Jen

Physics 11

Unit 2 – 1D Kinematics
Section 2.2: Speed and Velocity

Kinematics is the study of motion.

"1D" means the motion is along a straight line.

Distance vs. Displacement (Review from last day):

	Vector or Scalar?	Symbol	Description
Distance	scalar	d	How far something traveled ***along the path it took.***
Displacement	vector	$\vec{d}$	• Change in position. • Straight arrow from start to finish.

Speed vs. Velocity:
(average or speed/velocity is constant)

	Vector or Scalar?	Symbol	Formula
Speed	scalar	v	$v_{av} = \frac{d}{\Delta t}$
Velocity	vector	$\vec{v}$	$\vec{v}_{av} = \frac{\vec{d}}{\Delta t}$

Greek letter "Delta"

*The formulas above are for *average* speed and velocity. They don't usually work for *instantaneous* speed/velocity, unless the speed/velocity is constant.

where Δ means "change in" or "final minus initial" ($\Delta t = t_f - t_i$)

Example: How long does it take a car traveling at 45 km/h to travel 100 m?

$v_{av} = \frac{d}{t\Delta}$

$t = \frac{d}{v_{av}} \Longrightarrow \frac{100}{12.5} = 8\,s$

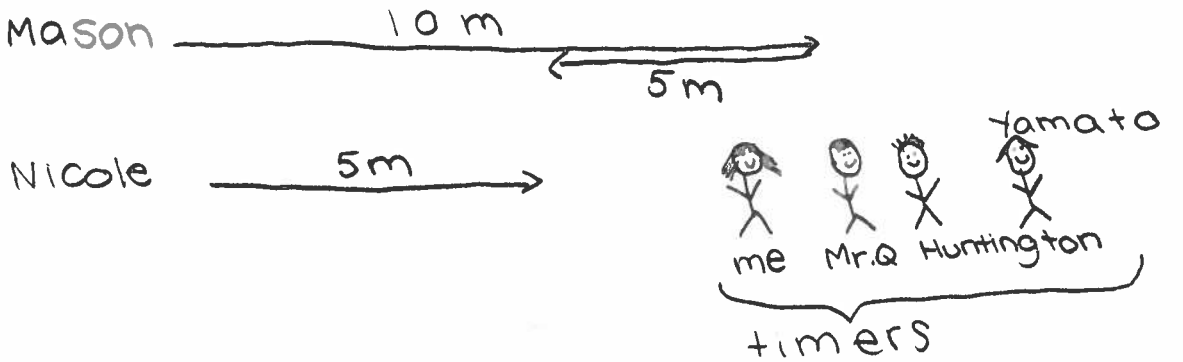
$\frac{45\,km/h}{3.6} = 12.5\,m/s$

Example:

Mason *runs* 10 m right and then turns around and *runs* 5 m left. The total time of travel is 5.2 s.

Nicole starts at the same position, but *walks* only 5 m right. The total time of travel is 4.6 s.

Diagram:



	Mason	Nicole
Distance	15m	5m
Displacement	5m right	5m right
Average Speed	$v_{av} = \frac{d}{\Delta t} = \frac{15}{5.2} = 2.9$ m/s	$v_{av} = \frac{d}{\Delta t} = \frac{5}{4.6} = 1.08$ m/s
Average Velocity	$\vec{v}_{av} = \frac{\vec{d}}{\Delta t} = \frac{5}{5.2} = 0.9$ m/s right	$\vec{v}_{av} = \frac{\vec{d}}{\Delta t} = \frac{5}{4.6} = 1.08$ m/s right