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:

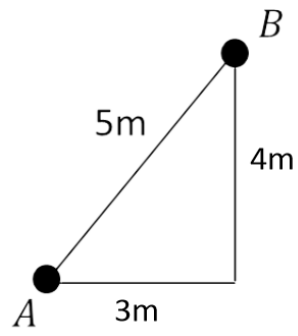| Scalar	Vector

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...
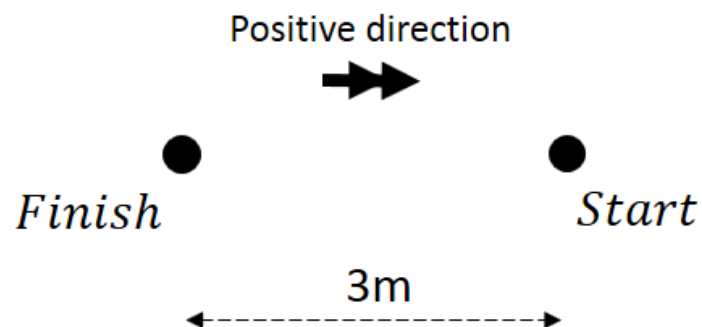
What is the distance travelled?

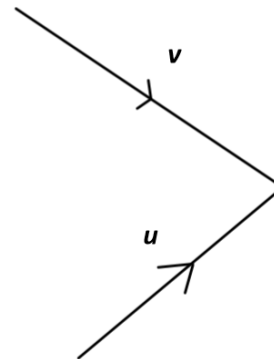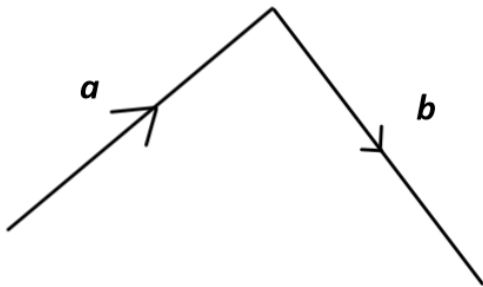What is the displacement of the particle?

Vector Notation

Column Notation   ***i-j* Notation**
                                                     (***i*** and ***j*** are **unit** vectors of length 1)
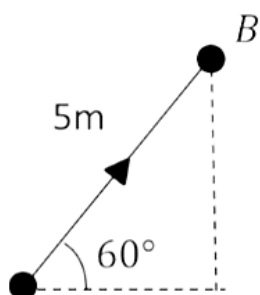
Adding and Subtracting Vectors

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

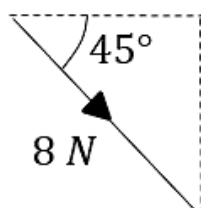Two vectors are parallel if they have the **same direction but different magnitudes.**

Converting Between Vectors and Scalars

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

<div style="display:flex; justify-content:space-between;">
<u>Scalar (Distance)</u>
<u>Vector (Displacement)</u>
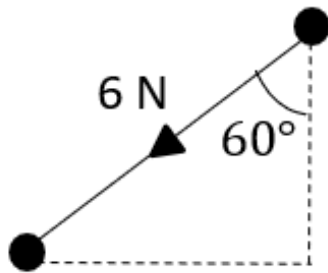</div>

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

<div style="display:flex; justify-content:space-between;">
<u>Vector (Velocity)</u>
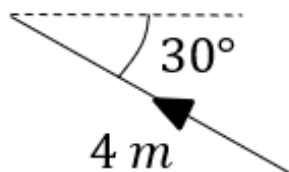<u>Scalar (Speed)</u>
</div>

$$\begin{pmatrix} 5 \\ -12 \end{pmatrix} ms^{-1}$$

Further Examples

Scalar Form	Vector Form

6 N   60°

$$(6\boldsymbol{i} - 8\boldsymbol{j})\ ms^{-2}$$

30°

$4\ m$

Test Your Understanding

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

Her displacement from A to B is $6\underline{i} + 4\underline{j}$ m.

Her displacement from B to C is $5\underline{i} - 12\underline{j}$ 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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