**Physics Formula Sheet**

$\vec{v_{av}} = \left(\frac{\vec{v_1}+\vec{v_2}}{2}\right)$

$\vec{v_2} = \vec{v_1} + \vec{a}\Delta t$

$\vec{\Delta d} = \left(\frac{\vec{v_1}+\vec{v_2}}{2}\right)\Delta t$

$\vec{\Delta d} = \vec{v_1}\Delta t + \frac{1}{2}\vec{a}\Delta t^2$

$\vec{\Delta d} = \vec{v_2}\Delta t - \frac{1}{2}\vec{a}\Delta t^2$

$\vec{v_2}^2 = \vec{v_1}^2 + 2\vec{a}\vec{\Delta d}$

$\Delta t = \frac{2v_1 sin\theta}{g}$

$\Delta d_x = \frac{v_1^2 sin2\theta}{g}$

$\vec{v_{og}} = \vec{v_{om}} + \vec{v_{mg}}$

$F_g = mg$

$F_g = \frac{Gm_1m_2}{r^2}$

$T = 2\pi\sqrt{\frac{L}{g}}$

$\vec{F_{net}} = ma$

$F_f = \mu F_N$

$a_c = \frac{v^2}{r}$

$a_c = \frac{4\pi^2 r}{T^2}$

$a_c = 4\pi^2 r f^2$

$\frac{F_1}{F_2} = \frac{r_2^2}{r_1^2}$

$F_e = kx$

$E_e = \frac{1}{2}kx^2$

$W = \vec{F}\vec{\Delta d}$

$E_g = mgh$

$E_k = \frac{mv^2}{2}$

$W = \Delta E$

$W = E_{k2} - E_{k1}$

$W = E_{g2} - E_{g1}$

$P = \frac{W}{\Delta t} = \frac{\Delta E}{\Delta t}$

$E_t = E_t'$

$E_t = E_g + E_k + E_e + ...$

$E_\gamma = E_i - E_f (emission)$

$t_o = \frac{t}{\sqrt{1-\frac{v^2}{c^2}}}$

$L_o = \frac{L}{\sqrt{1-\frac{v^2}{c^2}}}$

$m = \frac{m_o}{\sqrt{1-\frac{v^2}{c^2}}}$

$E = mc^2$

$E_h = mc\Delta t$

$m_c c_c \Delta t_c = -m_h c_h \Delta t_h$

$L_f = \frac{E_h}{m}$

$L_v = \frac{E_h}{m}$

$E_k = \frac{p^2}{2m}$

$\vec{p} = m\vec{v}$

$W = \vec{F} cos\theta \vec{\Delta d}$

$\vec{F}\Delta t = \vec{\Delta p}$

$Eff. = \frac{Useful\ Energy\ Output}{Energy\ Input} x100\%$

$\vec{p} = \vec{p'}$

$v_1' = v_1\left(\frac{m_1-m_2}{m_1+m_2}\right)$

$v_2' = v_1\left(\frac{2m_1}{m_1+m_2}\right)$

$E_g = \frac{-Gm_1m_2}{r}$

$E_t = \frac{1}{2}E_g$

$v = \sqrt{\frac{2GM}{r}}$

$E_t = E_g + E_k$

$E_k = E_b = |E_t|$

$f = \frac{1}{T}$

$f = \frac{\#\ of\ cycles}{\Delta t}$

$v = f\lambda$

$n_1 sin\theta_1 = n_2 sin\theta_2$

$sin\theta_c = \frac{n_2}{n_1}$

$\frac{n_1}{n_2} = \frac{v_2}{v_1} = \frac{\lambda_2}{\lambda_1}$

$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$

$M = \frac{h_i}{h_o} = \frac{-d_i}{d_o}$

$P = \frac{1}{f}$

$x_n = \frac{\left(n-\frac{1}{2}\right)L\lambda}{d}$

$\frac{x_n}{L} = sin\theta_n$

$x_n = \frac{nL\lambda}{d}$

$y_n = \frac{\left(n+\frac{1}{2}\right)L\lambda}{w}$

$\frac{y_n}{L} = sin\theta_n$

$y_n = \frac{nL\lambda}{w}$

$\Delta x = \frac{L\lambda}{d}$

$\Delta y = \frac{L\lambda}{w}$

$p = \frac{h}{\lambda}$

$\Delta x = \frac{L\lambda}{2t}$

$I = \frac{q}{\Delta t}$

$V = \frac{E}{q}$

$E = qI\Delta t$

$q = ne$

$V = IR$

$\frac{R_1}{R_2} = \frac{A_2}{A_1} = \frac{L_1}{L_2}$

$V_T = V_1 + V_2 + V_3 + \ ... \ + V_n$

$P = I^2 R$

$I_T = I_1 + I_2 + I_3 + \ ... \ + I_n$

$R_T = R_1 + R_2 + R_3 + \ ... \ + R_n$

$P = \frac{V^2}{R}$

$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \ + \frac{1}{R_n}$

$P = VI$

$Cost = Energy \ \times \ Rate$