

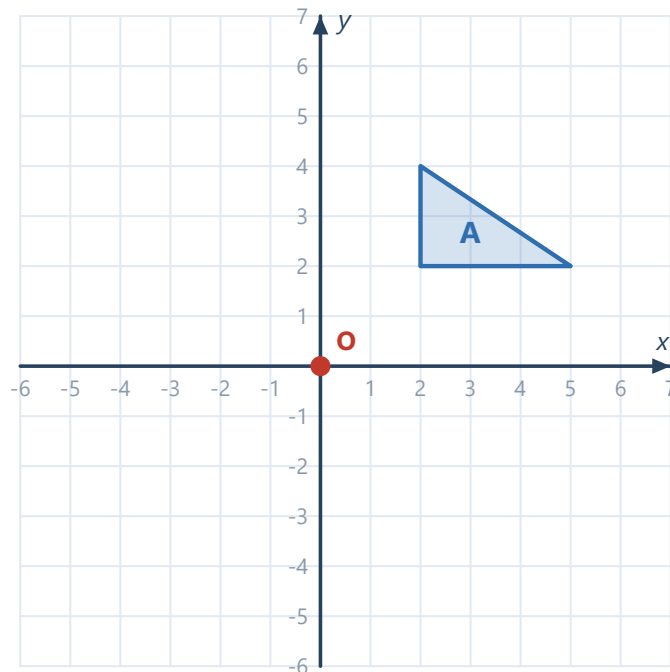
GCSE Maths: Rotation (Higher): answers

GCSE Maths - Transformations and Similarity - Higher - Lesson 21.2

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch21-transformations-congruence-similarity/higher/rotation/

Exercise 21B Rotation Non-calculator

- 1 Shape A has vertices at (2, 2), (5, 2), (2, 4). Rotate A about the origin O(0, 0) and write down the coordinates of the vertices of the image.



- (a) 90° clockwise

Answer: B: (2, -2), (2, -5), (4, -2)

- (b) 180°

Answer: B: (-2, -2), (-5, -2), (-2, -4)

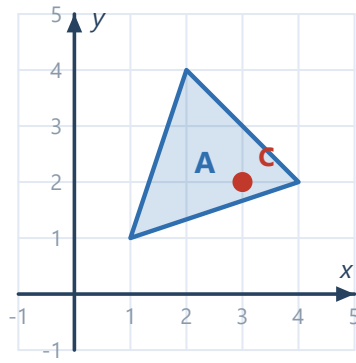
- (c) 90° anticlockwise

Answer: B: (-2, 2), (-2, 5), (-4, 2)

- (d) 270° clockwise

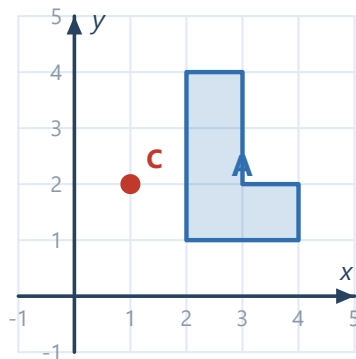
Answer: B: (-2, 2), (-2, 5), (-4, 2)

- 2 Rotate shape A through 180° about the point C (3, 2). Write down the coordinates of the vertices of the image B. A has vertices at (1, 1), (4, 2), (2, 4).



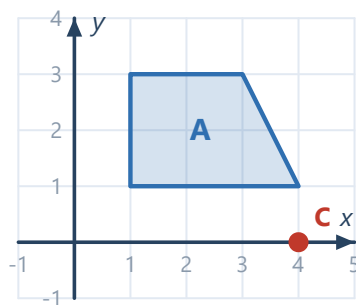
Answer: B: (5, 3), (2, 2), (4, 0)

- 3 Rotate shape A through 90° anticlockwise about the point C (1, 2). Write down the coordinates of the vertices of the image B. A has vertices at (2, 1), (4, 1), (4, 2), (3, 2), (3, 4), (2, 4).



Answer: B: (2, 3), (2, 5), (1, 5), (1, 4), (-1, 4), (-1, 3)

- 4 Rotate shape A through 90° clockwise about the point C (4, 0). Write down the coordinates of the vertices of the image B. A has vertices at (1, 1), (4, 1), (3, 3), (1, 3).



Answer: B: (5, 3), (5, 0), (7, 1), (7, 3)

- 5 Write down the image of the point P(4, 1) when it is rotated about the origin through:

(a) 90° clockwise

Answer: (1, -4)

(b) 180°

Answer: (-4, -1)

(c) 90° anticlockwise

Answer: $(-1, 4)$

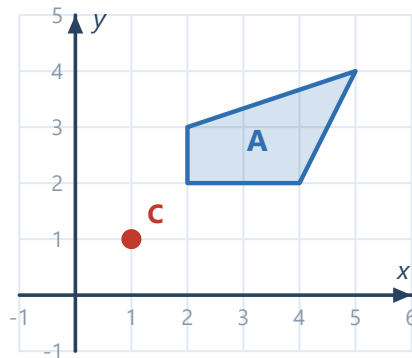
(d) 270° anticlockwise

Answer: $(1, -4)$

- 6 The point $P(2, 3)$ is rotated 90° anticlockwise about the centre $C(1, 1)$. Work out the coordinates of the image of P .

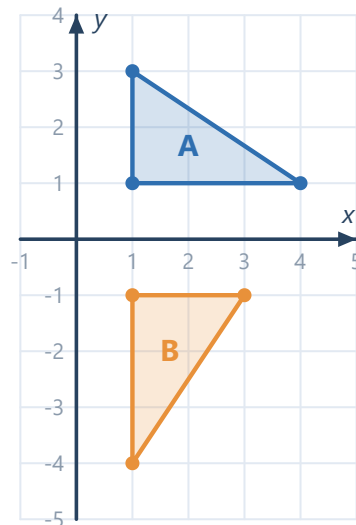
Answer: $(-1, 2)$

- 7 Shape A has vertices at $(2, 2)$, $(4, 2)$, $(5, 4)$, $(2, 3)$. One of the vertices is the centre of rotation $C(1, 1)$. Rotate A 90° clockwise about C and write down the vertices of the image.



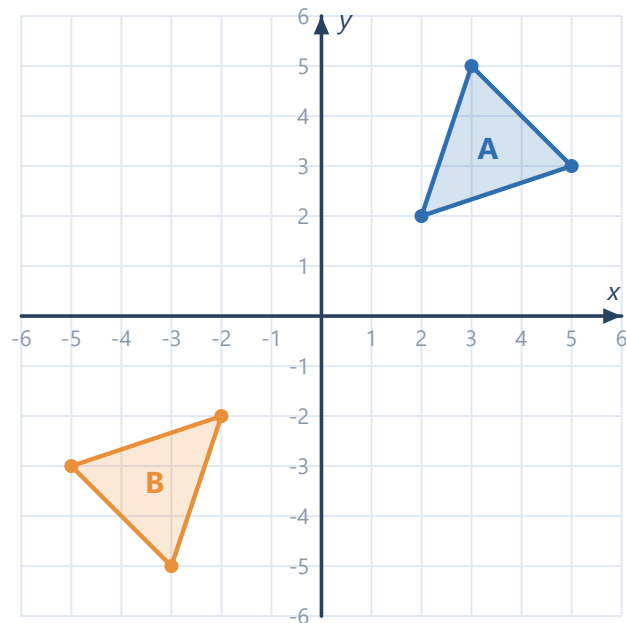
Answer: B: $(2, 0)$, $(2, -2)$, $(4, -3)$, $(3, 0)$

- 8 Describe fully the single transformation that maps A onto B.



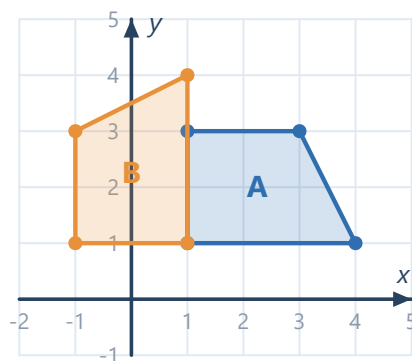
Answer: Rotation, 90° clockwise, centre $(0, 0)$

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



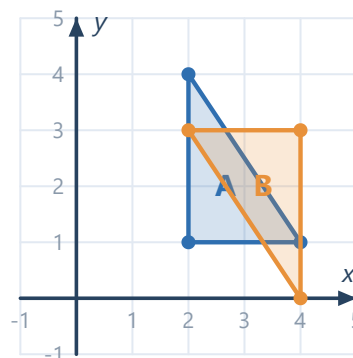
Answer: Rotation, 180° , centre $(0, 0)$

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



Answer: Rotation, 90° anticlockwise, centre $(1, 1)$

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



Answer: Rotation, 180° , centre $(3, 2)$

12 Ben says: "Rotating the point $(3, 1)$ through 90° clockwise about the origin gives $(-1, 3)$." Is he right? Explain.

Answer: No. $(-1, 3)$ is 90° anticlockwise. The correct image is $(1, -3)$.

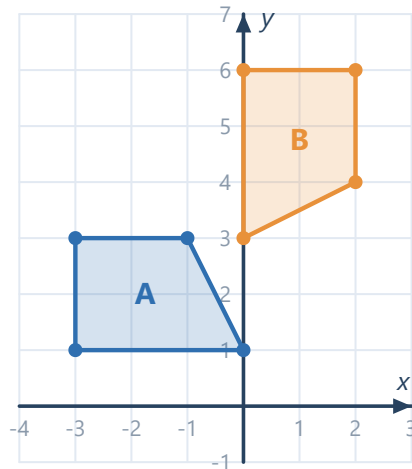
- 13** The point $P(2, 5)$ is rotated about the origin to $P'(5, -2)$. Describe the rotation fully.

Answer: Rotation, 90° clockwise, centre $(0, 0)$

- 14** A point is rotated 90° clockwise about the origin, and then the image is rotated 90° clockwise about the origin again. Show that the result is the same as one rotation of 180° about the origin. Use the point $(3, 1)$.

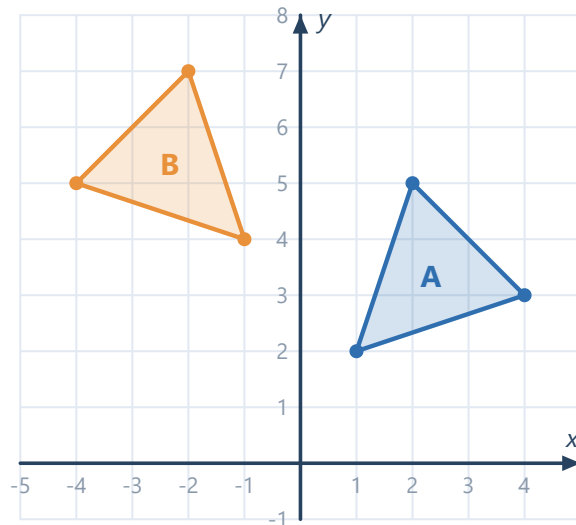
Answer: $(3, 1) \rightarrow (1, -3) \rightarrow (-3, -1)$, the same as 180°

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



Answer: Rotation, 90° clockwise, centre $(1, 2)$

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



Answer: Rotation, 90° anticlockwise, centre $(-1, 2)$

- 17 Challenge.** Vertex $P(3, 4)$ of a shape is rotated 90° clockwise about a point C and its image is $P'(6, 1)$. Work out the coordinates of C .

Answer: $C = (3, 1)$

