

A hodge-podge of equations:

$$P^2 = \frac{4\pi^2}{GM} a^3 \quad dF = \frac{2GMm}{r^3} dr$$

$$v_{esc} = \sqrt{\frac{2GM}{r}} \quad v_{circ} = \sqrt{\frac{GM}{r}}$$

$$r_{lim} < 2.5 \left( \frac{\bar{\rho}_p}{\bar{\rho}_m} \right)^{1/3} R_p \quad v^2 = GM \left( \frac{2}{r} - \frac{1}{a} \right)$$

$$\lambda_{max}(cm) = \frac{0.29}{T(K)} \quad L = 4\pi R^2 \sigma T^4$$

$$r_{peri} = a(1 - e) \quad r_{apo} = a(1 + e)$$

$$m - M = 5 \log_{10}(d) - 5 \quad m_1 - m_2 = -2.5 \log_{10} \left( \frac{f_1}{f_2} \right)$$

$$M = 4.76 - 2.5 \log_{10} \left( \frac{L}{L_{\odot}} \right) \quad B_{\lambda}(T) = \frac{2hc^2/\lambda^5}{e^{hc/\lambda kT} - 1}$$

$$E_n = -\frac{13.6}{n^2} eV \quad T_{eq} = T_* (1 - a)^{1/4} \sqrt{\frac{R_*}{2r}}$$

$$H = \frac{kT}{mg} \quad P(z) = P_0 e^{-z/H}$$

$$V_t = 4.74 \mu (" / yr) d(pc) \quad \langle M_V \rangle = -2.8 \log P - 1.43$$

$$[Fe/H] = \log(Fe/H)_* - \log(Fe/H)_{\odot} \quad R_s = \frac{2GM}{c^2}$$

$$M_I = -8.7(\log(v_c) - 2.5) - 23.5 \quad r_e \sim \sigma^{1.24} \langle I \rangle^{-0.82}$$

$$M = \frac{L}{4\pi} \frac{\sigma}{cGm} \quad \mu(r) = \mu_0 + 1.09(r/h)$$

$$v = H_0 d \quad M = \frac{5\langle R \rangle \sigma^2}{G}$$

$$1 + z = \frac{1}{R} \quad t_H = 1/H_0$$

$$\left( \frac{\dot{R}}{R} \right)^2 - \frac{8}{3} \pi G \rho - \frac{\Lambda}{3} = -\frac{k}{R^2}$$

$$2T + U = 0$$

Possibly Useful Constants and Conversions:

- Solar Blue Magnitudes:  $m_B = -26.14$ ,  $M_B = +5.42$
- Solar Visual Magnitudes:  $m_V = -26.8$ ,  $M_V = +4.76$
- Gravitational constant  $G = 39.5$  **if** time is measured in years, distances in AU, and masses in solar masses.
- Gravitational constant  $G = 4.43 \times 10^{-3}$  **if** time is measured in Myr, distances in pc, and masses in solar masses.
- Stefan-Boltzmann constant  $\sigma = 7.18 \times 10^{-17}$  **if** luminosities are measured in solar luminosities, temperature is measured in Kelvin, and sizes are measured in solar radii.
- 1 parsec (pc) = 206,265 AU
- 1 arcsecond (") = 1/3600 degrees =  $4.85 \times 10^{-6}$  radians
- 1 Angstrom ( $\text{\AA}$ ) =  $10^{-8}$  cm
- 1 year =  $3.15 \times 10^7$  s