Units of length and time used in astronomy

second, symbol: s, also written as a superscript ^{s};
minute, symbol: min, 1 min = 60 s, also written as a superscript ^{m};
hour, symbol: h, 1 h = 3 600 s, also written as a superscript ^{h};
day, symbol: d, 1 d = 24 h = 86 400 s, also written as a superscript ^{d}.

Example.
A sidereal day (equal to the period of the Earth's rotation around its axis):
23 h 56 min 4 s = $23^h 56^m 04^s$.

(Julian) year, symbol: a,

$$1 \text{ a} = 365.25 \text{ d (exactly)}, \quad 1 \text{ a} = 31\,557\,600 \text{ s} \cong 3.156 \times 10^7 \text{ s}.$$

In scientific literature, the year is often marked with the symbol yr.

The **astronomical unit**, symbol: au,

$$1 \text{ au} = 149\,597\,870\,700 \text{ m} \quad \text{(exactly)}.$$

1 au is approximately the average distance from the Earth to the Sun,

$$1 \text{ au} \cong 1.496 \times 10^{11} \text{ m}.$$

In scientific literature, the astronomical unit is often marked with the symbol AU.

Speed of light in vacuum:

$$c = 299\,792\,458 \; \frac{\text{m}}{\text{s}} \quad \text{(exactly)}.$$

The **light-year**, symbol: ly, is the distance light travels in a vacuum in one Julian year:

$$1 \text{ ly} = c \cdot \text{a} \cong 9.461 \times 10^{15} \text{ m}.$$

Central angle α cuts an arc of length d from a circle of radius r,

$$d = r\alpha,$$

when the measure of the angle α is expressed in radians.

The **parsec**, symbol: pc, is defined as follows:

the distance $r = 1$ pc when for $d = 1$ au the angle $\alpha = 1''$, thus

$$1 \text{ pc} = \frac{1 \text{ au}}{1''}. \qquad \text{Because } 1'' = \frac{\pi}{648\,000} \text{ rad,}$$

$$1 \text{ pc} = \frac{648\,000}{\pi} \text{ au} \quad \text{(exactly)}; \qquad 1 \text{ pc} \cong 3.086 \times 10^{16} \text{ m.}$$

Proxima Centauri, the star closest to the Sun, is 4.2 ly $\cong$ 1.3 pc from the Sun.

Conversions between length units:

$$1 \text{ ly} \cong 6.324 \times 10^4 \text{ au} \cong 3.066 \times 10^{-1} \text{ pc,}$$

$$1 \text{ pc} \cong 2.063 \times 10^5 \text{ au} \cong 3.262 \text{ ly.}$$

One can express measures of plane angles using a usual **degree measure**, in which

$$\text{full angle} = 360^\circ, \quad 1^\circ = 60', \quad 1' = 60'',$$

or using a **time measure**, in which

$$360^\circ = 24^\text{h} \implies 1^\text{h} = 15^\circ,$$
$$1^\text{h} = 60^\text{m} \implies 1^\text{m} = 15',$$
$$1^\text{m} = 60^\text{s} \implies 1^\text{s} = 15''.$$