Y10 Maths Knowledge Organiser Higher Tier: Vectors

What must I be able to do?

New content:

- ☐ Understand and use vector notation
  - ➤ Sparx U632
- ☐ Calculate the magnitude of a vector
- ☐ Calculate and represent graphically the sum of two vectors
  - ➤ Sparx U903
- ☐ Calculate the resultant of two vectors
  - ➤ Sparx U903
- ☐ Use a scalar multiple of a vector
  - ➤ Sparx U564
- ☐ Solve geometric problems in two dimensions using vectors
  - ➤ Sparx U781
- ☐ Apply vector methods for simple geometric proofs
  - ➤ Sparx U560

Key vocabulary

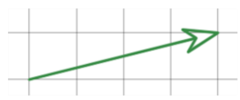
Vector	A quantity which has <u>magnitude</u> and <u>direction</u>.
Scalar	A quantity which has size but not direction e.g. 3
Magnitude	The length of a vector. Calculated by using Pythagoras' theorem.

Column Vectors

Vectors are often written as column vectors

Left or right → $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$ ← Up or down

This is the vector $\begin{pmatrix} 4 \\ 1 \end{pmatrix}$



It goes 4 units right and 1 unit up.

Add/subtract vectors:

$$\begin{pmatrix} 8 \\ 4 \end{pmatrix} - \begin{pmatrix} 3 \\ 6 \end{pmatrix} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$$

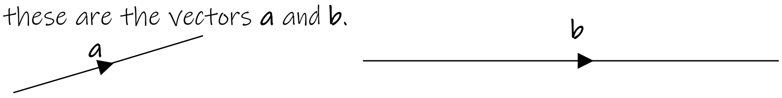
Multiply vectors by a scalar constant

$$3\begin{pmatrix} 4 \\ 7 \end{pmatrix} = \begin{pmatrix} 12 \\ 21 \end{pmatrix}$$

Vector Geometry

Often, a vector will be defined in a more abstract way and the actual details of the direction are not known.

E.g. these are the vectors **a** and **b**.



Important facts to know which can be used in a geometric proof.

- Two vector sums (addition/subtraction) which start and end at the same point must be equal
- Two vectors which are parallel and equal in length can be represented using the same letter

  e.g. if the base of a square is the vector **a** so is the top of the square
- Two vectors which are multiples of each other **must be parallel**

  e.g. 3**a** and 2**a** are both parallel as they are both multiples of **a**

  This also applies to vector addition so **a** + **b** is parallel to 3(**a** + **b**)
- If two vectors are parallel and pass through the same point, then they must lie on the **same straight line**

  e.g. if you can show that the vector from points A to B, i.e. $\overrightarrow{AB}$ is parallel to the vector $\overrightarrow{AC}$ then points A, B and C must lie on the same line as they both pass through point A.

  We would call vectors $\overrightarrow{AB}$ and $\overrightarrow{AC}$ **colinear**