

## Transformations task

Draw a coordinate grid with both  $x$ -axis and  $y$ -axis ranging from  $-5$  to  $5$ .

- (a) Draw square A. Three of its vertices are at  $(2, 1)$ ,  $(5, 2)$  and  $(1, 4)$ . Where are the coordinates of its fourth vertex?
- (b) Reflect square A in the  $x$ -axis to get square B. What are the coordinates of the vertices of square B?
- (c) Rotate square B by  $90^\circ$  clockwise around the origin to get square C. What are the coordinates of the vertices of square C?
- (d) Translate square C by the vector  $\begin{pmatrix} 1 \\ 5 \end{pmatrix}$  to get square D. What are the coordinates of the vertices of square D?
- (e) What transformation (or combination of transformations) can be used to get from square D back to square A?

*Challenge:* Can you do this with a *single* transformation?

### Extension question

Can you give rules which give the image of the point  $(x, y)$  under all of the above transformations? (That is, can you say where the point  $(x, y)$  will end up if it is (b) reflected in the  $x$ -axis, or (c) rotated by  $90^\circ$  clockwise about the origin, or (d) translated by the vector  $\begin{pmatrix} 1 \\ 5 \end{pmatrix}$ ?)