Unit 1 Handouts (Physics 100)

Name: A1/2

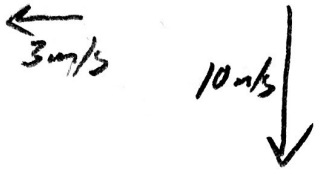
Notes: Kinematics Intro, Basic Terms, Average Velocity

Kinematics: The study of motion without considering its causes.

Scalar: A quantity with magnitude but no direction. Give an example: A speed of 10 m/s

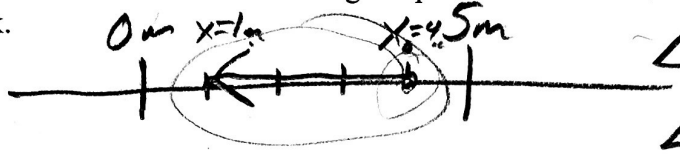
Vector: A quantity with magnitude and direction. Give an example: A velocity of 10 m/s downward.

Δ = **Delta** = "change in"



Formula for Δ = Final – initial.

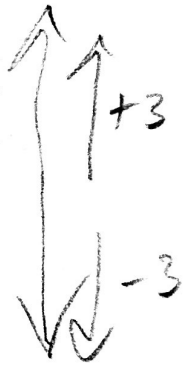
Example Problem: Calculate the "change in position" for an object that moves from the 4m mark to the 1m mark.



$\Delta x = x - x_0$

$\Delta x = 1m - 4m = -3m$

	Symbol	Meaning (what it's *supposed to* mean)	Vector or Scalar?	Common Units
Position	x or y	Where something is on a number line.	S	meters (m)
Displacement	Δx or Δy	"Change in position"	V	m
Distance	d	Like displacement, but doesn't include direction. What a car's odometer keeps track of.	S	m
Total Distance	d	Sum of all of the distances traveled on a trip.	S	m
Change in Time	Δt	How long some event lasts.	S	seconds (s)
Speed	none "speed"	How fast something is moving. A ratio of distance traveled to travel time elapsed.	S	m/s meters per second
Velocity	V	Speed and direction.	V	m/s



+3m/s

If I have a velocity of 3 m/s, what does that mean? 2 Because it's positive

I move forward (right) 3m each second.

One Definition of Velocity:

How many meters you add or subtract to/from your position each second.

Average Velocity (symbol = $\bar{V}$): when we measure velocity, *average velocity* is what we will actually measure. This is the average speed of an object as it travels through a given distance. The object may speed up or slow down over that distance, but the average velocity that we calculate will not show this.

Average Velocity Formula #1 (Hint: the units provide the formula)

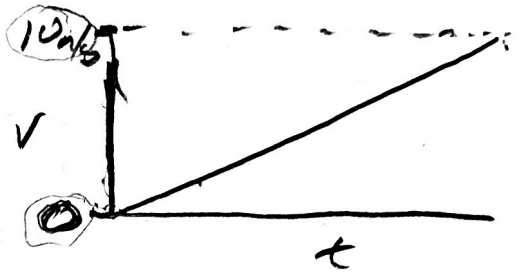
$\bar{V} = \frac{\Delta x}{\Delta t}$ ← meters of displacement / ← time

Average Velocity Formula #2

$\bar{V} = \frac{V_0 + V}{2}$

"Initial velocity" symbol = V_0 (Starting)

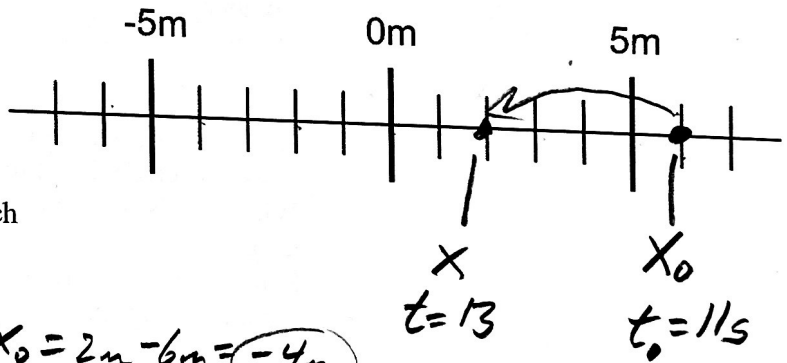
Final velocity symbol = V



Average Speed Formula:

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

Terminology Practice: A student starts a timer. When the timer gets to 11 seconds, an object is at the 6m mark on the number line to the right. When the timer gets to 13 seconds, the object's new position is -2. Show these positions and times on the number line to the right. Then calculate each of the following.



$\Delta t = 2s$

Displacement? $\Delta x = -4m = x - x_0 = 2m - 6m = -4m$

Distance traveled? $d = 4m$

Average velocity? $\bar{V} = \frac{\Delta x}{\Delta t} = \frac{-4m}{2s} = -2m/s$

Average speed? $\frac{\text{distance}}{\Delta t} = \frac{4m}{2s} = 2m/s$