Recording transformations with coordinates

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. Complete the images of $A(-1, 2)$ and $B(2, -2)$ under $(x, y) \mapsto (x + 2, y - 1)$. [2 marks]

Add 2 to x and subtract 1 from y for each point.

Answer: $A'(1, 1), B'(4, -3)$

2. $P(-3, 1)$ maps to $(1, -2)$ and $Q(-1, 4)$ maps to $(3, 1)$. Find the common translation. [2 marks]

Subtract original coordinates from image coordinates for both pairs.

Answer: 4 units right and 3 units down.

3. A translation maps a point to $(2, 5)$ by moving 1 left and 3 up. Find the original. [2 marks]

Undo 1 left by adding 1 to x; undo 3 up by subtracting 3 from y.

Answer: $(3, 2)$

4. Which coordinate-axis reflection maps $(3, -2)$ to $(-3, -2)$ and $(-1, 4)$ to $(1, 4)$? [2 marks]

Only the x-coordinates change sign for both pairs.

Answer: Reflection in the y-axis.

5. Use $(x, y) \mapsto (-y, x)$ to find the image of $(4, 1)$. Name the turn. [2 marks]

Substitute $x = 4$ and $y = 1$ into the mapping.

Answer: $(-1, 4)$; 90° anticlockwise about the origin.

6. One proposed translation maps $A(0, 1)$ to $(2, 4)$ and $B(2, 1)$ to $(4, 5)$. Explain why the record contains a mistake. [2 marks]

A single translation must give the same coordinate change to both vertices.

Answer: A changes by $(2, 3)$, but B changes by $(2, 4)$.