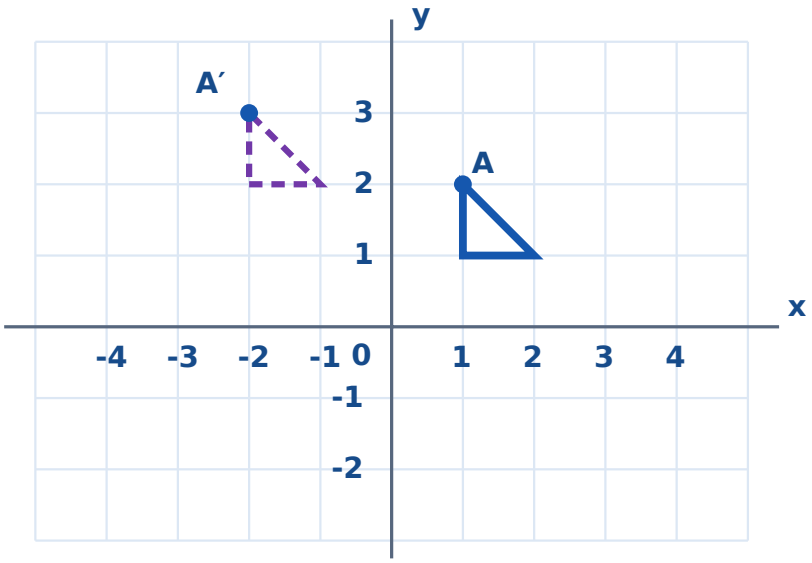
Translations

A translation slides every point the same distance in the same direction.



A(1, 2) moves 3 left and 1 up to A′(−2, 3). The whole triangle makes the same move.

Translate A(1, 2) by 3 left and 1 up.

$x = 1 - 3 = -2$	Left means subtract from x.
$y = 2 + 1 = 3$	Up means add to y.

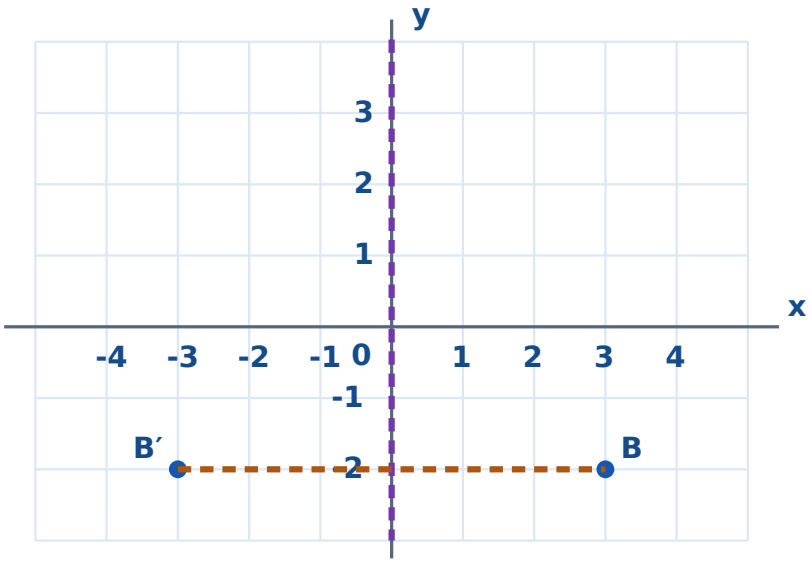
$A' = (-2, 3)$

Check

The image has the same size and shape as the original. The prime mark names the image point.

Reflections

A reflection flips the shape across a mirror line.



B and B′ are the same perpendicular distance from the y-axis.

Reflect B(3, −2) in the y-axis.

$x = -3$	Change the sign of the x-coordinate.
$y = -2$	The y-coordinate stays the same.

$B' = (-3, -2)$

Other mirror lines

In the x-axis, keep x and change the sign of y. In y = x, swap x and y.

Rotations

Always identify the centre before you move any point.

Rotate C(2, 1) through 90° anticlockwise about (0, 0).

$(x, y) \longrightarrow (-y, x)$	For this quarter-turn about the origin, swap coordinates and negate the new x.
$(2, 1) \longrightarrow (-1, 2)$	Use that rule with the original coordinates.

$C' = (-1, 2)$

Check

A rotation moves every point through the same angle about the same centre, without changing the shape or size.

Describing a transformation

Give enough information for someone else to reproduce the movement.

Transformation	What to state
Translation	Horizontal and vertical movement
Reflection	The equation or name of the mirror line
Central symmetry	Centre of symmetry (equivalent to a half-turn)
Rotation	Centre, angle and direction

Find the image of (4, 3) under central symmetry about (2, 1).

$(4-2,\ 3-1)=(2,2)$	The point is 2 right and 2 up from the centre.
$(2-2,\ 1-2)=(0,\ -1)$	Go the same distance on the opposite side of the centre.

$(0,\ -1)$

Check

The centre (2, 1) is the midpoint between (4, 3) and its image (0, −1).