

Combined Transformations *ramp up*

a Reflect (1, 4) in the y axis, then translate by $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$. Give the new point. 	b Translate (1, 4) by $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$, then reflect in the y axis. Give the new point. 	c Rotate (3, 2) 90° anticlockwise about (0, 0), then reflect in the x axis. 	d Rotate 180° about (0, 0), then reflect in the x axis. Describe this as one.
e Reflect in $x = 1$, then in $y = 2$. Describe this as one transformation. 	f Rotate 90° clockwise, then 180° , both about (0, 0). Describe this as one. 	g Reflect in the y axis, then in $y = x$. Describe this as one transformation. 	h Which has no invariant points: a reflection, a rotation or a translation?
i Reflect in the x axis, then translate by $\begin{pmatrix} 0 \\ 4 \end{pmatrix}$. Describe this as one transformation. 	j Reflect in the x axis, then translate by $\begin{pmatrix} 0 \\ 4 \end{pmatrix}$. Find every invariant point. 	k Rotate 180° about (0, 0), then translate by $\begin{pmatrix} 4 \\ 2 \end{pmatrix}$. Find the invariant point. 	l Reflect in the x axis, then translate by $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$. Describe how to undo this.

The Maths Habit

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