

## Phys12 Vectors 2 D : Notes - 10

A **vector** is a magnitude and a direction. Many quantities in physics are vector quantities. Examples are; displacement, velocity, acceleration and force. Other quantities in physics are **scalars**. A scalar is just a magnitude. Examples of scalars are mass and temperature.

In grade 12 physics, students are expected to have a good understanding of vectors in two dimensions.

One way to represent a vector is with an ordered pair. For example,  $\mathbf{A} = [3.0, 2.0]$  represents a vector with a component 3.0 along the x-axis and a component 2.0 along the y-axis. The vector is usually represented by a bold letter or a letter with an arrow drawn above it. The units could be m, N, or m/s etc. depending on whether we are talking about displacement, force or velocity. Vectors can be added, subtracted or multiplied by a scalar.

$$\text{e.g. } 2 \mathbf{A} = 2 \times [3.0, 2.0] = [6.0, 4.0] ; - \mathbf{A} = - [3.0, 2.0] = [-3.0, -2.0]$$

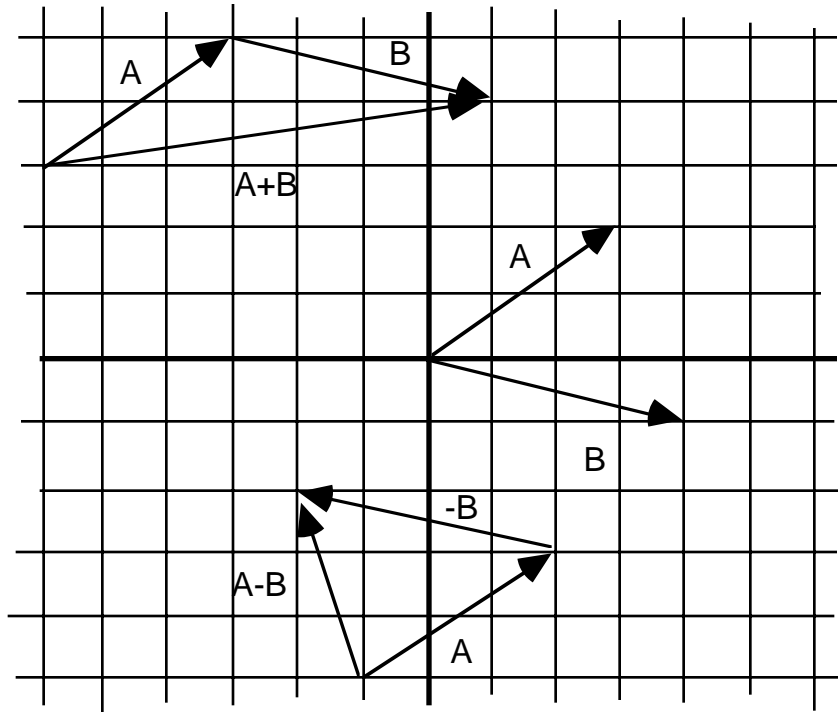
If we have a vector  $\mathbf{B} = [4.0, -1.0]$ , then :

$\mathbf{A} + \mathbf{B} = [3.0, 2.0] + [4.0, -1.0] = [7.0, 1.0]$ . This vector is called the : **resultant**.

Also, the difference between two vectors can be found.

$$\mathbf{A} - \mathbf{B} = [3.0, 2.0] - [4.0, -1.0] = [-1.0, 3.0]$$

These vectors are shown on the grid below. It is **important** to note that the position of the tail of the vector is **not** specified.



The **magnitude** of **A** is given by  $|\mathbf{A}|$ . This is the length of the vector :  $= \sqrt{13} = 3.6$  units. Another way of representing **A** is :  $\mathbf{A} = 3.6 [34^\circ \text{ N of E}]$ . This assumes North is in the positive Y direction and East is in the positive X direction.