ASTR 200 Formulae and constants

$c = 3.0 \times 10^{8} m/s$ $G = 6.67 \times 10^{-11} N m^2 kg^{-2}$ $k = 1.38 \times 10^{-23} J/K$ $h = 6.63 \times 10^{-34} J s$

$M_{\odot} = 1.99 \times 10^{30} kg$ $M_{\oplus} = 6.0 \times 10^{24} kg$ $m_e = 9.1 \times 10^{-31} kg$ $m_p = 1.67 \times 10^{-27} kg$

$R_{\odot} = 7.0 \times 10^{8} m$ $R_{\oplus} = 6.4 \times 10^{6} m$ $au = 1.50 \times 10^{11} m$ $pc = 3.1 \times 10^{16} m$

$L_{\odot} = 3.8 \times 10^{26} W$ $T_{\odot} \simeq 5800 K$ $\sigma = 5.67 \times 10^{-8} W m^{-2} K^{-4}$ $1 yr \simeq \pi \times 10^{7} s$

$\alpha \simeq 1/137$ $1 nm = 10^{-9} m$ $1 eV = 1.6 \times 10^{-19} J$ $1 radian = 206265''$

$q = a(1-e)$ $Q = a(1+e)$ $A = \pi a b$ $r = \frac{a(1-e^2)}{1+e\cos\theta}$ $v_p^2 = \frac{GM}{a}\frac{1+e}{1-e}$ $v_a^2 = \frac{GM}{a}\frac{1-e}{1+e}$

$v^2 = GM\left(\frac{2}{r} - \frac{1}{a}\right)$ $t_{ff} \simeq \frac{1}{3\sqrt{G\rho}}$ $M_1 a_1 = M_2 a_2$ $M_1 v_1 = M_2 v_2$

$P^2 = \frac{4\pi^2}{G(M_1+M_2)}(a_1+a_2)^3$ $v_{esc} = \sqrt{\frac{2GM}{R}}$ $\frac{v}{c} = \frac{\Delta\lambda}{\lambda}$ $\lambda_p = \frac{2.900 \times 10^{6} nm K}{T}$ $L = 4\pi R^2 \sigma T^4$

$E_n = \frac{-m_e c^2 \alpha^2}{2}\frac{Z^2}{n^2} \simeq -13.6 eV \frac{Z^2}{n^2}$ $E = h\nu$ $c = \nu\lambda$ $d(pc) = \frac{1}{\alpha('')}$ $flux \propto r^{-2}$ $\mu = \frac{v_T}{d}$

$\frac{dP}{dR} = -g\rho$ $P = nkT = \frac{\rho k T}{\mu m_p}$ $c_s = \sqrt{\frac{\gamma k T}{\mu m_p}}$ $P_e \sim \hbar^2 n_e^{5/3}/m_e$