

Formulas

Kinematics

$$\begin{aligned}\vec{d} &= \vec{v}t \\ \vec{a} &= \frac{\vec{v}_f - \vec{v}_i}{t} \\ \vec{v}_f &= \vec{v}_i + \vec{a}t \\ \vec{d} &= \vec{v}_i t + \frac{1}{2}\vec{a}t^2 \\ v_f^2 &= v_i^2 + 2ad \\ \vec{d} &= \frac{\vec{v}_f + \vec{v}_i}{2}t \\ \vec{v}_{av} &= \frac{\vec{d}_{total}}{t_{total}} \\ \vec{v}_{av} &= \frac{\vec{v}_f + \vec{v}_i}{2}\end{aligned}$$

Forces

$$\begin{aligned}F_{NET} &= ma \\ F_{NET} &= \sum F \\ F_g &= mg \\ F_f &= \mu F_N \\ F_g &= \frac{-Gm_1m_2}{d^2} \\ g &= \frac{Gm}{d^2}\end{aligned}$$

Equilibrium

$$\begin{aligned}\tau &= F_{\perp}d \\ \sum \tau_{cc\omega} &= \sum \tau_{c\omega} \\ \sum F_y &= 0 \\ \sum F_x &= 0\end{aligned}$$

Constants

$$\begin{aligned}G &= 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2 \\ c &= 3.00 \times 10^8 \text{ m/s} \\ g_{\text{earth}} &= 9.8 \text{ m/s}^2 \\ e^- &= -1.602 \times 10^{-19} \text{ C} \\ p^+ &= 1.602 \times 10^{-19} \text{ C}\end{aligned}$$

Work Energy Power

$$\begin{aligned}W &= Fd \\ W &= \Delta E \\ \text{Power} &= \frac{w}{t} \\ \varepsilon &= \frac{P_{out}}{P_{in}} \\ \varepsilon &= \frac{W_{out}}{W_{in}} \\ KE &= \frac{1}{2}mv^2 \\ PE &= mgh \\ Q &= mC\Delta T = mC(T_f - T_i)\end{aligned}$$

Momentum

$$\begin{aligned}\text{Impulse} &= F \cdot t \\ \text{Impulse} &= \Delta p = p_f - p_i \\ p &= mv\end{aligned}$$

Circular Motion

$$\begin{aligned}F_{net} &= \frac{mv^2}{r} \\ F_{Net} &= \frac{m4\pi^2 r}{T^2}\end{aligned}$$

Electromagnetism

$$\begin{aligned}F_E &= \frac{kQ_1Q_2}{r^2} \\ F_{\beta} &= \beta Il \\ F_{\beta} &= Qv\beta \\ \vec{E} &= \frac{kQ}{r^2} \\ \vec{E} &= \frac{\Delta V}{d} \\ E_p &= \frac{kQ_1Q_2}{r} \\ \Delta E_p &= \Delta VQ \\ \beta &= \frac{\mu_0 NI}{l} \\ \varepsilon mf &= \beta lv \\ \varepsilon mf &= -\frac{N\Delta\Phi_1}{\Delta t} \\ \Phi_{\beta} &= \beta A\end{aligned}$$

Trig

$$\begin{aligned}\sin \theta &= \frac{0}{H} \\ \cos \theta &= \frac{A}{H} \\ \tan \theta &= \frac{0}{A} \\ 2\sin(\theta) \cos(\theta) &= \sin(2\theta)\end{aligned}$$

