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

$\frac{1}{P} = \frac{1}{E} + \frac{1}{S}$ [inferior planet]

$\frac{1}{P} = \frac{1}{E} - \frac{1}{S}$ [superior planet]

$E = h\nu$

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

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

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

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

λ_{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 $= 1.097 \times 10^7$ m^{-1}

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

b = L / (4πd^2)

L = 4πR^2 σT^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

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

$\Delta \lambda = \lambda_0$ v/c

$\lambda = \lambda_0 + \Delta \lambda$

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

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

$F_{tidal\text{-}net}$ = (2GMAd) / r^6

E = mc^2