Equinoxes

Day and night are not exactly of equal length at the time of the March and September equinoxes.

The dates on which day and night are each 12 hours occur a few days before and after the equinoxes.

The specific dates of this occurrence are different for different latitudes.

On the day of an equinox, the geometric center of the Sun's disk crosses the equator, and this point is above the horizon for 12 hours everywhere on the Earth.

However, the Sun is not simply a geometric point.

Sunrise is defined as the instant when the leading edge of the Sun's disk becomes visible on the horizon, whereas sunset is the instant when the trailing edge of the disk disappears below the horizon.

These are the moments of first and last direct sunlight.

At these times the center of the disk is below the horizon.

Furthermore, atmospheric refraction causes the Sun's disk to appear higher in the sky than it would if the Earth had no atmosphere.

Thus, in the morning the upper edge of the disk is visible for several minutes before the geometric edge of the disk reaches the horizon.

Similarly, in the evening the upper edge of the disk disappears several minutes after the geometric disk has passed below the horizon.

The times of sunrise and sunset in almanacs are calculated for the normal atmospheric refraction of 34 minutes of arc and a semidiameter of 16 minutes of arc for the disk.

Therefore, at the tabulated time the geometric center of the Sun is actually 50 minutes of arc below a regular and unobstructed horizon for an observer on the surface of the Earth in a level region.

For observers within a couple of degrees of the equator, the period from sunrise to sunset is always several minutes longer than the night.

At higher latitudes in the northern hemisphere, the date of equal day and night occurs before the March equinox.

Daytime continues to be longer than nighttime until after the September equinox.

In the southern hemisphere, the dates of equal day and night occur before the September equinox and after the March equinox.

In the northern hemisphere, at latitude 5 degrees the dates of equal day and night occur about February 25 and October 15; at latitude 40 degrees they occur about March 17 and September 26.

On the dates of the equinoxes, the day is about 7 minutes longer than the night at latitudes up to about 25 degrees, increasing to 10 minutes or more at latitude 50 degrees.