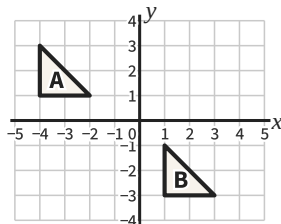


1 Translations

- a) $\begin{pmatrix} p \\ q \end{pmatrix}$ maps A onto B.

Translate B by $\begin{pmatrix} q \\ p \end{pmatrix}$.

- b) $\begin{pmatrix} h \\ k \end{pmatrix}$ maps $(-2, 3)$ onto $(2h + 1, 4 - k)$.
Find h and k .



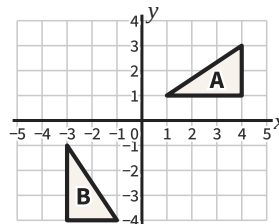
a) $\begin{pmatrix} -4 \\ 5 \end{pmatrix}$: $(-3, 2), (-1, 2), (-3, 4)$

b) $h = -3, k = 0.5$

2 Rotations

- a) Describe fully the single transformation that maps A onto B.

- b) Rotate the point (a, b) 90° anticlockwise about $(1, 0)$.



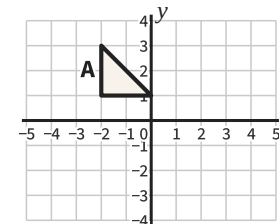
a) rotation 90° clockwise about $(-2, 2)$

b) $\begin{pmatrix} a-1 \\ b \end{pmatrix}$ turns to $\begin{pmatrix} -b \\ a-1 \end{pmatrix}$: $(1-b, a-1)$

3 Reflections

- a) Reflect A in the line $y = x - 2$. Write down the vertices of the image.

- b) A reflection maps $(-3, 2)$ onto $(1, -2)$.
Find the equation of the mirror line.



a) $(3, -4), (3, -2), (5, -4)$

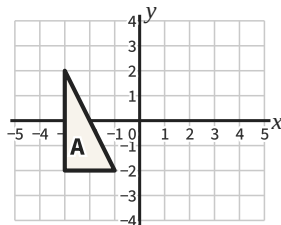
b) midpoint $(-1, 0)$, gradient 1

b) $y = x + 1$

4 Enlargement

- a) Enlarge A by scale factor $\frac{3}{2}$, centre $(-5, -2)$.

- b) An enlargement with centre $(1, 2)$ maps $(3, 3)$ onto $(7, 5)$. Find the image of $(0, 4)$.



a) $(-2, -2), (1, -2), (-2, 4)$

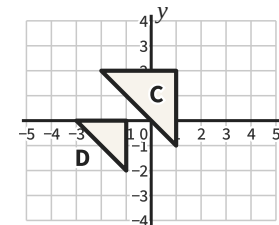
b) scale factor 3: $(1, 2) + 3 \times \begin{pmatrix} -1 \\ 2 \end{pmatrix} = (-2, 8)$

Transformations revision mat answers

5 Describing enlargements

- a) Describe fully the single transformation that maps C onto D.

- b) What fraction of the area of C is the area of D?



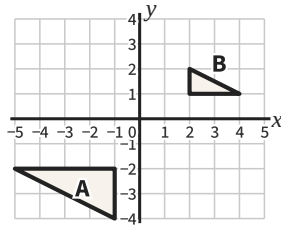
a) enlargement, scale factor $\frac{2}{3}$, centre $(-5, -4)$

b) $(\frac{2}{3})^2 = \frac{4}{9}$

6 Negative scale factors

- a) Describe fully the single transformation that maps A onto B.

- b) An enlargement, scale factor -3 , maps $(2, 1)$ onto $(-6, 5)$. Find its centre.



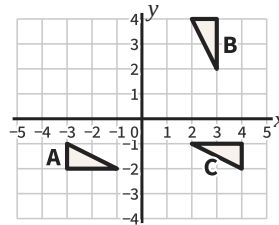
a) enlargement, scale factor $-\frac{1}{2}$, centre $(1, 0)$

b) it splits the join $1:3$, so $(0, 2)$

7 Mixed transformations

- a) Describe fully the single transformation that maps A onto B.

- b) Describe fully the single transformation that maps A onto C.



a) reflection in the line $y = 1 - x$

b) rotation 180° about $(0.5, -1.5)$

8 Combined transformations

- a) Show that a reflection in $x = 1$ followed by a reflection in $x = 4$ is a translation. Give its vector.
- b) A rotation of 90° clockwise about $(0, 0)$ is followed by a reflection in the x axis. Use the point (a, b) to describe fully the single transformation.

a) $x \rightarrow 2 - x \rightarrow 8 - (2 - x) = x + 6$, so $\begin{pmatrix} 6 \\ 0 \end{pmatrix}$

b) $(a, b) \rightarrow (b, -a) \rightarrow (b, a)$

b) reflection in the line $y = x$