Reminders 01-21-10:

-ADDS IN RECITATION OR IN LAB

Lecture 11-12:20PM MW ALL SECTIONS

Section 42167 12:45-1:50PM T(Recitation)-Th(lab)-FULL

Section 42168 2:00-3:05PM M(Recitation)-W(lab)-AVAILABLE

Section 42169 9:30-10:35AM M(Recitation)-W(lab)

Section 42170 8:15-9:30PM M(Recitation)-W(lab)-AVAILABLE

-Official method of communication via email is through your Sierra College email address. I will NOT answer emails that do not come from our email system, since they might contain sensitive information.

-If you miss any two of our class meetings this week, I'll drop you from the course to make room for those that want to add.

-1st Quiz in Recitation next week.
-1st POW due Tuesday by 5PM
-Read Syllabus and Log onto Computers
-Log onto Webassign ASAP, sierracollege 8874 0123!!!
-Check course web page once a week.
-Visit and Physics Tutoring Center LRC-441
-Log in when entering lab S-107
-Read Chapters 1 & 2
-Write the last four digits of your Sierra College ID in textbook.
-Homework and problem solving will be discussed in Recitation.
-Lab software can be obtained from desktop of computers in lab.
-All graded items are placed in a basket outside my office.

I am assuming that you will solve about three homework problems per day.

You are expected to plan vacations around exam dates (not vice versa)!

Students will be dropped without notice on the 3rd lab or recitation absence or the 5th lecture absence.

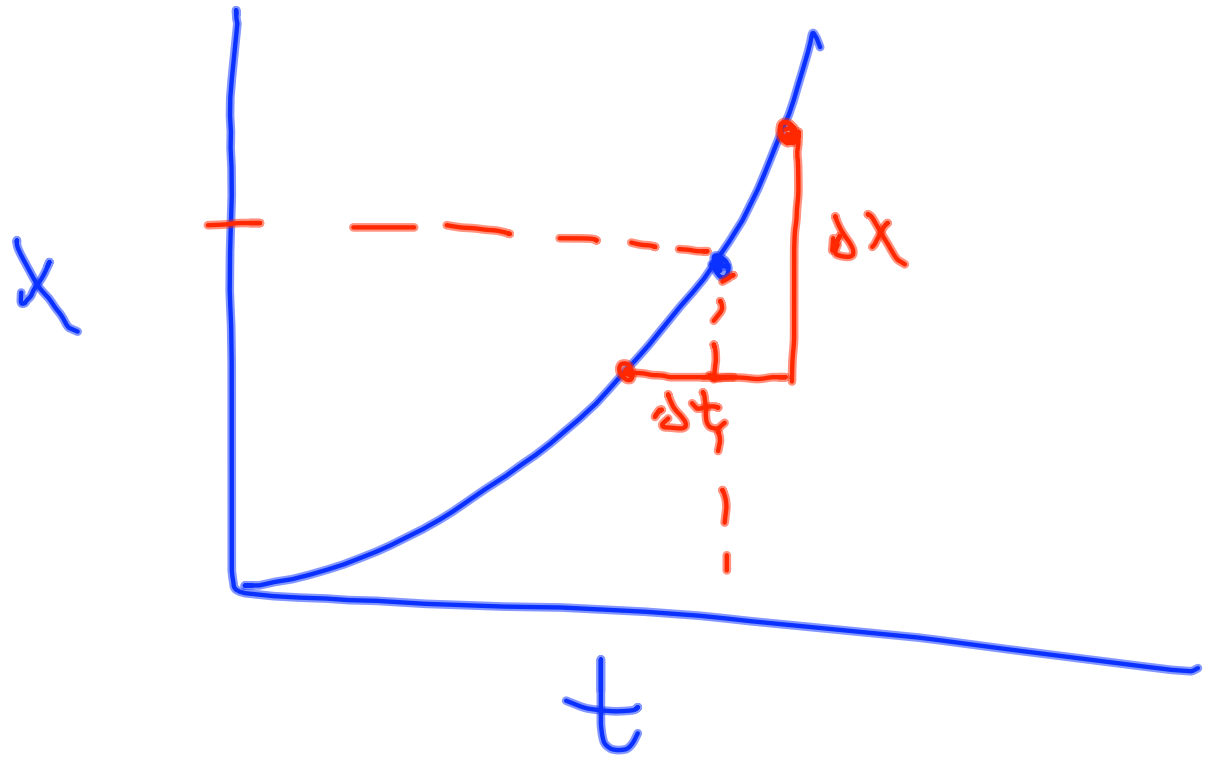
Objectives:

- Displacement, Velocity, and Acceleration
- Motion at Constant Velocity and Constant Acceleration

Displacement

$\Delta \vec{x}$ $\Delta \vec{r}$

Δx



inst. vel $\lim_{\Delta t \to 0} \frac{\Delta x}{\Delta t} = \frac{dx}{dt}$

Avg velocity: displacement divided time interval (vector).

Avg. Speed: total distance traveled divided by time interval (scalar)

Inst. velocity: time derivative of position vector (vector)

Inst. speed: magnitude of Inst. velocity vector (scalar)

Example:

A particle moves along the x-axis according equation $x=3.00-4.00t-2.00t^2$, where x is in met is in seconds. What are the position, velo acceleration at t=3.00s. Plot their corres graphs.

Want $x(t=3s)$

$x = 3.00m - 4.00\frac{m}{s}(3.00s) - 2.00\frac{m}{s^2}(3.00s)^2$

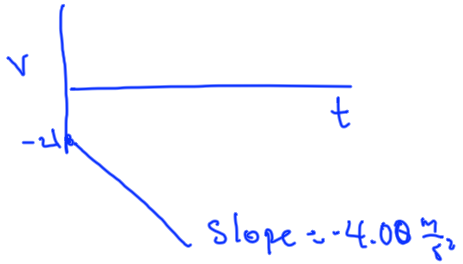
$= -27.0m$

$v = \frac{dx}{dt} = -4.00\frac{m}{s} - 4.00\frac{m}{s^2}t$

$v(t=3.00s) = -4.00\frac{m}{s} - 4.00\frac{m}{s^2}(3.00s)$

$= -16.0\frac{m}{s}$

$a = \frac{dv}{dt} = \frac{d^2x}{dt^2} = -4.00\frac{m}{s^2}$



Suppose $a = 3t^2$

$v_{x0} = 1$ at $t = 0$

$$\frac{dv}{dt} = 3t^2$$

$$dv = 3t^2\,dt$$

$$\int dv = \int 3t^2\,dt$$

$$v = t^3 + C$$

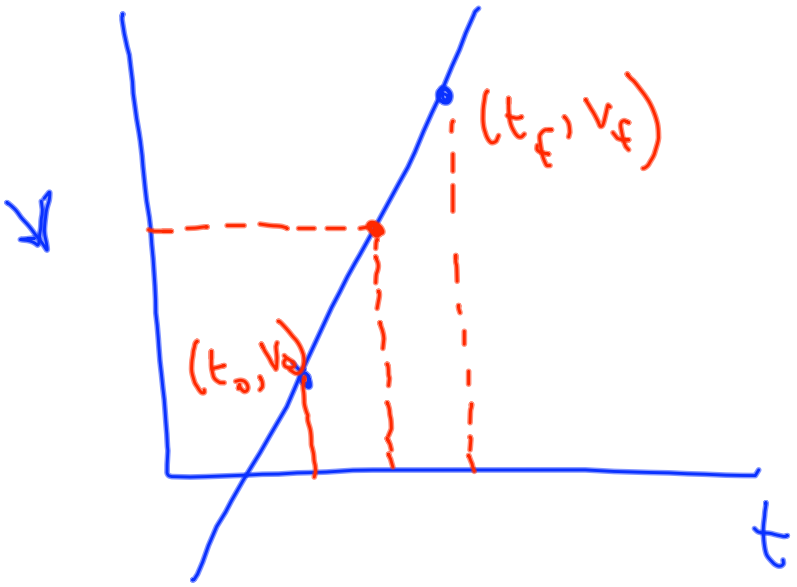
$$v = t^3 + 1$$

$$x = \int (t^3 + 1)\,dt$$

$$= \frac{t^4}{4} + t + x_0$$

$a = -kx$ Need math 33 to do this one.

$$\frac{dv}{dt} = -kx$$



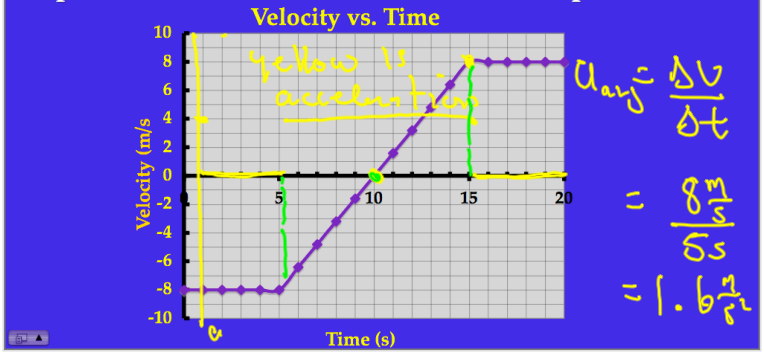
$$v_{avg} = \frac{\Delta x}{\Delta t} = \frac{v_0 + v_f}{2}$$

$$\Delta x = \frac{1}{2}(v_0 + v_f)\Delta t$$

$$\langle f \rangle = \frac{1}{t_f - t_0}\int_{t_0}^{t_f} f(t)\,dt$$

$$= \frac{1}{t_f - t_0}\int_{t_0}^{t_f} (v_{x0} + a_x t)\,dt$$

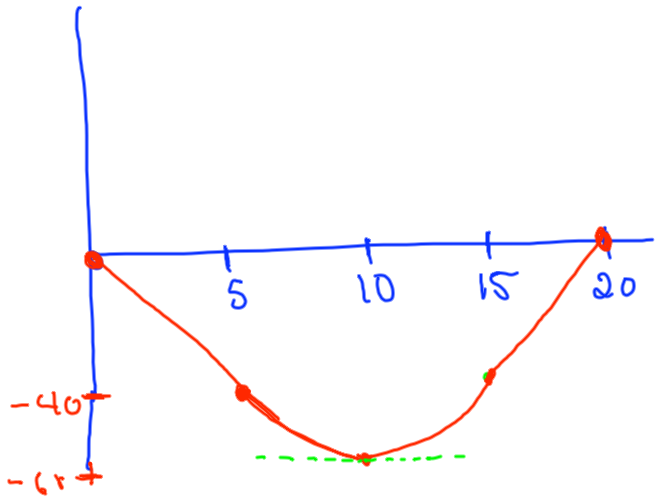
Example:
A particle moves along the x-axis according to the graph shown. Determine the average acceleration between 10.0s and 15.0s and plot the graph a vs. t. where x is in meters and t is in seconds. Determine the displacement between 5.00s and 20.00s and plot x vs. t.



To find Δx from 5 to 20s I just need displacement.

from 15 to 20s.

$\Delta x = (8\ m/s)(5s) = 40m$

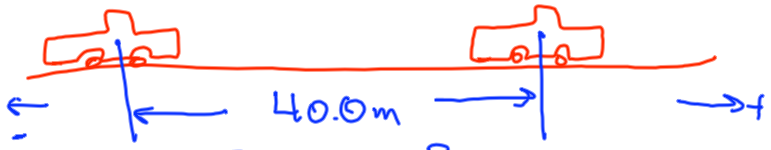


Title: Jan 21-12:07 PM (9 of 10)

Example: A car covers 40.0m in 8.00s while smoothly slowing down to 3.00m/s. Calculate its acceleration.

$\Delta x = 40.0\,m$ $\quad V_f = 3.00\,m/s$

$\Delta t = 8.00\,s$



$V_i = ?$ $\quad a = ?$

$$V_{avg} = \frac{\Delta x}{\Delta t} = \frac{40.0\,m}{8.00\,s} = 5.00\,m/s$$

$$V_{avg} = \frac{1}{2}(V_{x_0} + V_f)$$

$$2V_{avg} - V_f = V_{x_0}$$

$$V_{x_0} = 2\left(5.00\,\frac{m}{s}\right) - 3.00\,m/s = \underline{7.00\,m/s}$$

$$a = \frac{\Delta V}{\Delta t} = \frac{3.00\,\frac{m}{s} - 7.00\,\frac{m}{s}}{8.00\,s}$$

$$= \frac{-4.00\,\frac{m}{s}}{8.00\,s} = -0.500\,m/s^2$$