Solutions

Award method and answer marks as indicated; accept equivalent correct methods.

2.1

- Add the vector components: $(5, -1)$.

2.2

- The point is 3 above the line, so its image is 3 below: $(3, -1)$.

2.3

- Clockwise changes (x, y) to $(y, -x)$: $(1, -4)$.

2.4

- Multiply both coordinates: $(3, 2)$.

3.1

(a)

- Double each coordinate: $(2, 2), (6, 2), (2, 4)$; join with a ruler.

(b)

- Every point moves 3 right, 1 down: **translation by** $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$.

(c)

- **Rotation** 180° **about the origin**; either direction is valid for a half-turn.

3.2

(a)

- Keep the centre **(2,2)** fixed.
- Halve each displacement from it, giving the other image vertices **(4,2)** and **(2,4)**.

(b)

- Reflection gives **(6,2), (2,2), (6,6)**. The x-values 2 and 6 are both **2 units from x = 4** on opposite sides.
- Each reflected point keeps its y-coordinate, so the joining segment is perpendicular to the vertical mirror.

3.3

- Add the top number to x and the bottom number to y: $(3 - 5,\ -2 + 4)$.
- $(\mathbf{-2},\ \mathbf{2})$.

3.4

(a)

- Reflecting in the x-axis changes the sign of y: $Q' = (\mathbf{2},\ \mathbf{-5})$.
- Reflecting in the y-axis changes the sign of x: $Q'' = (\mathbf{-2},\ \mathbf{-5})$.

(b)

- Both signs change: a **rotation of** 180° **about the origin** $(0, 0)$.