1. Nov/2021/Paper_12/No.14

Work out.

(a) $\begin{pmatrix} 3 \\ -2 \end{pmatrix} + \begin{pmatrix} -5 \\ 7 \end{pmatrix}$

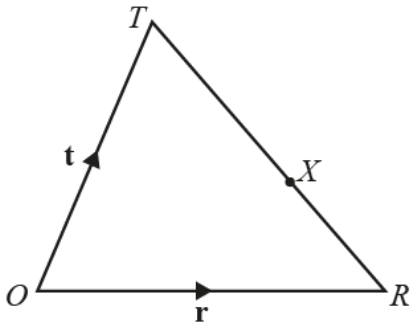
$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b) $5\begin{pmatrix} 3 \\ -1 \end{pmatrix}$

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

PapaCambridge

2. Nov/2021/Paper_23/No.26



NOT TO SCALE

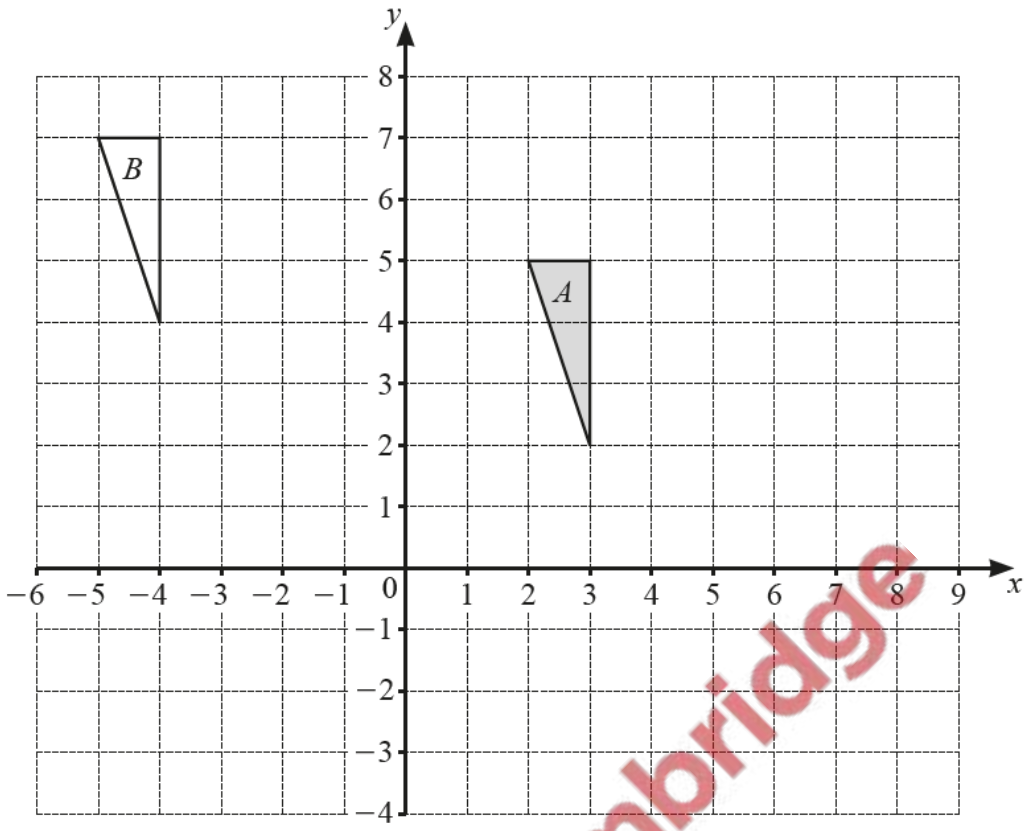
ORT is a triangle.
X is a point on TR so that $TX : XR = 3 : 2$.
O is the origin, $\overrightarrow{OR} = \mathbf{r}$ and $\overrightarrow{OT} = \mathbf{t}$.

Find the position vector of X.
Give your answer in terms of $\mathbf{r}$ and $\mathbf{t}$ in its simplest form.

..... [3]

PapaCambridge

3. Nov/2021/Paper_31/No.9



(a) On the grid, draw the image of

(i) triangle A after a rotation of 90° clockwise about the origin, [2]

(ii) triangle A after a reflection in the line $x = 5$, [2]

(iii) triangle A after an enlargement, scale factor 2, centre (7, 7). [2]

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

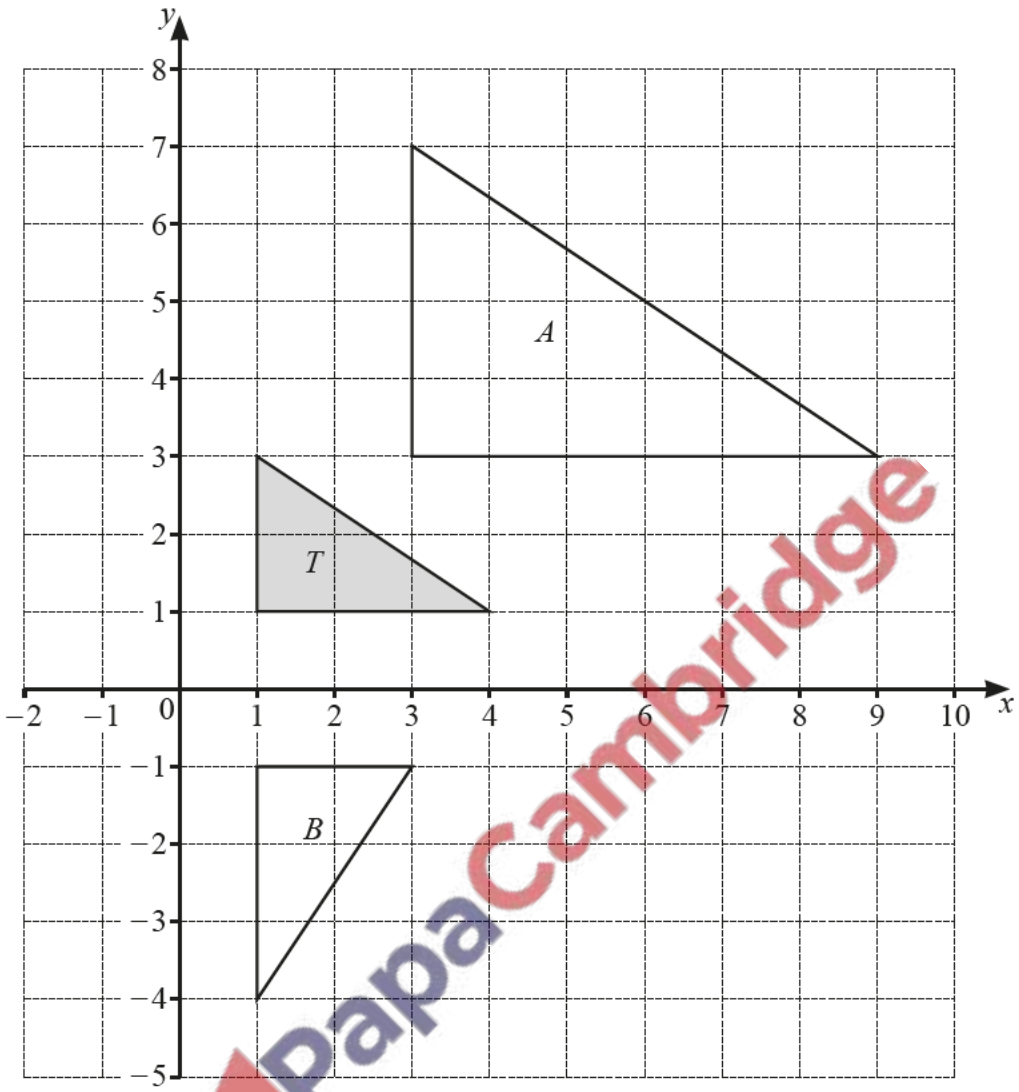
.....

..... [2]

PapaCambridge

4. Nov/2021/Paper_32/No.9

Triangles A, B and T are shown on the grid.



PapaCambridge

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

.....

..... [3]

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

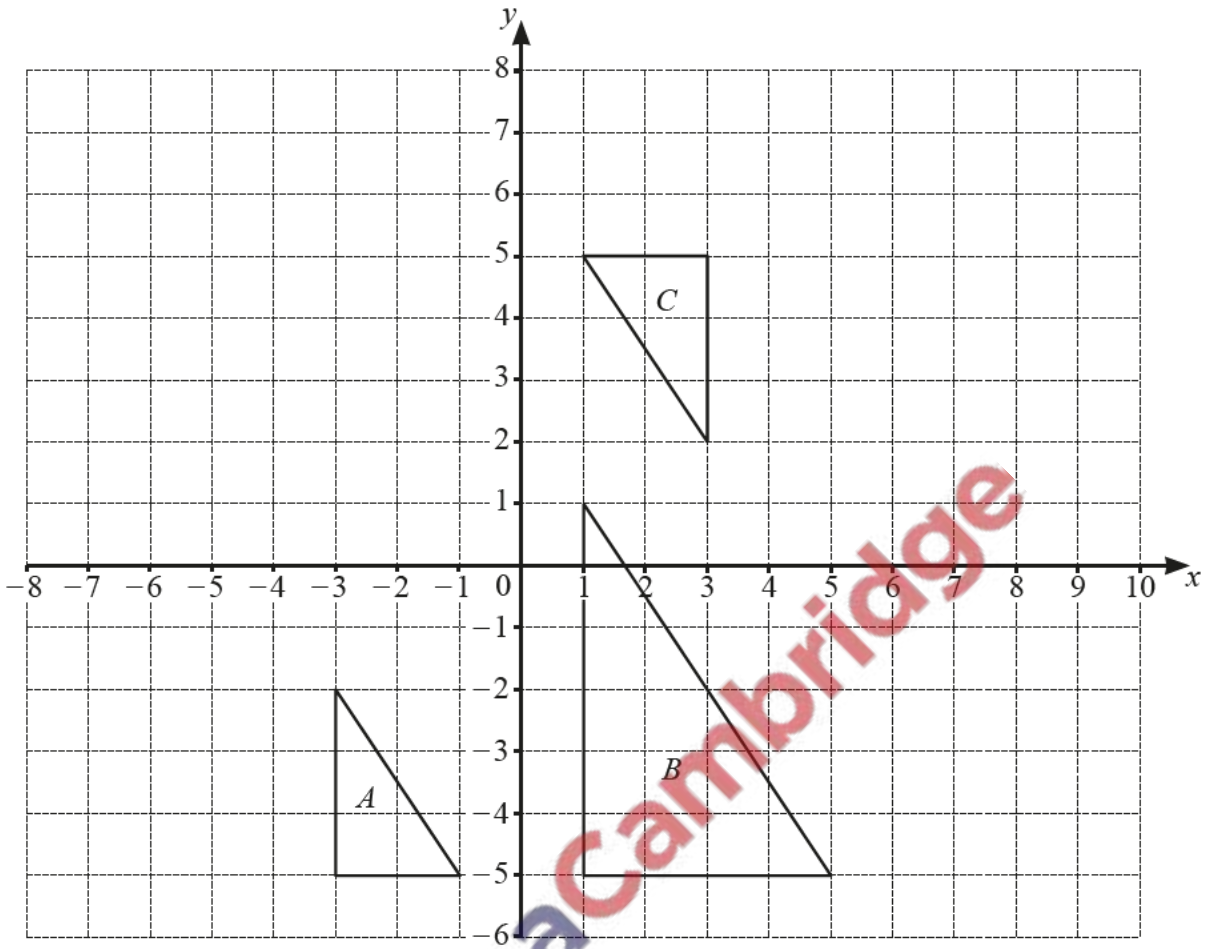
.....

..... [3]

(c) On the grid, draw the image of triangle T after a translation by the vector $\begin{pmatrix} 5 \\ -3 \end{pmatrix}$. [2]

5. Nov/2021/Paper_33/No.3b

(b) Triangles A, B and C are shown on the grid.



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

(a) triangle A onto triangle B,

.....

..... [3]

(b) triangle A onto triangle C.

.....

..... [3]

(ii) On the grid, reflect triangle C in the line $x = -1$. [2]

(iii) On the grid, translate triangle C by the vector $\begin{pmatrix} 5 \\ -1 \end{pmatrix}$. [2]

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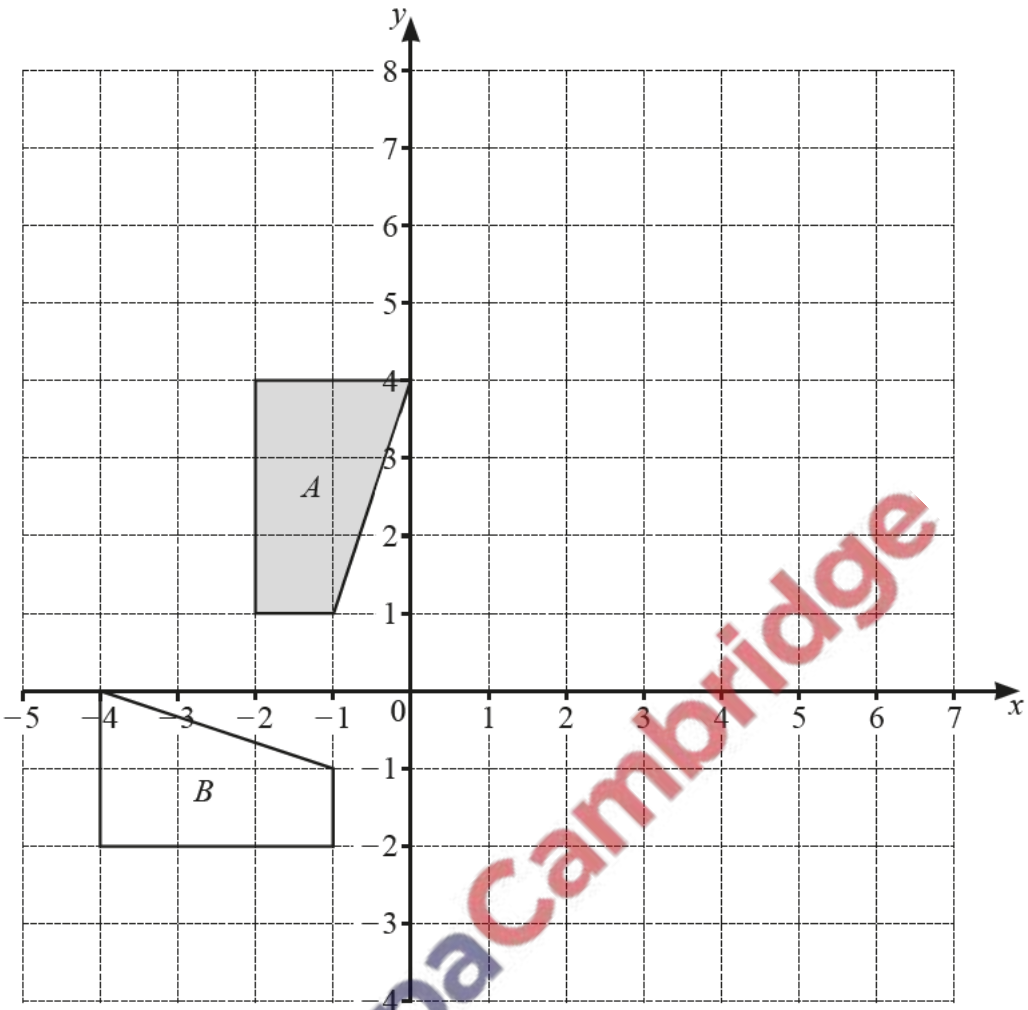
6. Nov/2021/Paper_41/No.7

(a)



(i) On the grid, draw the image of

(a) shape A after an enlargement, scale factor 2, centre (0, 1), [2]

(b) shape A after a reflection in the line $y = x - 1$. [3]

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

.....

..... [3]

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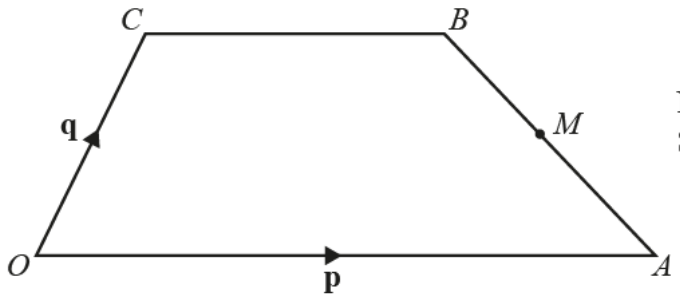
(b)



NOT TO SCALE

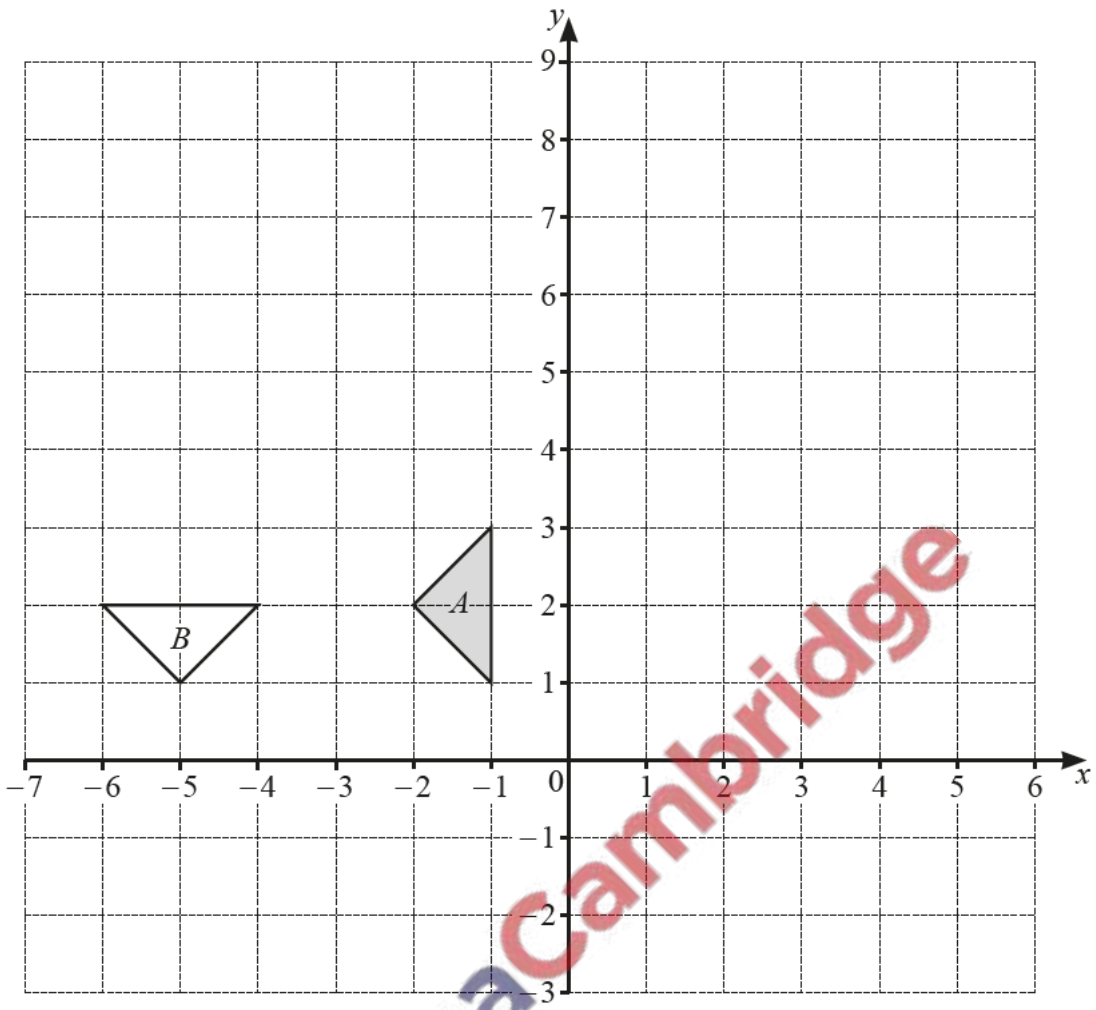
$OABC$ is a trapezium and O is the origin.
M is the midpoint of AB.
$\overrightarrow{OA} = \mathbf{p}$, $\overrightarrow{OC} = \mathbf{q}$ and $OA = 2CB$.

Find, in terms of **p** and **q**, the position vector of M.
Give your answer in its simplest form.

PapaCambridge

..... [3]

7. Nov/2021/Paper_42/No.4



PapaCambridge

(a) On the grid, draw the image of triangle A after

(i) a translation by the vector $\begin{pmatrix} -4 \\ 5 \end{pmatrix}$, [2]

(ii) a reflection in the line $x = 1$, [2]

(iii) an enlargement, scale factor 2 and centre $(-5, -2)$. [2]

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

.....

..... [3]

8. Nov/2021/Paper_42/No.9

(a) F is the point $(5, -2)$ and $\overrightarrow{FG} = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$.

Find

(i) the coordinates of point G,

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

(ii) $5\overrightarrow{FG}$,

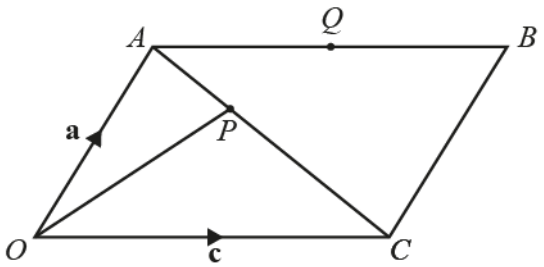
$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(iii) $|\overrightarrow{FG}|$.

..... [2]

PapaCambridge

(b)



NOT TO SCALE

$OABC$ is a parallelogram.
P is a point on AC and Q is the midpoint of AB.
$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{c}$.

(i) Find, in terms of **a** and/or **c**

(a) $\overrightarrow{AQ}$,

$\overrightarrow{AQ} =$ ..... [1]

(b) $\overrightarrow{OQ}$.

$\overrightarrow{OQ} =$ ..... [1]

(ii) $\overrightarrow{OP} = \frac{2}{3}\mathbf{a} + \frac{1}{3}\mathbf{c}$

(a) Show that O, P and Q lie on a straight line.

[2]

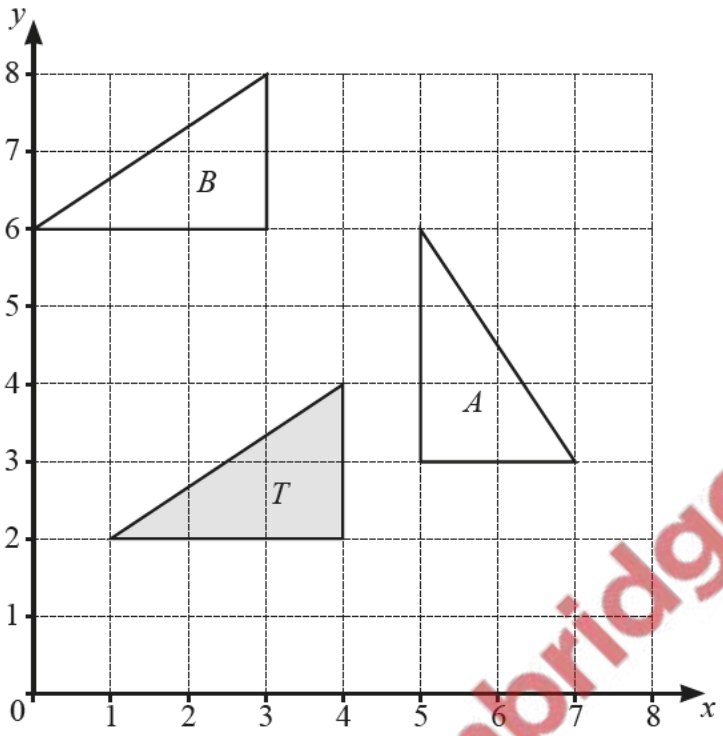
(b) Write down the ratio $OP : OQ$.
Give your answer in the form $1 : n$.

1 : ..... [1]

PapaCambridge

9. Nov/2021/Paper_43/No.1

The diagram shows three triangles, T, A, and B, drawn on a 1 cm^2 grid.



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

.....

..... [3]

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

.....

..... [2]

(ii) Calculate the distance that each point of triangle T moves when it is mapped onto triangle B.

..... cm [2]

PapaCambridge

10. March/2021/Paper_12/No.7

Work out.

(a) $2\begin{pmatrix}-3\\7\end{pmatrix}$

$\begin{pmatrix}\quad\\\quad\end{pmatrix}$ [1]

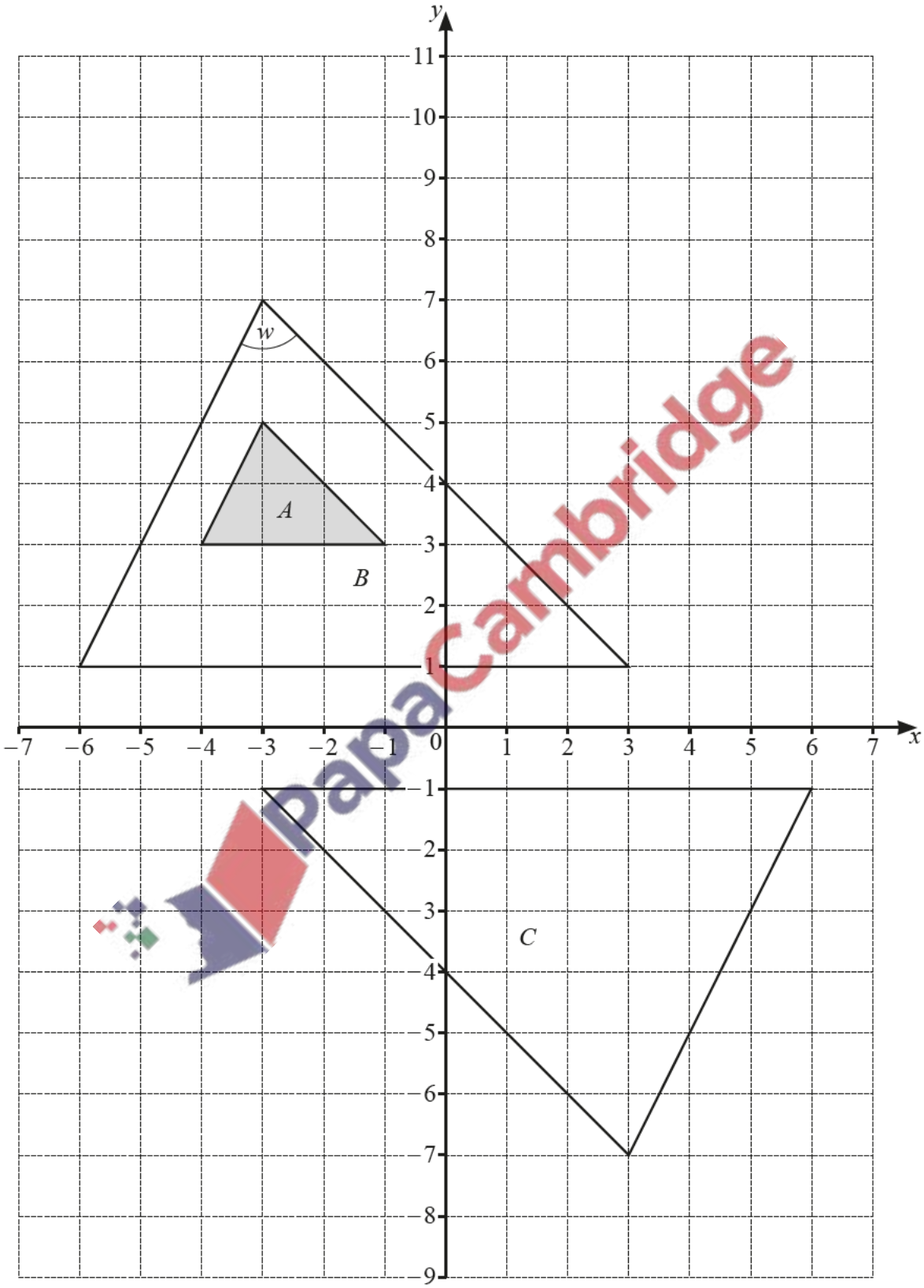
(b) $\begin{pmatrix}8\\-6\end{pmatrix}+\begin{pmatrix}-5\\2\end{pmatrix}$

$\begin{pmatrix}\quad\\\quad\end{pmatrix}$ [1]

PapaCambridge

11. March/2021/Paper_32/No.3

The diagram shows three triangles A, B and C on a grid.
Triangle A is shaded.



PapaCambridge

(a) Measure angle w.

Angle w = ... [1]

(b) Explain why triangle B is congruent to triangle C.

..... [1]

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

(i) triangle A onto triangle B,

.....

..... [3]

(ii) triangle B onto triangle C.

.....

..... [3]

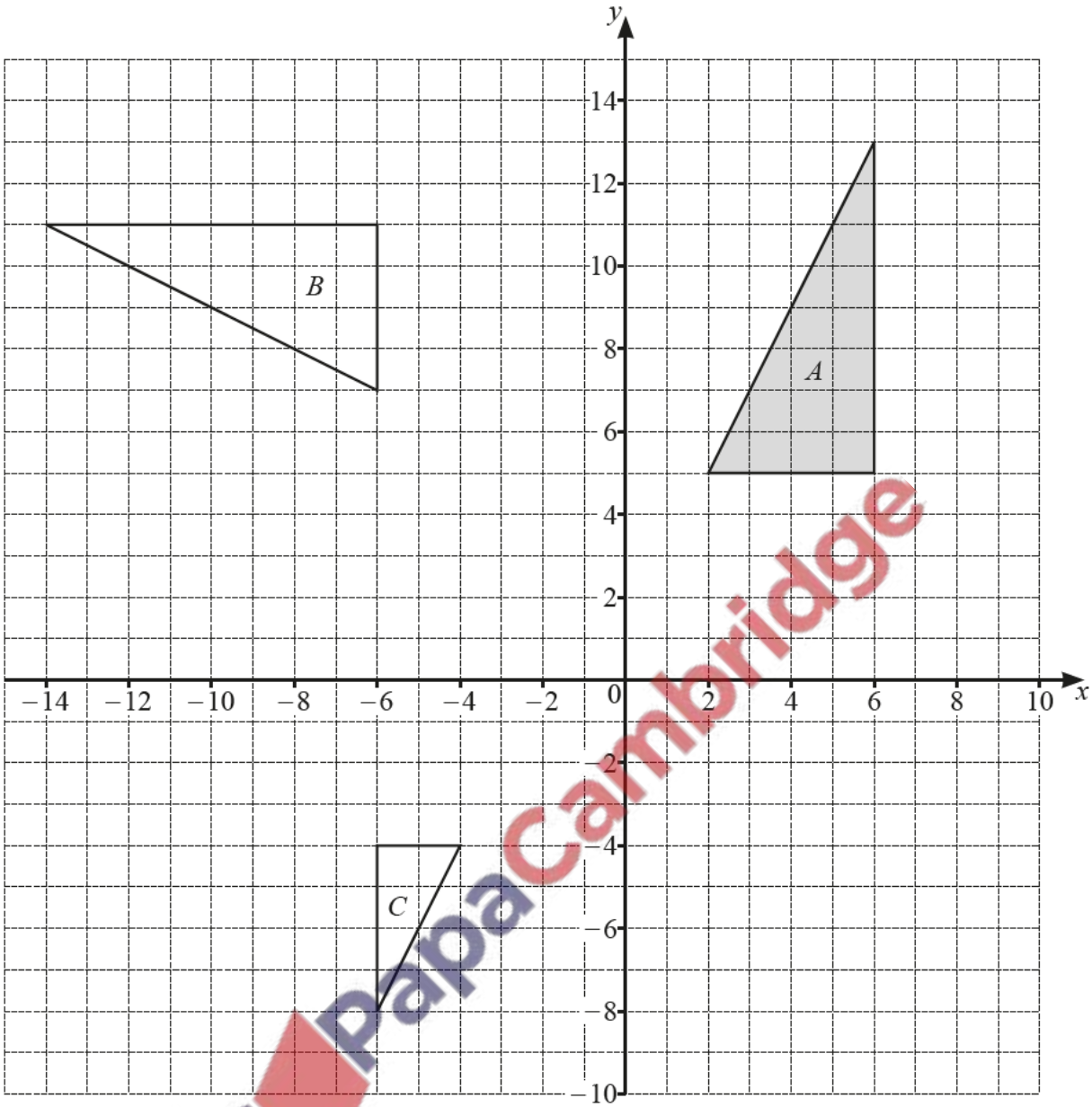
(d) On the grid, draw the image of

(i) shape A after a translation by the vector $\begin{pmatrix} 7 \\ -1 \end{pmatrix}$, [2]

(ii) shape A after a reflection in the line $y = -1$. [2]

PapaCambridge

12. March/2021/Paper_42/No.2



PapaCambridge

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

(i) triangle A onto triangle B,

.....

..... [3]

(ii) triangle A onto triangle C.

.....

..... [3]

(b) Draw the image of triangle A after a translation by the vector $\begin{pmatrix} -5 \\ -10 \end{pmatrix}$. [2]

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

PapaCambridge

13. June/2021/Paper_11/No.9

Work out.

(a) $\begin{pmatrix} 6 \\ -5 \end{pmatrix} + \begin{pmatrix} 8 \\ -1 \end{pmatrix}$

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b) $3\begin{pmatrix} -4 \\ 7 \end{pmatrix}$

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

PapaCambridge

14. June/2021/Paper_12/No.7

$$\mathbf{a} = \begin{pmatrix} 5 \\ -7 \end{pmatrix} \qquad \mathbf{b} = \begin{pmatrix} -2 \\ 6 \end{pmatrix}$$

Work out $\mathbf{a} - \mathbf{b}$.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

PapaCambridge

15. June/2021/Paper_13/No.10

(a) $\mathbf{a} = \begin{pmatrix} 3 \\ -4 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 5 \\ 2 \end{pmatrix}$

Work out.

(i) $8\mathbf{b}$

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(ii) $\mathbf{a} - \mathbf{b}$

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b) Point L has coordinates $(-3, 6)$ and $\overrightarrow{LM} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$.

Find the coordinates of point M.

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

PapaCambridge

16. June/2021/Paper_21/No.5

Work out.

(a) $\begin{pmatrix} 6 \\ -5 \end{pmatrix} + \begin{pmatrix} 8 \\ -1 \end{pmatrix}$

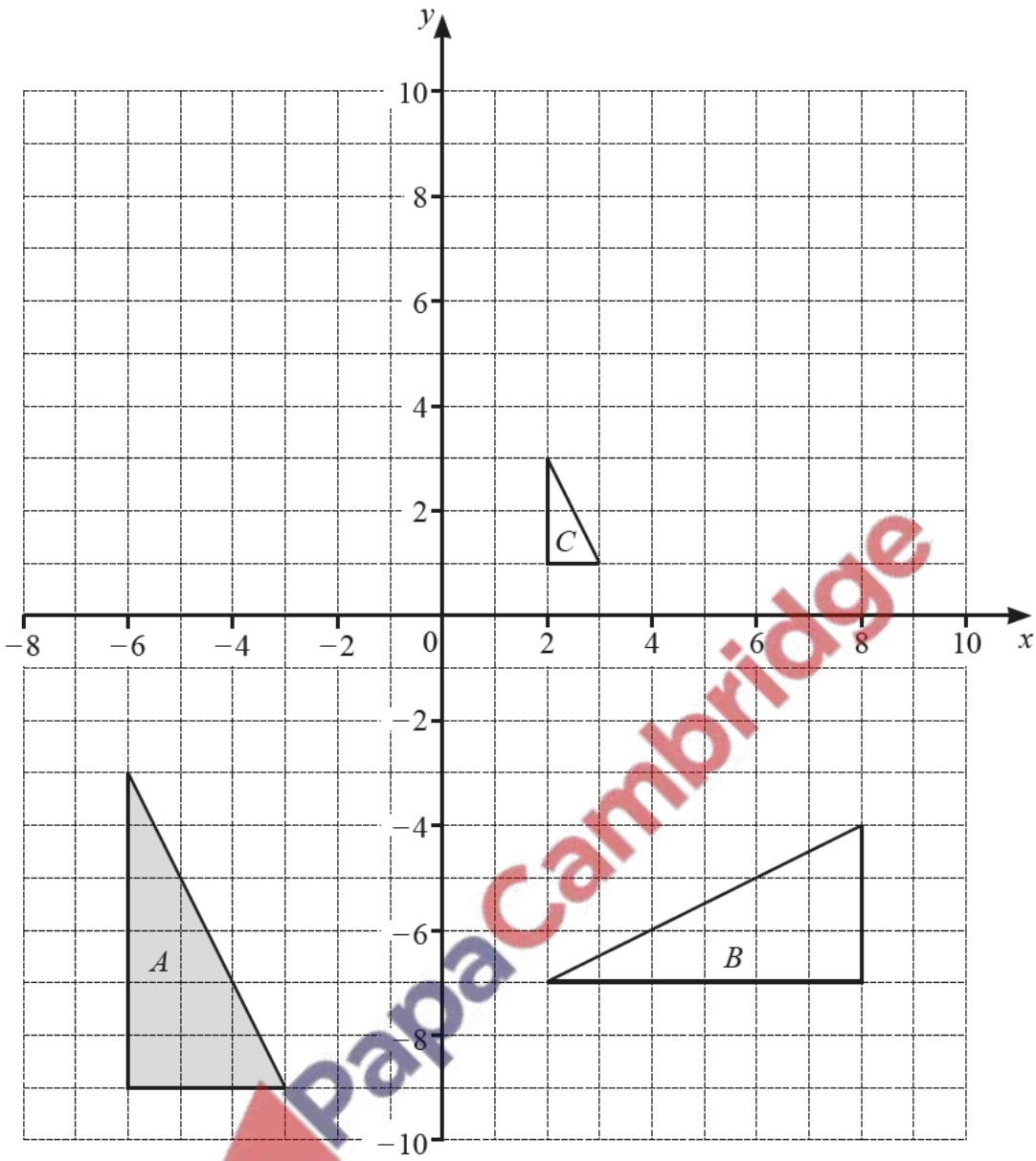
$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b) $3\begin{pmatrix} -4 \\ 7 \end{pmatrix}$

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

PapaCambridge

17. June/2021/Paper_21/No.10



PapaCambridge

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

(i) triangle A onto triangle B,

.....

..... [3]

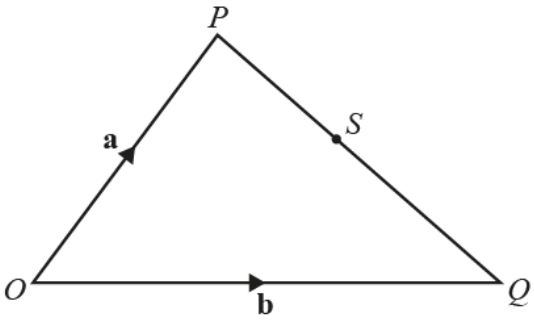
(ii) triangle A onto triangle C.

.....

..... [3]

(b) Draw the image of triangle A after a translation by the vector $\begin{pmatrix} 2 \\ 10 \end{pmatrix}$. [2]

18. June/2021/Paper_21/No.18



NOT TO SCALE

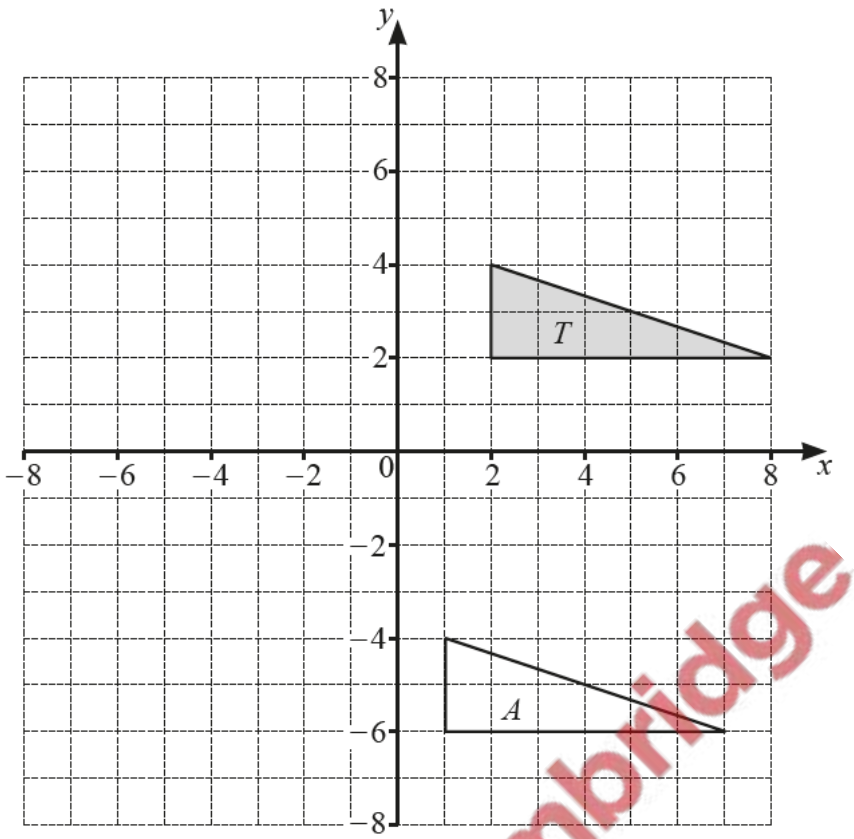
S is a point on PQ such that $PS : SQ = 4 : 5$.

Find $\overrightarrow{OS}$, in terms of **a** and **b**, in its simplest form.

$\overrightarrow{OS}$ = ... [2]

PapaCambridge

19. June/2021/Paper_23/No.10



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

.....

..... [2]

(b) Draw the image of triangle T after an enlargement, scale factor $-\frac{1}{2}$, centre (0, 0). [2]

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20. June/2021/Paper_23/No.14

The magnitude of the vector $\begin{pmatrix} 20 \\ k \end{pmatrix}$ is 29.

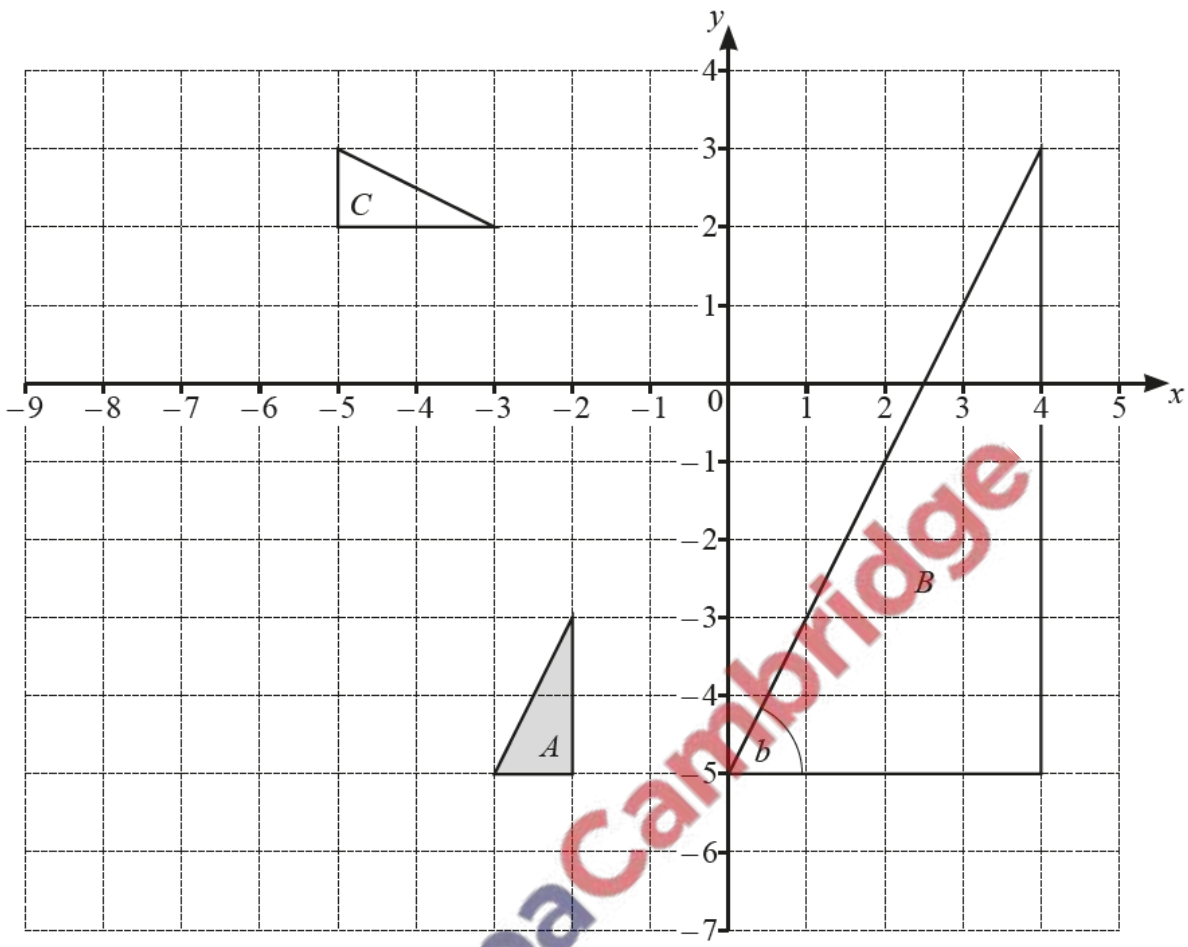
Find the value of k.

$k =$ ..... [3]

PapaCambridge

21. June/2021/Paper_31/No.6

The diagram shows three triangles, A, B and C, on a 1 cm^2 grid.



PapaCambridge

(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, draw the image of

(i) triangle A after a translation by the vector $\begin{pmatrix} -5 \\ 4 \end{pmatrix}$, [2]

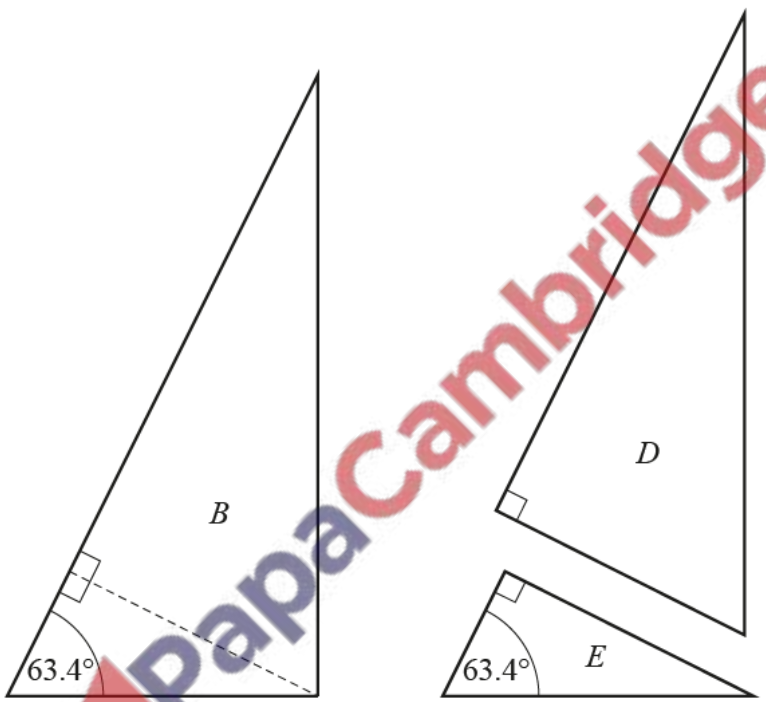
(ii) triangle A after a reflection in the line $x = -4.5$. [2]

(c) The diagram also shows an angle b in triangle B.

Use trigonometry to show that angle b is 63.4°, correct to 1 decimal place.

[2]

(d)



Two new triangles, D and E, are made from triangle B, as shown in the diagram.

Are all three triangles similar?
Give a reason for your answer.

..... because .....

..... [2]

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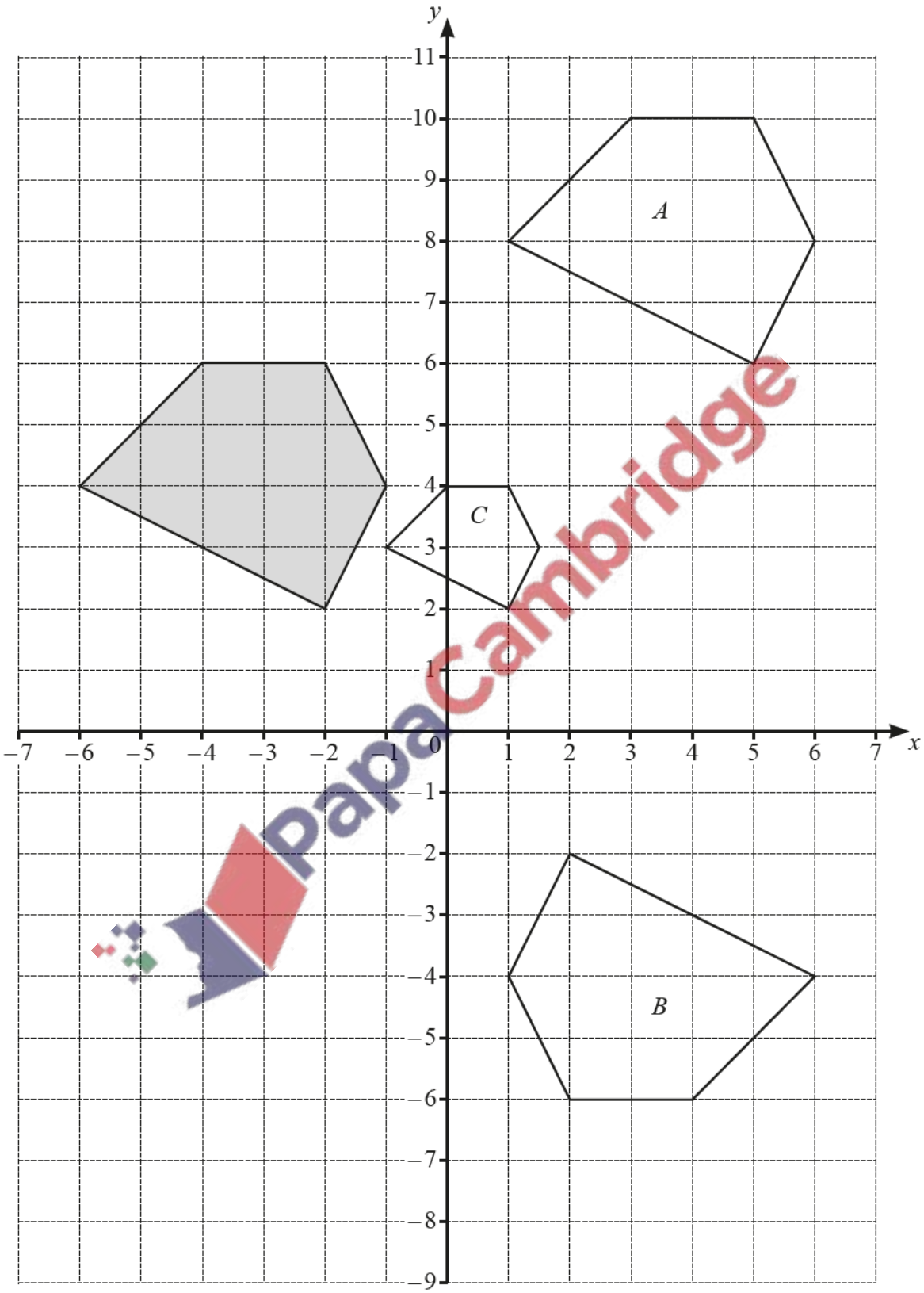
22. June/2021/Paper_32/No.2

The diagram shows four polygons on a 1 cm^2 grid.



PapaCambridge

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

..... [1]

(b) Find the area of the shaded polygon.

..... cm^2 [2]

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

(i) the shaded polygon onto polygon A,

.....

..... [2]

(ii) the shaded polygon onto polygon B,

.....

..... [3]

(iii) the shaded polygon onto polygon C.

.....

..... [3]

(d) On the grid, draw the image of the shaded polygon after a reflection in the line $y = 0$. [2]

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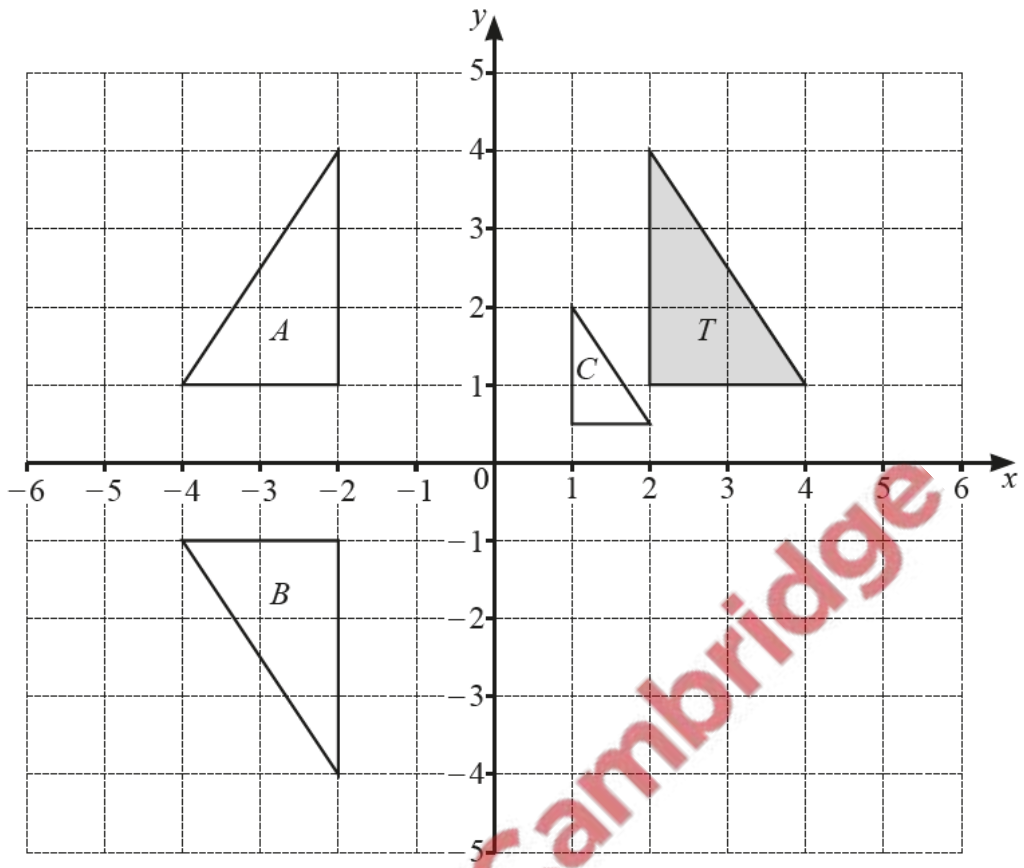
23. June/2021/Paper_33/No.10

The diagram shows four triangles on a grid.



(a) On the grid, translate triangle T by the vector $\begin{pmatrix} 2 \\ -5 \end{pmatrix}$. [2]

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

(i) triangle T onto triangle A,

.....

..... [2]

(ii) triangle T onto triangle B,

.....

..... [3]

(iii) triangle T onto triangle C.

.....

..... [3]

PapaCambridge

24. June/2021/Paper_42/No.5

(a) $\mathbf{a} = \begin{pmatrix} -3 \\ 8 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$

(i) Find

(a) $\mathbf{b} - \mathbf{a}$,

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b) $2\mathbf{a} + \mathbf{b}$,

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

(c) $|\mathbf{b}|$.

..... [2]

(ii) $\mathbf{a} + k\mathbf{b} = \begin{pmatrix} 13 \\ m \end{pmatrix}$, where k and m are integers.

Find the value of k and the value of m.

$k =$ .....

$m =$ ..... [3]

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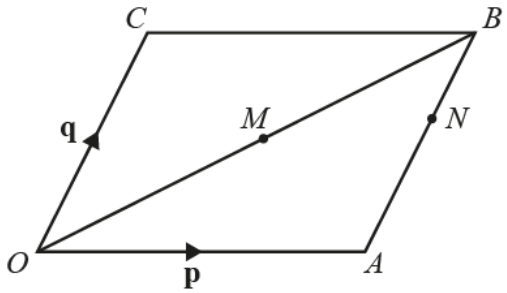
(b)



NOT TO SCALE

$OABC$ is a parallelogram and O is the origin.
M is the midpoint of OB.
N is the point on AB such that $AN : NB = 3 : 2$.
$\overrightarrow{OA} = \mathbf{p}$ and $\overrightarrow{OC} = \mathbf{q}$.

(i) Find, in terms of **p** and **q**, in its simplest form.

(a) $\overrightarrow{OB}$

$\overrightarrow{OB} =$ ..... [1]

(b) $\overrightarrow{CM}$

$\overrightarrow{CM} =$ ..... [2]

(c) $\overrightarrow{MN}$

$\overrightarrow{MN} =$ ..... [2]

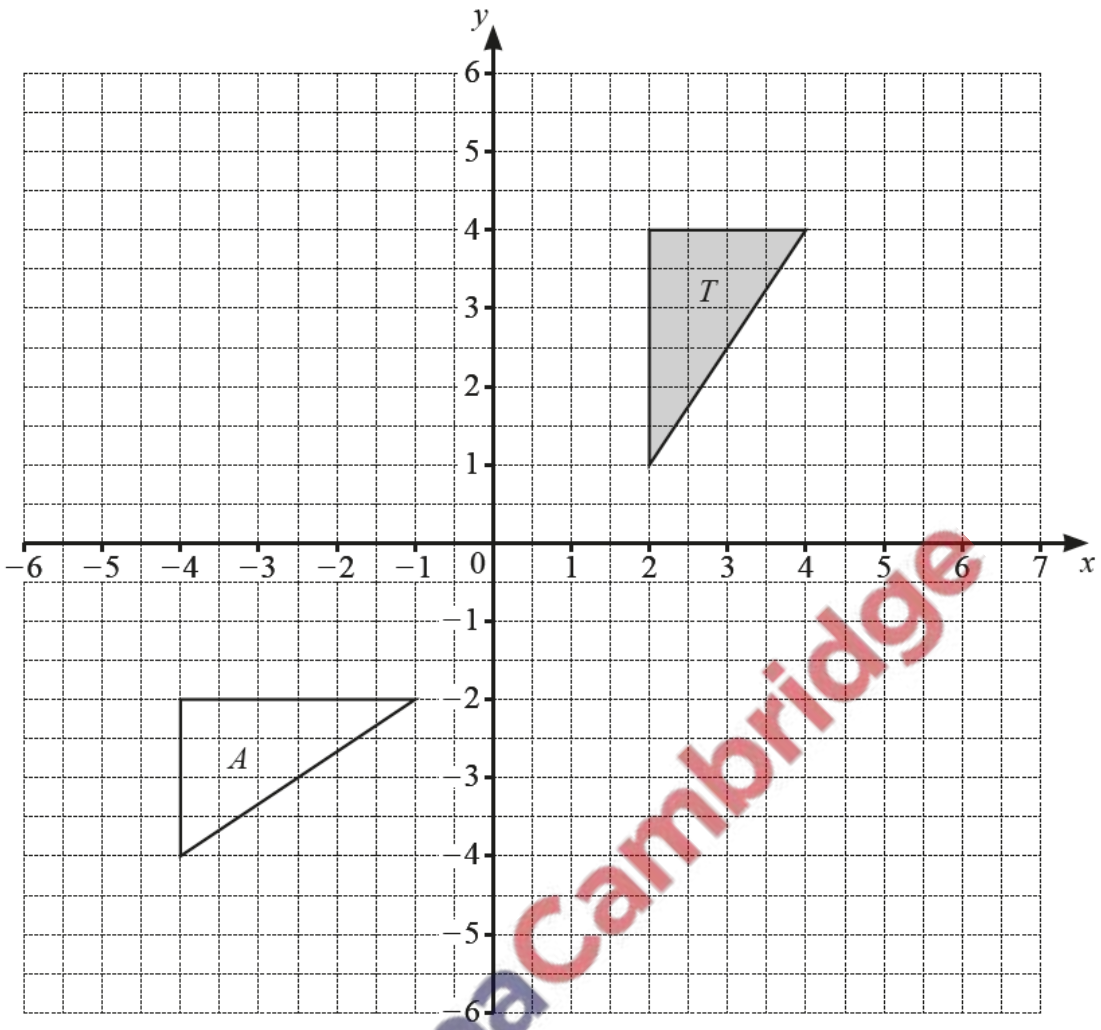
(ii) CB and ON are extended to meet at D.

Find the position vector of D in terms of **p** and **q**.
Give your answer in its simplest form.

..... [3]

PapaCambridge

25. June/2021/Paper_42/No.7



(a) On the grid, draw the image of

(i) triangle T after a translation by the vector $\begin{pmatrix} 2 \\ -1 \end{pmatrix}$, [2]

(ii) triangle T after a rotation, 90° clockwise, about the origin, [2]

(iii) triangle T after an enlargement, scale factor $-\frac{1}{2}$, centre $(-2, 3)$. [2]

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

.....

..... [2]

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(b) The position vector of P is $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$ and the position vector of Q is $\begin{pmatrix} -2 \\ 5 \end{pmatrix}$.

(i) Find the vector $\overrightarrow{PQ}$.

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

(ii) R is the point such that $\overrightarrow{PR} = 3\overrightarrow{PQ}$.

Find the position vector of R.

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

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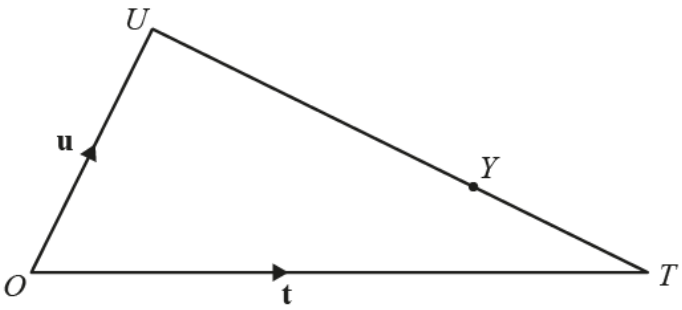
(c)



NOT TO SCALE

$\overrightarrow{OT} = \mathbf{t}$, $\overrightarrow{OU} = \mathbf{u}$ and $UY = 2YT$.

(i) Find $\overrightarrow{OY}$ in terms of **t** and **u**.
Give your answer in its simplest form.

$\overrightarrow{OY}$ = ... [2]

(ii) Z is on OT and YZ is parallel to UO.

Find $\overrightarrow{OZ}$ in terms of **t** and/or **u**.
Give your answer in its simplest form.

$\overrightarrow{OZ}$ = ... [1]

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