Acceleration

-a vector quantity describing the *rate of change of velocity*

units are metres per second per second

$$a = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{t}$$

Direction of Acceleration

the direction of acceleration vectors is NOT always the same as the direction of the velocity vectors
For Example:

-if a vehicle is speeding up in the +x direction, acceleration and velocity are in the same direction

-if the vehicle now starts to slow down, the acceleration vector has reversed and is no pointing in the opposite direction.
-think of the way you would have to push on an object to cause a particular change in velocity.

Sep 25 - 7:31 PM

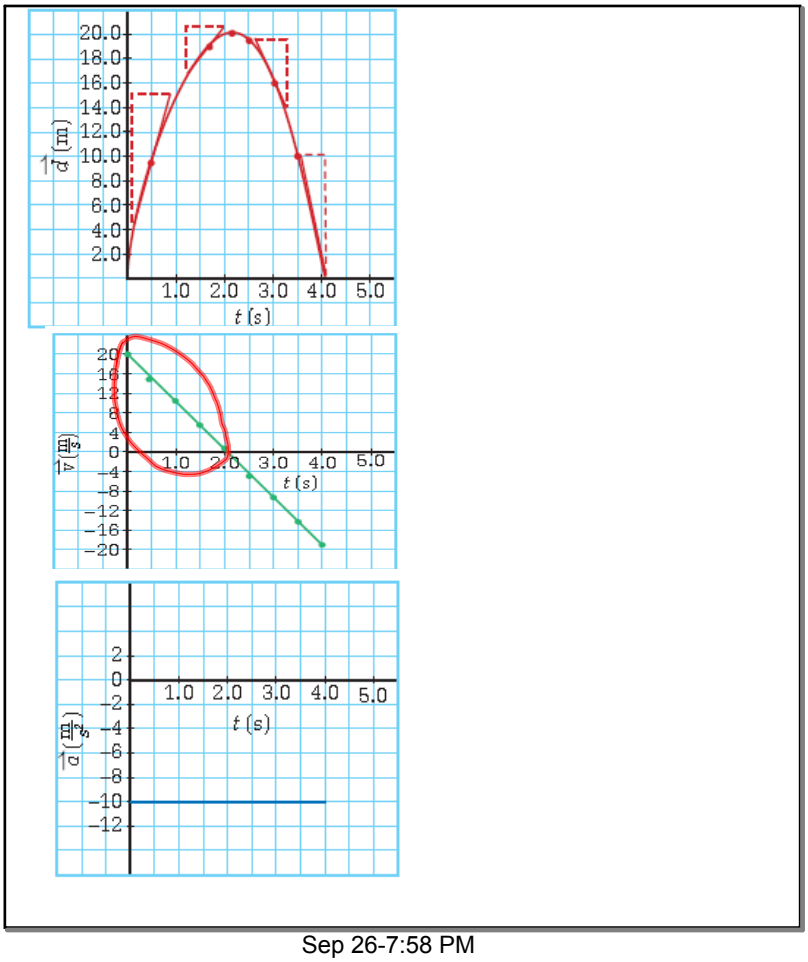
Uniform and Non-Uniform Acceleration

Velocity		**Acceleration**
$v = \frac{\Delta d}{\Delta t} = \frac{d_f - d_i}{t}$	}	$a = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{t}$

-notice the similarities to the mathmatical expressions of velocity and acceleration

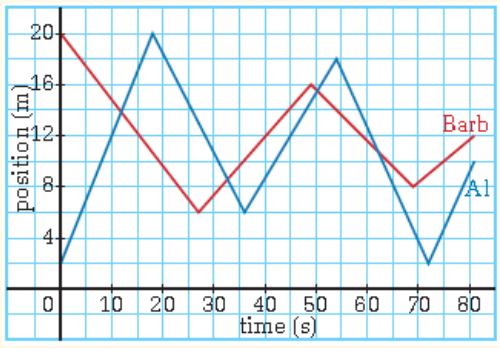
-the terms *average, constant* and *instantaneous* apply to acceleration as much as they do to velocity
-graphically, the slope of a velocity/time graph is the *rate of change* of velocity with respect to time and is therefore acceleration.

Sep 25 - 7:48 PM



Sep 26-7:58 PM

1. The following graphs represent the motion of two students, Al and Barb, walking back and forth in front of the school, waiting to meet friends.



(a) During what periods of time are Al and Barb walking in the same direction?

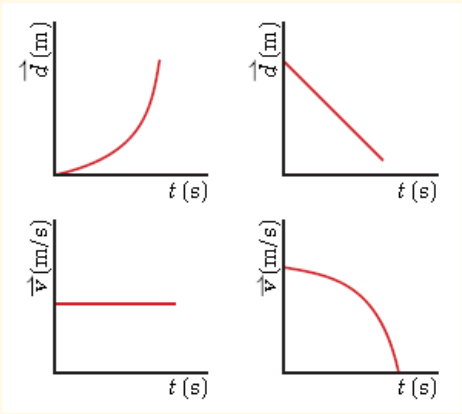
(b) At what points do Al and Barb meet?

(c) During what periods of time are Al and Barb facing each other?

(d) Which student is, on the average, walking faster than the other? Explain your reasoning.

Oct 2-7:47 PM

7. Draw conclusions about the acceleration of the motion represented by the following graphs.



Oct 2-7:48 PM

Practice Problems-p. 80

1. An Indy car's velocity increases from +6.0 m/s to +38 m/s over a 4.0 s time interval. What is its average acceleration?
2. A stalled car starts to roll backward down a hill. At the instant that it has a velocity of 4.0 m/s down the hill, the driver is able to start the car and start accelerating back up. After accelerating for 3.0 s, the car is travelling uphill at 3.5 m/s. Determine the car's acceleration once the driver got it started. (Assume that the acceleration was constant.)
3. A bus is travelling along a street at a constant velocity when the driver steps on the brakes and brings the bus to a stop in 3.0 s. If the brakes cause the bus to accelerate at $-8.0\ m/s^2$, at what velocity was the bus travelling when the brakes were applied?

$$a = \frac{V_f - V_i}{t}$$

Oct 2-7:51 PM