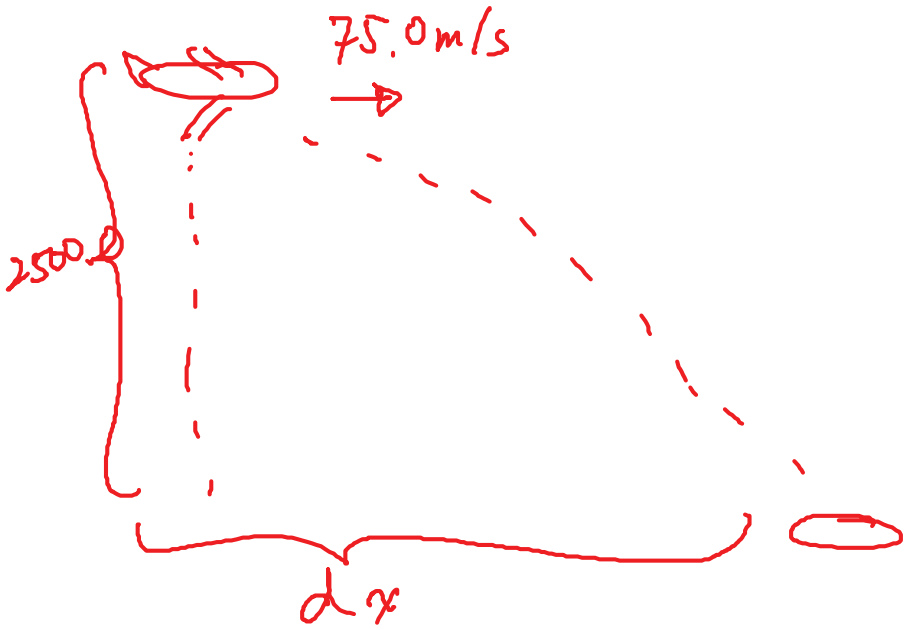
Lesson 7

Tuesday, April 13, 2010
3:16 PM



$d_y = 2500\ m \quad t = ? \quad V_{yo} = 0 \quad V_{xi} = 75 \frac{m}{s} \quad g = -9.80 \frac{m}{s^2}$

$$d = V_i t + \frac{1}{2} g t^2$$

$$-2500_m = 0 + \frac{1}{2}\left(-9.80 \frac{m}{s^2}\right) t^2$$

$$-2500\ m = -4.9 \frac{m}{s^2}\, t^2$$

$$t = 22.587697\ s$$

$$d_x = V_x \cdot t$$

$$= \left(75.0 \frac{m}{s}\right)(22.587697\ s)$$

$$= 1694.07\ldots$$

$$= 1.7 \times 10^3\ m$$

$= 1.7 \times 10^3$ m

$= 1700$ m

$= 1690$ m

$= 1.69 \times 10^3$ m

Dynamics

There are 4 types of forces

gravitational force - attractive force that exists between all objects

electromagnetic force - results from basic property of particles called electric charges

strong nuclear force - holds particles in the nucleus together

weak nuclear force = ? a form of electromagnetic force

Newton - 3 laws

1 #1 [illegible] inertia [illegible] of object

law #1 - law of inertia. If objects are in motion, they tend to remain in motion, or, objects that are stationary remain stationary iff (If and only if)

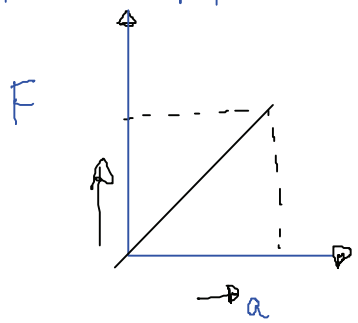
There are no external forces.

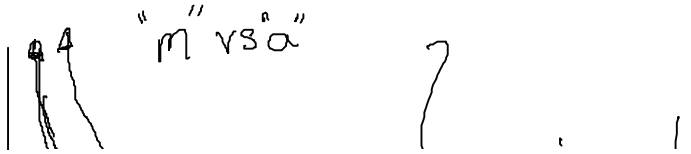
law #2 The rate of change in an objects velocity is proportional to the net force, inversely proportional to the mass

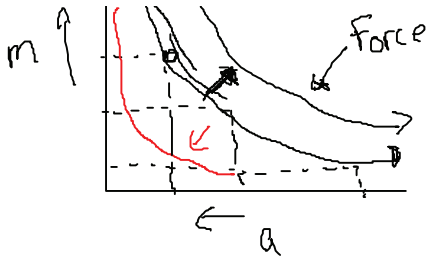
$\uparrow F_{net} = ma \uparrow$ Force is a push or pull

$\uparrow a \propto \frac{1}{m} \downarrow$ } → Proportion

F vs a







reciprocal graph

If we have constant F $\quad \vec{F} = m\vec{a}$

Force is a vector, SI unit force

$F = m \cdot a$

$F = \left[kg \cdot \frac{m}{s^2} \right]$ or "N" = newton

law #3 For every Force, there is an equal but opposite force

ex) What force is required to accelerate a 1500 kg car $3.0\ m/s^2$

$a = 3.0 \frac{m}{s^2}$

$m = 1500 kg$

$\vec{F} = m \cdot \vec{a}$

$= (1500 kg)\left(3.0 \frac{m}{s^2}\right)$

$= 4.5 \times 10^3\ kg \frac{m}{s^2}$ or $4.5 \times 10^3\ N$

$= 450\ N$ East

ex) A race car slows down from an initial velocity of 67.5 m/s and comes to a complete stop in 125m. Determine the required force if the car is 1500kg.

$V_f = 0$

$V_i = 67.5\ \frac{m}{s}$

$d = 125m$

$m = 1500kg$

$F = ?$

$a = ?$

$V_f^2 = V_i^2 + 2ad$

$a = \frac{V_f^2 - V_i^2}{2d}$, $a = -18.225\ \frac{m}{s^2}$

$F_{NET} = ma$

$= (1500kg)(-18.225\ \frac{m}{s^2}) = \boxed{-2.7 \times 10^4 N}$

If you have "a", you can calculate F_{NET} ONLY

W/B Pg 142 # 1-11 all

W/B Ps 142 # 1-11 all

TB #7, 8, 9 Due Next class

I forgot ps #, email classmates