

Vectors and Transformations – Key Topics for a C/B Grade

Vectors

Vectors have a particular size and direction.

The notation \overrightarrow{AB} means the vector going from A to B. Vectors are also described using **bold** letters.

To find a vector expression using a diagram, find a route going along known vectors. Remember that if you go backwards along a vector you subtract it.

The **modulus** or **magnitude** of a vector is its size (how big it is).

Column Vectors

A vector on a square grid can be described using a column vector. The top number gives the distance right, and the bottom number gives the distance up. To move left or down use negative numbers.

Column vectors can be added, subtracted or multiplied by a scalar (number) by adding, subtracting or multiplying each number in turn.

E.g.

$$2 \begin{pmatrix} 3 \\ -2 \end{pmatrix} + \begin{pmatrix} 4 \\ 5 \end{pmatrix} - \begin{pmatrix} -1 \\ 1 \end{pmatrix} = \begin{pmatrix} 6 \\ -4 \end{pmatrix} + \begin{pmatrix} 4 \\ 5 \end{pmatrix} - \begin{pmatrix} -1 \\ 1 \end{pmatrix} = \begin{pmatrix} 6 + 4 - -1 \\ -4 + 5 - 1 \end{pmatrix} = \begin{pmatrix} 11 \\ 0 \end{pmatrix}$$

Transformations

There are 4 types of transformation. To describe them fully, you need to give the type and the additional necessary information.

- Reflection: the mirror line (Ideally give the equation of the line. If you can't remember it, draw the mirror line and clearly label it. Be careful with diagonal mirror lines, it is a common mistake to describe a diagonal reflection as a rotation.)
- Rotation: the angle and direction of rotation, and the centre of rotation (To find the centre, use tracing paper and trial and error.)
- Translation: the column vector of the move.
- Enlargement: the scale factor and the centre (the scale factor is how many times bigger – a s.f of $\frac{2}{3}$ or $\frac{3}{2}$ will make the shape smaller)

If you are asked to describe a *single* transformation you must only give *one* type of transformation or you will automatically get no marks.