Motion

Kinematics - the study of motion

Scalar quantity - has size (magnitude) only

10 s , 150 km , 65 kg

Vector quantity - has size and direction

52 km [NE] , 98 $\frac{km}{h}$ [W 10° S]

position ($\vec{d}$) - the location of an object in relation to a reference point (m)
(vector)

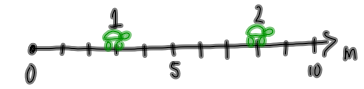
$\vec{d}$ = 5 km [E]

distance (Δd) - how far the object has gone (m)
(scalar)

Δd = 125 km

displacement ($\Delta \vec{d}$) - change in position; where the object is now in relation to where it started (m)
(vector)

$\Delta \vec{d}$ = 4.25 m [R]



ref point

$\vec{d}_i$ = 3m [R]

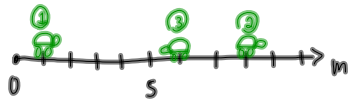
$\vec{d}_f$ = 8m [R]

distance (Δd) = 5m

displacement ($\Delta \vec{d}$) = $\vec{d}_f - \vec{d}_i$

$\Delta \vec{d}$ = 8m [R] - 3m [R]

$\Delta \vec{d}$ = 5m [R]



ref point

$\vec{d}_i$ = 1m [R]

$\vec{d}_f$ = 6m [R]

Δd = 7m + 2m = 9m

$\Delta \vec{d} = \vec{d}_f - \vec{d}_i$

$\Delta \vec{d}$ = 6m [R] - 1m [R]

$\Delta \vec{d}$ = 5m [R]

$\vec{d}_i$ = 3m [R]

$\vec{d}_f$ = 3m [R]

Δd = 5m + 5m = 10m

$\Delta \vec{d}$ = 0m ($\vec{d}_f - \vec{d}_i$ = 3m [R] - 3m [R])

time interval (Δt) – the time it takes for the motion (s)

(scalar)

t_i - the initial time (s)

t_f - the final time (s)

$\Delta t = t_f - t_i$

speed (v) – the rate at which the distance is covered (m/s)

(scalar) (how fast)

10 km/h 3.5 cm/s

3.00×10^8 m/s

velocity ($\vec{v}$) – the rate at which position changes (m/s)

(vector) (displacement occured)

52 km/h [E] 4.5 m/s [N]

Remember

speed → use distance (scalar)

velocity → use displacement (vectors)