

## Announcements – 9/1/09

- Welcome to Physics 105!
  - I'm Dr. Colton
- Answers to two common questions
  - The Physics 107 Lab is completely separate from this course, since it's not required for all majors. I know practically nothing about it.
  - There is no Blackboard site for this class.
    - Instead, we'll use my own website (details later)
- We'll go over the syllabus shortly. Make a note of these corrections, though:
  - Wed office hours changed: now Wed 2:30 – 4 pm (Fri still 3:30 – 5 pm)
  - Page 3 printing error: look for it after page 6
- As most of you have found out already, I send out periodic class-wide emails via Route Y. Make sure your email address there is current.

## Introductory Stuff

### Syllabus

- Course objectives (pg 3)
- Schedule (pg 1)

**Physics 105 Class Schedule – Fall 2009**

Important: The reading assignments are given here for the 8<sup>th</sup> edition of the textbook only (that's the edition I have). If you are using the 5<sup>th</sup>, 6<sup>th</sup>, or 7<sup>th</sup> editions, you need to look at the reading assignment table on the next page because your sections may be different.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
31	Before first class: Review units, trig.	1 Position & velocity Reading: syllabus; 2.1-2.2	2 lecture 1	3 Acceleration, 1-D motion Reading: 2.3-2.6	4 lecture 2	5 HW1
7	Labor Day Holiday	8 HW2 Reading: 3.1-3.5 (except for the worked examples in 3.4)	9 Vectors lecture 3	10 HW3 2-D motion/ Exam 1 Review Reading: the rest of 3.4 Begin Exam 1 (Ch.2-3)	11 lecture 4	12
14	Adding deadline	15 Newton's Laws of Motion Reading: 4.1-4.4	16 End Exam 1 (late fee after 1 pm)	17 Using Newton's Laws: ropes, pulleys and planes Reading: 4.5	18 lecture 6	19 HW4

- Reading assignments for other editions (pg 2)
- Grading (pg 4)

**Grading:** If you hit these grade boundaries, you are guaranteed to get the grade shown. Please note that these boundaries are curved a bit from the standard 90-80-70-60 scale. Expect about half the class to get B-'s and above, and about half to get B-'s and below.

A	93%	B+	85%	C+	73%	D+	54%
A-	89%	B	81%	C	65%	D	49%
		B-	77%	C-	58%	D-	45%

Grades will be determined by the following weights:

- Reading assignments and pre-class "warm-up" quizzes: 3%
- Class participation and "clicker" quizzes: 3%
- Homework: 30%
- 4 Midterm Exams: 44%
- Final Exam: 20%

### Class website:

[physics.byu.edu](http://physics.byu.edu) → Courses → Class Web Pages → Physics 105 (Colton J)

Takes you to...

<http://www.physics.byu.edu/faculty/colton/courses/phy105-fall09/>

- Warmup exercises
- Obtain CID (student ID number for the class)
- Register clicker
- Homework data sheets
- Homework submission/status
- Check your course grade
- Study aids
  - Class notes, both before & after class
  - Videos of demos
  - Link to Google group
    - Homework discussion/hints/help
  - Sample exam problems
  - Exam solutions
  - Website links
  - Etc.
- List of "How to get started"

### More stuff you should know from syllabus:

- Four free warmup quizzes
  - Four free clicker quizzes
  - Extra credit opportunities
- } Read about them on your own

**The best study aid: the other students! Take two minutes now to exchange names/numbers/emails with 3-4 people sitting near you.**

**First clicker quiz:** (do the clicker quizzes if you have yours, but they won't be recorded today)

I now have the names/numbers/emails of 3-4 other people in the class.

- True
- False

...and now, for the **Physics**

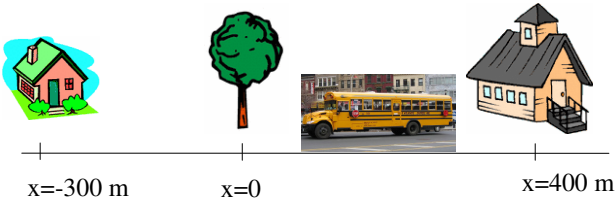
## Chapter 1: Units/Trigonometry

→ skipped, but you need to know it  
→ don't need to know "sig figs"

## Chapter 2: Kinematics

### mathematical description of motion

Recording motion: Choose an origin (zero)  
Choose a + direction.

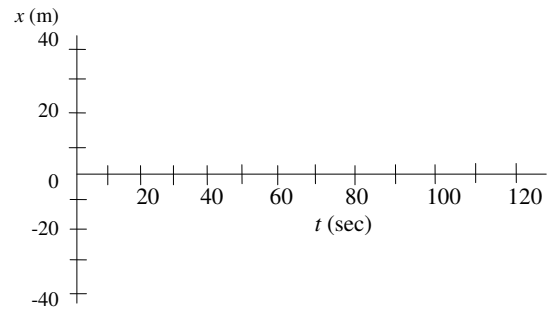


The bus starts at  $x=200$  m, goes to your house, and waits for you, then takes you to school.

Table of “position vs time”,  $x(t)$

$t$ (sec)	$x$ (m)
0	200
20	-300
50	-300
120	400

$x(t)$  plot of table (assuming constant speed between events)



Where is the bus going the slowest (not counting stops)?

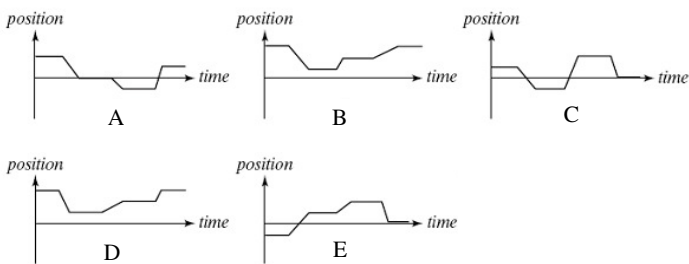
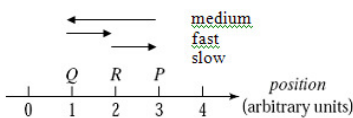
Where is it going the fastest?

When is it moving to the right?

When is it moving left?

### Clicker quiz:

Nancy, initially at point  $P$  in the illustration, stays there a moment and then moves along the axis to  $Q$  and stays there a moment. She then runs quickly to  $R$ , stays there a moment, and then strolls slowly back to  $P$ . Which of the  $x(t)$  graphs below correctly represents this motion?



Question: what was Nancy’s total change in position?  
→ ambiguous

## Position vs. Displacement

**Position:** where something is located, often labeled by  $x$

**Displacement:** a change in position, often labeled by  $\Delta x$

$$\Delta x = x_f - x_0$$

$f$  = “final”     $0$  = initial, pronounced “naught”

What do we mean by +/- position?

Being on the right/left side of the origin

What do we mean by +/- displacement?

Has shifted to the right or left

**Clicker quiz:** What was Nancy’s total displacement?

- a. -4
- b. -2
- c. 0
- d. 2
- e. 4

**Clicker quiz:** What was Nancy’s total distance traveled?

- a. -4
- b. -2
- c. 0
- d. 2
- e. 4

**Clicker quiz:** An object goes from one point in space to another. After it arrives at its destination, its displacement is \_\_\_\_\_ compared to the distance traveled?

- a. either greater than or equal to
- b. always greater than
- c. always equal to
- d. either smaller than or equal to
- e. always smaller than

Hint: draw a picture of some random path

## Speed vs. Velocity

**velocity:** rate of change of position

**average velocity,  $v_{ave} =$**

sometimes written  $\langle v \rangle$

→ must always specify the time interval (start/end times)

## Slope

**Speed vs velocity:** are they the same thing?

**Question:** A race car driver does 100 laps of a circular track, at a constant 200 mph.

What was his average speed?

What was his average velocity?

**Problem:** On the Tour de Provo, bicyclists ride straight south for 3 hours at 8 km/hr, rest for 2 hours, then continue their ride south down a mountain for 1 hour at 20 km/hr. What is their average velocity for the morning?

From "Problem Solving" section of syllabus: PEANuT

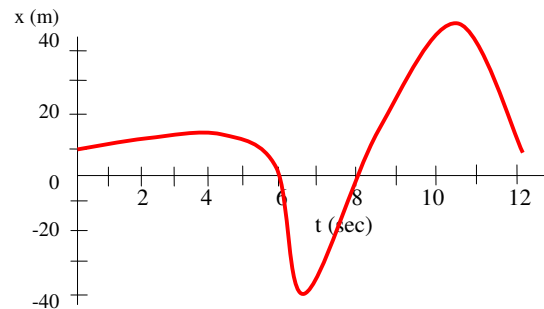
**Picture**  
**Equations**  
**Algebra**  
**Numbers**  
**Think**

## Instantaneous Velocity

(...at a particular time)

The **instantaneous** velocity at a particular time is the average velocity over a **very small time interval** around that time

= slope of tangent line of the  $x(t)$  graph at that point

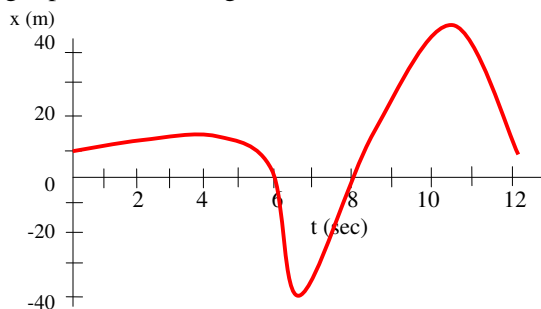


Positive slope means:

Negative slope means:

Zero slope means:

The shadow of a roller coaster car has the following left-right position on the ground.



**Problem:** Find  $v_x$  at 6 seconds in m/s, including direction.

**Clicker quiz:** During the ride the roller coaster stops and turns around \_\_\_\_\_ times.

A: 1 B: 2 C: 3 D: 4 E: 5.

**Clicker quiz:** The time it has the largest speed is closest to \_\_\_\_\_ sec.

A: 3 B: 5.75 C: 6.25 D: 8 E: 10.5

**Clicker quiz:** At  $t = 8$  sec, the car is moving to the \_\_\_\_\_

A: right B: left C: not moving

## Summary: What you need to do ASAP

See also the "How to get started" section of the website.

### Before class on Thursday

- Get CID (via website, if you weren't emailed one)
- Get course packet
- Get textbook
- Get clicker
- Register clicker via course website
- Do reading assignment
- Do warm-up exercise on website

### Before Saturday night

- Get individual homework data sheet via class website
- Do first homework assignment
- Submit HW via class website

### Optional, but highly recommended

- Register for class Google group
- Read the syllabus regarding on-line homework system
  - We'll discuss briefly on Thurs
- Read the syllabus regarding other stuff: extra credit, departmental policies, etc.