Some (potentially) useful formulas and physical constants

$D = \frac{\alpha('')d}{206,265}$

$P[yr]^2 = a[AU]^3$

$P^2 = \left[\frac{4\pi^2}{G(m_1 + m_2)} \right] a^3$

$F = ma$

$F = G\left(\frac{m_1 m_2}{r^2} \right)$

$G = 6.67 \times 10^{-11}$ newton–m^2/kg^2

$E = h\nu$

$h = 6.625 \times 10^{-34}$ J–s $= 4.135 \times 10^{-15}$ eV–s

$c = 3.00 \times 10^5$ km/s $= 3.00 \times 10^8$ m/s

$\nu = \frac{c}{\lambda}$

$E = \frac{hc}{\lambda}$

$\lambda_{max}\ (m) = \frac{0.0029}{T(K)}$

$F = \sigma T^4$

$\sigma = 5.67 \times 10^{-8}$ W m^{-2} K^{-4}

$\frac{1}{\lambda} = R\left(\frac{1}{N^2} - \frac{1}{n^2} \right)$

R = 1.097×10^7 m^{-1}

θ [arcseconds= $2.5 \times 10^5\ \frac{\lambda}{D}$

b = L / ($4\pi d^2$)

L = $4\pi R^2 \sigma T^4$

$E_k = \frac{1}{2}\ mv^2$

$E_k = \frac{3}{2}\ kT$

$v = \sqrt{\frac{3kT}{m}}$

$k = 1.38 \times 10^{-23}$ J/K

$v_{escape} = \sqrt{\frac{2GM}{R}}$

Magnification = f(objective) / f(eyepiece)

1 AU = 1.496×10^8 km

1 ly = 9.46×10^{12} km = 63,240 AU

1 pc = 3.09×10^{13} km = 3.26 ly

1 atm = 14.7 lb/in.^{2} = 1.01×10^5 N/m^2

1 bar = 0.987 atm

1 M_0 = 1.99 x 10^{30} kg

$H_0 \approx$ 70 km/s/Mpc

T(K) = T_C + 273

Radius of the Earth = 6378 km

Radius of the Moon = 1738 km

Earth-Moon distance = 384,400 km

Radius of Mars = 3397 km

Radius of the Sun = 696,000 km

Area of a circle, radius R: $A = \pi R^2$

Surface area of a sphere, radius R: $A = 4\pi R^2$

Volume of a sphere, radius R: $V = \frac{4}{3}\pi R^3$

d(pc) = 1 / p (arcseconds)

v_t (km/s) = 4.74 μ (arcseconds/yr) d(pc)

$m_2 - m_1 = 2.5 \log(b_1/b_2)$

m – M = 5 log d(pc) – 5

$M_1 + M_2 = a^3/P^2$

t = f M c^2 / L

L "proportional to" $M^{3.5}$

$F_{tidal} = F_{near} - F_{far}$

F_{tidal} = (2GMmd) / r^3

$T = T^0 / (1 - [v/c]^2)^{1/2}$

$L = L^0 \ (1 - [v/c]^2)^{1/2}$

$R_{Sch} = 2GM / c^2$

$P = 2 \pi r / v$

$M(<r) = rv^2 / G$

$\lambda_o = (1+z) \lambda_e$

$v[km/s] = H_0 \, d[Mpc]$

$z \approx c \, z / H_0$

$d \approx cz / H_0$