Physics 207 Labs......start next week (MC1a & 1c)
Physics 207, Lecture 2, Sept 9 ‘09

- Kinematics  Finish Chapter 1, Chapter 2
  - Units and scales, order of magnitude calculations, significant digits (on your own for the most part)
  - Position, Displacement
  - Velocity (Average and Instantaneous), Speed
  - Acceleration
  - Special case of uniform acceleration
  - Try out those clickers!

Assignments:
- For next class: read Chapter 3 (Vectors)
- Mastering Physics: HW1 due Weds (today) 6pm
- Mastering Physics: HW2 due Friday 6pm
Physics 207
Introductory Questionnaire

What do you hope to learn from this course?

What do you hope to do with this new knowledge?

What do you expect the lectures to do for you?

What do you expect the book to do for you?

How many hours/week do you think it will take to learn all you need to know from this course? Include everything: lectures, homework, reading, etc.
Chapter 2 Reading Quiz
Turn on your clickers!

The slope of the curve in the position vs. time graph for a particle’s motion gives

A. the particle’s speed.
B. the particle’s acceleration.
C. the particle’s average velocity.
D. the particle’s instantaneous velocity.
E. not covered in the reading assignment
Chapter 2 Reading Quiz

Is it possible for an object’s instantaneous velocity and instantaneous acceleration to be of opposite sign at some instant of time?

A. yes  
B. no  
C. need more information  
D. Not covered in the reading assignment
Learning Goals for Kinematics

1. Given either $s(t)$, $v(t)$, or $a(t)$, determine the graphs of the other two functions.

2. Become fluent at transferring your thinking between a mental picture, a graphical picture, and an algebraic picture of motion.
acceleration:

\[
\begin{align*}
\frac{\Delta \vec{v}}{\Delta t} &= \frac{\vec{v}_2 - \vec{v}_1}{t_2 - t_1}, \\
\text{inst.} \quad \frac{\Delta \vec{v}}{\Delta t} &= \frac{d\vec{v}}{dt} = \text{slope of } v-t \text{ graph} \\
&= \frac{d^2 x}{dt^2} = \text{concave up } x-t \text{ graph}
\end{align*}
\]
1-D Kinematics (use \( s \), no vectors)

Student walks at constant \( v \) across room, slows down to \( v = 0 \), speeds up (in negative direction) to constant negative velocity, returns to origin.

\[
\frac{\text{d} s}{\text{d} t} = v_s(t)
\]

\[
\Rightarrow s_f = s_i + \int_{t_i}^{t_f} v_s(t) \, dt
\]

\[
a_s = \frac{\text{d} v_s}{\text{d} t}
\]

\[
\Rightarrow v_f = v_i + \int_{t_i}^{t_f} a_s(t) \, dt
\]