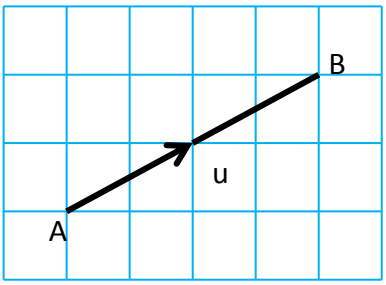
VECTORS

A vector is a quantity with both magnitude (size) and direction.

Naming Vectors



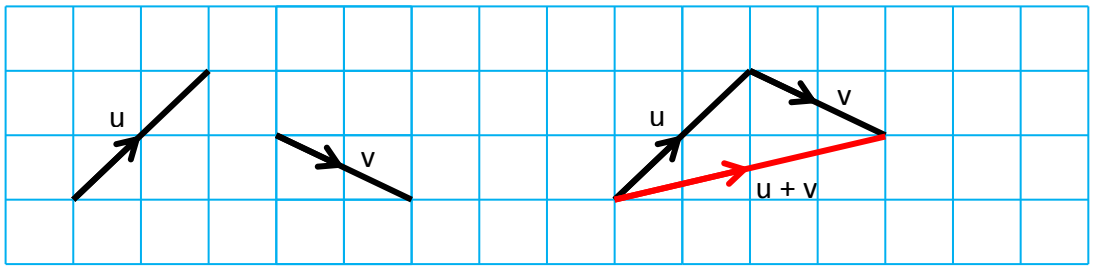
A vector is named either by using the letters at the end of the directed line segment $\overrightarrow{AB}$ or by using a lower case letter which will either be bold, **u**, or underlined, u.

A column vector shows the x, y and z (if in 3 dimensions) components.

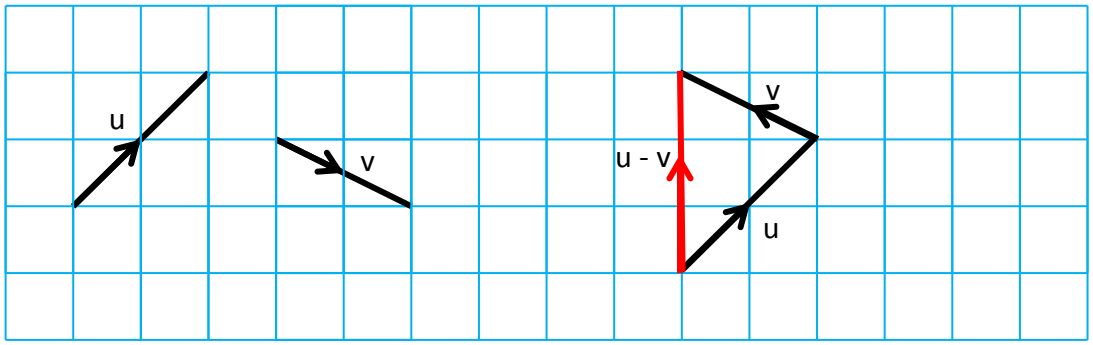
$\overrightarrow{AB} =$ **u** = $\underline{u} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$

Addition & Subtraction

When we add vectors we place them 'nose to tail'.



When we subtract vectors we add a negative vector.



We can also add or subtract vectors by adding or subtracting their components.

e.g. If $\underline{u} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$ and $\underline{v} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$ then $\underline{u} + \underline{v} = \begin{pmatrix} 3 \\ -2 \end{pmatrix} + \begin{pmatrix} 4 \\ 5 \end{pmatrix} = \begin{pmatrix} 7 \\ 3 \end{pmatrix}$

If $\underline{a} = \begin{pmatrix} 4 \\ -1 \\ 0 \end{pmatrix}$ and $\underline{b} = \begin{pmatrix} -3 \\ 6 \\ 2 \end{pmatrix}$ then $\underline{a} - \underline{b} = \begin{pmatrix} 4 \\ -1 \\ 0 \end{pmatrix} - \begin{pmatrix} -3 \\ 6 \\ 2 \end{pmatrix} = \begin{pmatrix} 7 \\ -7 \\ -2 \end{pmatrix}$

The resultant vector is the sum of the vectors.

Magnitude of a Vector

$$\text{If } \overrightarrow{AB} = \begin{pmatrix} x \\ y \end{pmatrix} \text{ then } \left|\overrightarrow{AB}\right| = \sqrt{x^2 + y^2}$$

$$\text{Similarly if } \overrightarrow{AB} = \begin{pmatrix} x \\ y \\ z \end{pmatrix} \text{ then } \left|\overrightarrow{AB}\right| = \sqrt{x^2 + y^2 + z^2}$$

Multiplication

We can multiply a vector by a scalar by multiplying each component by the scalar value.

$$\text{If } \underline{a} = \begin{pmatrix} x \\ y \\ z \end{pmatrix} \text{ then } \mathrm{k}\,\underline{a} = k\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} kx \\ ky \\ kz \end{pmatrix}$$

Parallel Vectors

If one vector is a multiple of another then the vectors are parallel.

i.e. if $\underline{a} = k\,\underline{b}$ then vectors $\underline{a}$ and $\underline{b}$ are parallel.

Position Vectors

A position vector is a vector from the origin, O, to a point P.

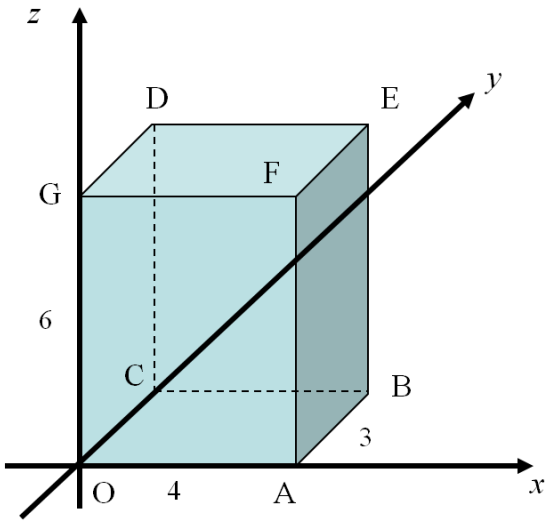
The position vector $\overrightarrow{OP}$ is the vector from O to P, it is also written as $\underline{p}$.

3D Coordinates

Coordinate points can be given in 3 dimensions.

In the diagram opposite the vertices of the cuboid have coordinates:

O(0,0,0)
A(4,0,0)
B(4,3,0)
C(0,3,0)
D(0,3,6)
E(4,3,6)
F(4,0,6)
G(0,0,6)



Vectors Practice

http://www.bbc.co.uk/schools/gcsebitesize/maths/geometry/vectorshirev1.shtml

Revise vectors and try the Test Bite.

http://www.bbc.co.uk/education/guides/zg76fg8/revision

Revise vectors and try the test.

http://www.supermathsworld.com/ Ask your teacher for the login details.

Select SHAPE from the menu. Select VECTORS. Try on EASY, MEDIUM and HARD levels.