Planner

Reflections, rotations and translations

- Finding the mirror line for a reflection
- Finding the centre of rotation and the angle of rotation
- Describing a single transformation that can replace a combination of transformations

Keywords

You should know

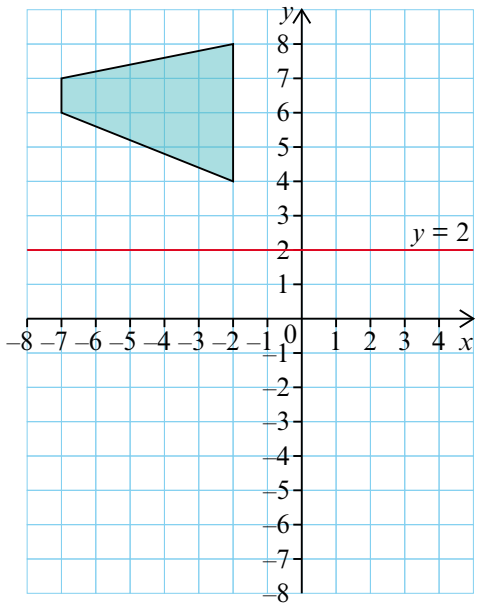
explanation 1a explanation 1b explanation 1c

1 Copy each diagram.

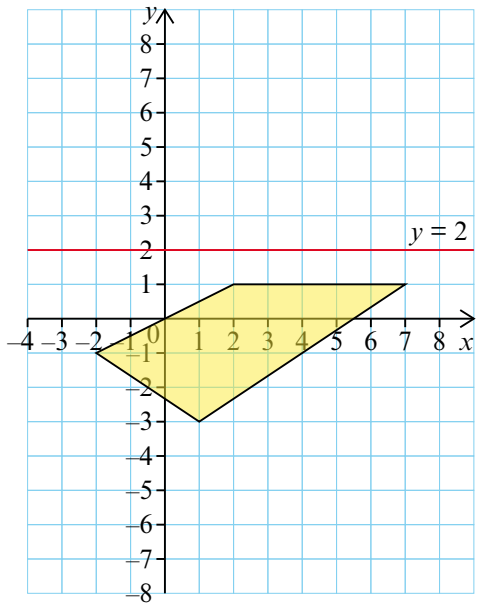
i Reflect each shape in the y-axis. Label the new shape A.

ii Reflect each shape in the line $y = 2$. Label the new shape B.

a

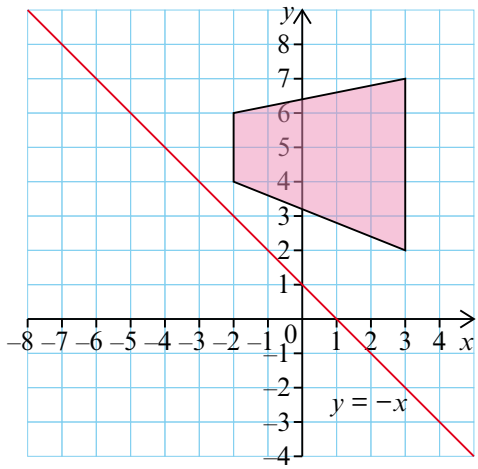


b

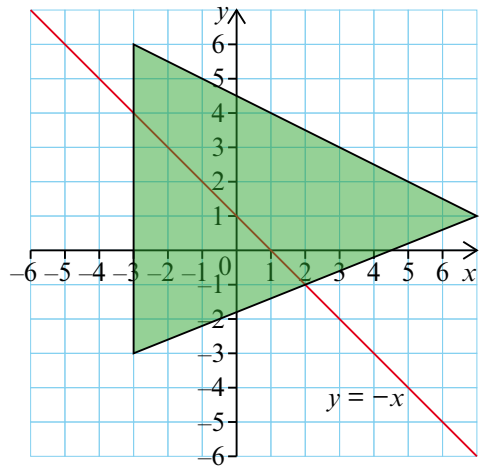


2 Copy each diagram. Reflect each shape in the line $y = -x$.

a

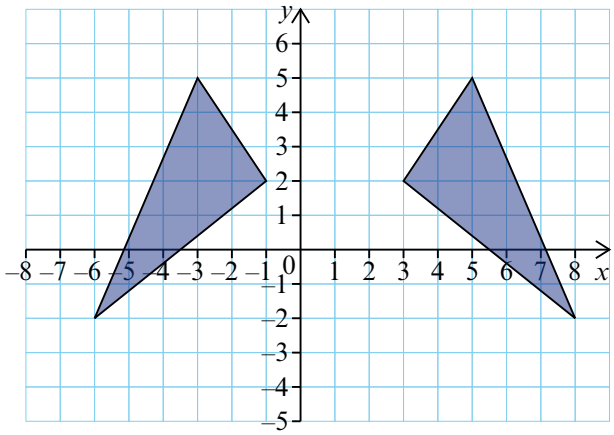


b

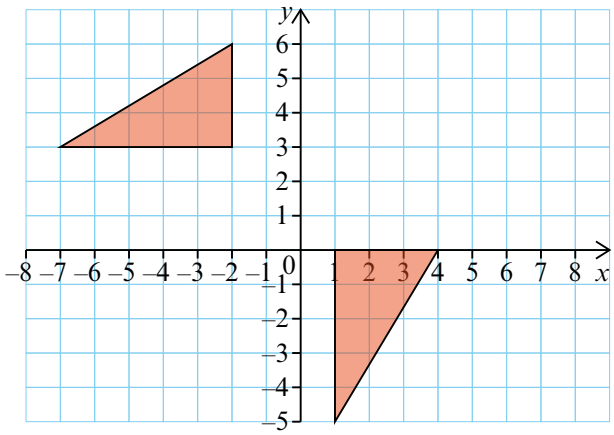


3 Copy each diagram. Draw in the line of reflection.

a



b



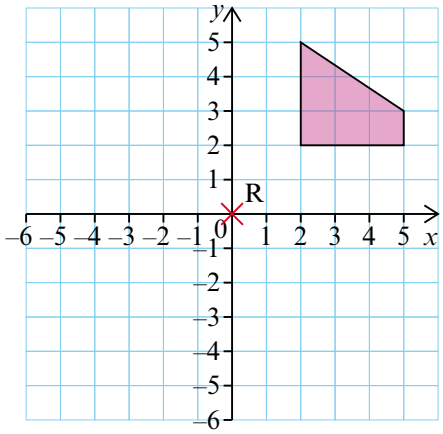
explanation 2a | explanation 2b | online

4 Copy each diagram. Rotate each shape as described.

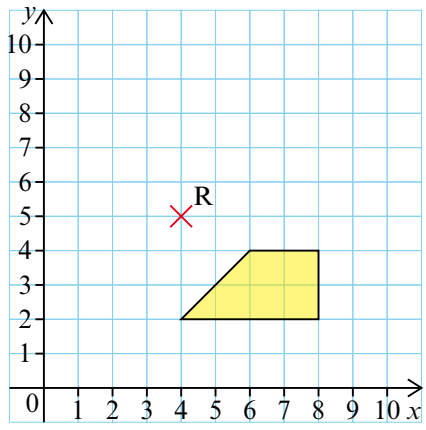
i 90° anticlockwise about the marked centre of rotation (R)

ii 180° about the marked centre of rotation (R)

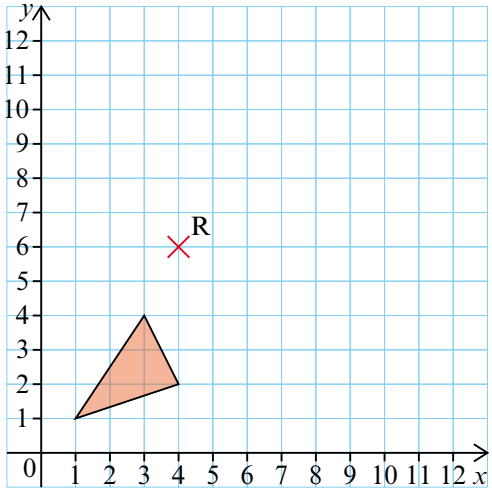
a



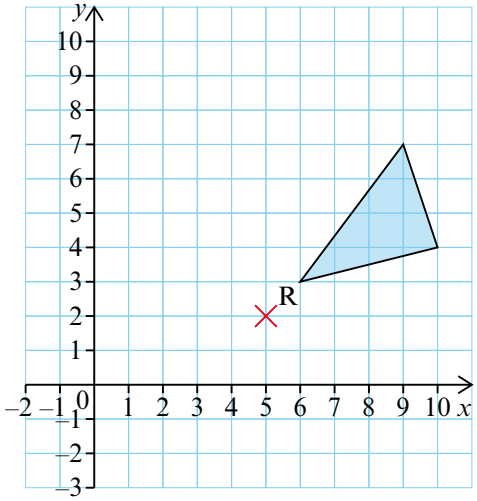
b



c



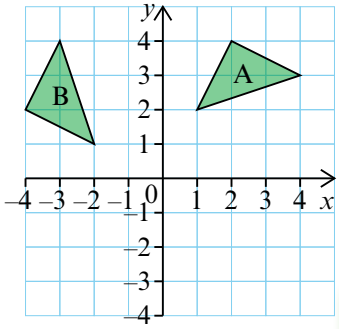
d



5 Look at the diagram.

a Describe fully the rotation that will map A to B.

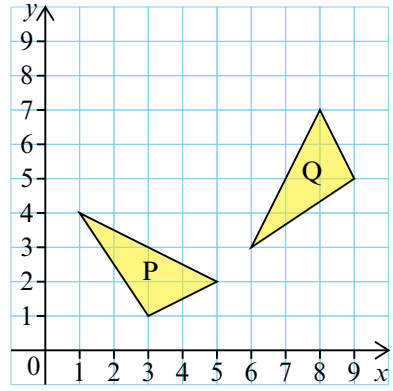
b Describe fully the rotation that will map B to A.



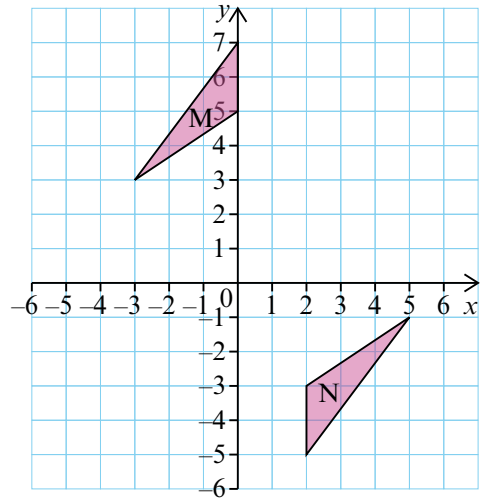
6 Look at the diagram.

a Describe fully the rotation that will map P to Q.

b Describe fully the rotation that will map Q to P.



7 Describe fully the rotation that will map M to N.



explanation 3a explanation 3b

8 Write the vector that will translate the shapes as described.

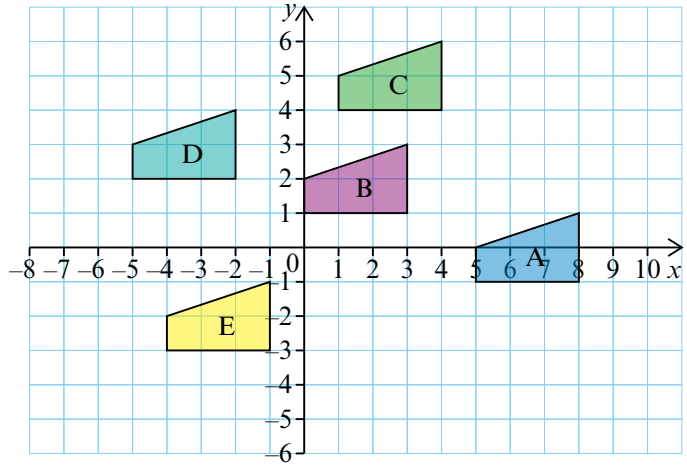
a E to B

b A to C

c D to B

d C to E

e A to D



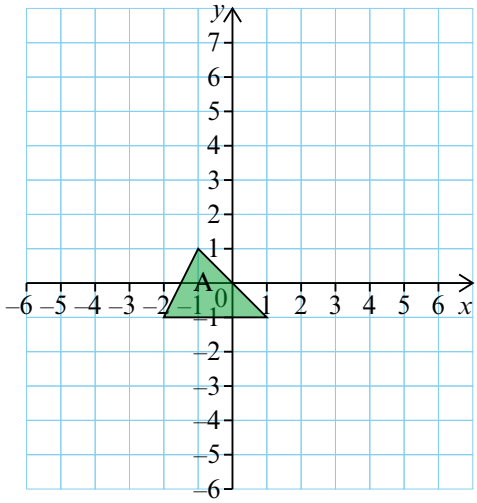
9 **a** Copy the diagram.

b Translate A by $\begin{pmatrix} 4 \\ 3 \end{pmatrix}$. Label the image B.

c Translate A by $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$. Label the image C.

d Translate A by $\begin{pmatrix} 4 \\ -2 \end{pmatrix}$. Label the image D.

e Translate A by $\begin{pmatrix} -3 \\ -4 \end{pmatrix}$. Label the image E.



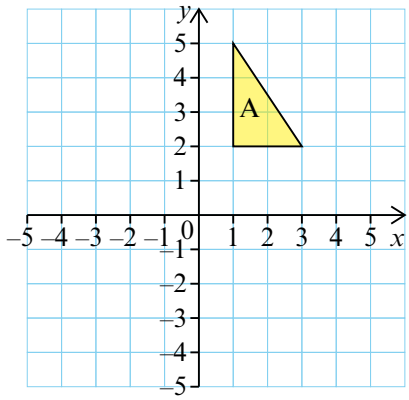
explanation 4a explanation 4b online

10 **a** Copy the diagram.

b Reflect triangle A in the line $y = 1$.
Label the new triangle B.

c Reflect triangle B in the line $x = 0$.
Label the new triangle C.

d Describe fully the single transformation that will map triangle A to triangle C.



11 **a** Copy the diagram from question **10** again.

b Reflect triangle A in the line $y = 2$. Label the new triangle B.

c Reflect triangle B in the line $x = 1$. Label the new triangle C.

d Describe fully the single transformation that will map triangle A to triangle C.

12 **a** Copy the diagram from question **10** again.

b Reflect triangle A in the line $x = 0$. Label the new triangle B.

c Reflect triangle B in the line $y = 1$. Label the new triangle C.

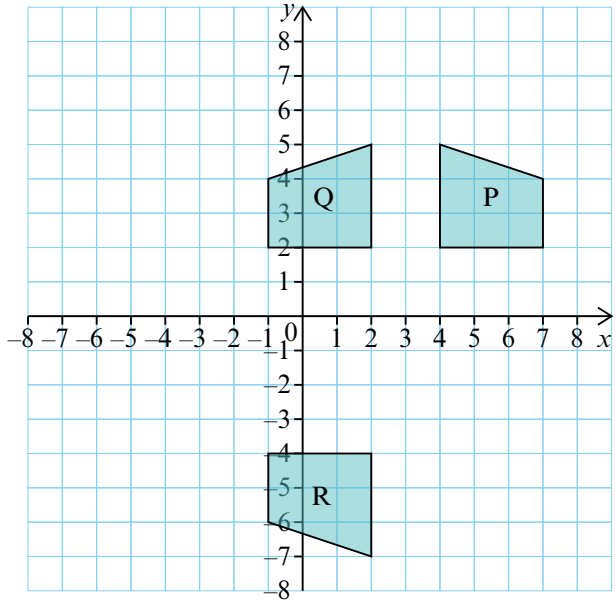
d Compare these answers to your answers to question **10**.
Has changing the order of the reflections made a difference to the single transformation that will map triangle A to triangle C?

13 Repeat question **11** but this time reflect triangle A first in the line $x = 1$ and then in the line $y = 2$. Does this make a difference to the single transformation?

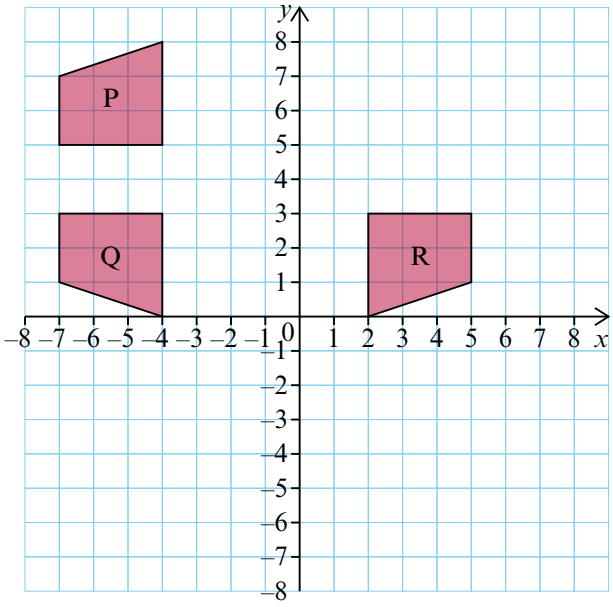
14 **a** Write the equation of the line of reflection that will map shape P to shape Q.

b Write the equation of the line of reflection that will map shape Q to shape R.

c Write the single transformation that will map shape P to shape R.



15 Repeat question **14** for this diagram.



16 Look at your answers to questions **10** to **15**.

a Using your answers, what single transformation do you think is equivalent to each of these?

i A reflection in the line $x = 1$ followed by a reflection in the line $y = 3$

ii A reflection in the line $y = 3$ followed by a reflection in the line $x = 2$

b Check your answers to part **a** by drawing suitable diagrams.

17 Write the single transformation that is equivalent to a reflection in the line $x = a$ followed by a reflection in the line $y = b$.

18 **a** Copy the diagram.

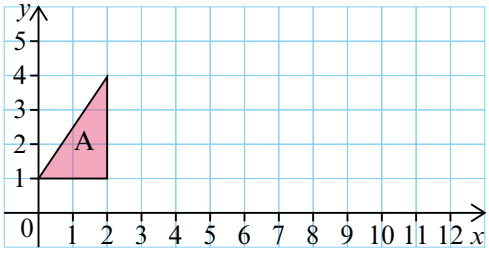
b Reflect triangle A in the line $x = 3$.

Label the new triangle B.

c Reflect triangle B in the line $x = 8$.

Label the new triangle C.

d Write down the single transformation that will map triangle A to triangle C.



19 **a** Repeat question **18** using two different vertical lines.

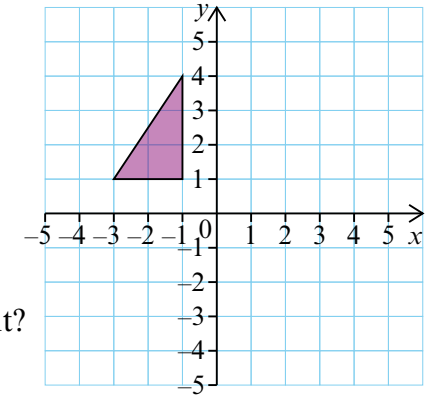
b Write a general rule for the single transformation when a shape is reflected in two different vertical lines.

c Investigate what happens when a shape is reflected in two different horizontal lines.

d Write a general rule for the single transformation when a shape is reflected in two different horizontal lines.

20 **a** Copy the diagram.

Find the image of the shaded shape after a rotation of 90° anticlockwise about (0, 0) followed by a translation of $\begin{pmatrix} 5 \\ 4 \end{pmatrix}$.



b Repeat part **a** but this time do the translation followed by the reflection.

c Was the order of transformations important?

Give an explanation for your answer.

21 Copy the diagram.

Investigate whether order is important when the combination of transformations is a reflection in the x-axis and a rotation of 180° about (0, 0).