

GCSE Maths: Describing and identifying single transformations (Higher): answers

GCSE Maths - Transformations and Similarity - Higher - Lesson 21.5

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/describing-and-identifying-single-transformations/

Exercise 21E Describing single transformations Non-calculator

1 Shape B is the image of shape A. For each description, write down the single transformation that could have been used (name it only).

(a) B is the same size as A and is a mirror image of A.

Answer: Reflection

(b) B is bigger than A but has the same shape.

Answer: Enlargement

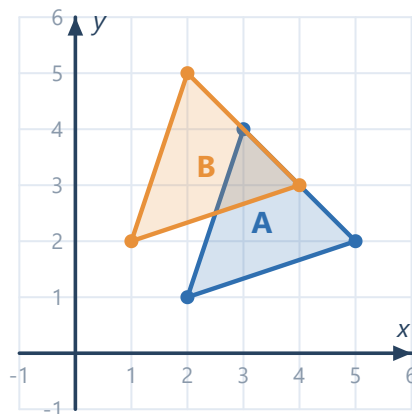
(c) B is the same size as A, faces the same way, and every side of B is parallel to the matching side of A.

Answer: Translation

(d) B is the same size as A, not flipped, but turned round.

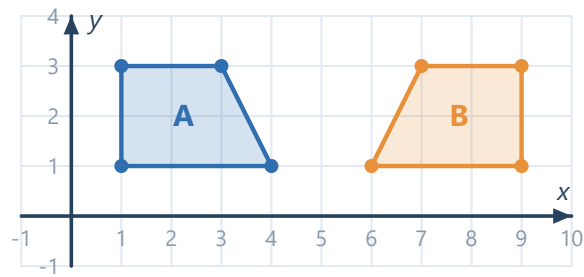
Answer: Rotation

2 Describe fully the single transformation that maps A onto B.



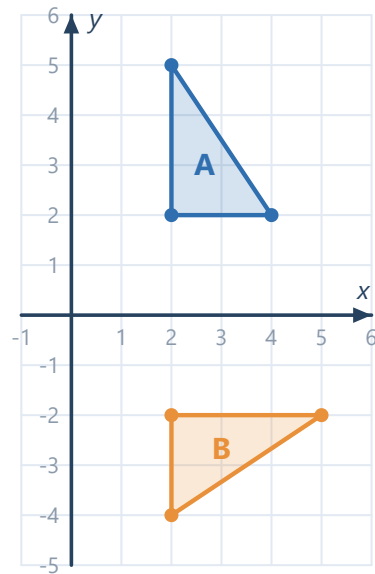
Answer: Reflection in the line $y = x$

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



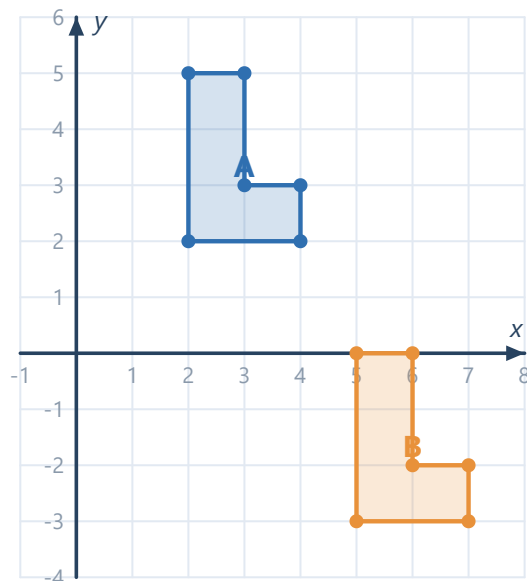
Answer: Reflection in the line $x = 5$

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



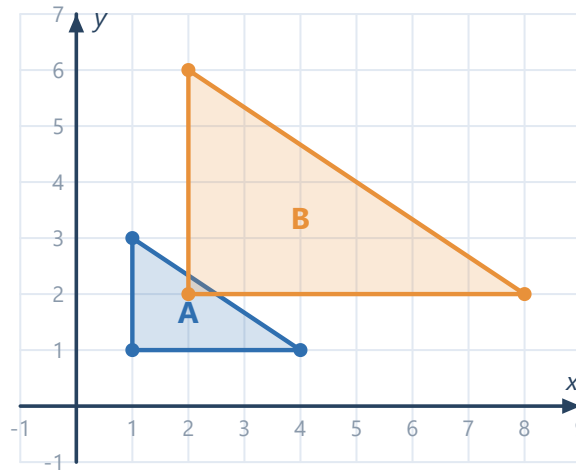
Answer: Rotation, 90° clockwise, centre $(0, 0)$

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



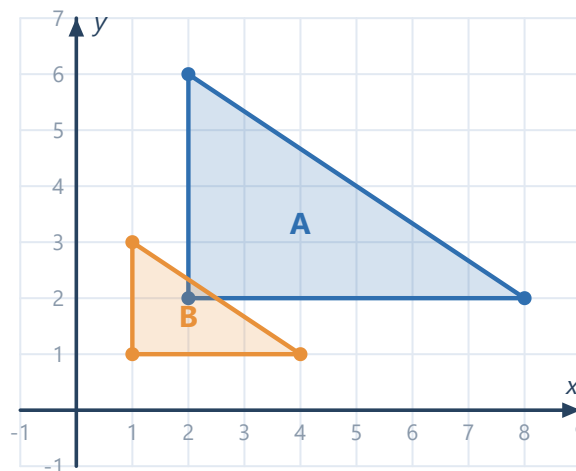
Answer: Translation by $\begin{pmatrix} 3 \\ -5 \end{pmatrix}$

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



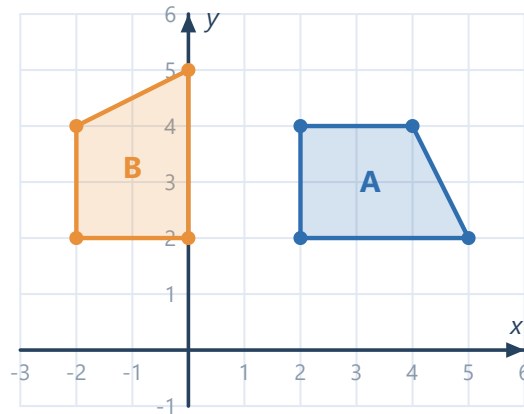
Answer: Enlargement, scale factor 2, centre (0, 0)

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



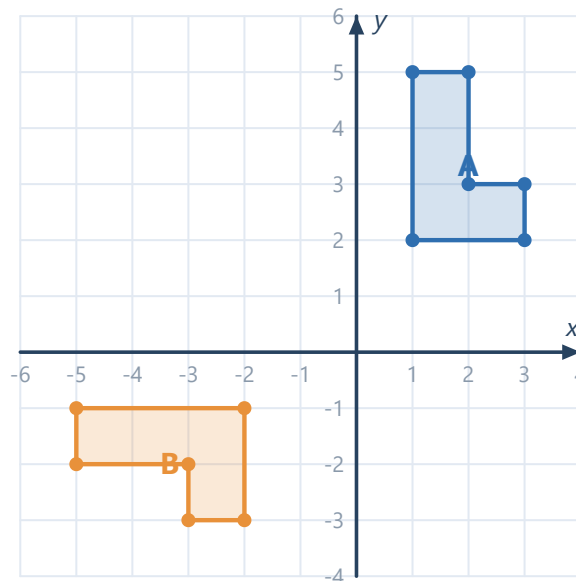
Answer: Enlargement, scale factor $\frac{1}{2}$, centre (0, 0)

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



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

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



Answer: Reflection in the line $y = -x$

- 10 Say whether the image is **congruent** to the object, or only **similar**.

- (a) a reflection

Answer: Congruent

- (b) a rotation

Answer: Congruent

- (c) a translation

Answer: Congruent

- (d) an enlargement with scale factor 3

Answer: Similar (not congruent)

- 11 Write down the invariant point(s) of each transformation.

- (a) reflection in the line $x = 2$

Answer: Every point on the mirror line $x = 2$.

- (b) rotation of 90° clockwise about $(1, 1)$

Answer: Only the centre, $(1, 1)$.

- (c) translation by $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$

Answer: None

- (d) enlargement with scale factor 3 and centre $(0, 0)$

Answer: Only the centre, $(0, 0)$.

- 12** Shape A is mapped to shape B by a reflection in the line $x = 6$. Which single transformation maps B back onto A? Describe it fully.

Answer: Reflection in the line $x = 6$

- 13** Shape A is mapped to B by an enlargement with scale factor 3 and centre $(2, 1)$. Describe fully the transformation that maps B back onto A.

Answer: Enlargement, scale factor $\frac{1}{3}$, centre $(2, 1)$

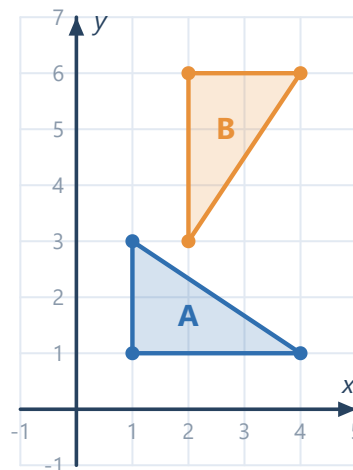
- 14** Ali says that the transformation that maps A onto B is a reflection in the y -axis. A has a vertex at $(3, 2)$ and B has a vertex at $(7, 2)$ matching it. Show that Ali is wrong, and say what the mirror line must be if it is a reflection.

Answer: Reflection in $x = 5$, not $x = 0$

- 15** Show that a rotation of 180° about the origin is the same as an enlargement with scale factor -1 and centre the origin. Use the point $(4, -3)$.

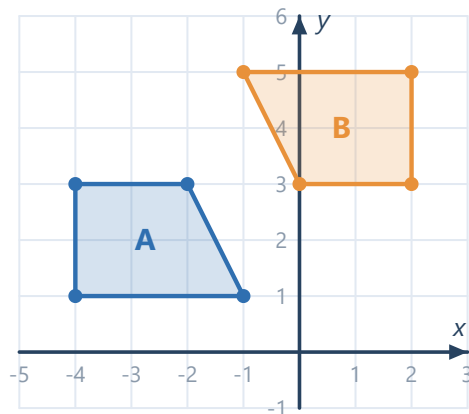
Answer: Both give $(-4, 3)$

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



Answer: Rotation, 90° clockwise, centre $(4, 3)$

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



Answer: Rotation, 180° , centre $(-1, 3)$

18 Challenge. A triangle A with vertices $(1, 1)$, $(3, 1)$ and $(1, 4)$ is mapped to B with vertices $(-1, 1)$, $(-3, 1)$ and $(-1, 4)$. Two students describe the transformation differently. Hannah says: "Reflection in the y -axis." Ravi says: "Rotation of 180° about the origin." Who is right? Explain.

Answer: Hannah is right. Ravi is wrong.