

A white racing airplane is shown in flight, banking to the right. The background features a large body of water reflecting the warm, golden light of a sunset. The sun is low on the horizon, creating a shimmering path of light across the water. In the distance, there are silhouettes of landmasses and small boats. The overall scene is serene and captures the beauty of aviation during the 'golden hour'.

Kinematics.

The study of how objects move.

Learning goal C1

- differentiate between scalar and vector quantities
- define *distance*, *displacement*, *speed*, and *velocity*

Vocabulary...

Quantities:

- Distance
- Displacement
- Speed
- Velocity
- Acceleration

Descriptors:

Used to describe speed, velocity and acceleration

- Constant
- Uniform
- Average
- Final
- Initial
- Instantaneous

Vectors and Scalars

- Scalars have magnitude (size) only.
- Vectors have both Magnitude and Direction

Example:

Distance: is a **scalar**. 25 m **only has size**

Displacement: **vector** 25 m North. **Has size and direction!**

Vectors

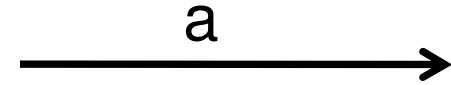
- Vectors can be represented in two ways

a) Writing: *10 steps [East]*

b) Drawing an arrow

use a scale: 1cm = 1 step

label with a letter



Position:

- Position is given from a reference point:

Example: Mr B is 1.0 m from the door

Which side of the door?

Mr B is 1.0 m in front of the door

(it has size and direction, thus it is a vector!)

Distance and Displacement.

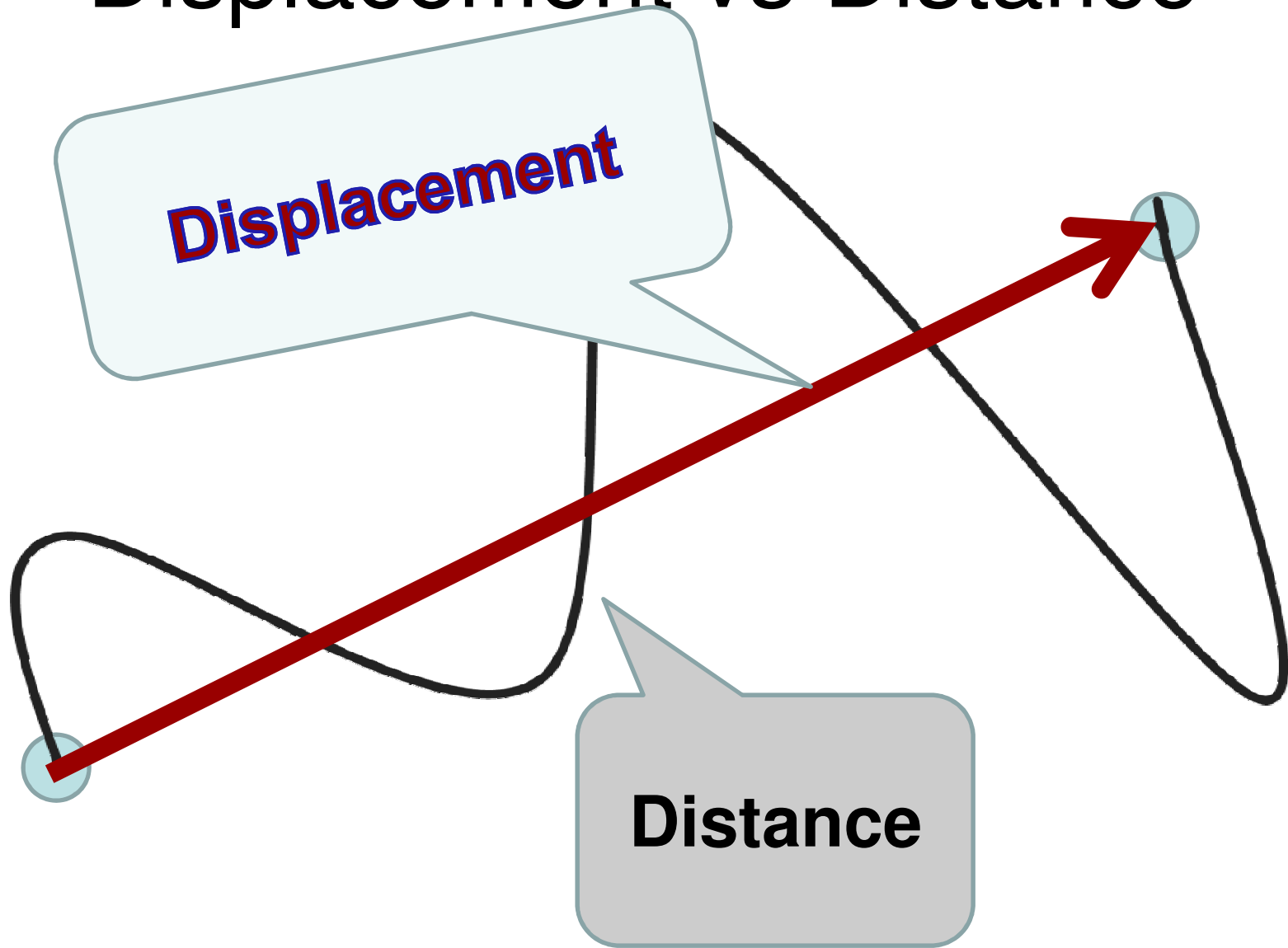
- Distance is a scalar, no direction given. Distance always is the total length of the path taken.
- Displacement is a vector thus has a direction. displacement must therefore be a straight line!
It is the ***change in position!!***

Displacement is the difference between the final and starting positions



***Definition!
Pay
Attention!***

Displacement vs Distance



Displacement:

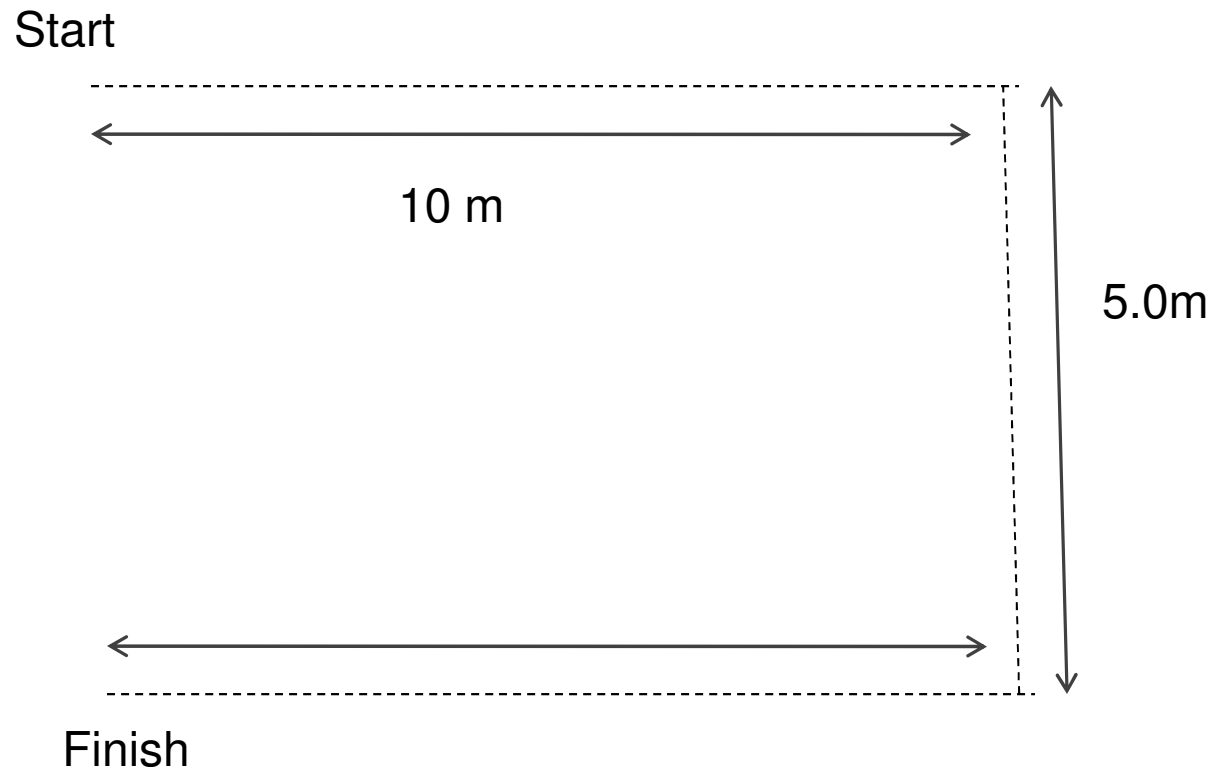
Is a change in position...

position 2(final) – position 1(initial)

Or

$$\Delta \vec{d} = d_2 - d_1$$

Displacement always tells you how far you are from your starting position and in what direction.



What is the distance walked? **25m**

What is the displacement of the person? **5.0 m south**

**Describe each leg of the trip as a displacement?
Could each one also be a distance?**

Distance and Speed

- Distance can be described as the total length of path traveled. [d]
- Speed therefore is given by

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

or

$$v = \frac{d}{t}$$

What would its unit be?

$$\frac{\text{meter}}{\text{second}} = \frac{m}{s} = \frac{m}{s} = m \cdot s^{-1}$$

Displacement and Velocity.

- Displacement is the change in position.
position 2 – position 1
- Velocity = displacement / time

$$\vec{v} = \frac{\Delta \vec{d}}{t} = \frac{\vec{d}_2 - \vec{d}_1}{t_2 - t_1}$$

Homework.

- Homework: read p 2-4
- Practice on p 5 (1- 8)
- Practice on p 7 (1- 4)
- Practice on P 8 (1– 4)