Source: [[KBPHYS360MasterIndex]]

So let's talk about energy!

1 | Types of Energy

- Potential Energy $PE_{grav} = mgh$ (which is work (force times distance) for moving stuff up $\vec{F} \cdot \vec{h}$)
- Kinetic Energy $KE_{translational} = \frac{1}{2}mv^2$ + $KE_{rotational} = \frac{1}{2}I\omega^2$

Where...

- I: moment of inertia
- ω: rotational velocity

2 | Potential Energy

Potential energy exists because of a force field. There is an object "propping" it up pending release of energy.

=> Where did $\Delta PE = W = mg\Delta h$ come from?

So, define $PE = -W_{AB}$. "Potential energy of A to B." Gravity will do a certain amount of work from one point to anther, it will do the opposite the other way.

In order for Work to be accomplished, an object has to be actually moved.

3 | Work

$W = \vec{F} \cdot \vec{d}$, where $\vec{F}$ force and $\vec{d}$ change of distance that the force manifest.

=> $W = |\vec{F}| \cos\theta \times |\vec{d}|$

which, => $W = |\vec{d}| \cos\theta \times |\vec{F}|$

so, essentially, work is either displacement times parallel as part of force, or visa versa.

Why?

3.1 | The Dot Product, a review

The Dot product is a measure of the "pararllelity" of $\vec{F}$ with $\vec{D}$.
=> Dot product: the component of the first vector parallel to the second vector multiplied to the magnitude of d.

$\vec{A} \cdot \vec{B} = |\vec{A}||\vec{B}| \cos\theta$

Calculating