Physics Formula Sheet

$\vec{v_{av}} = \left(\frac{\vec{v_1}+\vec{v_2}}{2}\right)$ $\quad \vec{v_2} = \vec{v_1} + \vec{a}\Delta t$ $\quad \vec{\Delta d} = \left(\frac{\vec{v_1}+\vec{v_2}}{2}\right)\Delta t$ $\quad \vec{\Delta d} = \vec{v_1}\Delta t + \frac{1}{2}\vec{a}\Delta t^2$

$\vec{\Delta d} = \vec{v_2}\Delta t - \frac{1}{2}\vec{a}\Delta t^2$ $\quad \vec{v_2}^2 = \vec{v_1}^2 + 2\vec{a}\vec{\Delta d}$ $\quad \Delta t = \frac{2v_1 sin\theta}{g}$ $\quad \Delta d_x = \frac{v_1^2 sin2\theta}{g}$

$\vec{v_{og}} = \vec{v_{om}} + \vec{v_{mg}}$ $\quad F_g = mg$ $\quad F_g = \frac{Gm_1m_2}{r^2}$ $\quad T = 2\pi\sqrt{\frac{L}{g}}$

$\vec{F_{net}} = ma$ $\quad F_f = \mu F_N$ $\quad a_c = \frac{v^2}{r}$ $\quad a_c = \frac{4\pi^2 r}{T^2}$

$a_c = 4\pi^2 r f^2$ $\quad \frac{F_1}{F_2} = \frac{r_2^2}{r_1^2}$ $\quad F_e = kx$ $\quad E_e = \frac{1}{2}kx^2$

$W = \vec{F}\vec{\Delta d}$ $\quad E_g = mgh$ $\quad E_k = \frac{mv^2}{2}$ $\quad W = \Delta E$

$W = E_{k2} - E_{k1}$ $\quad W = E_{g2} - E_{g1}$ $\quad P = \frac{W}{\Delta t} = \frac{\Delta E}{\Delta t}$ $\quad E_t = E_t'$

$E_t = E_g + E_k + E_e + ...$ $\quad E_\gamma = E_i - E_f (emission)$ $\quad t_o = \frac{t}{\sqrt{1-\frac{v^2}{c^2}}}$ $\quad L_o = \frac{L}{\sqrt{1-\frac{v^2}{c^2}}}$

$m = \frac{m_o}{\sqrt{1-\frac{v^2}{c^2}}}$ $\quad E = mc^2$ $\quad E_h = mc\Delta t$ $\quad m_c c_c \Delta t_c = -m_h c_h \Delta t_h$

$L_f = \frac{E_h}{m}$ $\quad L_v = \frac{E_h}{m}$ $\quad E_k = \frac{p^2}{2m}$ $\quad \vec{p} = m\vec{v}$

$W = \vec{F} cos\theta \vec{\Delta d}$ $\quad \vec{F}\Delta t = \vec{\Delta p}$ $\quad Eff. = \frac{Useful\ Energy\ Output}{Energy\ Input} x100\%$ $\quad \vec{p} = \vec{p'}$

$v_1' = v_1\left(\frac{m_1-m_2}{m_1+m_2}\right)$ $\quad v_2' = v_1\left(\frac{2m_1}{m_1+m_2}\right)$ $\quad E_g = \frac{-Gm_1m_2}{r}$ $\quad E_t = \frac{1}{2}E_g$

$v = \sqrt{\frac{2GM}{r}}$ $\quad E_t = E_g + E_k$ $\quad E_k = E_b = |E_t|$ $\quad f = \frac{1}{T}$

$f = \frac{\#\ of\ cycles}{\Delta t}$ $\quad v = f\lambda$ $\quad n_1 sin\theta_1 = n_2 sin\theta_2$ $\quad sin\theta_c = \frac{n_2}{n_1}$

$\frac{n_1}{n_2} = \frac{v_2}{v_1} = \frac{\lambda_2}{\lambda_1}$ $\quad \frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$ $\quad M = \frac{h_i}{h_o} = \frac{-d_i}{d_o}$ $\quad P = \frac{1}{f}$

$x_n = \frac{\left(n-\frac{1}{2}\right)L\lambda}{d}$ $\quad \frac{x_n}{L} = sin\theta_n$ $\quad x_n = \frac{nL\lambda}{d}$ $\quad y_n = \frac{\left(n+\frac{1}{2}\right)L\lambda}{w}$

$\frac{y_n}{L} = sin\theta_n$ $\quad y_n = \frac{nL\lambda}{w}$ $\quad \Delta x = \frac{L\lambda}{d}$ $\quad \Delta y = \frac{L\lambda}{w}$

$p = \frac{h}{\lambda}$ $\quad \Delta x = \frac{L\lambda}{2t}$ $\quad I = \frac{q}{\Delta t}$ $\quad V = \frac{E}{q}$

$E = qI\Delta t$ $\quad q = ne$ $\quad V = IR$ $\quad \frac{R_1}{R_2} = \frac{A_2}{A_1} = \frac{L_1}{L_2}$

$V_T = V_1 + V_2 + V_3 + \ ... \ + V_n$ $\quad P = I^2R$ $\quad I_T = I_1 + I_2 + I_3 + \ ... \ + I_n$ $\quad R_T = R_1 + R_2 + R_3 + \ ... \ + R_n$

$P = \frac{V^2}{R}$ $\quad \frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \ + \frac{1}{R_n}$ $\quad P = VI$ $\quad Cost = Energy \ \times \ Rate$

$\frac{V_p}{V_s} = \frac{N_p}{N_s} + \frac{I_s}{I_p}$ $\quad F_e = \frac{kq_1q_2}{r^2}$ $\quad \vec{F_e} = q\vec{\epsilon}$ $\quad \epsilon = \frac{kq}{r^2}$

$E_e = \frac{kq_1q_2}{r}$ $\quad \epsilon = \frac{V}{d}$ $\quad V = \frac{kq}{r}$ $\quad F_m = qvBsin\theta$

$F_m = BILsin\theta$ $\quad \frac{e}{m} = 1.76 \times 10^{11}\ C/kg$ $\quad \frac{q}{m} = \frac{\epsilon}{B^2 r}$ $\quad B = \mu_o\left(\frac{I}{2\pi r}\right)$

$B = \mu_o\left(\frac{NI}{L}\right)$ $\quad E_\gamma = hf$ $\quad f = \frac{c}{\lambda}$ $\quad E_\gamma = E_k + W$

$E_\gamma = E_f - E_i\ (absorption)$ $\quad E_\gamma = E_i - E_f\ (emission)$ $\quad \lambda = \frac{h}{mv}$ $\quad d_2 = d_1\left(\frac{n_2}{n_1}\right)$

$\frac{B_1}{B_2} = \frac{N_1 I_1 \mu_1 d_2}{N_2 I_2 \mu_2 d_1}$ $\quad v_s = 332 + 0.6T$ $\quad f_2 = f_1\left(1 \pm \frac{v_o}{v_s}\right)$ $\quad f_2 = f_1\left(\frac{v_s}{v_s \pm v_o}\right)$

$\beta = 10log\left(\frac{I_2}{I_1}\right)$ $\quad I = \frac{P}{4\pi r^2}$ $\quad \frac{I_1}{I_2} = \frac{r_2^2}{r_1^2}$ $\quad L_n = \frac{n\lambda}{2}$

$\Delta L = \frac{\lambda}{2}$ $\quad L_n = \frac{(2n-1)}{\lambda}$ $\quad \frac{f_1}{f_2} = \frac{L_2 d_2 \sqrt{T_1}\sqrt{\rho_2}}{L_1 d_1 \sqrt{T_2}\sqrt{\rho_1}}$ $\quad f_b = |f_2 - f_1|$

$v = \sqrt{\frac{GM}{r}}$ $\quad C = \frac{R^3}{T^2}$ $\quad F_2 = \frac{\mu_o I_1 I_2 L}{2\pi d}$ $\quad f_n = nf_o$

$tan\theta_p = \frac{n_2}{n_1}$ $\quad |PS_1 - PS_2| = \left(n - \frac{1}{2}\right)\lambda$ $\quad |PS_1 - PS_2| = n\lambda$ $\quad \frac{\lambda}{w} \geq \ 1$

Constants

$e = 1.6 \times 10^{-19}\ C$ $\quad m_{proton} = 1.67 \times 10^{-27}\ kg$ $\quad g = 9.8\ N/kg$ $\quad m_{electron} = 9.11 \times 10^{-31}\ kg$

$m_{Earth} = 5.98 \times 10^{24}\ kg$ $\quad n_{diamond} = 2.42$ $\quad n_{water} = 1.33$ $\quad n_{zircon} = 1.92$

$h = 6.626 \times 10^{-34}\ J \cdot s$ $\quad k = 9.0 \times 10^9\ N \cdot m^2/kg^2$ $\quad c = 3 \times 10^8\ m/s$ $\quad G = 6.67 \times 10^{-11}\ N \cdot m^2/kg^2$

$R_{Earth} = 6.38 \times 10^6\ m$