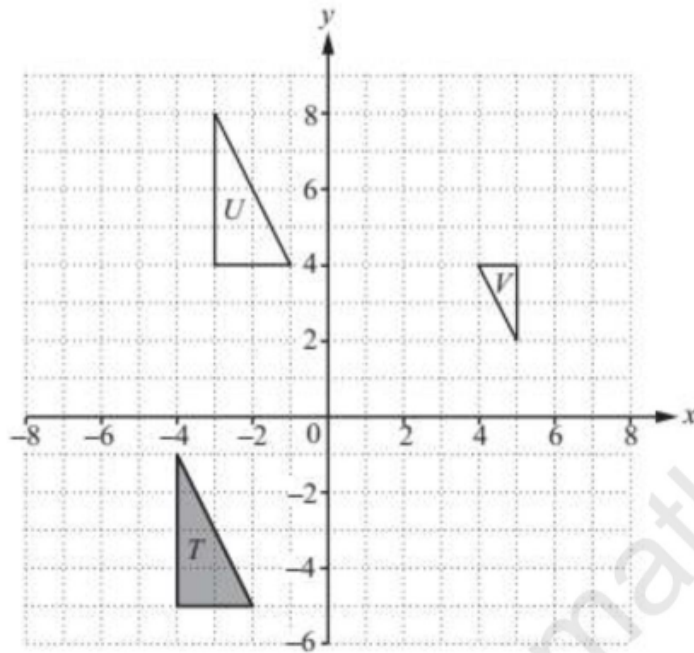


- (i) shape A after a reflection in the line $x = 1$, [2]

(ii) shape A after an enlargement with scale factor -2 , centre $(0, 1)$, [2]

0580/42/M/J/16 Q3)

29. (a) (i) Draw the image of triangle T after a reflection in the line $x = 0$. [2]



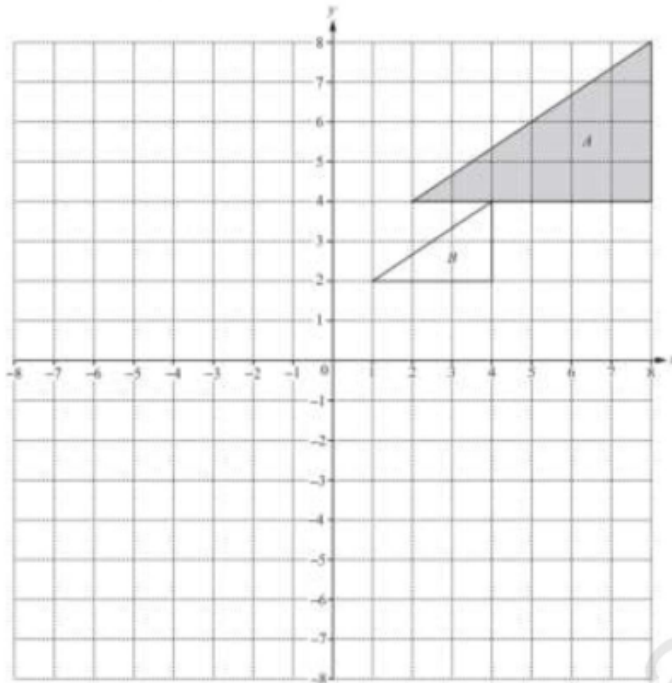
(ii) Draw the image of triangle T after a rotation through 90° clockwise about $(-2, -1)$. [2]

(iii) Describe fully the **single** transformation that maps triangle T onto triangle U. [2]

(iv) Describe fully the **single** transformation that maps triangle T onto triangle V. [3]

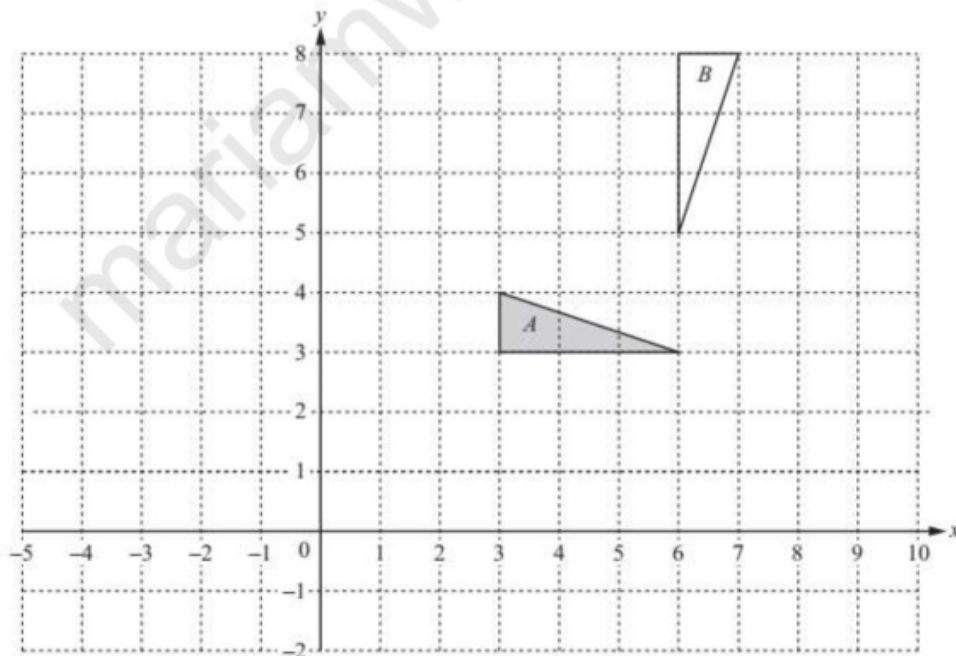
0580/43/M/J/16 Q6)

30. (a) (i) $V = \begin{pmatrix} -4 \\ -8 \end{pmatrix}$, Draw the image of triangle A after the translation by vector v. [2]



- (b) (i) Describe fully the single transformation that maps triangle A onto triangle B. [3]
0580/41/O/N/16 Q5) (a)

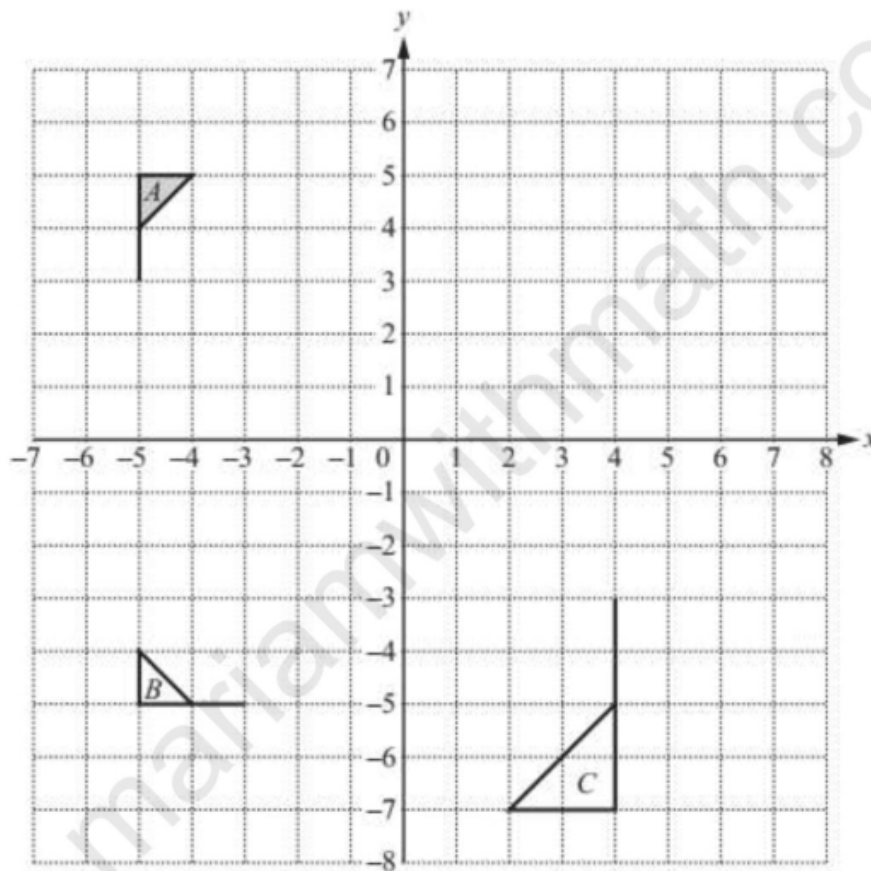
31. (a) Draw the image when triangle A is reflected in the line $x = 1$. [2]



- (b) Draw the image when triangle A is translated by the vector $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$ [2]

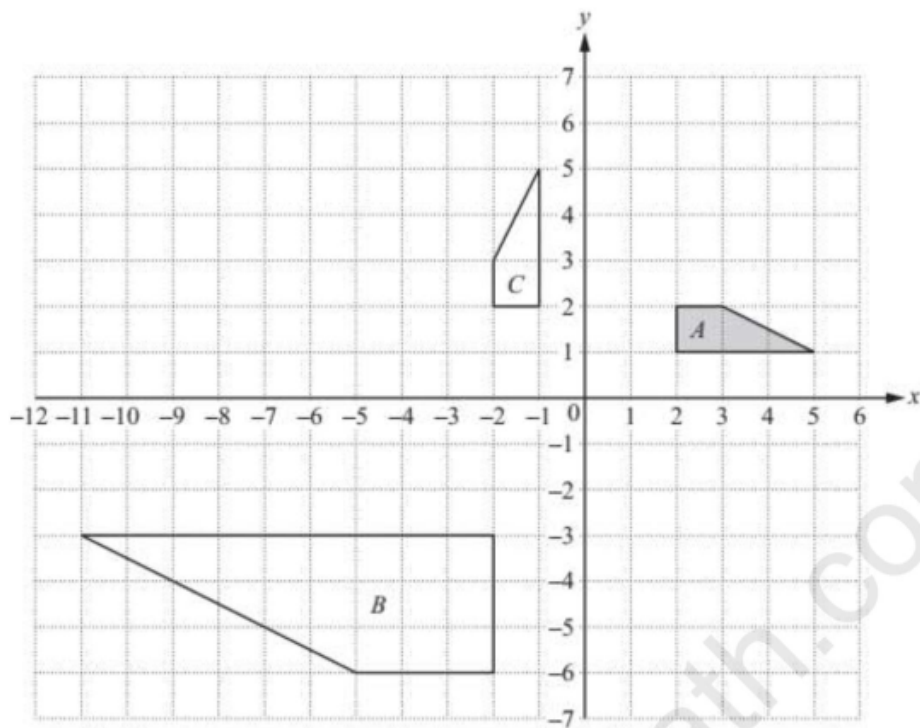
- (c) Draw the image when triangle A is enlarged by scale factor 2 with centre (4, 5). [2]
 (d) Describe fully the **single** transformation that maps triangle A onto triangle B. [3]
0580/43/O/N/16 Q4)

32. (a) Describe fully the **single** transformation that maps
 (i) flag A onto flag B, [3]
 (ii) flag A onto flag C. [3]
 (b) Draw the image of flag A after a translation by the vector $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$ [2]
 (c) Draw the image of flag A after a reflection in the line $x = 1$. [2]



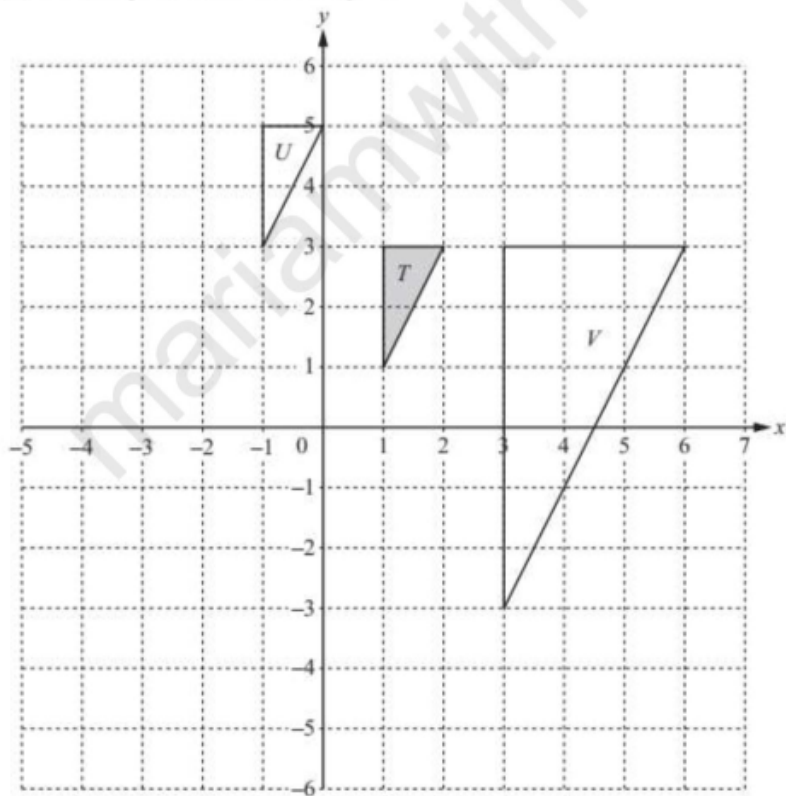
0580/42/F/M/15 Q7)

33. (a) Draw the image of
 (i) shape A after a translation by $\begin{pmatrix} -1 \\ 3 \end{pmatrix}$, [2]
 (ii) shape A after a rotation through 180° about the point (0, 0), [2]
 (b) Describe fully the single transformation that maps shape A onto shape B. [2]



0580/41/M/J/15Q3)

34. (a) On the grid, draw the image of



(i) triangle T after a reflection in the line $x = -1$, [2]

(ii) triangle T after a rotation through 180° about $(0, 0)$. [2]

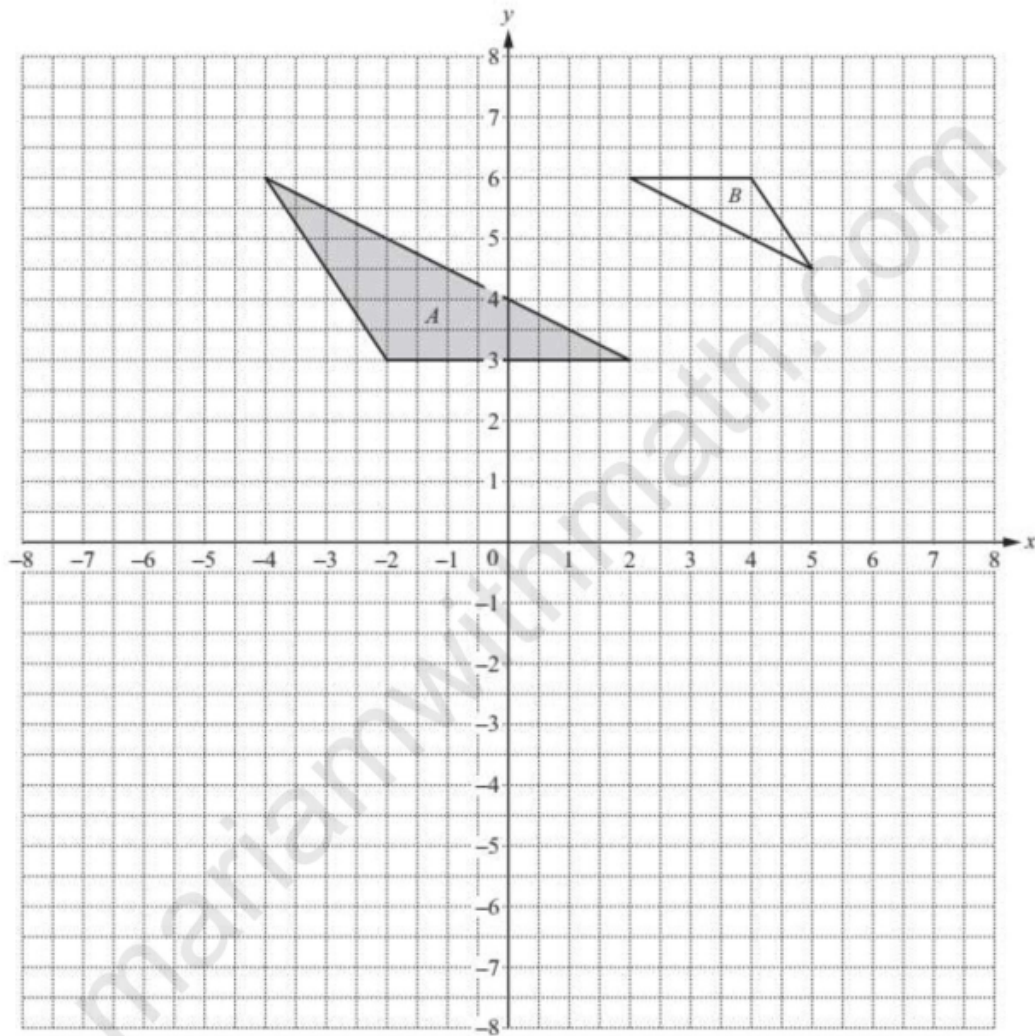
(b) Describe fully the single transformation that maps

(i) triangle T onto triangle U, [2]

(ii) triangle T onto triangle V. [3]

0580/43/M/J/15 Q1)

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



(b) On the grid, draw the image of

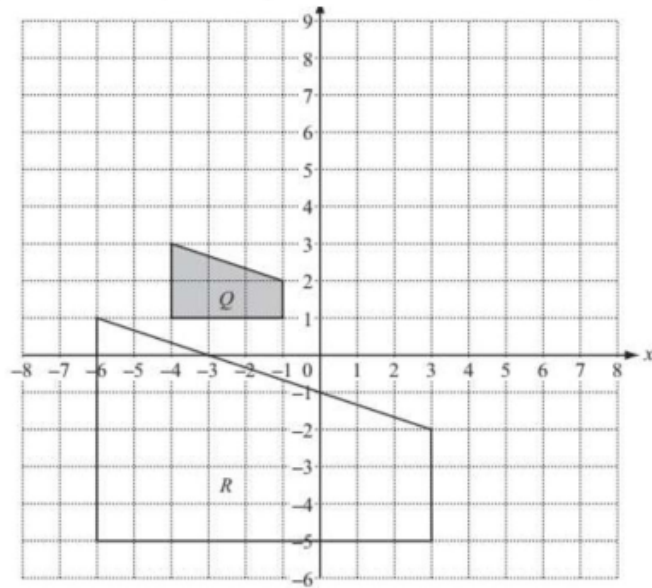
(i) triangle A after a reflection in the line $x = -3$, [2]

(ii) triangle A after a rotation about the origin through 270° anticlockwise, [2]

(iii) triangle A after a translation by the vector $\begin{pmatrix} -1 \\ -5 \end{pmatrix}$. [2]

0580/42/O/N/14 Q4)

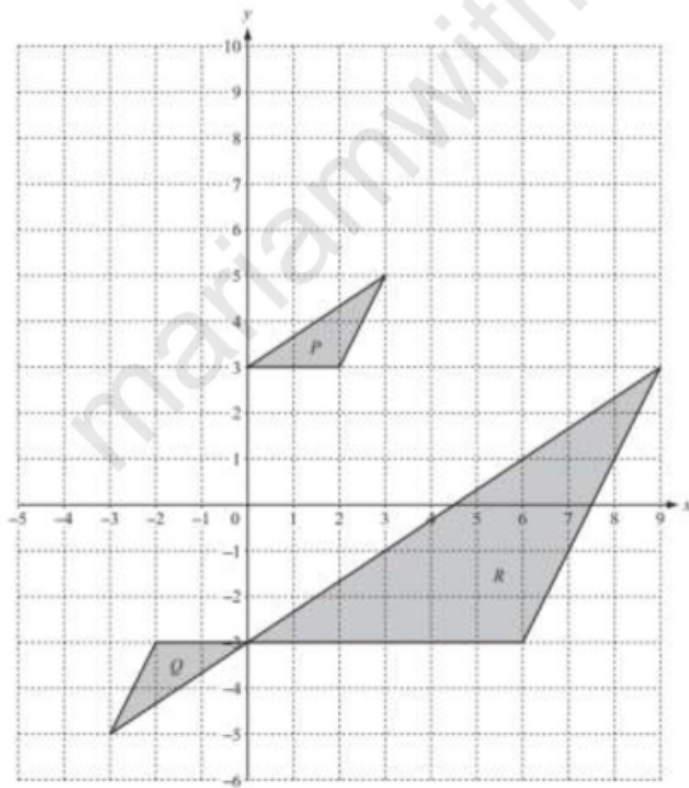
36. (a) Describe fully the **single** transformation that maps shape Q onto shape R. [3]



- (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]

0580/41/M/J/13 Q4)

37. (a) Describe fully

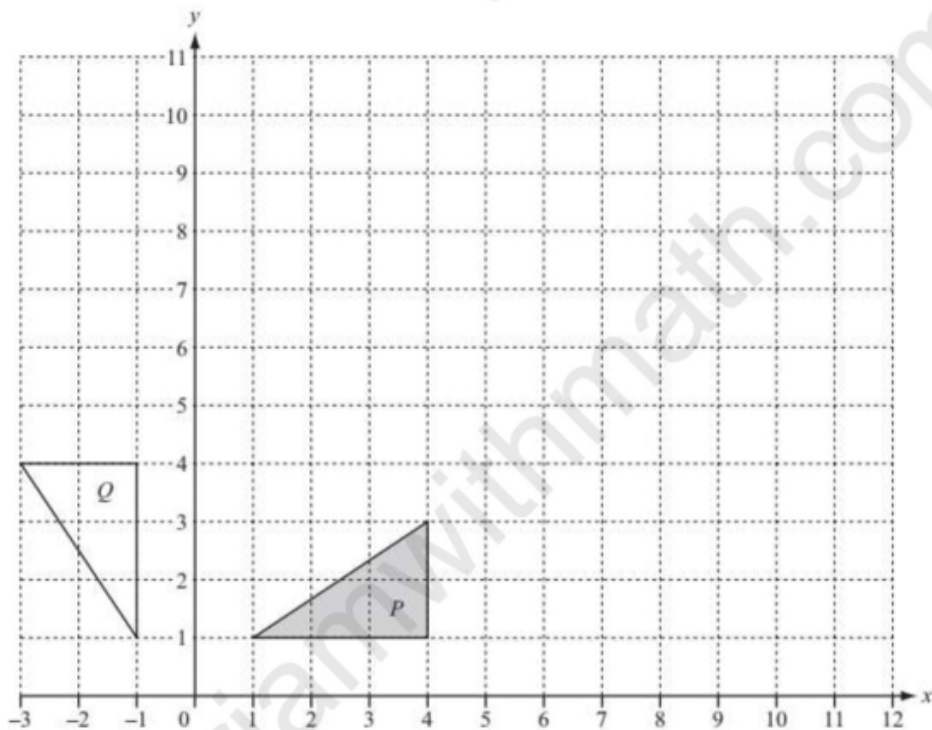


- (i) the **single** transformation which maps **triangle P** onto triangle Q, [3]

- (ii) the **single** transformation which maps **triangle Q** onto triangle R, [3]
- (iii) the **single** transformation which maps **triangle R** onto triangle P. [3]
- (b) On the grid, draw the image of
 - (i) **triangle P** after translation $\begin{pmatrix} -4 \\ -5 \end{pmatrix}$ [2]
 - (ii) **triangle P** after reflection in the line $x = -1$. [2]

0580/41/M/J/12 Q7)

38. (a) Draw the translation of triangle P by $\begin{pmatrix} 5 \\ 3 \end{pmatrix}$. [2]



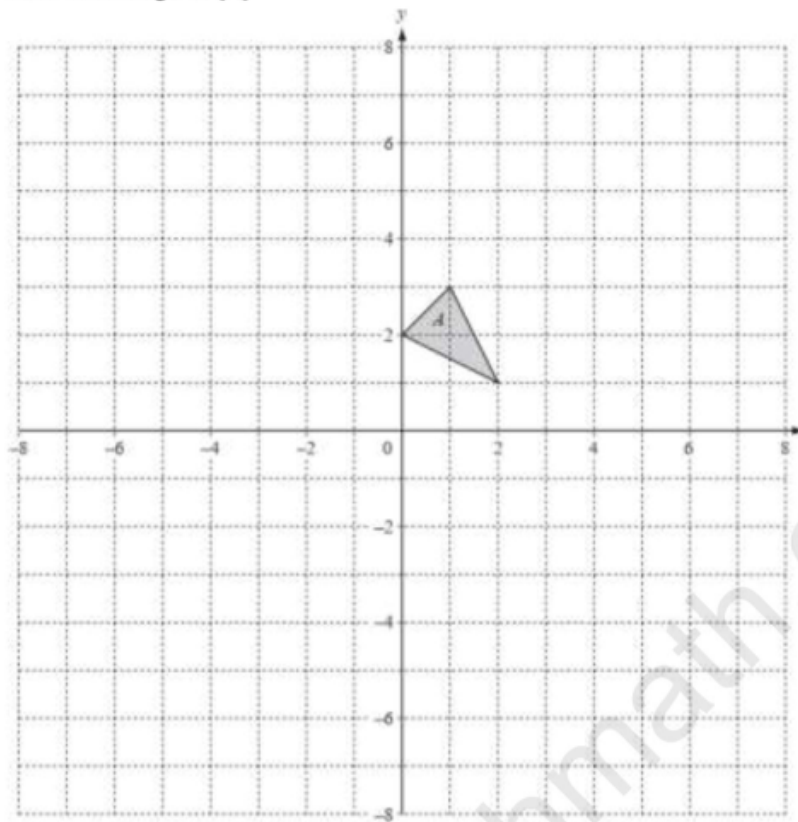
- (b) Draw the reflection of triangle P in the line $x = 6$. [2]
- (c) (i) Describe fully the **single** transformation that maps triangle P onto triangle Q. [3]

0580/43/M/J/12 Q3)

39. Draw the images of the following transformations on the grid above.

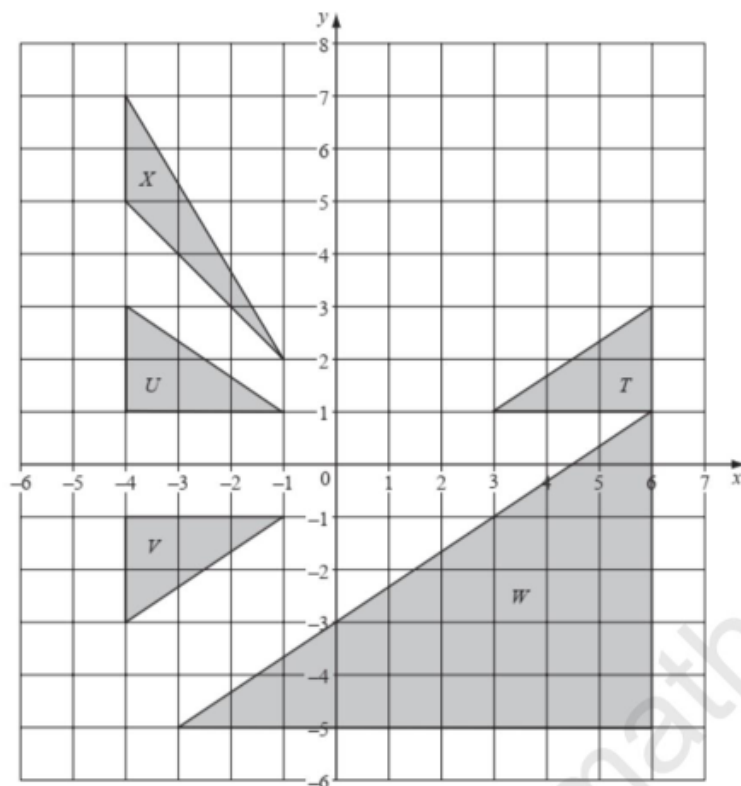
- (i) Translation of triangle A by the vector $\begin{pmatrix} 3 \\ -7 \end{pmatrix}$ [2]
- (ii) Reflection of triangle A in the line $x = 3$. Label the image C. [2]
- (iii) Rotation of triangle A through 90° anticlockwise around the point (0, 0). Label the image D. [2]
- (iv) Enlargement of triangle A by scale factor -4 , with centre (0, 1).

Label the image E. [2]



0580/42/O/N/10 Q8)

40. (a) Describe fully the single transformation which maps
- (i) triangle T onto triangle U, [2]
 - (ii) triangle T onto triangle V, [3]
 - (iii) triangle T onto triangle W, [3]



0580/04/O/N/09 Q2)

Answers

1 (a) Rotation 90° clockwise oe $(1, 0)$ (b) Enlargement -2 $(0, 2)$	2 (a) Translation $\begin{pmatrix} -1 \\ -5 \end{pmatrix}$ (b) Correct reflection at $(6, 2), (6, 6), (7, 6), (7, 3)$
3 (a) Rotation [centre] origin oe 90° [anti-clockwise] (b) Enlargement [centre] $(0, 3)$ [sf] -2	4 (a) Enlargement [scale factor] 2 [centre] $(7, 0)$ (b) Image at $(6, 4), (7, 4), (6, 8)$
5 $(-1, 4), (-1, 5), (1, 5), (1, 1)$	6 Enlargement $1/3$ $(2, 1)$
7 (a) Enlargement [s.f.] $1/2$ [centre] $(-1, 3)$	8 (a) Triangle at $(2, -1), (2, 1), (1, -2)$ (b) Rotation [centre] $(1, 0)$ 180° or half turn
9 (a) triangle at $(1, 1), (1, -1), (2, -1)$, (b) triangle at $(-1, -1), (1, -1), (1, -2)$ (c) reflection in the x axis	10 (a)(i) Reflection $x = 1.5$ (ii) Rotation $(0, -1)$ 90° [anticlockwise] oe (b)(i) Image at $(5, -1), (6, -1), (6, -3)$ (ii) Image at $(-6, 3), (-4, 3), (-6, 7)$
11 (a)(i) Image at $(1, 7), (4, 7), (4, 9), (3, 9)$ (ii) Image at $(5, 3), (6, 3), (8, 5), (5, 5)$ (iii) Rotation 180° $(4.5, 6)$ OR Enlargement, [factor] -1 $(4.5, 6)$ (b) (i) Image at $(1, 2), (1, 5), (3, 5), (3, 4)$	12 (a) (i) Image at $(-5, 4), (-2, 4), (-4, 6)$ (ii) Image at $(2, 1), (4, -1), (2, -2)$ (b) Rotation 90° [anticlockwise] oe $(1, -1)$

13 (b)(i) (6, 1) (10, 6) (ii) (-3, 1) (-8, 5) (iii) (3, 3) (-1, 8) (c) Enlargement -2 Origin oe	14 (a) Reflection $y = -1$, (b)(i) Image at (-6, 5) (-6, 7) (-5, 7) (-4, 5) (ii) Image at (1, -1) (3, -1) (3, -3) (2, -3) (iii) Image at (1, 2) (1, 6) (3, 6) (5, 2)
15 (a)(i) Translation $\begin{pmatrix} -8 \\ 2 \end{pmatrix}$ (ii) Enlargement [sf =] 1/2 oe (-4, 0) (iii) Rotation 90° clockwise oe (1, -1) (b) Triangle with (1, -1), (5, -1), (1, 7)	16 (a)(i) Image at (3, -3), (7, -3), (7, -5) (ii) Image at (-5, 1), (-1, 1), (-5, -1) (iii) Image at (6, 3), (6, 4), (4, 3) (b) Rotation 90° [anticlockwise] oe (-6, -2)
17 (a)(i) Translation $\begin{pmatrix} 5 \\ 8 \end{pmatrix}$ (ii) Enlargement [sf] 0.5 oe [centre] (0, -7) (iii) Rotation 90 [anticlockwise] oe Origin oe (b) Image at (-8, 1) (-8, 5) (-8, 7) (-4, 1)	18 (a) Rotation 90° clockwise oe Origin oe (b)(i) Image at (-4, -1) (-4, -4) (-2, -4) (ii) Image at (3, -1) (5, -1) (3, -4)
19 (a)(i) Reflection $y = -1$ (ii) Triangle at (0, -3), (4, -1), (4, -3) (iii) Triangle at (-2, 2), (-2, 6), (-4, 6) (iv) Triangle at (-3, -1), (-3, -2), (-1, -1)	20 (a)(i) Rotation 1 90° [anticlockwise] oe 1 (9, 5) (ii) Translation $\begin{pmatrix} -8 \\ -14 \end{pmatrix}$ (iii) Enlargement 1[sf] 1/3 (-8, -2) (b) Image at (1, -3) (2, -3) (2, -5)
21 (a)(i) Image at (5, 1), (7, 1), (7, 4) (ii) Image at (-1, 1), (-4, 1), (-1, 3) (iii) Image at (2, -4), (4, -4), (2, -1) (b) Enlargement [sf] -0.5 oe (5, 5)	22 (a)(i) Image at (8, 1), (10, 5), (8, 5) (ii) Image at (4, 10), (4, 8), (8, 8) (iii) Image at (6, 3), (6, 5), (7, 5)
23 (i) Translation $\begin{pmatrix} 3 \\ -13 \end{pmatrix}$ (ii) Enlargement [sf] -1/2 (0, -4) (b) Image at (0, 0) (0, 6) (-4, 6) (-4, 2) (c) Image at (4, 0) (10, 0) (10, -4) (6, -4)	24 (a)(i)(1,-3),(2,-3),(5,-3),(1,-5) (a)(ii) (0,1),(2,1),(-3,1),(1,2) (a)(iii)(-1,-1),(-1,-4),(-1,-6),(-2,-5) (b)(i) Enlargement [factor] 1/2 or 0.5 [centre] (0, 0) oe
25 (a)(i) Image at (0, 1), (0, 2), (-3, 1) (ii) Image at (0, 0), (0, -2), (6, -2) (iii) Image at (-5, 4), (-5, 5), (-2, 4) (b) Rotation 90° clockwise oe (4, -1)	26 (a) (i) Rotation 90° [anticlockwise] oe (4, 4) (ii) Enlargement [centre] (5, 1) [scale factor] 2 (b) (i) Image at (-2, 5) (-2, 7) (-1, 7) (ii) Image at (-2, 1) (-2, -1) (-1, -1)
27 (a) (i) Triangle drawn, vertices (2, -4), (2, -5), (4, -4) (ii) Triangle drawn, vertices (-3, 4), (-3, 5), (-1, 4) (iii) Enlargement [factor] 3 [centre] (-6, -5)	28 (a) (i) Image at (3, 1), (5, 1), (5, 4), (4, 4), (4, 2), (3, 2) (ii) Image at (2, 1), (6, 1), (6, -5), (4, -5), (4, -1), (2, -1)
29 (i) Correct image (2, -5) (4, -5) (4, -1) (ii) Correct image (-2, 1) (-6, 1) (-6, -1) (iii) Translation by $\begin{pmatrix} 1 \\ 9 \end{pmatrix}$ (iv) Enlargement [SF] -1/2 oe [Centre] (2, 1)	30 (i) Image at (-2, -4), (4, -4), (4, 0) (b) (i) Enlargement [factor] 0.5 oe [centre] (0, 0) oe
31 (a) Triangle drawn at (-4, 3), (-1, 3), (-1, 4) (b) Triangle drawn at	32 (a) (i) Rotation [centre] (0, 0) or origin 90° [anticlockwise] oe (ii) Enlargement [centre]

(1, 7), (1, 6), (4, 6) (c) Triangle drawn at (2, 3), (2, 1), (8, 1) (d) Rotation 90° clockwise oe (7, 4)	(-2, 1) [s.f.] - 2 (b) vertices at (-3, 4) (-3, 5) (-3, 6) (-2, 6) (c) vertices at (7, 3) (7, 4) (7, 5) (6, 5)
33 (a) (i) image at (1, 4) (1, 5) (2, 5) (4, 4) (ii) image at (-2, -1) (-5, -1) (-2, -2) (-3, -2) (iii) image at (2, -1) (2, -2) (3, -2) (5, -1) enlargement (1, 0) [scale factor] - 3	34 (a) (i) Triangle at (-3, 1), (-3, 3), (-4, 3) (ii) Triangle at (-1, -1), (-2, -3), (-1, -3) (b) (i) Translation $\begin{pmatrix} -2 \\ 2 \end{pmatrix}$ (ii) Enlargement (0, 3) [factor] 3
35 (a) Enlargement [SF] - $1/2$ oe [centre] (2, 5) (b) (i) Image at (-2, 6), (-8, 3), (-4, 3) (ii) Image at (3, -2), (3, 2), (6, 4) (iii) Image at (-5, 1), (-3, -2), (1, -2)	36 (a) Enlargement [centre] (-3, 4) [scale factor] 3 (b) (i) Image at (1, 5), (4, 5), (4, 6), (1, 7) (ii) Image at (5, 1), (8, 1), (8, 3), (5, 2)
37 (a) (i) Rotation (centre/about) origin (0, 0) 180° (ii) Enlargement (centre/about) (0, -3) SF - 3 (iii) Enlargement (centre/about) (0, 6) SF $1/3$ (b) (i) image at (-4, -2) (-2, -2) and (-1, 0) (ii) image at (-2, 3) (-4, 3) and (-5, 5)	38 (a) Triangle with vertices (6, 4), (9, 4), (9, 6) (b) Triangle with vertices (11, 1), (8, 1), (8, 3) (c) (i) Rotation 90° [anticlockwise] oe [centre] (0, 0) oe
39 (a) (i) Correct translation to (3, -5), (5, -6) and (4, -4) (ii) Correct reflection to (4, 1), (5, 3) and (6, 2) (iii) Correct rotation to (-2, 0), (-1, 2) and (-3, 1) (iv) Correct enlargement to (0, -3), (-8, 1) and (-4, -7)	40 (a) (i) Reflection (M), $x = 1$ (ii) Rotation (R) 180° (centre) (1, 0) (iii) Enlargement (E) (centre) (6, 4) (scale factor) 3