

COURSE INTRODUCTION & VELOCITY

Note on **Physics 107** Lab

- separate from this course...not required for all
- starts next week
- manual will be in bookstore
- add/drop by computer
- see website

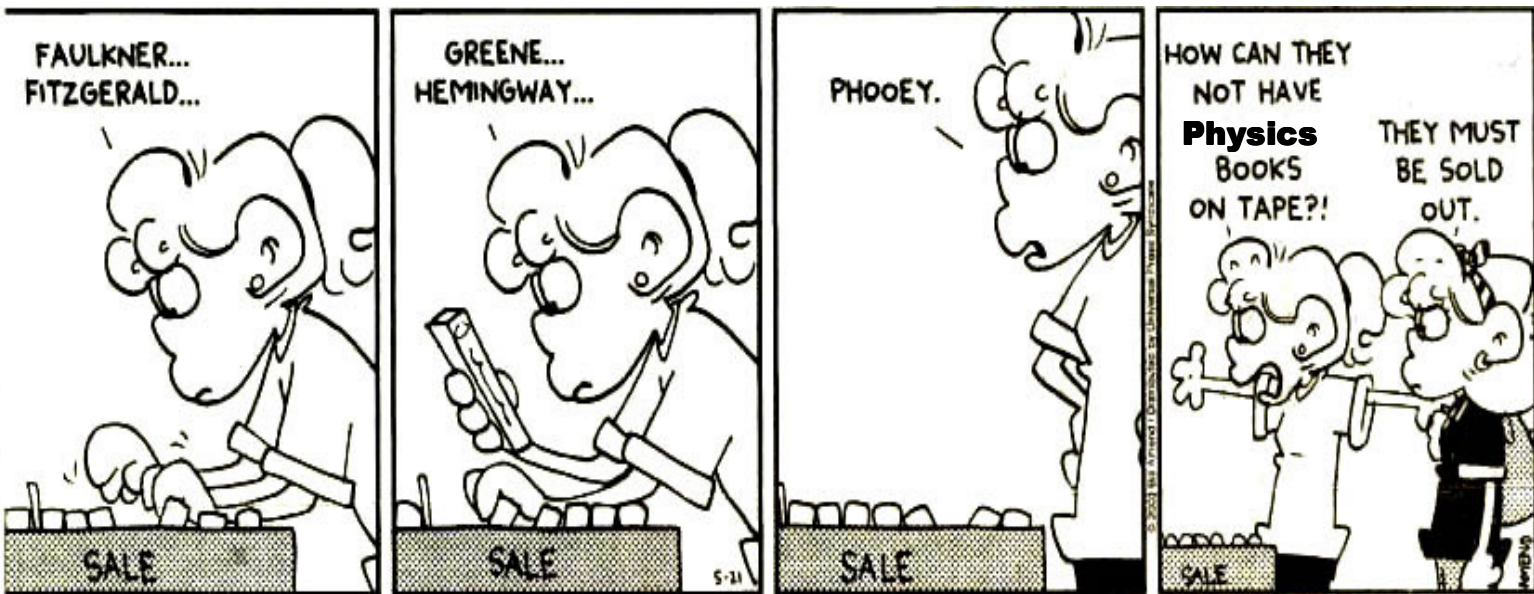
Physics 105 Introductory Notes

- prerequisite: algebra and trig
- packet, clicker, text in bookstore (5th - 7th edition)
- Course website <http://gardner.byu.edu/105w1> or physics.byu.edu>> Courses>>Class Web Pages>>Physics 105 (Gee K)
- Class ID numbers:
 - Most were emailed to Route Y address last week
 - If you added, get CID from gardner.byu.edu/105w1. Go to [Obtain Class Identification Number \(CID\)](#)
- Register your clickers
 - Go to 105 homepage and click on link. Do not follow instructions on back of clicker.
- Reading and participation
 - Will have reading assignments
 - PRE-CLASS Blackboard Quizzes, due at 1pm**
 - In-class clicker quizzes for extra credit
- 105 tutorial lab in N361 ESC
 - Go to 105 homepage to see schedule for 105 TAs. They will wear the 105 badge.

Physics 105 Class 1

Schedule for First Few Weeks

M	T	W	Th	F
Study on your own: 1.1-1.6, 1.9	Jan. 6 Velocity 2.1-2.3 (7 th & 8 th 2.1-2.2)		Jan. 8 HW 1 Acceleration 2.4-2.7 (7 th & 8 th 2.3-2.6)	
Holiday	Jan. 13 HW 2 Vectors, trig. 1.7-1.8, 3.1-3.3, 3.6 (7 th & 8 th 1.7-1.8, 3.1-3.2, 3.5)		Jan. 15 HW 3 2-D Motion 3.4-3.5 (7 th & 8 th 3.3-3.4)	
	Jan. 20 HW 4 Newton's laws 4.1-4.4		Jan. 22 HW 5 Using Newton's laws I 4.5	



Physics 105 Class 1

Homework:

The “problem” (in packet):

- 1-1. A certain bacterium swims with a speed of [01] _____ $\mu\text{m/s}$. How long would it take this bacterium to swim across a petri dish having a diameter of [02] _____ cm?
- 1-2. At the Olympics, an athlete runs the marathon in 2 h, 9 min, [03] _____ s. (This is near the record time.) The marathon distance is 26 mi, 385 yd (1 yd = 3 ft). Determine the average speed of this athlete. Caution: Find the distance in miles and the time in hours to high precision.

The “data” (Different for each student—get yours online)

Student ID 456

Homework data

Physics 105, Winter Semester 2004

set 1. [01] 3.43 [02] 8.20 [03] 22. [04] 30.2 [05] 39.8 [06] 4.0 [07] -1.4

set 2. [01] 212. [02] 18400. [03] 5.07 [04] 4.22 [05] 10.85 [06] 11.9 [07] 7.4

The “answers” (in packet)

Answers to Homework Problems, P1

1-1. 5.00, 9.00 h

1-2. 12.100, 12.200 mi/h

1-3a. 70.0, 120.0 km

1-3b. 45.0, 65.0 km/h

1-4a. 3.00, 5.00 m/s

1-4b. -0.25 , -0.75 m/s

1-4c. -0.75 , -1.25 m/s

1-4d. 0

2-1. 1.20, 1.50 h

2-2. 0.60, 1.20 m/s^2

2-3. -1400 , -1800 ± 10 m/s^2

2-4a. 0

Indicates the range, units, and precision of the answer

Homework:

- Submitted **online** through the course website
- Due 3:45 pm, T, Th before class
- Will receive immediate feedback on correct/incorrect answers
- Computer graded, worth 5 points
- Total of **3 tries** with new data for full credit
- Be careful about powers of ten: 3.2×10^{-16} becomes 3.2e-16.
(no spaces, no times signs, no commas)

Read detailed description in the “Homework Submission” document

SPECIAL NOTE:

- **Carry “all” digits through multipart calculations and round off only when submitting the answers. Err on the side of too many digits. If the range is (-0.75,-1.65 m/s), -1.5 is not OK, but -1.47 or -1.4739 is.**

Syllabus:

- In your packet
- Also available online
- **Read it carefully**

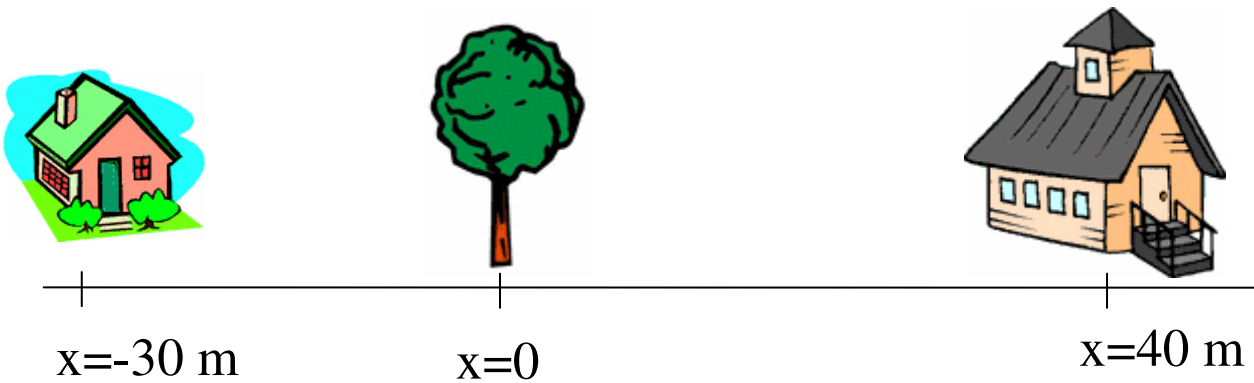
Kinematics: mathematical description of motion.

Chapter 2: One-dimensional motion along a **line**.

Recording motion:

Choose an origin (zero).

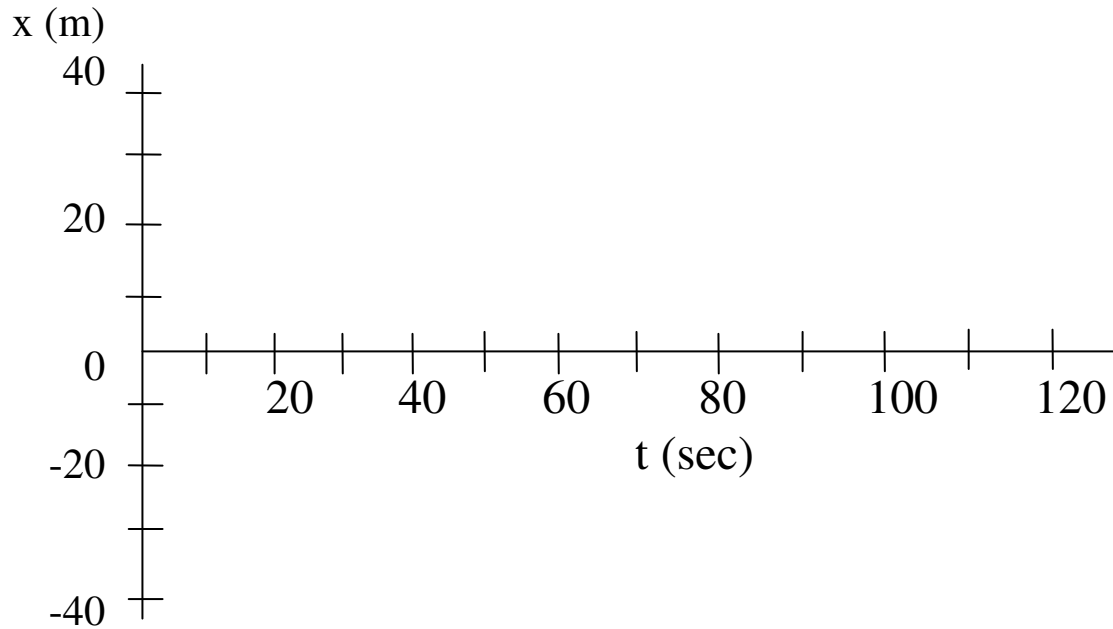
Choose + direction.



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

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

Plot $x(t)$:



Where is the bus going the **slowest**?

Where is it going the **fastest**?

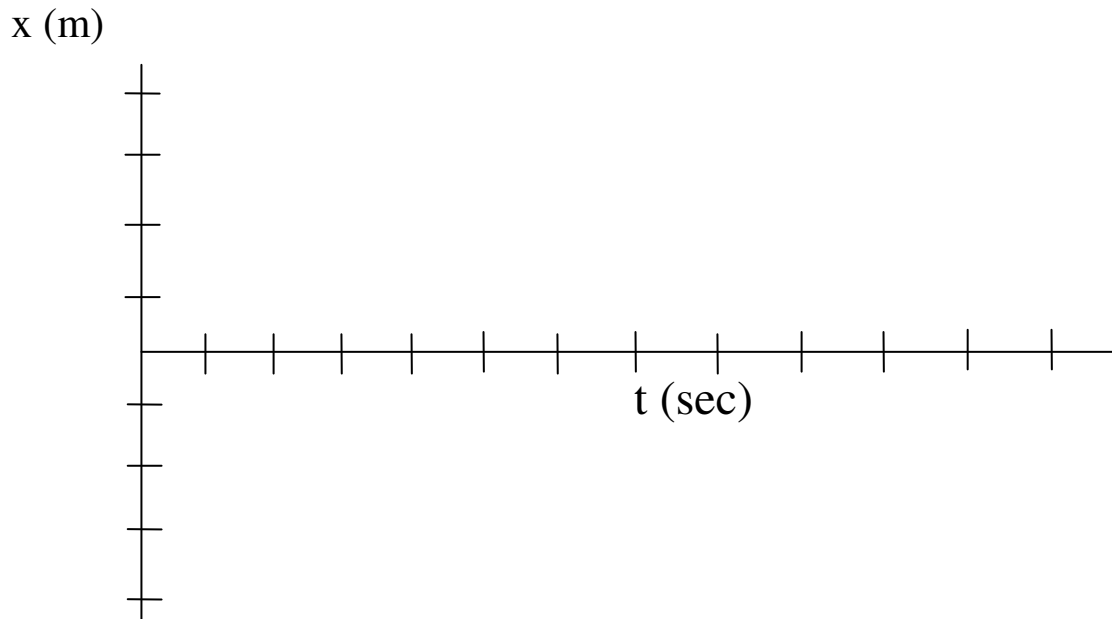
When is it moving **right**?

When is it moving **left**?

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P1 *You sketch one* (don't worry about numbers or straight lines, but make the *relative slopes* right!)

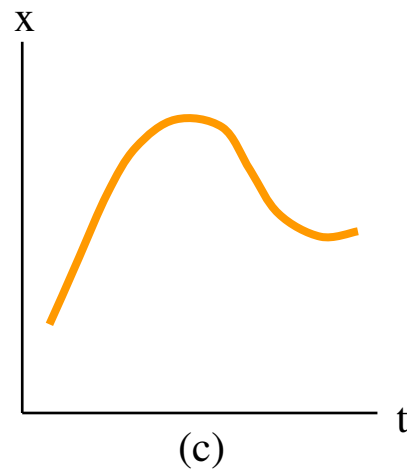
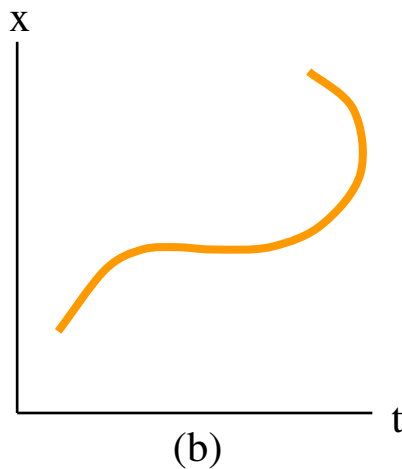
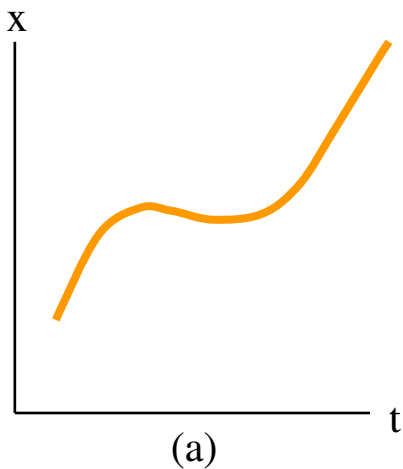
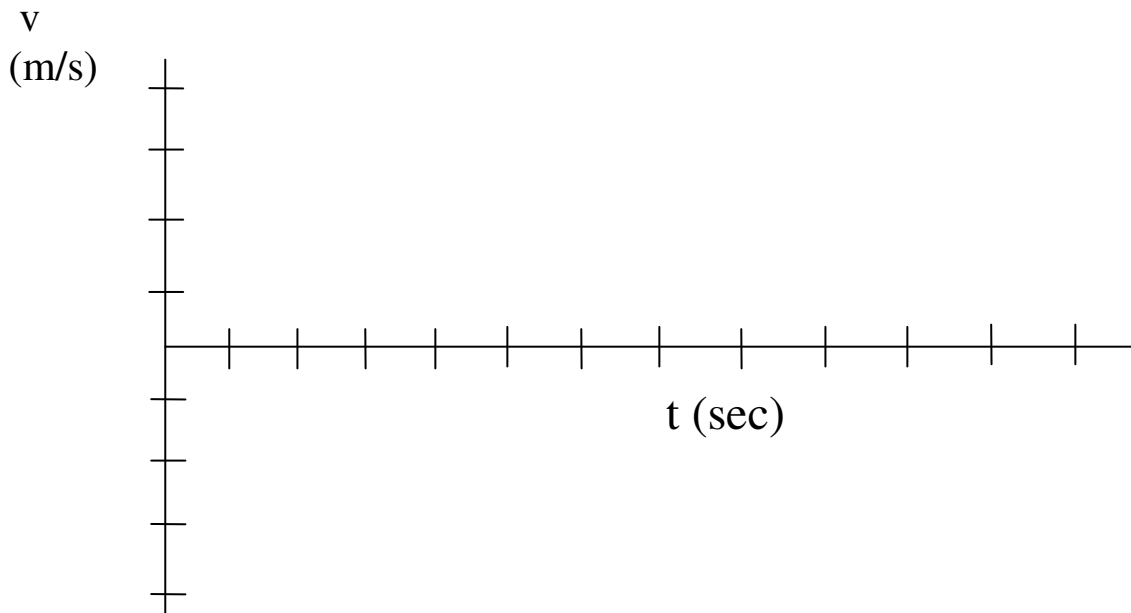
1. You walk in a straight line from your apartment to school.
2. You forgot your physics assignment and run home.
3. You stay at home while you look for your book.
4. Then you take your car most of the way to BYU.
5. You then walk the rest of the way to class.



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P2 Sketch the velocity vs time

1. You walk in a straight line from your apartment to school.
2. You forgot your physics assignment and run home.
3. You stay at home while you look for your book.
4. Then you take your car most of the way to BYU.
5. You then walk the rest of the way to class.



Which position-time curve is not realistic?

position: labeled by x

displacement: a change in position

$$\Delta x = x_f - x_i = x(t_f) - x(t_i). \text{ Can be + or - .}$$

velocity: *rate of change of position*

average velocity: $\langle v \rangle = \text{displacement/time}$

Example: find $\langle v \rangle$ for the bus from 20 to 120 sec

Speed vs. velocity:

On the Tour de France Lite, bicyclists ride straight south, 8 km/hr for 3 hours, rest for 2 hours, and ride down a mountain 20 km/hr for 1 hour, all in a straight line. What is the average velocity for the morning?

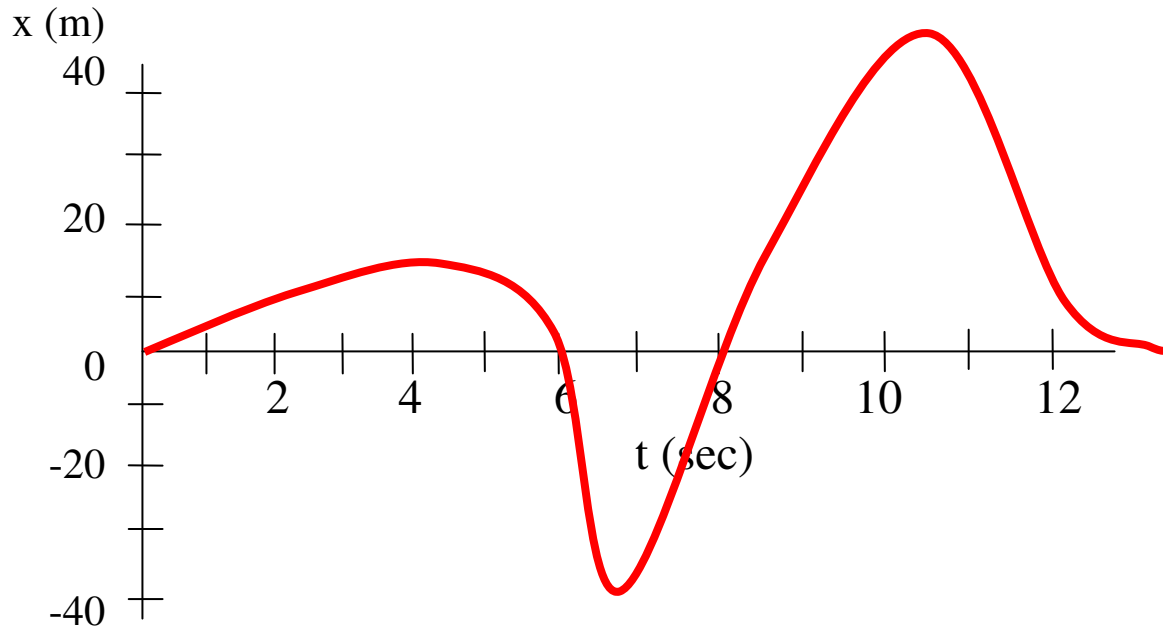
P3 (Practice) After a one hour rest, they go back up (north) the downhill part in 2 hours. What is their average velocity for the *day*?

P4 (Practice) What is their average speed for the day?

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instantaneous velocity $v(t_a)$ at some time t_a :

slope of tangent of $x(t)$ at $t = t_a$



Positive slope means:

Negative slope means:

Zero slope means:

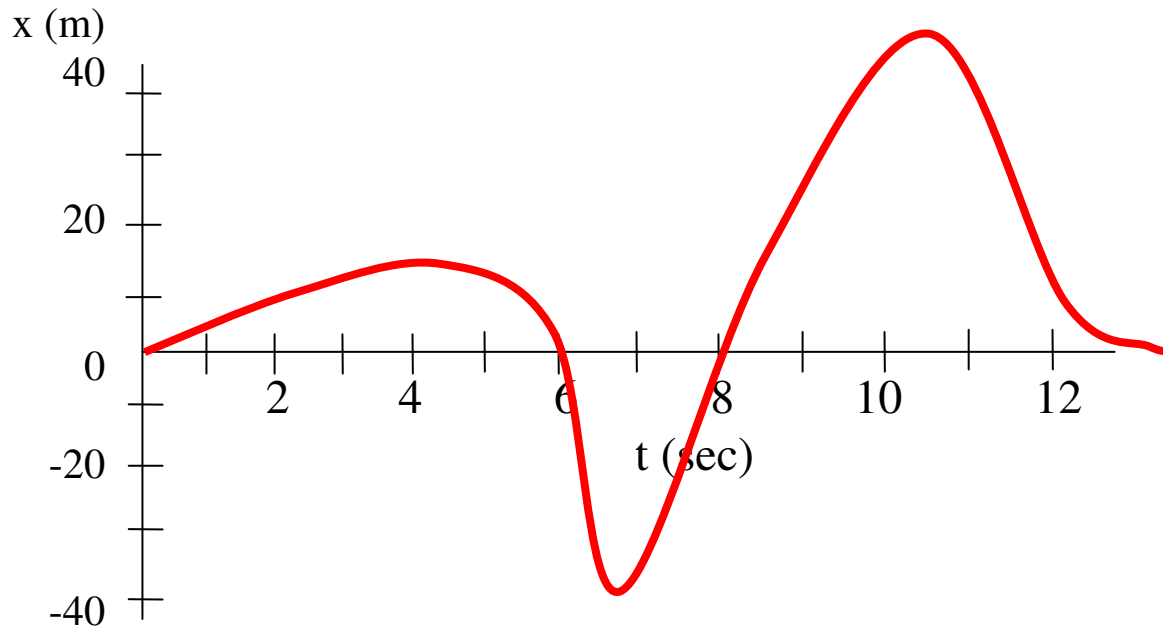
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"How could I have been doing 70 miles an hour when I've only been driving for ten minutes?"

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



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

P5 At which times does it stop in the ride?

P6 At which time is it going the fastest?

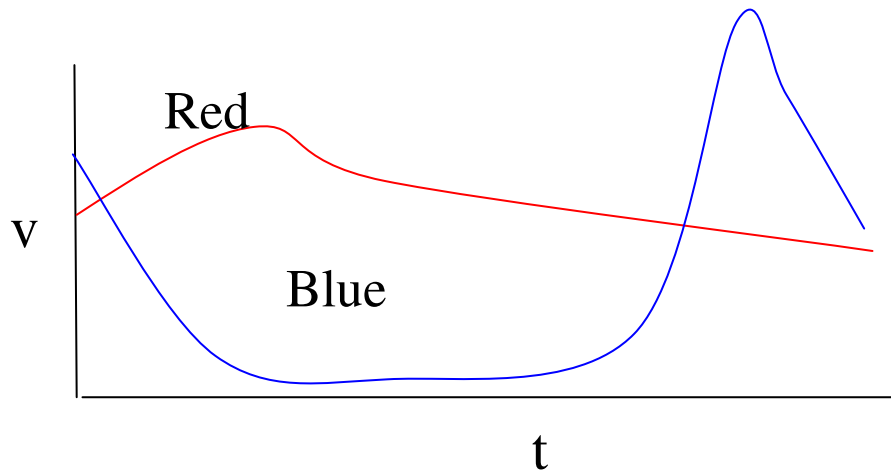
P7 In which time ranges is the roller coaster to the left of where it started? (*position not velocity*)

P8 In which time ranges is the *velocity* to the right?

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Example: The following are $v(t)$ curves for two airplanes.
Hint: look for the *average* velocity

P9. Which airplane has flown the farthest?



Famous 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? Where?

Solutions

Mathematical:

Graphical:

What to do before the next class:

- Read syllabus
- Get your CID and register your clicker **on the course webpage**
- Take Class 2 Blackboard quiz **before 1 pm.**
- Read 2.4-2.7
- Print out and bring Class 2 notes if you wish for Thursday
- Do Homework 1 which is due Thursday **before 2:45 pm.**