

Physics - Distance, speed, acceleration Notes

Kinematics - Study of how objects move.

Position - Where an object is

symbol: x

Distance - a length, or how far an object has moved, always positive

Symbol: d

★ Measured in: meters (m)

Displacement - Distance & Direction from the starting position to the ending position.

symbol: d

Measured in: meters (m)

A dog walks 12 m left then 4 m right.

A) How far did he walk

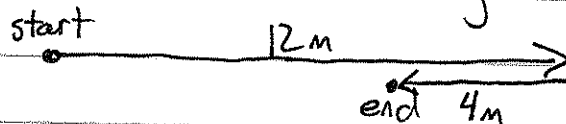
→ This is asking for distance

→ he went $12 + 4$ meters so... $12m + 4m = 16m$

B) ~~How far~~ How far is the dog from where he started?

→ This is how they ask for displacement.

→ He went 12 m one way then 4 m the other way...



→ looks like $12 - 4 = 8m$

Speed - how fast an object is going

- Always positive

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

- Symbol: v

~~measured~~ * measured in: m/s

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

Velocity - speed + direction

- can be negative (negative means backwards)

- velocity = $\frac{\text{displacement}}{\text{time}}$

- symbol: v

* measured in m/s

$$v = \frac{d}{t} \quad \text{or} \quad v = \frac{x_2 - x_1}{t}$$

Also we can rearrange (solve) the equations to get distance & time

distance = (speed) \times (time)

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

Example

It takes 400s to run to the store 200m away. How fast were you running?

• "How fast" means find speed

• speed = $\frac{\text{distance (m)}}{\text{time (s)}}$ so $v = \frac{200\text{m}}{400\text{s}} = \boxed{0.5\text{m/s}}$

A remote control car can drive at 8m/s . How far will it go in 3s?

• "How far" means find distance

• distance = (speed (m/s)) \times (time (s)) $\rightarrow d = (8\text{m/s})(3\text{s}) = \boxed{24\text{m}}$