2.1

- $(5, 2)$ is 2 to the right of $x = 3$, so the image is 2 to the left: $(\mathbf{1}, \mathbf{2})$

2.2

- both signs change: $(\mathbf{-2}, \mathbf{-3})$

2.3

- $(1 + 3 - 5, 2 - 1 + 4) = (\mathbf{-1}, \mathbf{5})$
- single translation $\begin{pmatrix} 3-5 \\ -1+4 \end{pmatrix} = \begin{pmatrix} \mathbf{-2} \\ \mathbf{3} \end{pmatrix}$

2.4

- in the x-axis: $(4, -1)$
- then in the y-axis: $(\mathbf{-4}, \mathbf{-1})$

2.5

- a point is invariant when it lies on the mirror line, where $y = x$
- $(\mathbf{2}, \mathbf{2})$ and $(\mathbf{0}, \mathbf{0})$; $(3, 1)$ moves to $(1, 3)$

3.1

- every point except the centre moves round a circle; only the **centre**, the origin, stays where it is

3.2

- $(x, y) \to (x, -y) \to (-x, -y)$
- **rotation of** $180°$ **about the origin**

3.3

- rotate first: $(2, 1) \to (-1, 2)$, then translate: $(0, 2)$
- translate first: $(3, 1)$, then rotate: $(-1, 3)$
- $(0, 2) \neq (-1, 3)$, so the order matters

3.4

- test the origin: in $x = 1$, $(0, 0) \to (2, 0)$; then in $x = 4$, $(2, 0) \to (6, 0)$
- every point moves 6 to the right: twice the 3-unit gap between the lines
- **translation by** $\begin{pmatrix} 6 \\ 0 \end{pmatrix}$

3.5

- from $C(1, 1)$: $(2, 1)$ is $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$, times -2 is $\begin{pmatrix} -2 \\ 0 \end{pmatrix}$, giving $(-1, 1)$
- likewise $(4, 1) \to (1 - 6, 1) = (-5, 1)$ and $(2, 2) \to (1 - 2, 1 - 2) = (-1, -1)$

- legs 4 and 2: area $= \frac{1}{2} \times 4 \times 2 = \mathbf{4}$ square units ($2^2 = 4$ times the original 1)