

## How big is that?

Diameter of hydrogen atom	$1.06 \times 10^{-8}$ cm
Diameter of the Moon	$3.5 \times 10^3$ km
Diameter of the Earth	$1.3 \times 10^4$ km
Diameter of the Sun	$1.4 \times 10^6$ km
Diameter of the Milky Way galaxy	$1.7 \times 10^5$ ly
Distance to the Moon	$3.8 \times 10^5$ km
Distance to the Sun	$1.5 \times 10^8$ km
Distance to the next nearest star	4 ly
Distance to the center of the Milky Way	$2.7 \times 10^4$ ly
Distance to the nearest galaxy	$1.7 \times 10^5$ ly
Mass of hydrogen atom	$1.67 \times 10^{-24}$ gm
Mass of the Moon	$7.4 \times 10^{25}$ gm
Mass of the Earth	$6.0 \times 10^{27}$ gm
Mass of the Sun	$2.0 \times 10^{33}$ gm ( $1 M_{\odot}$ )
Mass of the Milky Way galaxy	$5 \times 10^{10} M_{\odot}$
Luminosity of the Sun	$3.8 \times 10^{33}$ erg/s ( $1 L_{\odot}$ )
Luminosity of the largest stars	$10^5 L_{\odot}$
Luminosity of the Milky Way galaxy	$10^{10} L_{\odot}$
Luminosity of quasar 3C 273	$10^{12} L_{\odot}$
Earth's rotation period	$8.64 \times 10^4$ s (1 day)
Moon's revolution period	28 days
Earth's revolution period	365.25 days (1 year)
Sun's revolution period within Milky Way	$2.4 \times 10^8$ years
Age of the solar system	$4.6 \times 10^9$ years
Expected life span of the Sun	$1.5 \times 10^{10}$ years
Age of the Universe	$1.3 \times 10^{10}$ years
Earth's equator rotation speed	0.47 km/s
Earth's revolution speed	30 km/s
Sun's speed within the Milky Way	220 km/s
Milky Way's speed within the local Universe	500 km/s

**Typical lengths:**

Normal star diameter	$10^6$ km
Distance between stars	a few ly
Normal galaxy diameter	$10^5$ ly
Distance between galaxies	$10^6$ ly

**Typical masses:**

Smallest star	$0.1 M_{\odot}$
Normal star	$1 M_{\odot}$
Giant star	$10 M_{\odot}$
Normal galaxy	$10^{10} - 10^{11} M_{\odot}$
Galaxy cluster	$10^{14} - 10^{15} M_{\odot}$

**Typical luminosities:**

Normal star	$1 L_{\odot}$
Giant star	$10^3 - 10^5 L_{\odot}$
Normal galaxy	$10^9 - 10^{10} L_{\odot}$
Quasar	$10^{12} - 10^{13} L_{\odot}$

**Typical time spans:**

Planetary revolution	1 year
Galaxy rotation	$10^7 - 10^9$ years
Life of giant stars	$10^6 - 10^9$ years
Life of normal star	$10^{10}$ years

**Typical speeds:**

Planetary orbits	10 km/s
Stellar motion in galaxy	100 km/s
Between nearby galaxies	100 km/s

**Other important constants:**

$$1 \text{ ly} = 9.46 \times 10^{12} \text{ km} = 9.46 \times 10^{17} \text{ cm}$$

$$1 \text{ km} = 10^5 \text{ cm}$$

$$1 \text{ hour} = 3600 \text{ seconds}$$

$$\pi = 3.14159265359$$

$$\text{Speed of light: } c = 2.99792458 \times 10^5 \text{ km/s} = 2.99792458 \times 10^{10} \text{ cm/s} = 1 \text{ ly/year}$$

$$1 \text{ Mly} = 10^6 \text{ ly}$$

$$1 \text{ erg} = 1 \text{ gm cm}^2/\text{s}^2$$

$$1 \text{ year} = 3.16 \times 10^7 \text{ seconds}$$

$$\text{Hubble's constant: } H_0 = 20 \text{ km}/(\text{sec Mly})$$

$$\text{Newton's gravitational constant: } G = 6.67 \times 10^{-8} \text{ cm}^3/(\text{gm s}^2)$$