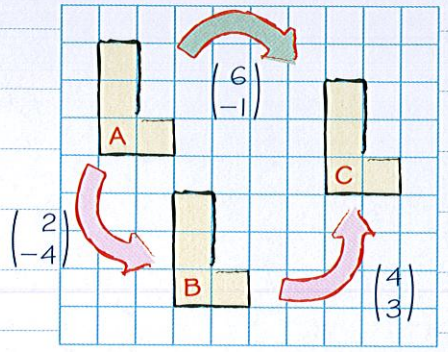
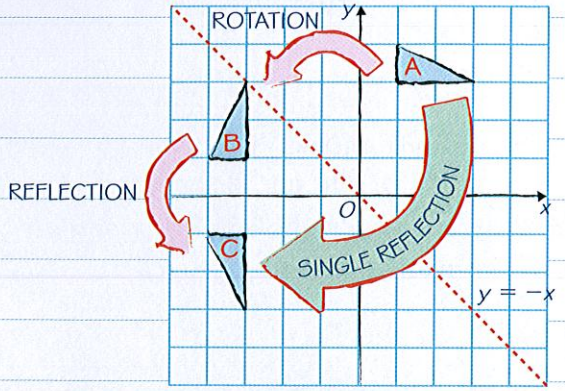
Combining transformations

You can describe two or more transformations using a single transformation.



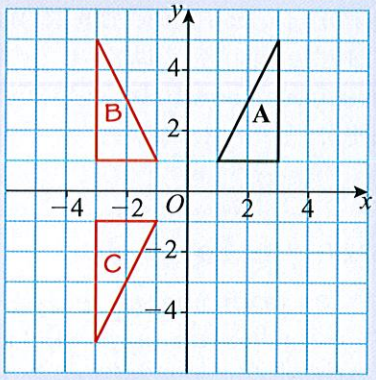
A to B to C: A translation $\begin{pmatrix}2\\-4\end{pmatrix}$ followed by a translation $\begin{pmatrix}4\\3\end{pmatrix}$ is the same as a single translation $\begin{pmatrix}6\\-1\end{pmatrix}$.



A to B to C: A rotation 90° clockwise about O followed by a reflection in the x-axis is the same as a single reflection in the line $y = -x$.

Worked example

grade B



Triangle **A** is reflected in the y-axis to give **B**.

Triangle **B** is then reflected in the x-axis to give **C**.

Describe fully the **single** transformation that takes triangle **A** to triangle **C**.

Rotation 180° about the point O.

You need to draw both transformations on the diagram. Remember that triangle C is a reflection of triangle B.

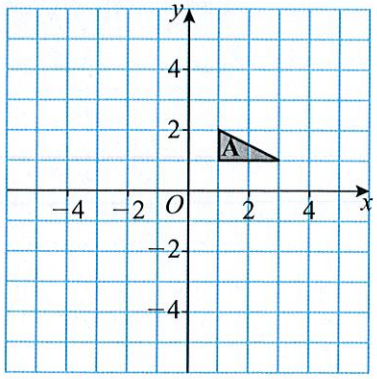
To describe a rotation fully you need to write 'rotation' and give the angle and centre of rotation. For a rotation of 180° you don't need to give a direction.

Describe fully...

- A translation: vector of translation. ✓
- A reflection: equation of mirror line. ✓
- A rotation: angle of turn, direction of turn and centre of rotation. ✓
- An enlargement: scale factor and centre of enlargement. ✓

Now try this

edexcel



Triangle **A** is enlarged by a scale factor of -1, centre O to give triangle **B**.

Triangle **B** is translated by the vector $\begin{pmatrix}4\\-2\end{pmatrix}$ to give triangle **C**.

Describe fully the single transformation that will map triangle **A** onto triangle **C**. **(4 marks)**

grade A*