

General constants & Laws:

Gravitational constant

$$G = 6.67 \cdot 10^{-11} \text{ N.m}^2.\text{kg}^{-2}$$

Stefan-Boltzmann law

$$W = sT^4; s = 5.67 \cdot 10^{-8} \text{ J.s}^{-1}.\text{m}^{-2}.\text{K}^{-4}$$

Wien's displacement law

$$\lambda_m T = 2.898 \cdot 10^{-3} \text{ m.K}$$

Speed of light in free space

$$c = 2.998 \cdot 10^8 \text{ m.s}^{-1}$$

Useful data:

1 tropical year

$$= 365.242 \text{ solar days}$$

1 sidereal day

$$= 23 \text{ hours } 56 \text{ minutes } 4.1 \text{ seconds}$$

1 Astronomical Unit (A.U.)

$$= 1.496 \cdot 10^{11} \text{ m}$$

1 parsec (pc)

$$= 3.0856 \cdot 10^{16} \text{ m} = 3.262 \text{ ly}$$

1 Mpc

$$= 10^6 \text{ pc}$$

1 lightyear (ly)

$$= 9.46 \cdot 10^{15} \text{ m}$$

Planetary data:

Sun

radius $R_{\odot}$

$$= 6.960 \cdot 10^8 \text{ m}$$

mass $M_{\odot}$

$$= 1.9891 \cdot 10^{30} \text{ kg}$$

Luminosity $L_{\odot}$

$$= 3.826 \cdot 10^{26} \text{ W}$$

Earth

equatorial radius $R_{\oplus}$

$$= 6.378 \cdot 10^6 \text{ m}$$

mass $M_{\oplus}$

$$= 5.9742 \cdot 10^{24} \text{ kg}$$

orbital radius

$$= 1 \text{ A.U.}$$

orbital period

$$= 1 \text{ year}$$

Moon

equatorial radius $R_{\lrcorner}$

$$= 1.7374 \cdot 10^6 \text{ m}$$

mass $M_{\lrcorner}$

$$= 7.3483 \cdot 10^{22} \text{ kg}$$

orbital radius

$$= 3.84400 \cdot 10^8 \text{ m}$$

orbital period (sidereal)

$$= 27.32166 \text{ days}$$

synodic month

$$= 29.53059 \text{ days}$$

Formulas

$$\frac{d}{dx}(y^n) = n(y^{n-1})\frac{d}{dx}y \quad \frac{d}{dx}(uvw) = vw\frac{d}{dx}u + uw\frac{d}{dx}v + uv\frac{d}{dx}w$$