**Working with Vectors**

In Mechanics you will often need to convert to/from the scalar form of a quantity and the vector form.

**SCALAR:**

**VECTOR:**

Examples of scalars and vectors:

|  |  |
| --- | --- |
| **Scalar** | **Vector** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

NB: 1-dimensional vectors are still different from scalars. Consider the displacement on a 1-dimensional line in a particular direction. If we’d gone backwards 3 units…



What is the distance travelled?

What is the displacement of the particle?

**Vector Notation**



**Column Notation *i*-*j* Notation**

(***i*** and ***j*** are **unit** vectors of length 1)

**Adding and Subtracting Vectors**

 

Two vectors are equal if they have the **same magnitude and direction**.

Two vectors are parallel if they have the **same direction but different magnitudes.**

**Converting Between Vectors and Scalars**

To convert to vector form, just use basic trigonometry to find the *𝑥* -change and *𝑦* -change.

**Scalar (Distance) Vector (Displacement)**





To convert scalar form, just find the **magnitude** of the vector using Pythagoras.

**Vector (Velocity) Scalar (Speed)**

$$\left(\begin{matrix}5\\-12\end{matrix}\right) ms^{-1}$$

**Further Examples**



**Test Your Understanding**

A woman walks from A to B and then from B to C.

Her displacement from A to B is 6i + 4j m.

Her displacement from B to C is 5i - 12j m.

a) What is the magnitude of the displacement from A to C?

b) What is the total distance the woman has walked in getting from A to C?

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