eClassroom

GCSE Mathematics

Transformations

Questions

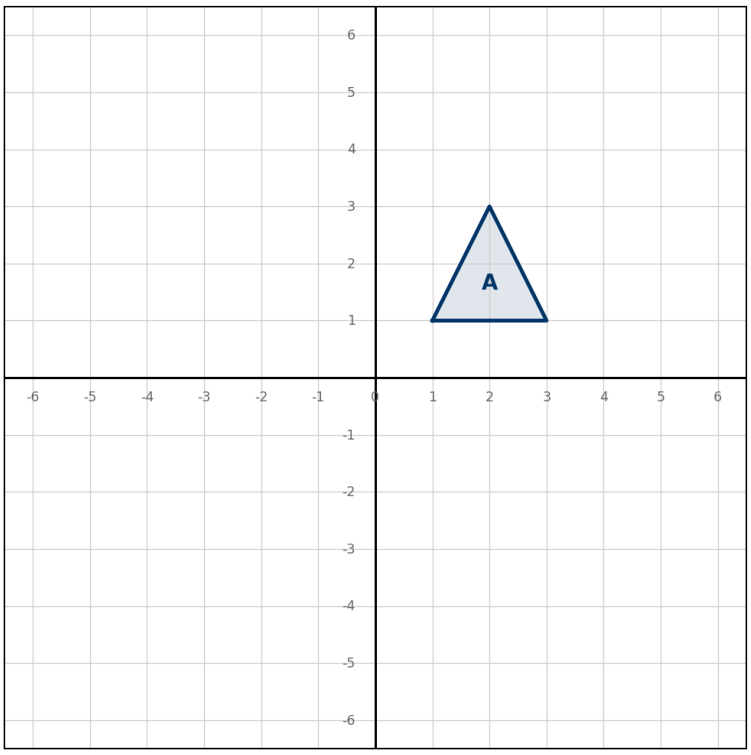
Pearson Edexcel GCSE & iGCSE Mathematics

Section A — Foundation

Worked Examples

[Fluency]

Reflect triangle A in the x-axis.



Reflect each vertex: (x,y)→(x,–y). Image: (1,–1),(3,–1),(2,–3)

[Reasoning]

Rotate triangle A by 90° anticlockwise about the origin.

Rule: (x,y)→(–y,x)

(1,1)→(–1,1), (3,1)→(–1,3), (2,3)→(–3,2)

[Problem Solving]

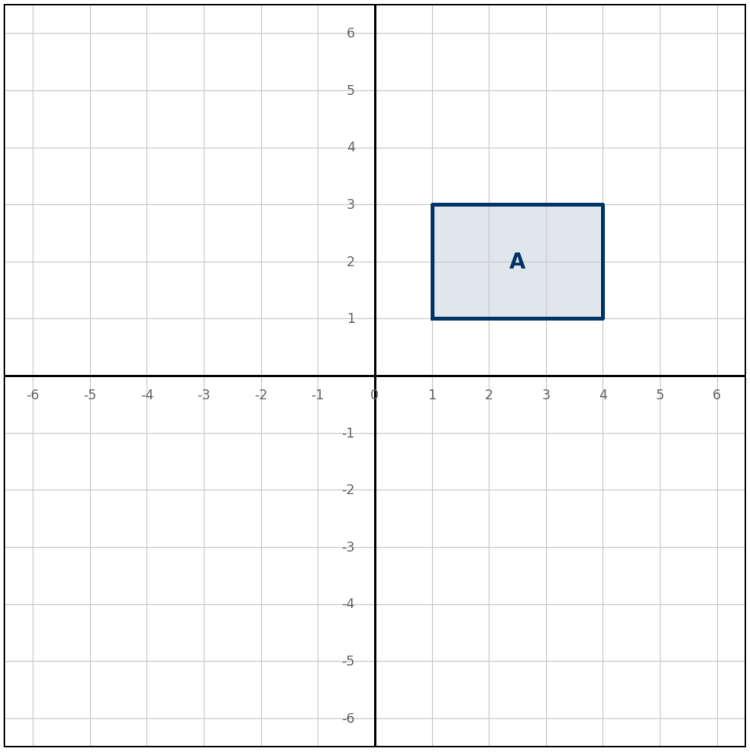
Enlarge triangle A by scale factor 2, centre (0,0).

Multiply each coordinate by 2:

(1,1)→(2,2), (3,1)→(6,2), (2,3)→(4,6)

[Fluency]

1.

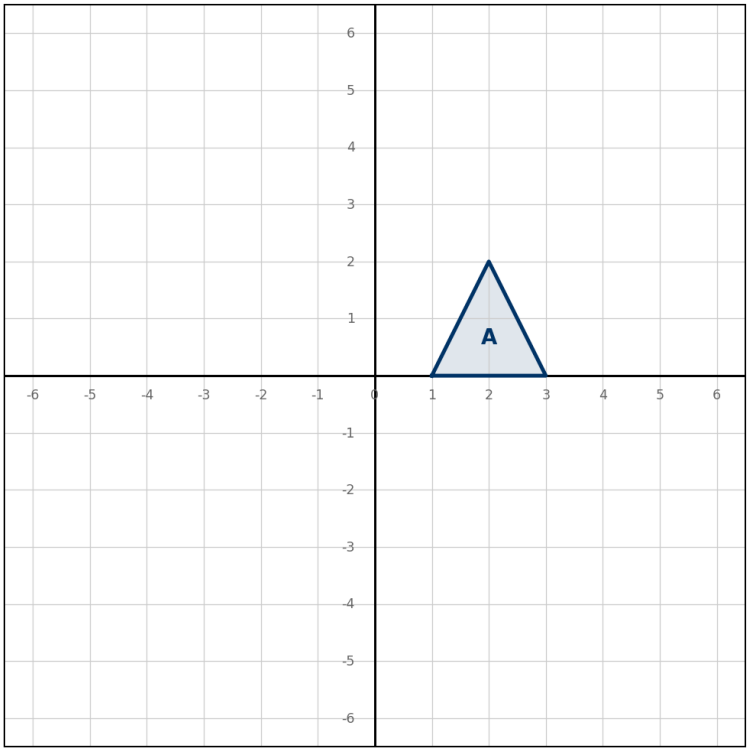


Reflect shape A in the y-axis. Label the image B.

(2 marks)

[Fluency]

2.

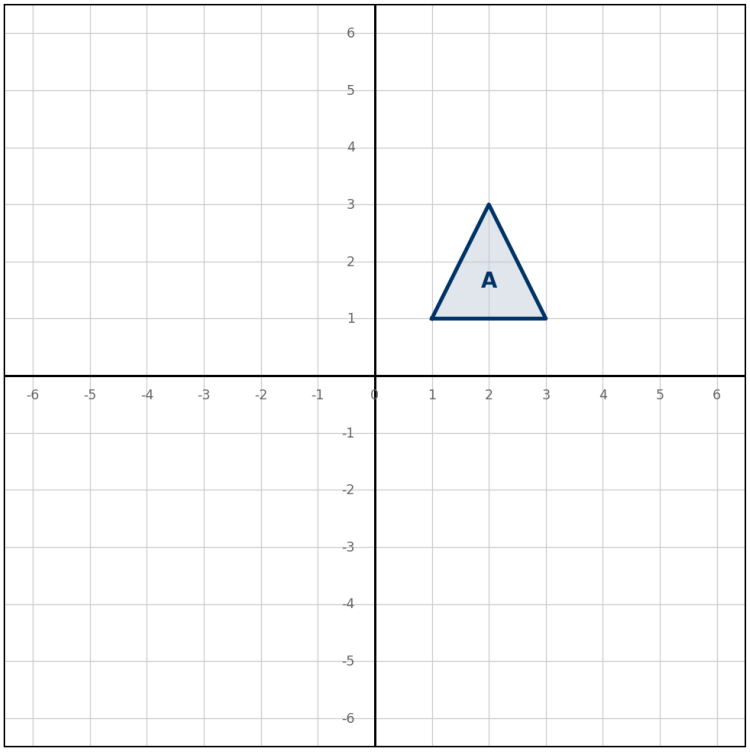


Reflect triangle A in the line y = x. Label the image B.

(2 marks)

[Fluency]

3.

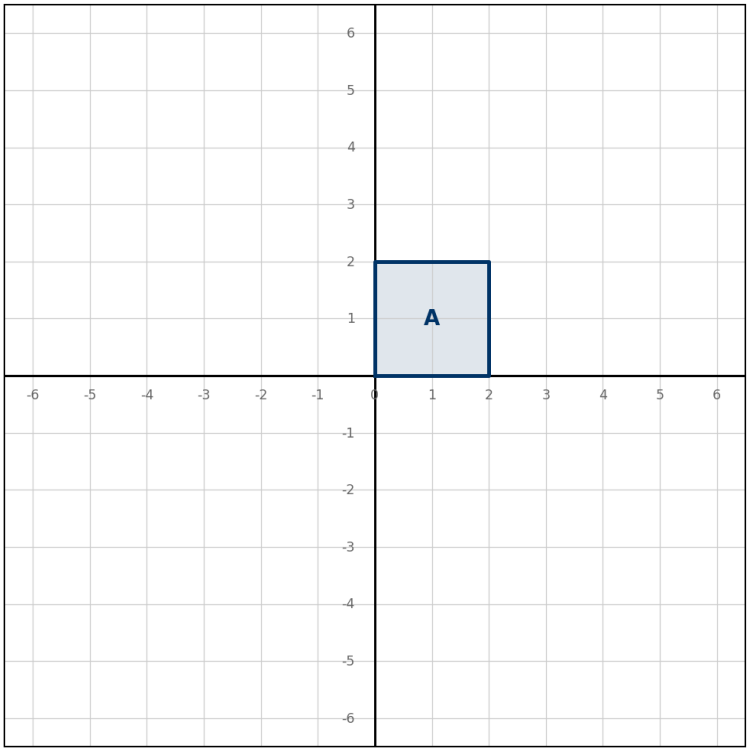


Rotate triangle A by 90° anticlockwise about the origin. Label the image B.

(2 marks)

[Fluency]

4.



Translate square A by the vector

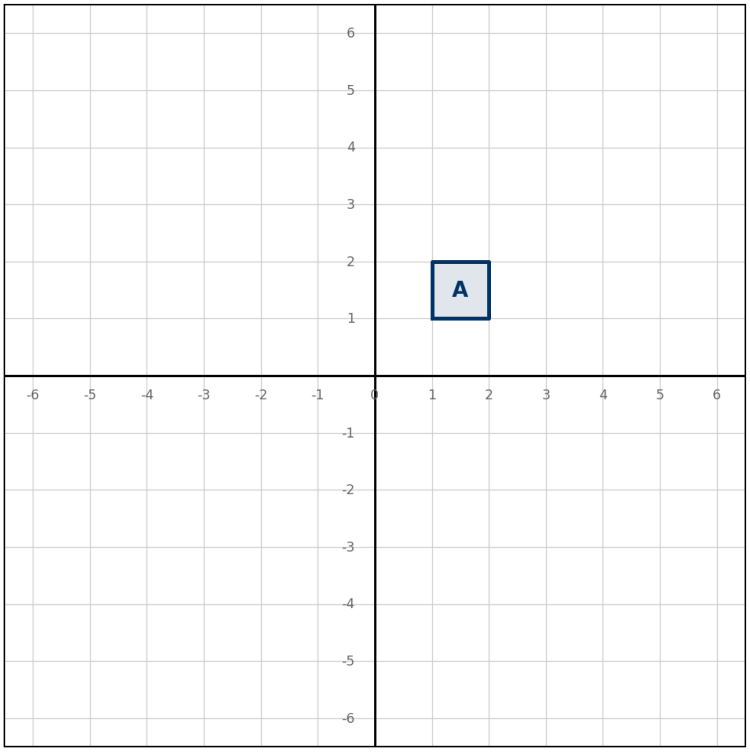
$\begin{pmatrix} 3 \\ -2 \end{pmatrix}$

Label the image B.

(2 marks)

[Fluency]

5.

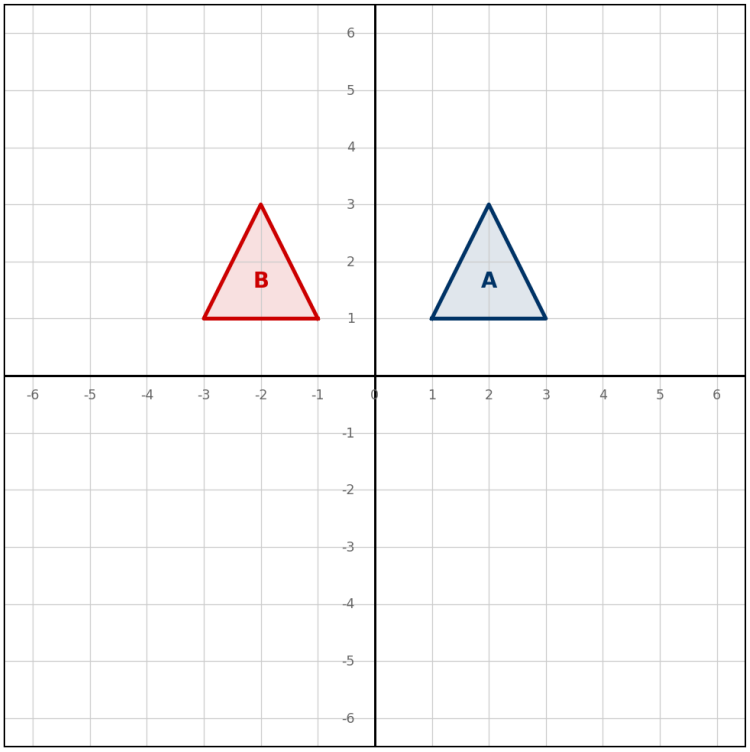


Enlarge square A by scale factor 3, centre (0,0). Label the image B.

(2 marks)

[Reasoning]

6.

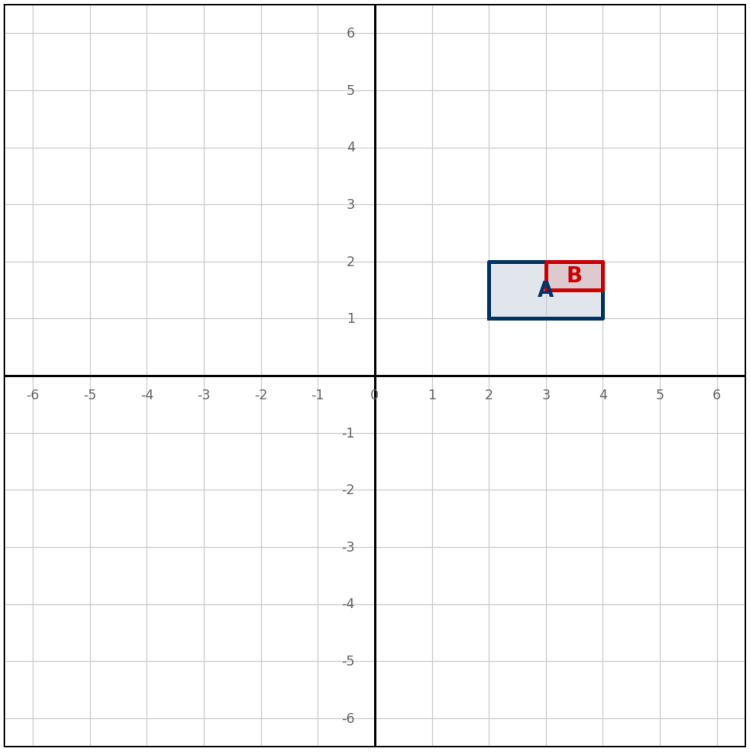


Describe fully the single transformation that maps A to B.

(2 marks)

[Reasoning]

7.

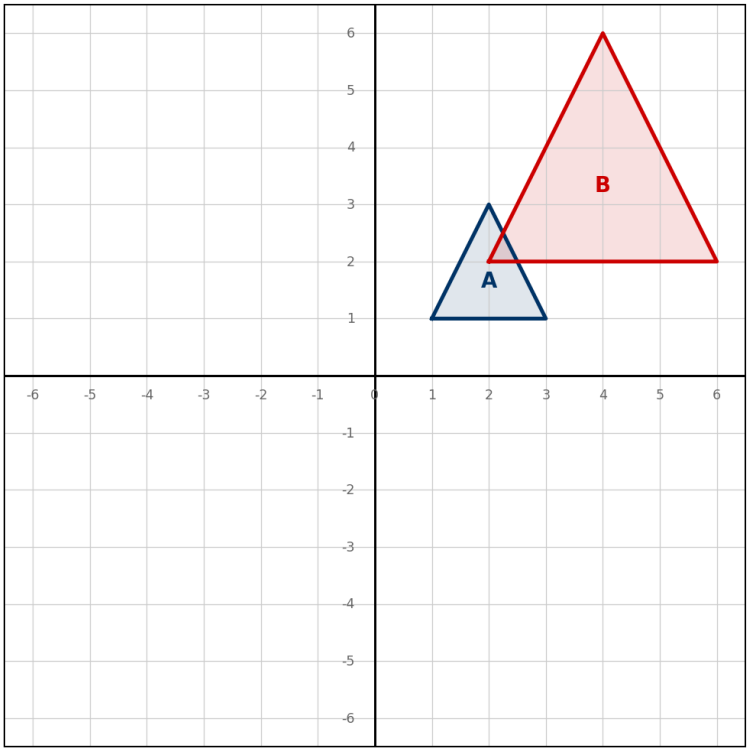


Describe fully the single transformation that maps A to B.

(3 marks)

[Reasoning]

8.



Describe fully the single transformation that maps A to B.

(3 marks)

[Problem Solving]

9.

A point P(4,5) is rotated 180° about the point (1,2).

Find the coordinates of the image P'.

(3 marks)

[Problem Solving]

10.

Shape A is reflected in the x-axis to give shape B.

Shape B is then reflected in the y-axis to give shape C.

Describe the single transformation that maps A directly to C.

(3 marks)

Section B — Higher

Worked Examples

[Fluency]

Enlarge triangle A by scale factor −2, centre (1,1). Vertex A(3,2) maps to?

Offset from centre: (3−1, 2−1) = (2,1)

Multiply by −2: (−4,−2)

Add centre: (−4+1, −2+1) = **(−3,−1)**

[Reasoning]

Find the centre of enlargement: A(2,1)→A'(5,4), SF=3.

Centre C: $5 = cx + 3(2-cx) = 6-2cx \rightarrow 2cx = 1 \rightarrow cx = 0.5$

Similarly: $4 = cy + 3(1-cy) \rightarrow cy = -0.5$

Centre = **(0.5, −0.5)**

[Problem Solving]

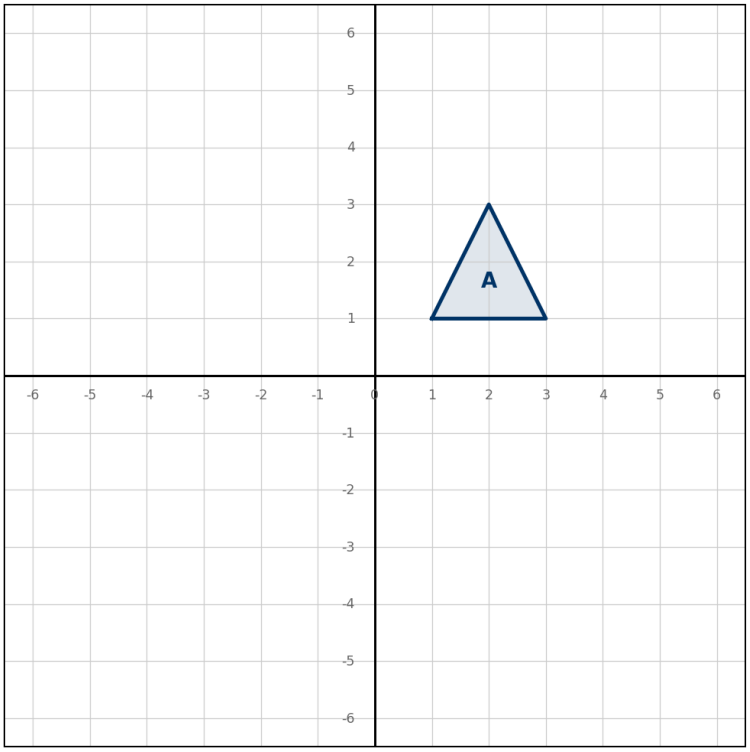
Describe the combined transformation: reflect in x-axis, then rotate 90° CCW.

$(x,y) \rightarrow (x,-y) \rightarrow (y,x)$

This is equivalent to reflection in the line y = x.

[Fluency]

1.

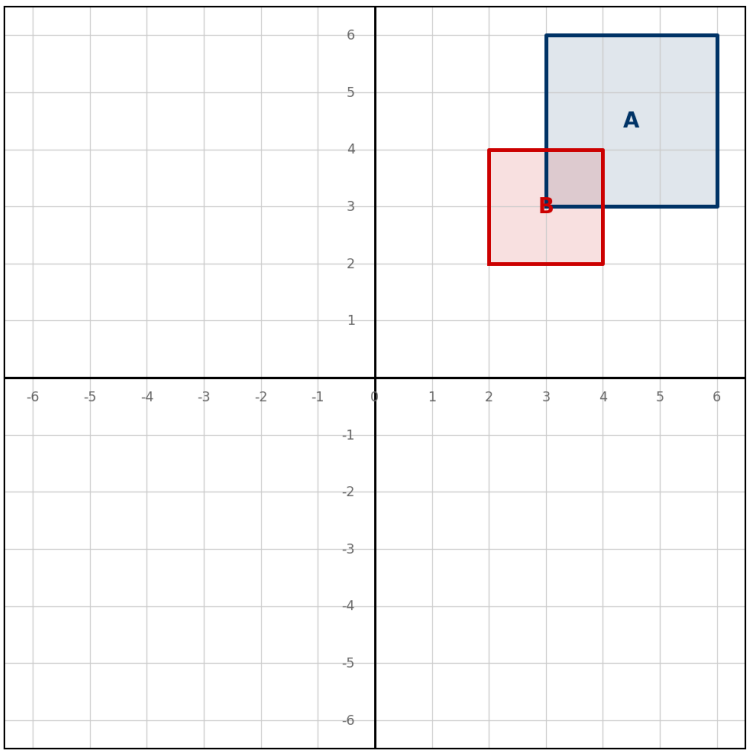


Enlarge triangle A by scale factor –2, centre (0,0). Label the image B.

(3 marks)

[Fluency]

2.



Shape B is an enlargement of shape A.

Find the scale factor and the centre of enlargement.

(4 marks)

[Fluency]

3.

A(2,1) maps to A'(5,4) under an enlargement with scale factor 3.

Find the centre of enlargement.

(3 marks)

[Reasoning]

4.

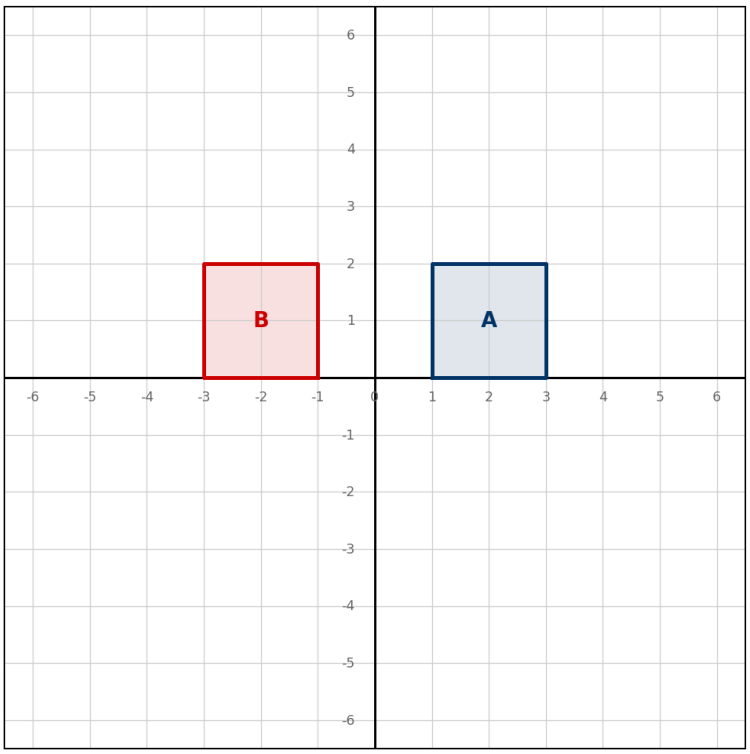
Describe fully the transformation with matrix

The 2×2 matrix with row 1: (0, –1) and row 2: (1, 0)

(2 marks)

[Reasoning]

5.



Find the single transformation equivalent to reflecting A in the y-axis then in the x-axis.

(3 marks)

[Reasoning]

6.

A shape is enlarged by scale factor –1, centre C.
Describe this transformation in another way.

(2 marks)

[Problem Solving]

7.

Point P(a, b) is rotated 90° clockwise about the origin.
Write down the coordinates of the image.

(2 marks)

[Problem Solving]

8.

Triangle A has vertices (1,1), (3,1), (2,4).
It is reflected in the line y = x, then rotated 90° anticlockwise about the origin.
Find the coordinates of the final image.

(4 marks)

[Problem Solving]

9.

Explain why a rotation of 180° about a point C is equivalent to enlargement with scale factor –1, centre C.

(3 marks)

[Problem Solving]

10.

Shape A has vertices (1,2), (3,2), (2,4).
It is enlarged by scale factor 2, centre (0,0) to give B.
B is then translated by

$$\begin{pmatrix} -1 \\ 3 \end{pmatrix}$$

to give C.
Find the vertices of C.

(4 marks)