Chapter 6 - Work, Energy & Power

Work: $W = F_{\parallel} \Delta d$ (scalar!)

$W = F \Delta d \cos\theta$

+ work, - work, no work ← 3 situations

W = area under F-d graph

$W = \Delta E$ (Work-Energy Theorem)

Kinetic Energy: $E_k = \frac{1}{2}mv^2$

Gravitational Potential Energy: $E_g = mgh$

Elastic Potential Energy: $E_e = \frac{1}{2}kx^2$

Hooke's Law: $F_a = kx$ (for applied force)

Power: $P = \frac{W}{\Delta t}$ ← work (Watts ⇒ W unit)

Efficiency: $\text{Efficiency} = \frac{E_O}{E_I} \times 100\%$

Chapter 7 - Conservation of Energy + Momentum

Law of Conservation of Mechanical Energy

$E_{total} = E'_{total}$

1 object 2 different energies

$E_g + E_e + E_k = E'_g + E'_e + E'_k$

(before) (after)

If there is a non-conservative force like friction then it does negative work and reduces the total mechanical energy ⇒ Work-Energy Theorem

$W = \Delta E_{total}$

Law of Conservation of Momentum

2 objects collision

$\vec{P}_{total} = \vec{P}'_{total}$ $(\vec{p} = m\vec{v})$

$\vec{P}_A + \vec{P}_B = \vec{P}'_A + \vec{P}'_B$ (neglecting friction)

Elastic Collisions:

- some collisions are elastic

$E_{k\,total} = E'_{k\,total}$

- in order to verify, you need to know all the velocities and masses.... if something is missing, use L of C.M. to find missing value.