Helpful Numbers

compiled by Tadashi Tokieda, August 2012

`conversion factors`

$0°\mathrm{C} = 273.15\,\mathrm{K}$ $\quad 1\,\mathrm{eV} \approx 16 \times 10^{-20}\,\mathrm{J}$ $\quad 1\,\mathrm{cal} \approx 4.2\,\mathrm{J}$ $\quad 1\,p_{\mathrm{atm}} \approx 10^5\,\mathrm{Pa}$ $\quad 1\,\mathrm{year} \approx \pi \times 10^7\,\mathrm{sec}$

`length`

wavelength of visible light $\approx \frac{1}{2} \times 10^{-6}\,\mathrm{m}$

radius of the Earth $R_\oplus = 4 \times 10^7 / 2\pi\,\mathrm{m}$ $\quad$ of the Moon $\approx \frac{1}{4} R_\oplus$ $\quad$ of the Sun $\approx 100\,R_\oplus$

distance Earth-Moon $\approx 60\,R_\oplus$ $\quad$ Earth-Sun $\approx \frac{1}{4} \times 10^5\,R_\oplus = 1\,\mathrm{AU}$

`time`

frequency of C_4 (middle do) $\approx 262\,\mathrm{Hz}$

age of the solar system $\approx 4.6 \times 10^9$ years $\quad$ of the genus *Homo* $\approx 2.3 \times 10^6$ years

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`speed`

speed of light in vacuum $c \approx 3 \times 10^8\,\mathrm{m/sec}$ $\quad$ of sound in air $\approx 345\,\mathrm{m/sec}$

`mass`

mass of an electron $m_e \approx 10^{-30}\,\mathrm{kg}$ $\quad$ of a proton $\approx \frac{5}{3} \times 10^3\,m_e$

density of water $\rho_{\mathrm{water}} = 1\,\mathrm{g/cm^3}$ $\quad$ of air $\approx \frac{1.2}{1000}\,\rho_{\mathrm{water}}$

density of the Earth $\approx 5.5\,\rho_{\mathrm{water}}$ $\quad$ of the Moon $\approx 3.3\,\rho_{\mathrm{water}}$ $\quad$ of the Sun $\approx 1.4\,\rho_{\mathrm{water}}$

mass of the Earth $M_\oplus \approx 6 \times 10^{24}\,\mathrm{kg}$ $\quad$ of the Moon $\approx \frac{1}{80} M_\oplus$ $\quad$ of the Sun $\approx \frac{1}{3} \times 10^6\,M_\oplus$

`gravitation`

gravitational constant $G \approx \frac{2}{3} \times 10^{-10}\,\mathrm{m^3/(kg \cdot sec^2)}$

gravitational acceleration on the Earth surface $g \approx 10\,\mathrm{m/sec^2}$ $\quad$ weight of a small apple $\approx 1\,\mathrm{N}$

`atom`

Planck constant $\hbar \approx 10^{-34}\,\mathrm{J \cdot sec}$

fine structure constant $\alpha = \frac{e^2}{4\pi\varepsilon_0} \frac{1}{\hbar c} \approx \frac{1}{137}$

`fluid`

viscosity of water $\mu_{\mathrm{water}} \approx 10^{-3}\,\mathrm{Pa \cdot sec}$ $\quad$ of air $\approx \frac{1}{50}\,\mu_{\mathrm{water}}$

surface tension of water $\approx 0.07\,\mathrm{J/m^2}$

`thermodynamics`

Boltzmann constant $k_{\mathrm{B}} \approx 1.4 \times 10^{-23}\,\mathrm{J/K}$ $\quad k_{\mathrm{B}}T$ at room temperature $\approx \frac{1}{40}\,\mathrm{eV} \approx 4\,\mathrm{pN\,nm}$

Avogadro's number $N_{\mathrm{A}} \approx 6 \times 10^{23}$

heat capacity of liquid water $= 1\,\mathrm{cal/(g \cdot K)}$ $\quad$ of air $\approx 1\,\mathrm{J/(g \cdot K)}$

water's enthalpy of vaporization $\approx 500\,\mathrm{cal/g}$ $\quad$ of fusion $\approx 80\,\mathrm{cal/g}$

solar power on ground at midday $\approx 1000\,\mathrm{W/m^2}$

metabolic rate of a seated adult $\approx 100\,\mathrm{W}$