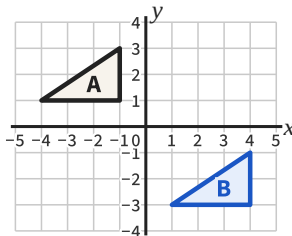


1 Translations

- a) Translate A by $\begin{pmatrix} 5 \\ -4 \end{pmatrix}$.
Label the image B.
- b) Write the column vector that translates B back onto A.

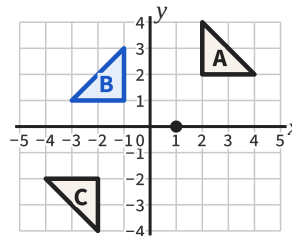


a) B at (1, -3), (4, -3), (4, -1)

b) $\begin{pmatrix} -5 \\ 4 \end{pmatrix}$

2 Rotations

- a) Rotate A 90° anticlockwise about (1, 0). Label the image B.
- b) Describe fully the single transformation that maps A onto C.

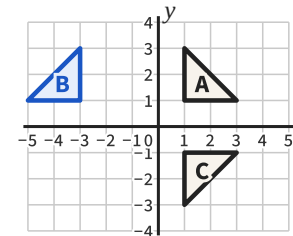


a) B at (-1, 1), (-3, 1), (-3, 3)

b) rotation 180° about (0, 0)

3 Reflections

- a) Reflect A in the line $x = -1$. Label the image B.
- b) Describe fully the single transformation that maps A onto C.

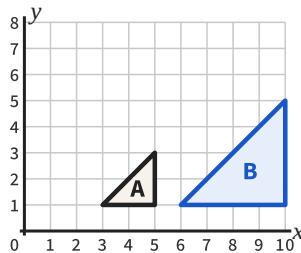


a) B at (-3, 1), (-5, 1), (-5, 3)

b) reflection in the x axis

4 Enlargement

- a) Enlarge A by scale factor 2, centre (0, 1). Label the image B.
- b) A rectangle 3 cm by 2 cm is enlarged by scale factor 4. Find the perimeter of the image.



a) B at (6, 1), (10, 1), (10, 5)

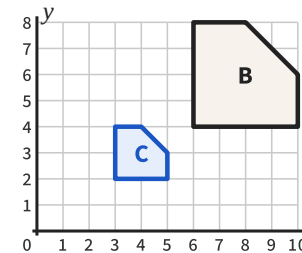
b) 12 cm by 8 cm, perimeter 40 cm

Transformations and vectors

Foundation A

5 Enlargement: scale factors

- a) Enlarge B by scale factor $\frac{1}{2}$, centre (0, 0). Label the image C.
- b) Which scale factor, with the same centre, maps C back onto B?

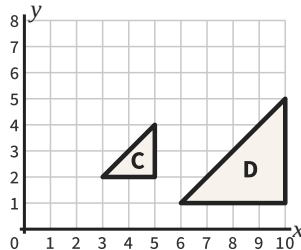


a) C at (3, 2), (5, 2), (5, 4), (3, 4)

b) scale factor 2

6 Describing enlargements

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

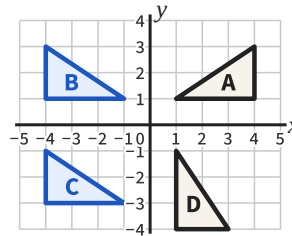


a) enlargement, scale factor 2, centre (0, 3)

b) enlargement, scale factor $\frac{1}{2}$, centre (0, 3)

7 Mixed transformations

- a) Reflect A in the y axis to give B. Then translate B by $\begin{pmatrix} 0 \\ -4 \end{pmatrix}$ to give C.
- b) Describe fully the single transformation that maps A onto D.

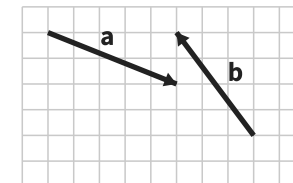


a) C at (-1, -3), (-3, -3), (-3, -1)

b) rotation 90° clockwise about (0, 0)

8 Calculating with vectors

- $\mathbf{a} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$
- a) Work out $\mathbf{a} + \mathbf{b}$.
- b) Work out $2\mathbf{a} - \mathbf{b}$.



a) $\begin{pmatrix} 5 \\ -2 \end{pmatrix} + \begin{pmatrix} -3 \\ 4 \end{pmatrix} = \begin{pmatrix} 2 \\ 2 \end{pmatrix}$

b) $\begin{pmatrix} 10 \\ -4 \end{pmatrix} - \begin{pmatrix} -3 \\ 4 \end{pmatrix} = \begin{pmatrix} 13 \\ -8 \end{pmatrix}$