3.17 Transformations: 1-hour Pack

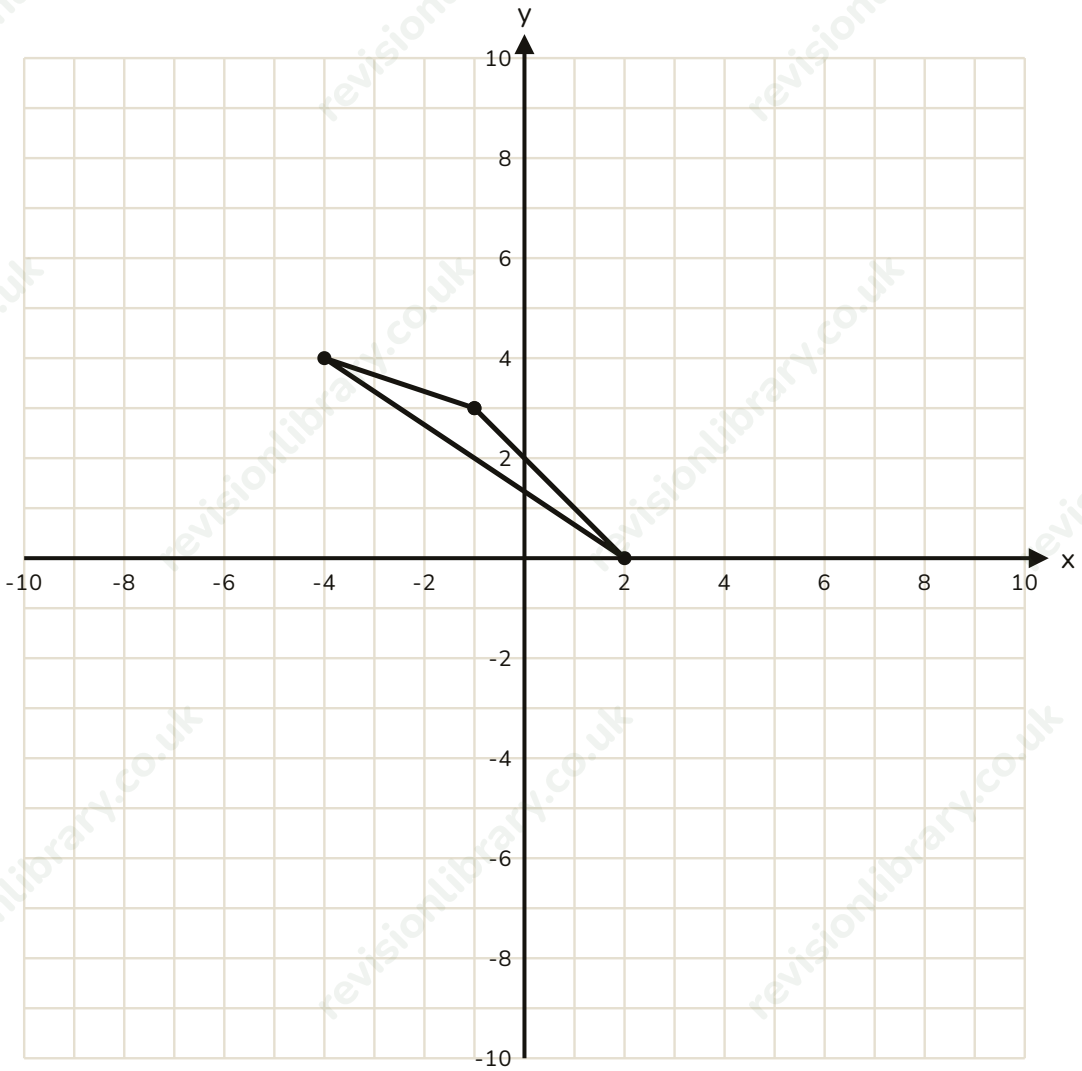
EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

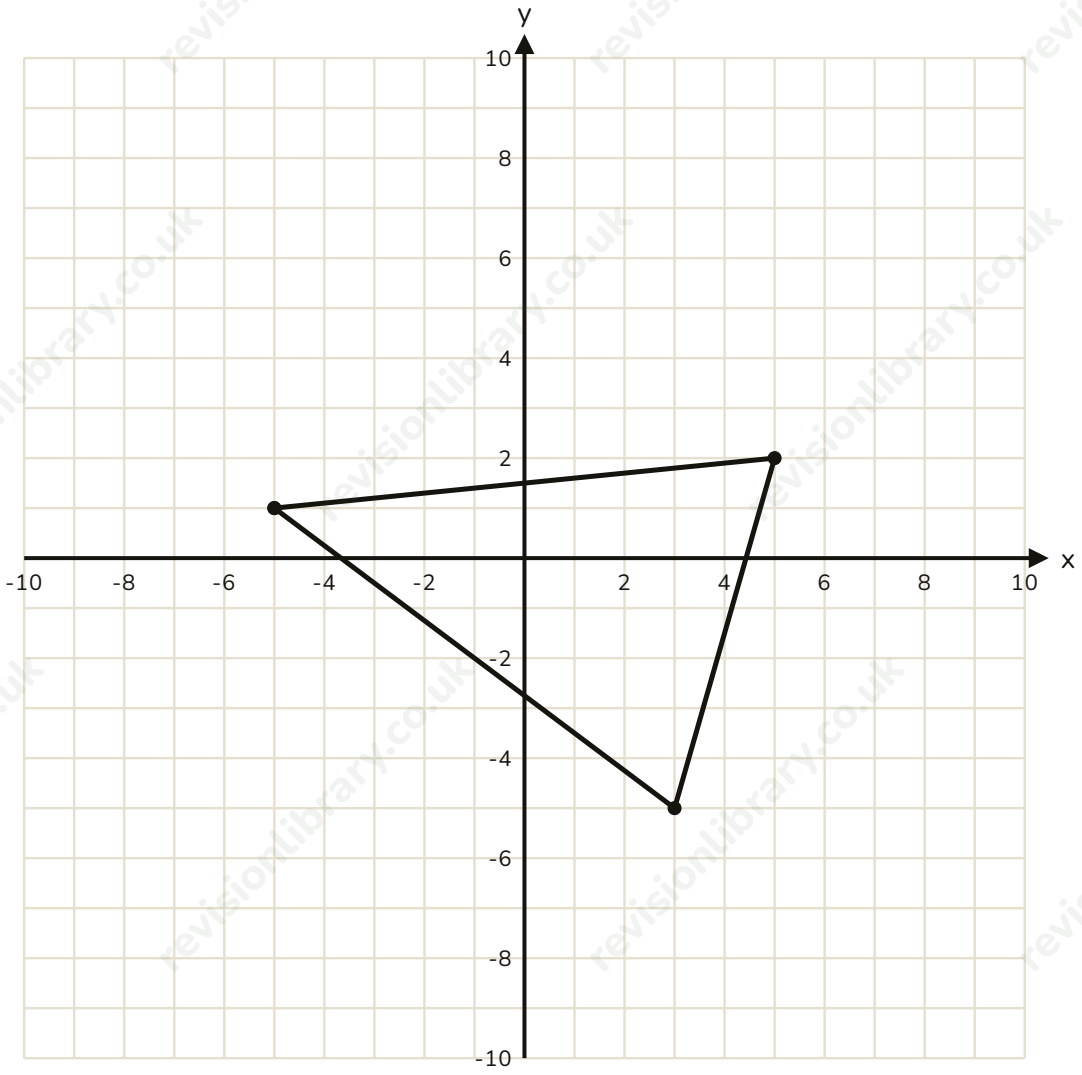
1 Triangle T has vertices at (-1, 3), (-4, 4), (2, 0).
Triangle T is reflected in the line y = -x.
Write down the coordinates of the vertices of the image.



(Total for Question 1 is 3 marks)

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2 Triangle T has vertices at (-5, 1), (3, -5), (5, 2).
Triangle T is rotated 90 degrees clockwise about the origin (0, 0).
Write down the coordinates of the vertices of the image.



(Total for Question 2 is 3 marks)

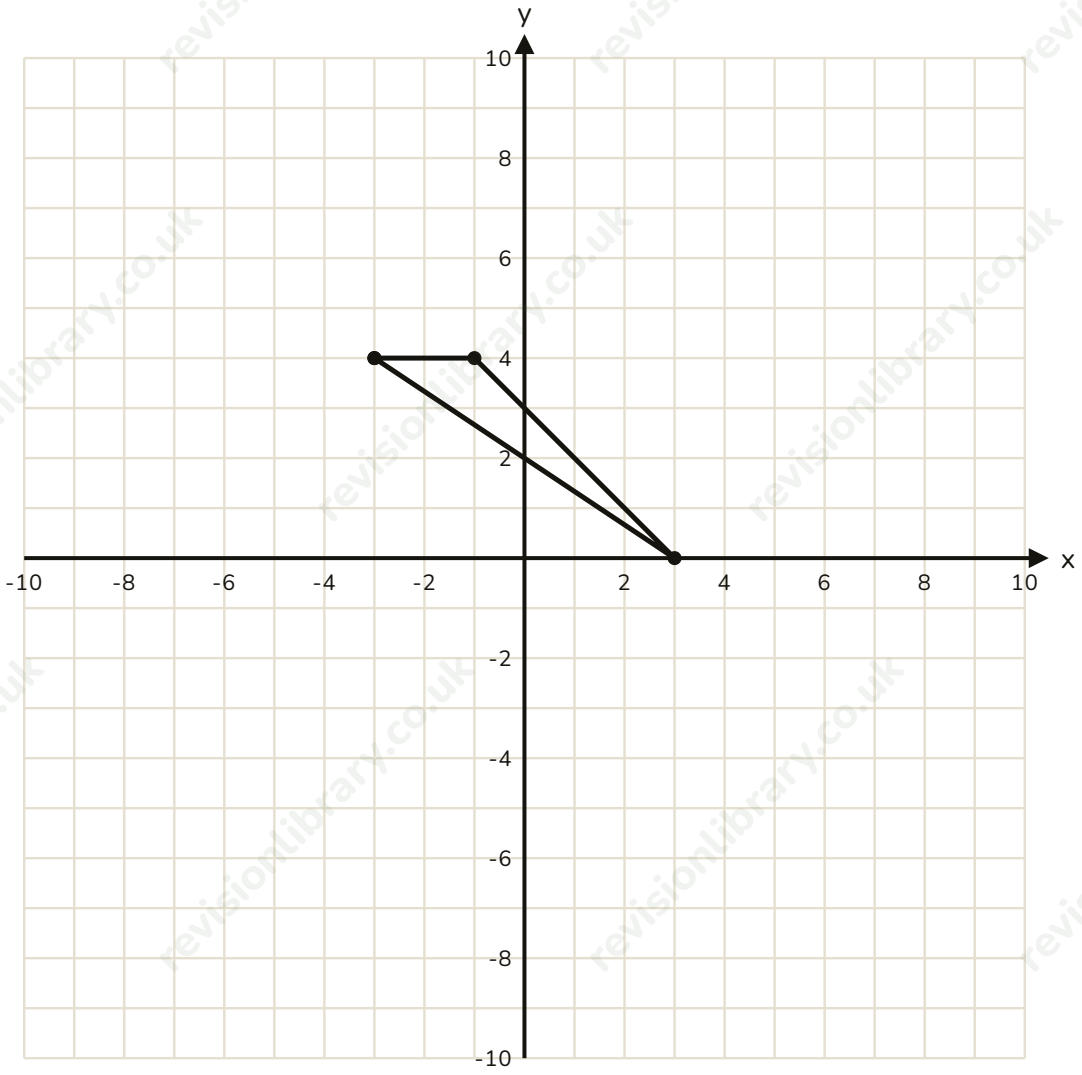
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3 Point P has coordinates (-5, 2). P is enlarged with scale factor 3 and centre (3, 1).
Write down the coordinates of the image of P.

(Total for Question 3 is 3 marks)

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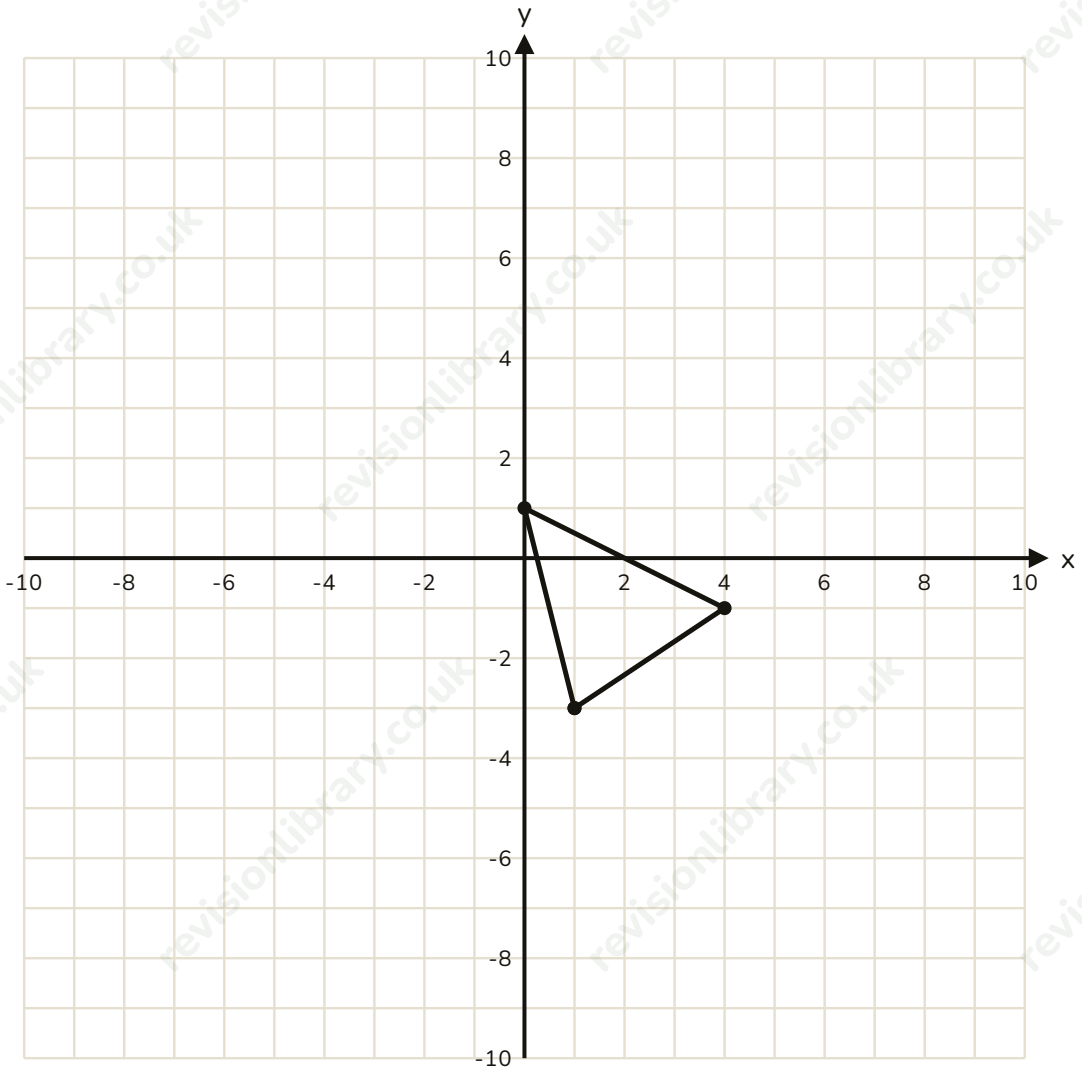
4 Triangle T has vertices at (-3, 4), (3, 0), (-1, 4).
Triangle T is reflected in the line y = x.
Write down the coordinates of the vertices of the image.



(Total for Question 4 is 3 marks)

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5 Triangle T has vertices at (1, -3), (0, 1), (4, -1).
Triangle T is rotated 90 degrees clockwise about the origin (0, 0).
Write down the coordinates of the vertices of the image.



(Total for Question 5 is 3 marks)

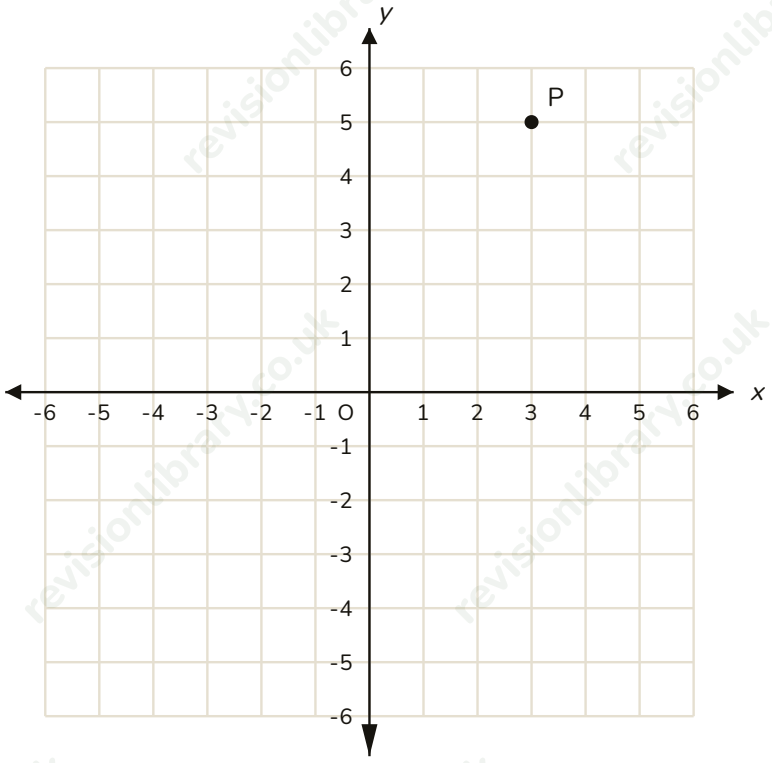
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6 Point P has coordinates (0, 1). P is enlarged with scale factor 3 and centre (-2, 3).
Write down the coordinates of the image of P.

(Total for Question 6 is 3 marks)

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7 Point P has coordinates (3, 5).
Write down the coordinates of the image of P after a reflection in the x-axis.

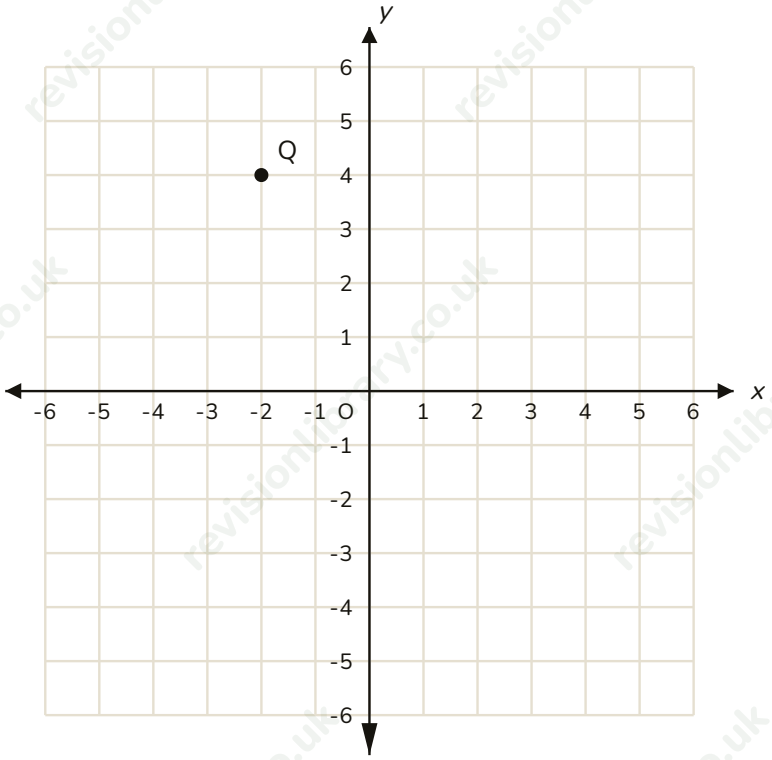


(Total for Question 7 is 1 mark)

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8 Point Q has coordinates (-2, 4).

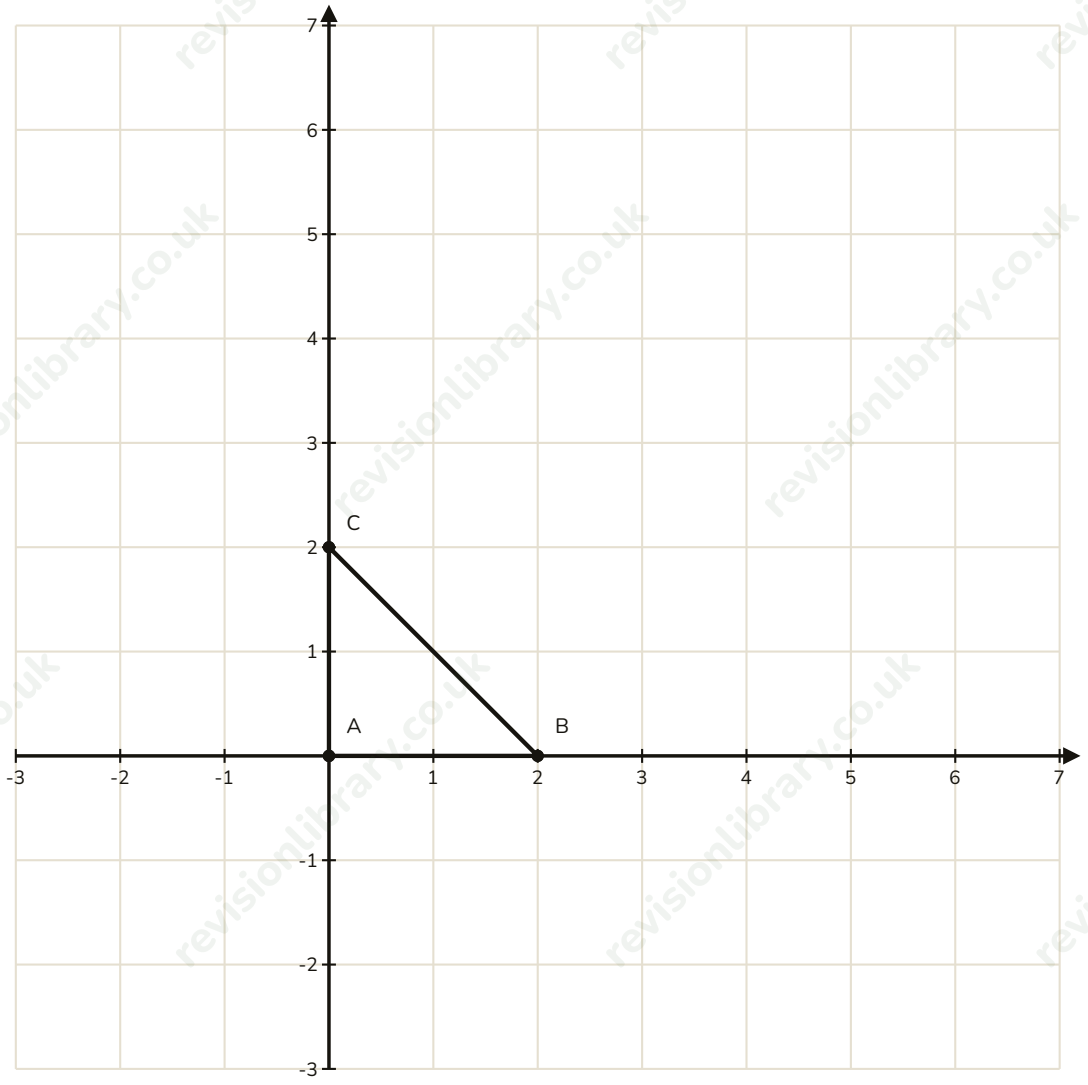
Write down the coordinates of the image of Q after a reflection in the y-axis.



(Total for Question 8 is 1 mark)

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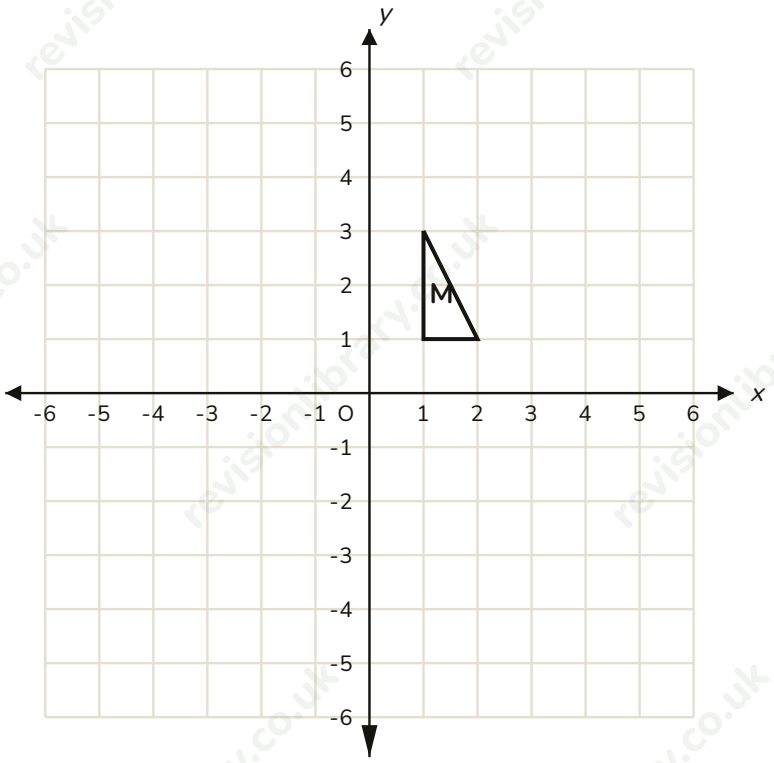
9 A right-angled isosceles triangle has vertices at (0, 0), (2, 0) and (0, 2). Apply the transformation: reflect in the line y = x, then translate by vector (1, -1). Work out the coordinates of the image of the point (2, 0).



(Total for Question 9 is 3 marks)

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10 Triangle M has vertices (1, 1), (1, 3) and (2, 1).
Find the coordinates of the vertices of the image of triangle M after an enlargement with scale factor 3, centre the origin.

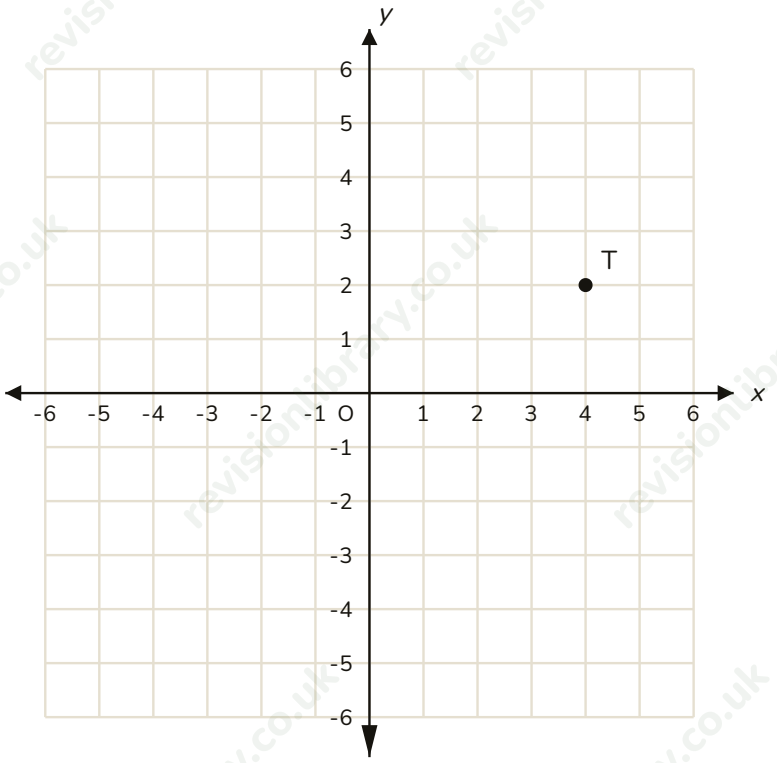


(Total for Question 10 is 2 marks)

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11 Point T has coordinates (4, 2).

Write down the coordinates of the image of T after a rotation of 90 degrees clockwise about the origin.

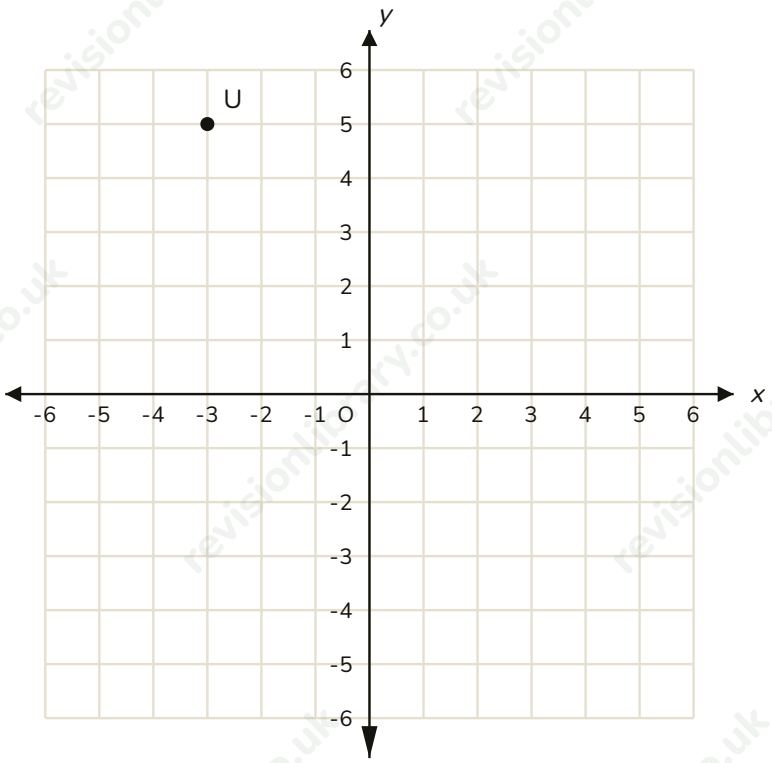


(Total for Question 11 is 1 mark)

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12 Point U has coordinates (-3, 5).

Write down the coordinates of the image of U after a rotation of 180 degrees about the origin.

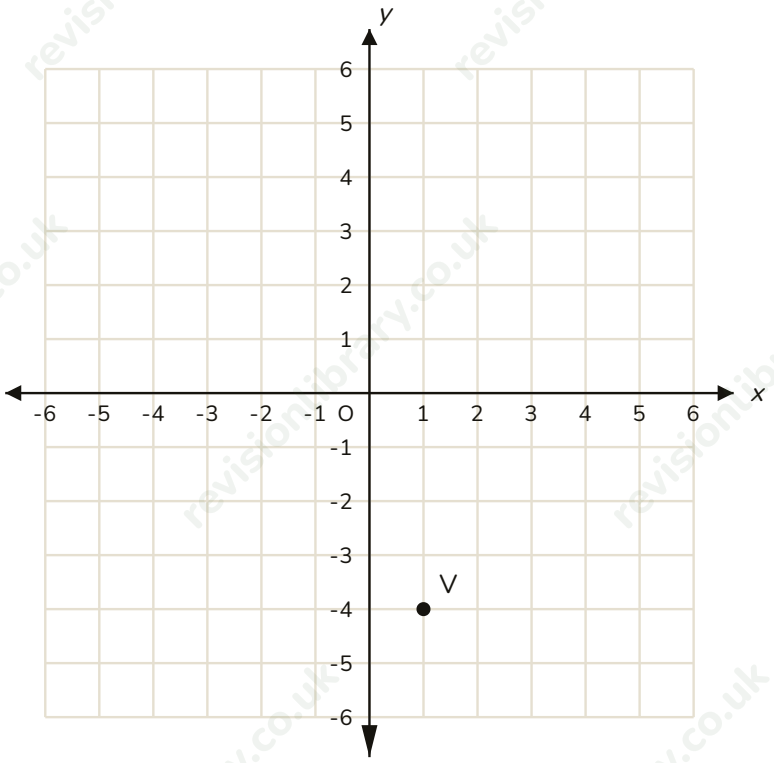


(Total for Question 12 is 1 mark)

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13 Point V has coordinates (1, -4).

Write down the coordinates of the image of V after a rotation of 90 degrees anticlockwise about the origin.

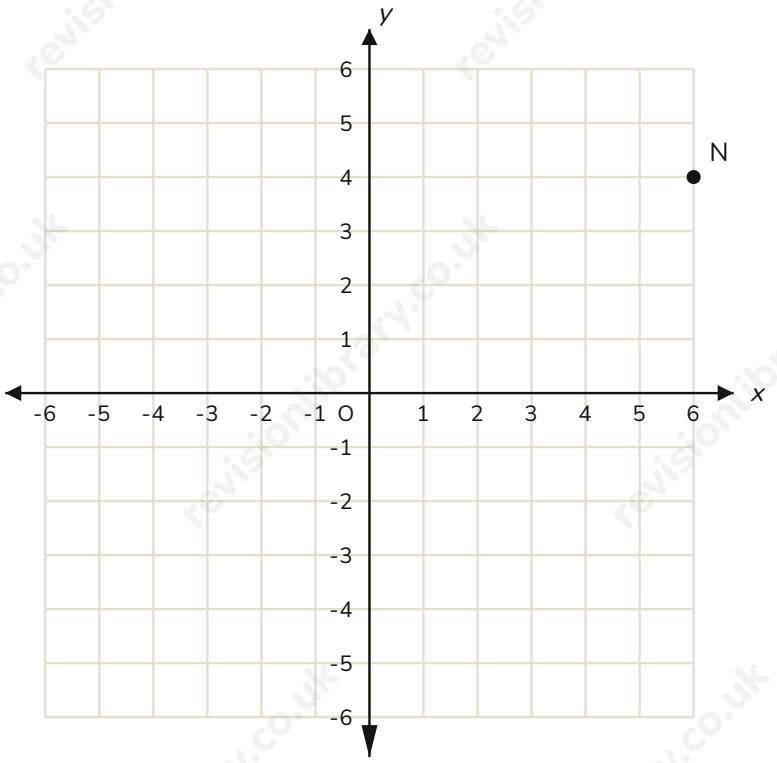


(Total for Question 13 is 1 mark)

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14 Point N has coordinates (6, 4).

Write down the coordinates of the image of N after an enlargement with scale factor 1/2, centre the origin.

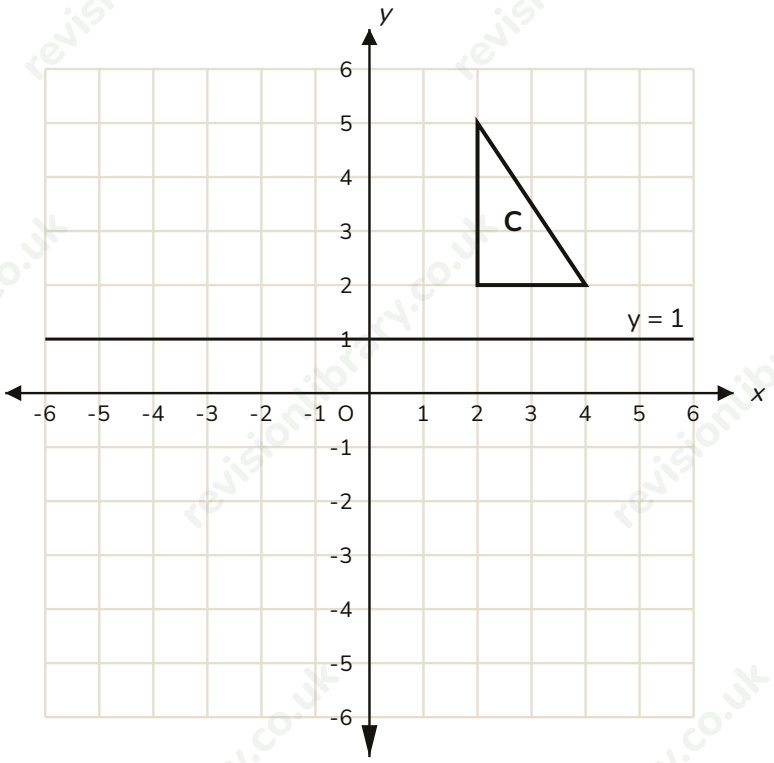


(Total for Question 14 is 1 mark)

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15 Shape C has vertices (2, 2), (2, 5) and (4, 2). Shape C is reflected in the line y = 1 to give shape D.

Find the coordinates of the vertices of shape D.

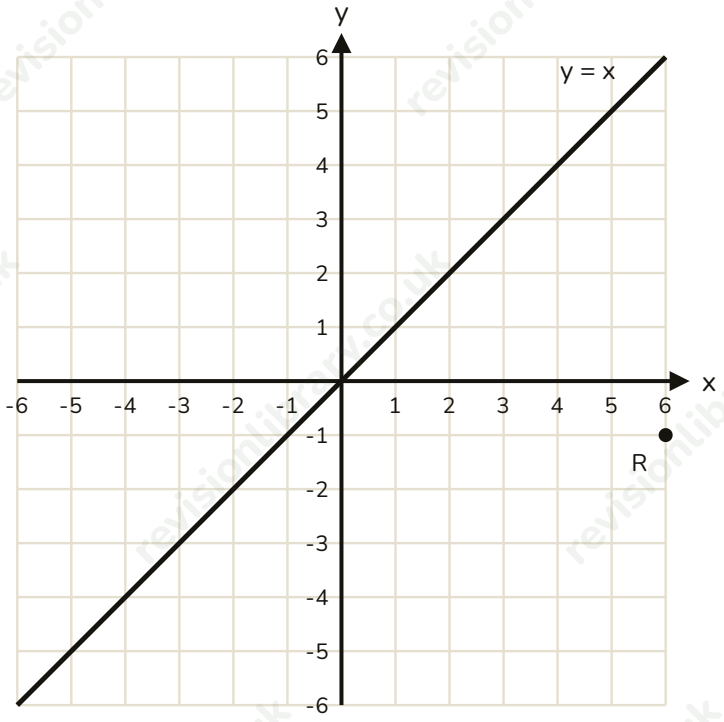


(Total for Question 15 is 3 marks)

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16 Point R has coordinates (6, -1).

Write down the coordinates of the image of R after a reflection in the line y = x.

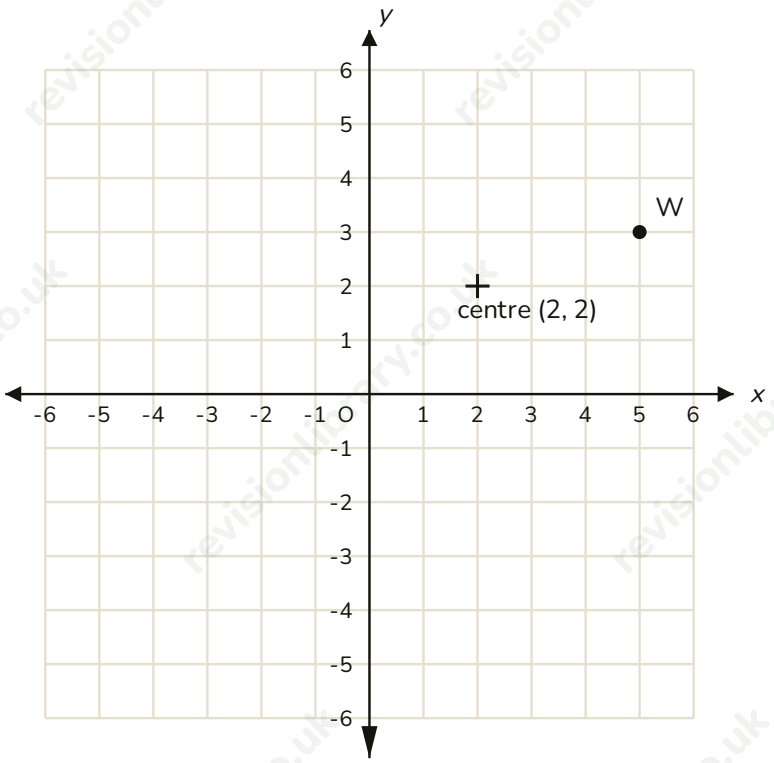


(Total for Question 16 is 1 mark)

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17 Point W has coordinates (5, 3).

Find the coordinates of the image of W after a rotation of 180 degrees about the point (2, 2).

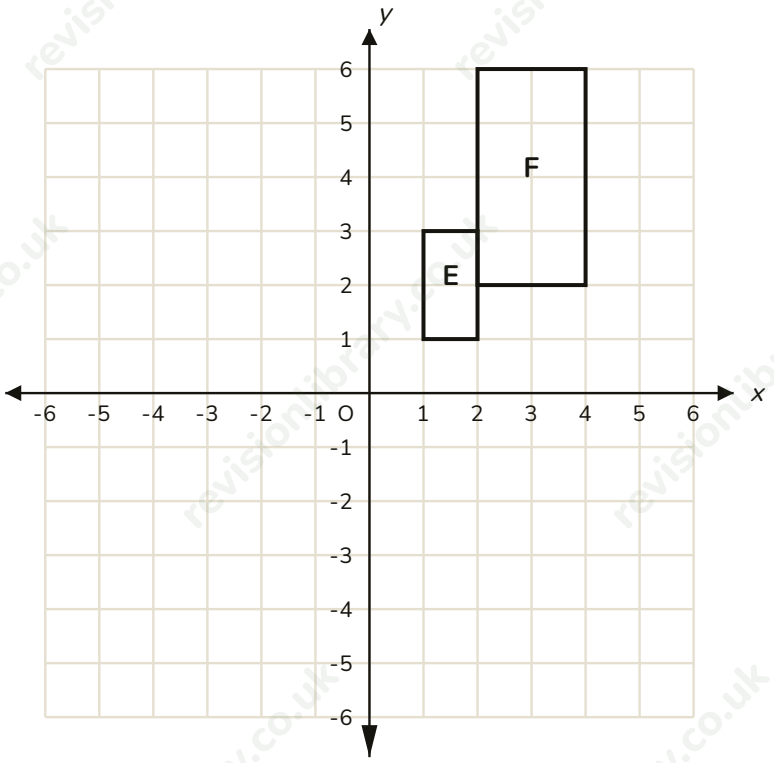


(Total for Question 17 is 2 marks)

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18 Shape E has vertices (1, 1), (1, 3), (2, 3) and (2, 1). Shape F has vertices (2, 2), (2, 6), (4, 6) and (4, 2).

Describe fully the single transformation that maps shape E onto shape F.



(Total for Question 18 is 3 marks)

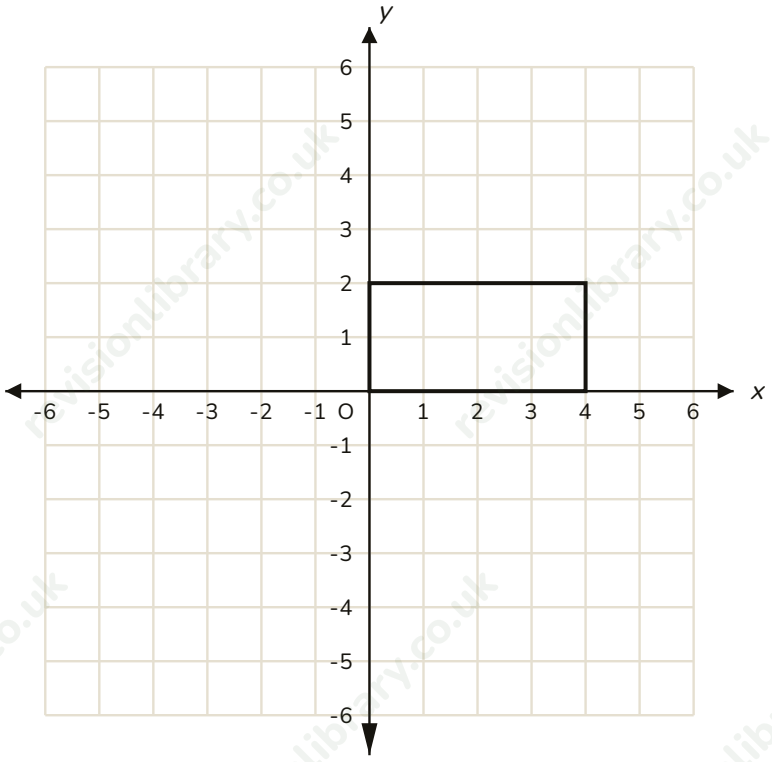
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19 A transformation maps the point P(3, -1) first by a shear in the x-direction with shear factor 2 (so (x, y) -> (x + 2y, y)), then by a rotation of 90 degrees anticlockwise about the origin. Find the final coordinates of P after both transformations.

(Total for Question 19 is 4 marks)

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20 Rectangle has vertices (0, 0), (4, 0), (4, 2) and (0, 2). The rectangle is enlarged with centre the origin so that the image has an area of 72 square units.
Find the scale factor of the enlargement, and hence find the coordinates of the vertices of the image.



(Total for Question 20 is 4 marks)

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Mark scheme · 3.17 Transformations: 1-hour Pack

Question 1

image of (-1, 3) correct	**B1**
image of (-4, 4) correct	**B1**
image of (2, 0) correct	**B1**

Answer: (-3, 1), (-4, 4), (0, -2)

Question 2

first image vertex correct	**B1**
second image vertex correct	**B1**
third image vertex correct	**B1**

Answer: (1, 5), (-5, -3), (2, -5)

Question 3

vector from centre to P is (-8, 1)	**M1**
multiplies the vector by 3	**M1**
(-21, 4)	**A1**

Answer: (-21, 4)

Question 4

image of (-3, 4) correct	**B1**
image of (3, 0) correct	**B1**
image of (-1, 4) correct	**B1**

Answer: (4, -3), (0, 3), (4, -1)

Question 5

first image vertex correct	**B1**
second image vertex correct	**B1**
third image vertex correct	**B1**

Answer: (-3, -1), (1, 0), (-1, -4)

Question 6

vector from centre to P is (2, -2)	**M1**
multiplies the vector by 3	**M1**
(4, -3)	**A1**

Answer: (4, -3)

Question 7

(3, -5) cao	**B1**

Answer: (3, -5)

Question 8

(2, 4) cao	**B1**

Answer: (2, 4)

Question 9

correct reflection in y = x: (x, y) -> (y, x), so (2,0) -> (0,2)	**M1**
correct translation by (1, -1): (0,2) + (1,-1) = (1,1)	**M1**
(1, 1) cao	**A1**

Answer: (1, 1)

Question 10

multiplies each coordinate by 3 oe, at least one correct vertex shown	**M1**
all three vertices correct: (3,3), (3,9), (6,3) cao	**A1**

Answer: (3, 3), (3, 9), (6, 3)

Question 11

(2, -4) cao	**B1**

Answer: (2, -4)

Question 12

(3, -5) cao	**B1**

Answer: (3, -5)

Question 13

(4, 1) cao	**B1**

Answer: (4, 1)

Question 14

(3, 2) cao	**B1**

Answer: (3, 2)

Question 15

uses image y-coordinate = 2 x 1 - y (oe equal perpendicular distance from y = 1), for at least one vertex	**M1**
two vertices correct	**A1**
all three vertices correct: (2,0), (2,-3), (4,0) cao	**A1**

Answer: (2, 0), (2, -3), (4, 0)

Question 16

(-1, 6) cao	**B1**

Answer: (-1, 6)

Question 17

uses image = (2 x 2 - 5, 2 x 2 - 3) oe, or a correct diagram/vector method	**M1**
(-1, 1) cao	**A1**

Answer: (-1, 1)

Question 18

enlargement (oe 'enlarged')	**B1**
scale factor 2 or -2	**B1**
centre (0, 0) with scale factor 2, or centre (2, 8/3) with scale factor -2; accept equivalent fractions or recurring decimals	**B1**

Answer: Enlargement, scale factor 2, centre the origin (0, 0); or enlargement, scale factor -2, centre (2, 8/3).

Question 19

apply shear: (3, -1) -> (3 + 2(-1), -1) = (1, -1) or equivalent method	**M1**
apply rotation 90 anticlockwise about origin: (x, y) -> (-y, x) applied to (1, -1)	**M1**
state intermediate result (-y, x) = -(-1), 1 = (1, 1) cao	**A1**
final coordinates clearly stated as (1, 1) cao	**B1**

Answer: Final coordinates: (1, 1).

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Question 20

area of original rectangle = 4 x 2 = 8 oe **M1**

area scale factor = 72 / 8 (= 9) oe **M1**

linear scale factor = 3 or -3, since $k^2 = 9$ **A1**

all four image vertices correct for the chosen scale factor: (0,0), (12,0), (12,6), (0,6) for k = 3, or (0,0), (-12,0), (-12,-6), (0,-6) for k = -3; ft their scale factor **A1**

Answer: Scale factor 3; image vertices (0, 0), (12, 0), (12, 6), (0, 6). Or scale factor -3; image vertices (0, 0), (-12, 0), (-12, -6), (0, -6).

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