

Announcements – 9/2/08

1. Welcome!
2. 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, so please don't ask!
 - There is no Blackboard site for this class; all such stuff will be taken care of via the course website: physics.byu.edu → Courses → Class Web Pages → Physics 105 (Colton J)
Takes you to...
<http://www.physics.byu.edu/faculty/colton/courses/phy105-fall08/>
3. We'll go over the syllabus shortly
4. We'll go over computer HW system details next class
 - Read the "Homework" pages from the course packet before then
 - The first HW is due Friday evening

Introducing Dr. Colton...
Introducing the class...

What is Physics?

Schedule in syllabus (reading assignments, HW, exams, etc)

Monday	Tuesday	Wed	Thursday	Friday
1 Holiday Before first day: Study units (chapter 1) Read syllab.	2 First Day of Class Velocity Reading: 2.1-2.3 (7/8 edition: 2.1-2.2)	3	4 <small>lecture 2</small> Acceleration Reading: 2.4-2.7 (7/8: 2.3-2.6)	5 HW 1
	9 <small>lecture 3</small> Vectors, trigonometry Reading: 1.7-8, 3.1-3, 3.6 (5: 1.8-1.9, 3.1-3.3, 3.6) (7/8: 1.7-1.8, 3.1-3.2, 3.5)	10 HW 2	11 <small>lecture 4</small> 2-D motion Reading: 3.4-3.5 (7/8: 3.3-3.4)	12 HW 3
15 Add/drop deadline	16 <small>lecture 5</small> Exam 1 Review (Ch. 2-3) No reading assignment Begin Exam 1	17	18 <small>lecture 6</small> Newton's Laws of Motion Reading: 4.1-4.4	19 HW 4

Syllabus items:

Student ID number for class

- Get CID via website if you don't have one already

Lecture notes available on the course website

- Print out before class (if you want)

Grading scheme:

A	93%	B+	84%	C+	71%	D+	48%
A-	88%	B	79%	C	60%	D	44%
		B-	75%	C-	52%	D-	40%

Graded on:

- HW: 30% (internet submission to be discussed next time)
- Pre-class "warm-up" quizzes: 3%
- Class participation "clicker" quizzes: 3%
- 4 Midterm Exams: 44%
- Final Exam: 20%

Warm-up exercises

- On course website, due 8 am day of class (sorry!)
- Graded only on "Did you complete the reading assignment?"
- Three free zeroes
- Can't make up missed warm-ups

More Syllabus items:

Clickers

- Get i-clicker at bookstore
- Register clicker via website
- Graded only on participation
- Five free zeroes, can't make up missed days

Extra credit

- Some homework problems
- Short paper on something from "real world"
- Book review
- Physics-related lecture

Help on homework

- Other students
- Tutorial lab
- Dr Colton's office hours
- **Weekly problem-solving session – what time?**
- Personal tutor
- Textbook/other books

University/departmental policies

- Prevention of Sexual Harassment
- Students with Disabilities
- Children in the Classroom

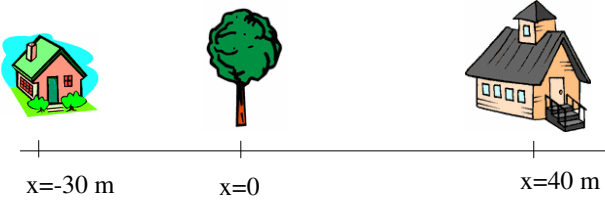
Chapter 1: Units – skipped!

→ but you need to know it

Chapter 2: Kinematics

mathematical description of motion

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

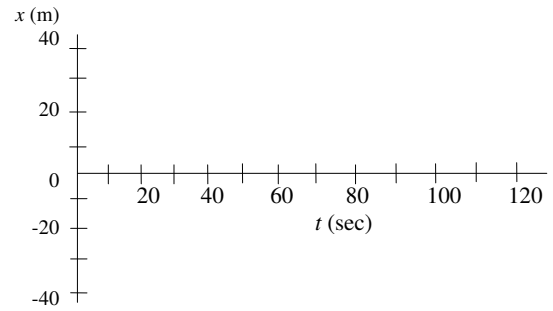


The bus starts at $x=20$ m, goes to your house, and waits for you, then takes you to school.

Table of “position vs time”, $x(t)$

t (sec)	x (m)
0	20
20	-30
50	-30
120	40

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



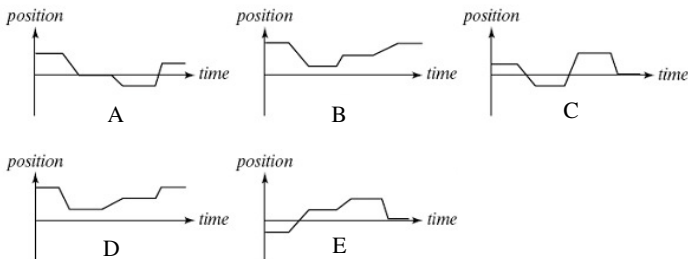
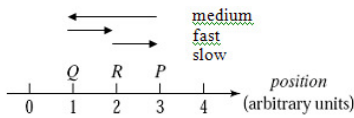
Where is the bus going the slowest (not counting stops)?

Where is it going the fastest?

When is it moving to the right?

When is it moving left?

Quiz 1. 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?



Note: Quizzes won't be recorded today

Question: what was Nancy's total change in position?
(a bit ambiguous)

Position vs. Displacement

Position: where something is located, often labeled by x

Displacement: a change in position, often labeled by Δx
 $\Delta x = x_f - x_i = x(t_f) - x(t_i)$

What do we mean by +/- position?

Being on the + or - side of the origin

What do we mean by +/- displacement?

Has shifted to the right or left

Q2. What was Nancy's total displacement?

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

Q3. What was Nancy's total distance traveled?

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

Q4. 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 = $v_{ave} = \langle v \rangle =$

Slope

What was Nancy's average velocity?

Speed vs velocity:

What was Nancy's average speed?

On the Tour de Utah, 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:

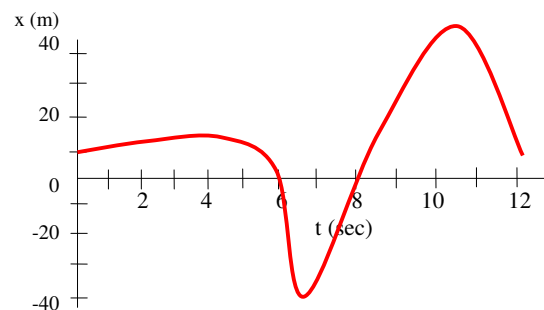
"Physicists Think Equations Are Cool, but Think again."

Instantaneous Velocity

(...at a particular time)

The **instantaneous** velocity at a time t_a , $v(t = t_a)$ is the average velocity over a **very small time interval** around t_a

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

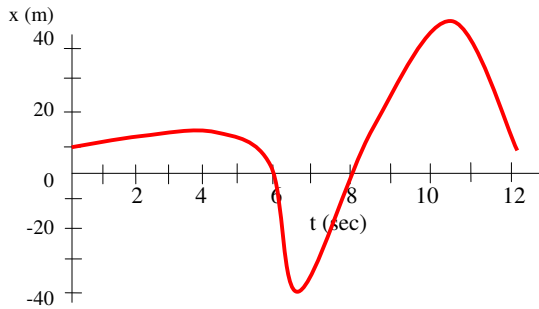


Positive slope means:

Negative slope means:

Zero slope means:

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



Find v_x at 6 seconds in m/s, including direction.

Q5. During the ride the roller coaster stops and turns around _____ times.

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

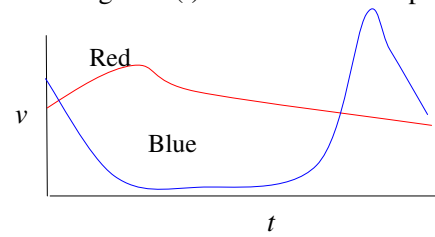
Q6. The time it has the largest speed is closest to _____ sec.

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

Q7. At $t = 8$ sec, the car is moving to the _____

A: right B: left C: not moving

The following are $v(t)$ curves for two airplanes.



Q8. Which airplane flew the farthest? _____

A. red B. blue

Hint: judge the average velocity

Train problems...



A train leaves Provo for SLC at 8:00 am, going 10 mph. A second express train leaves Provo for SLC at 9 am, going 15 mph. It is 40 miles to SLC. Will the 2nd train catch up before SLC? If so, where?

Hint: think about *relative* velocities.

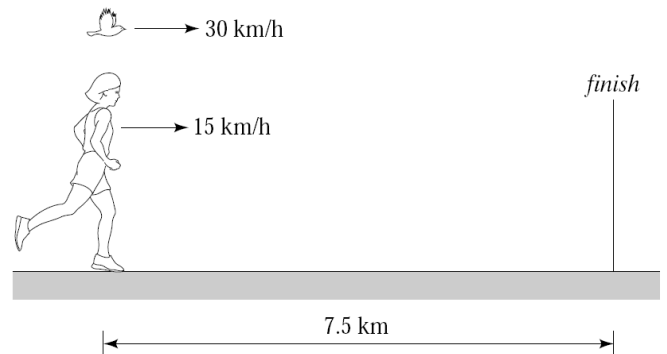
→ how fast does the gap close?

Steps:

- What is the initial gap? (How much of a head start does the first train have?)
- How fast does the gap close?
- How long does it take the gap to close?
- Where are both trains after this amount of time?

Q9. A marathon runner runs at a steady 15 km/hr. When the runner is 7.5 km from the finish, a bird begins flying from the runner to the finish at 30 km/hr. When the bird reaches the finish line, it turns around and flies back to the runner, and then turns around again, repeating the back-and-forth trips until the runner reaches the finish line. How many kilometers does the bird travel?

A. 10 km B. 15 km C. 20 km D. 25 km E. 30 km



Hint: how long does it take the runner to finish? (The bird was flying during this whole time.)

Summary: What you need to do ASAP

Before class on Thursday

- Get CID via website (if you weren't emailed one)
- Get course packet
- Get textbook
- Do reading assignment
- Do warm-up exercise on website
- Get clicker
- Register clicker via course website
- Read about on-line HW system in syllabus

Before Friday night

- Get individual homework data sheet via website
- Do first homework