

Definitions and explanations of Astronomy Terms found in the New Astronomy Box on City Pages:

Twilight

This is the time before sunrise and after sunset where it is still light outside, but the sun is not in the sky.

Civil Twilight

This is defined to be the time period when the sun is no more than 6 degrees below the horizon at either sunrise or sunset. The horizon should be clearly defined and the brightest stars should be visible under good atmospheric conditions (i.e. no moonlight, or other lights). One still should be able to carry on ordinary outdoor activities.

Nautical Twilight

This is defined to be the time period when the sun is between 6 and 12 degrees below the horizon at either sunrise or sunset. The horizon is not defined and the outline of objects might be visible without artificial light. Ordinary outdoor activities are not possible at this time without extra illumination.

Astronomical Twilight

This is defined to be the time period when the sun is between 12 and 18 degrees below the horizon at either sunrise or sunset. The sun does not contribute to the illumination of the sky before this time in the morning, or after this time in the evening. In the beginning of morning astronomical twilight and at the end of astronomical twilight in the evening, sky illumination is very faint, and might be undetectable.

Length Of Day

This is defined to be the time of Actual Sunset minus the time of Actual Sunrise. The change in length of daylight between today and tomorrow is also listed when available.

Length Of Visible Light

This is defined to be the time of Civil Sunset minus the time of Civil Sunrise.

Altitude (or Elevation)

First, find your azimuth. Next, the Altitude (or elevation) is the angle between the Earth's surface (horizon) and the sun, or object in the sky. Altitudes range from -90° (straight down below the horizon, or the nadir) to $+90^\circ$ (straight up above the horizon or the Zenith) and 0° straight at the horizon.

Azimuth

The azimuth (az) angle is the compass bearing, relative to true (geographic) north, of a point on the horizon directly beneath the sun. The horizon is defined as an imaginary circle centered on the observer. This is the 2-D, or Earth's surface, part of calculating the sun's position. As seen from above the observer, these compass bearings are measured clockwise in degrees from north. Azimuth angles can range from $0 - 359^\circ$. 0° is due geographic north, 90° due east, 180° due south, and 360 due north again.

Hour Angle of the Sun

The Solar Hour Angle of the Sun for any local location on the Earth is zero° when the sun is straight overhead, at the zenith, and negative before local solar noon and positive after solar noon. In one 24-hour period, the Solar Hour Angle changes by 360 degrees (i.e. one revolution).

Mean Anomaly of the Sun

The movement of the Earth around the Sun is an ellipse. However, if the movement of the Earth around the Sun were a circle, it would be easy to calculate its position. Since, the Earth moves around the sun about one degree per day, (in fact, it's 1/365.25 of the circle), we say the Mean Anomaly of the Sun is the position of the Earth along this *circular* path. The True Anomaly of the Sun is the position along its real elliptical path.

Obliquity

Obliquity is the angle between a planet's equatorial plane and its orbital plane.

Right Ascension of the Sun

The Celestial Sphere is a sphere where we project objects in the sky. We project stars, the moon, and sun, on to this imaginary sphere. The Right Ascension of the Sun is the position of the sun on our Celestial Sphere

Solar Noon (and Solar Time)

Solar Time is based on the motion of the sun around the Earth. The apparent sun's motion, and position in the sky, can vary due to a few things such as: the elliptical orbits of the Earth and Sun, the inclination of the axis of the Earth's rotation, the perturbations of the moon and other planets, and of course, your latitude and longitude of observation. Solar Noon is when the sun is at the highest in the sky, and is defined when the Hour Angle is 0°. Solar Noon is also the midpoint between Sunrise and Sunset.

Sun Declination

The Declination of the sun is how many degrees North (positive) or South (negative) of the equator that the sun is when viewed from the center of the earth. The range of the declination of the sun ranges from approximately +23.5° (North) in June to -23.5° (South) in December.

More information on:

- Sunrise and Sunset times for any day of the year from [U.S. Naval Observatory's Astronomical Applications Department](#)
- Sunrise and Sunset definitions from [SunriseSunset.com](#)
- Altitude and Azimuth calculations for any day of the year from [U.S. Naval Observatory's Astronomical Applications Department](#)
- Altitude and Azimuth definitions from [What Is](#) and from [Sunlit Design](#)
- Mean Anomaly of the Sun and Positions of the Sun from [Mr. Sunspot](#)
- Obliquity from [Solar Views](#)
- Right Ascension from [Wolfram Research](#)
- Solar Noon, Solar Time Hour Angle from [Sunlit Design](#)
- Sun Declination from [Sunlit Design](#)
- A Free Online Sun Angle tool for calculating the Sun Data in our Extended Astronomy Box for ANY time of day. [Sus Design](#) This numbers are different from ours, read their notes with regarding the use of this product.

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