

## Energy

$$W = Fx \cos \theta \quad K = \frac{1}{2}mv^2 \quad PE = mgh \quad P = \frac{W}{t}$$

$$\sum Energy_{initial} = \sum Energy_{final}$$

## Momentum/Collisions

$$J = Ft \quad p = m\Delta v \quad J = p \quad \sum P_{initial} = \sum P_{final}$$

## Electrostatics

$$F_e = k \left| \frac{q_1 q_2}{r^2} \right| \quad k = 9 \times 10^9 \frac{Nm^2}{C^2}$$

$$q_{electron/proton} = 1.6 \times 10^{-19} C$$

## Electric Circuits

$$V = IR \quad P = VI = I^2 R = \frac{V^2}{R} \quad R_{series} = \sum R_i \quad \frac{1}{R_{parallel}} = \sum \frac{1}{R_i}$$

## Magnetism

$$F_B = qvB \sin \theta \quad F_B = ILB \sin \theta$$

## Springs and Pendulums

$$F_s = kx \quad EPE = \frac{1}{2}kx^2 \quad T_{pendulum} = 2\pi \sqrt{\frac{l}{g}}$$

## Waves and Sound

$$v = \lambda f = 2lf = 4lf \quad c = \lambda f, c = 3 \times 10^8 m/s \quad T = \frac{1}{f} \quad f = \frac{1}{T}$$

## Optics

$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}, f = \text{focal length} \quad M = -\frac{d_i}{d_o}$$

$$n = \frac{c}{v_m} \quad n_1 \sin \theta_1 = n_2 \sin \theta_2$$