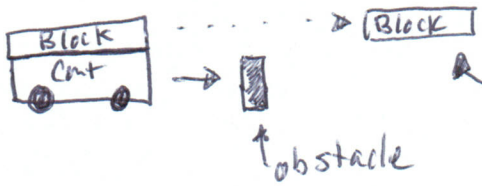
9/17 & 9/18/19 – Newtn 1st and 3rd Review and ~~Kinetic~~ Kinematic Eqn derivatn

Newton's 1st Law

Folks struggled with the suitcase questn on Homework and seat belt on quiz.

Demo: Cart with wood Block, ~~which way~~ what will happen when cart hits obstacle? where will the Block go?



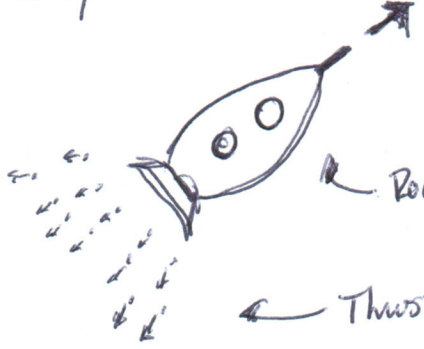
Cart hits obstacle
Block keeps going forward

An object in motion stays in motion unless acted upon by an unbalanced force

same thy with suitcase and using a car.
If we are not attached to the car when it stops, we don't stop.
There is no unbalanced Force acting upon you, unless you are wearing a seatbelt!

Newton's 3rd Law

Folks struggled with Rocket questn. Although its true that the Rocket does not encounter air resistance in space that will slow it down, the reason that a Rocket can maneuver and move around in space though is Newton's 3rd Law: For every action (Force) there is an equal and opposite reactn (-Force)



Rocket = Equal and Opposite Force pushes Rocket Forward.

Thrust = Many Molecules and Atoms with Large Accelerations add up to a Large total Force (Fnet)

Doing Kinematic Equations From Graphs

- Use Class Compiled Kinematic Datasheet on DP to help with this (or your own data)
- Use Handout you received in Class (also linked on DP) to help guide you in this

9/17 & 9/18 - Newton's 1st and 3rd Review and Kinematic Eqn derivation

Uniform Motion Graph

What is the shape of this Graph? ---> Linear!
What is general math eqn for a line ---> $y = mx + b$ or $f(x) = mx + b$
What does the eqn look like for our graph? ---> $s(t) = mt + b$
What is b? ---> y intercept... when the value on horizontal (x or t) axis is zero ($t = 0$) so this is the starting position (s_0)

What is m? ---> slope! $\frac{\Delta y}{\Delta x} = \frac{y_f - y_0}{x_f - y_0}$ for our graph $m = \frac{\Delta s}{\Delta t} = \frac{s_f - s_0}{t_f - t_0}$

What is $\frac{\Delta s}{\Delta t}$? $\rightarrow \frac{\text{change in position}}{\text{change in time}} = \frac{\text{displacement}}{\text{time}} = \text{Velocity!} = v$

$$s(t) = \frac{\Delta s}{\Delta t} t + s_0 = vt + s_0$$

Position as a function of time, constant velocity (no acceleration)

1 dimensional X graph AND 1 dimensional Y graph

What is the shape of this graph? ---> its a 2nd order polynomial, Quadratic
Part of a Parabola
What is the general form? ---> $Ax^2 + Bx + C = y = f(x)$
What is it for our graph? ---> $At^2 + Bt + C = s(t)$
} What are A, B, & C? We will get there!

This general equation is true for Y as well (just signs are different)

What direction is the X graph going? ---> positive
Is the object accelerating? ---> yes!

What direction is the Y graph going? ---> negative
Is the object accelerating? ---> yes!

When an object is accelerating How do we talk about velocity? We can see that the velocity is different at every point!

We can talk about the average velocity (v_{avg})