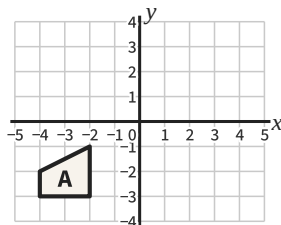


1 Translating shapes

- a) Translate A by $\begin{pmatrix} 5 \\ 4 \end{pmatrix}$.

Write down the vertices of the image.

- b) Which single vector does the same as $\begin{pmatrix} 2 \\ -1 \end{pmatrix}$ followed by $\begin{pmatrix} -5 \\ 2 \end{pmatrix}$?



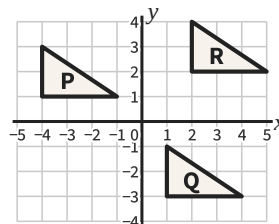
$$a) (1, 1), (3, 1), (3, 3), (1, 2)$$

$$b) \begin{pmatrix} 2 \\ -1 \end{pmatrix} + \begin{pmatrix} -5 \\ 2 \end{pmatrix} = \begin{pmatrix} -3 \\ 1 \end{pmatrix}$$

2 Describing translations

- a) Write the column vector that translates P onto Q.

- b) Write the column vector that translates R onto Q.



$$a) \begin{pmatrix} 5 \\ -4 \end{pmatrix} \quad b) \begin{pmatrix} -1 \\ -5 \end{pmatrix}$$

3 Calculating with vectors

$$a = \begin{pmatrix} 3 \\ -2 \end{pmatrix} \quad b = \begin{pmatrix} -1 \\ 4 \end{pmatrix}$$

- a) Work out $2a + b$ as a column vector.

- b) $3a + c = \begin{pmatrix} 1 \\ 6 \end{pmatrix}$. Find c .

$$a) \begin{pmatrix} 6 \\ -4 \end{pmatrix} + \begin{pmatrix} -1 \\ 4 \end{pmatrix} = \begin{pmatrix} 5 \\ 0 \end{pmatrix}$$

$$b) c = \begin{pmatrix} 1 \\ 6 \end{pmatrix} - \begin{pmatrix} 9 \\ -6 \end{pmatrix} = \begin{pmatrix} -8 \\ 12 \end{pmatrix}$$

4 Vectors: magnitude

- a) Work out the magnitude of $\begin{pmatrix} -5 \\ 12 \end{pmatrix}$.

- b) The vector $\begin{pmatrix} k \\ 6 \end{pmatrix}$ has magnitude 10. Find the two possible values of k .

$$a) \sqrt{(-5)^2 + 12^2} = \sqrt{169} = 13$$

$$b) k^2 + 36 = 100, k = 8 \text{ or } -8$$

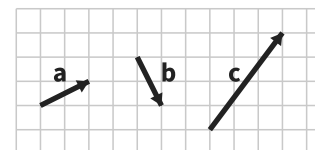
Vectors revision mat answers

Higher A

5 Vectors on a grid

- a) Write a and b as column vectors.

- b) Write c in terms of a and b .



$$a) a = \begin{pmatrix} 2 \\ 1 \end{pmatrix}, b = \begin{pmatrix} 1 \\ -2 \end{pmatrix}$$

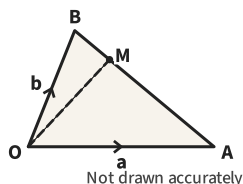
$$b) c = \begin{pmatrix} 3 \\ 4 \end{pmatrix} = 2a - b$$

6 Vector paths

OA = a and OB = b . M is on AB so that AM : MB = 3 : 1.

- a) Write the vector AB in terms of a and b .

- b) Write the vector OM in terms of a and b .



$$a) AB = b - a$$

$$b) OM = a + \frac{3}{4}(b - a) = \frac{1}{4}a + \frac{3}{4}b$$

7 Parallel vectors

- a) Show that $\begin{pmatrix} 6 \\ -9 \end{pmatrix}$ is parallel to $\begin{pmatrix} -4 \\ 6 \end{pmatrix}$.

- b) $\begin{pmatrix} k \\ 10 \end{pmatrix}$ is parallel to $\begin{pmatrix} 3 \\ -5 \end{pmatrix}$. Find k .

$$a) \begin{pmatrix} 6 \\ -9 \end{pmatrix} = -1.5 \times \begin{pmatrix} -4 \\ 6 \end{pmatrix}, a \text{ multiple, so parallel}$$

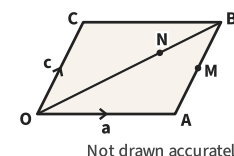
$$b) 10 = -2 \times (-5), \text{ so } k = -2 \times 3 = -6$$

8 Vector proof

OABC is a parallelogram. M is the midpoint of AB. ON : NB = 2 : 1.

- a) Write CM in terms of a and c .

- b) Prove that C, N and M lie on a straight line.



$$a) CM = a - \frac{1}{2}c$$

$$b) CN = \frac{2}{3}(a + c) - c = \frac{2}{3}a - \frac{1}{3}c = \frac{2}{3}CM: \text{ parallel, through C}$$