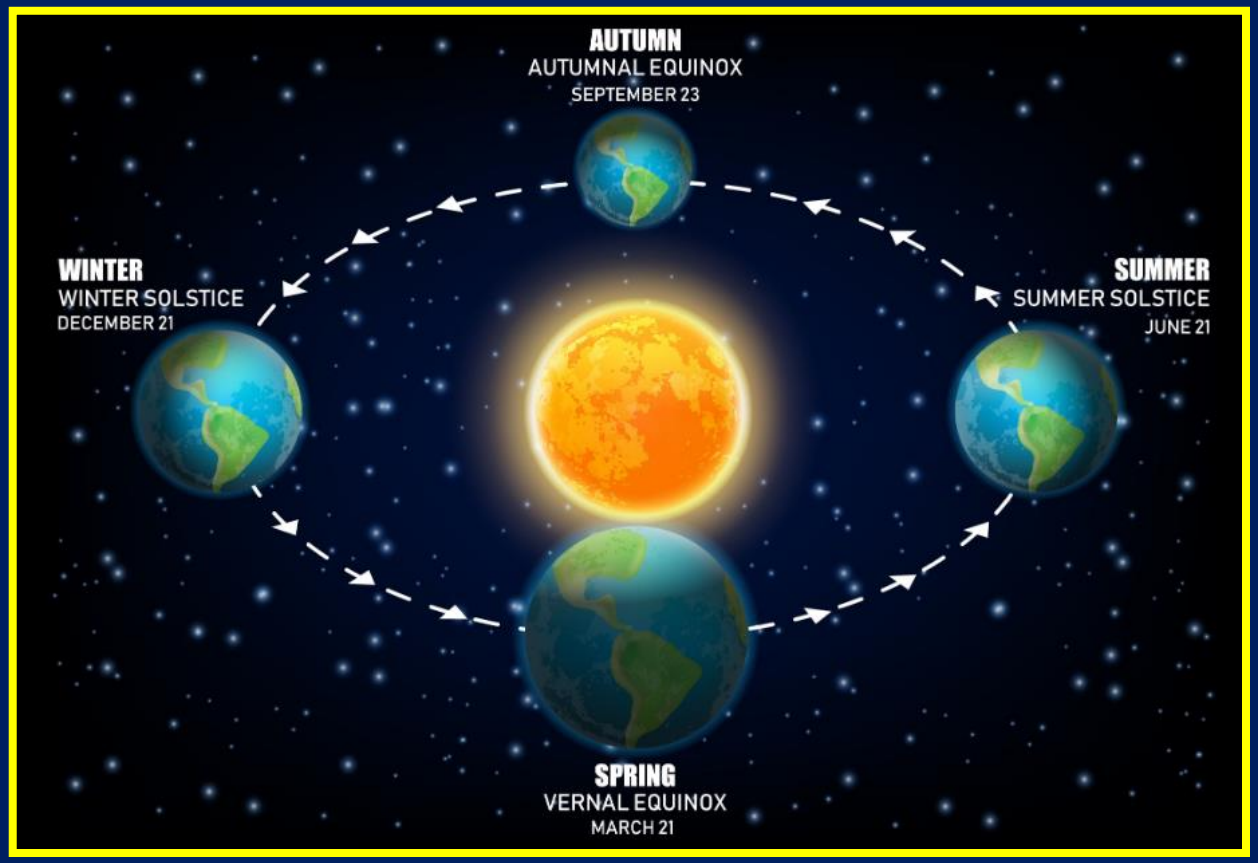
Earth's Seasons



Essential Standard 1.1: Explain Earth's role as a body in space.

Objective 1.1.2: I can explain how Earth's rotation and revolution about the Sun affect Earth's seasons

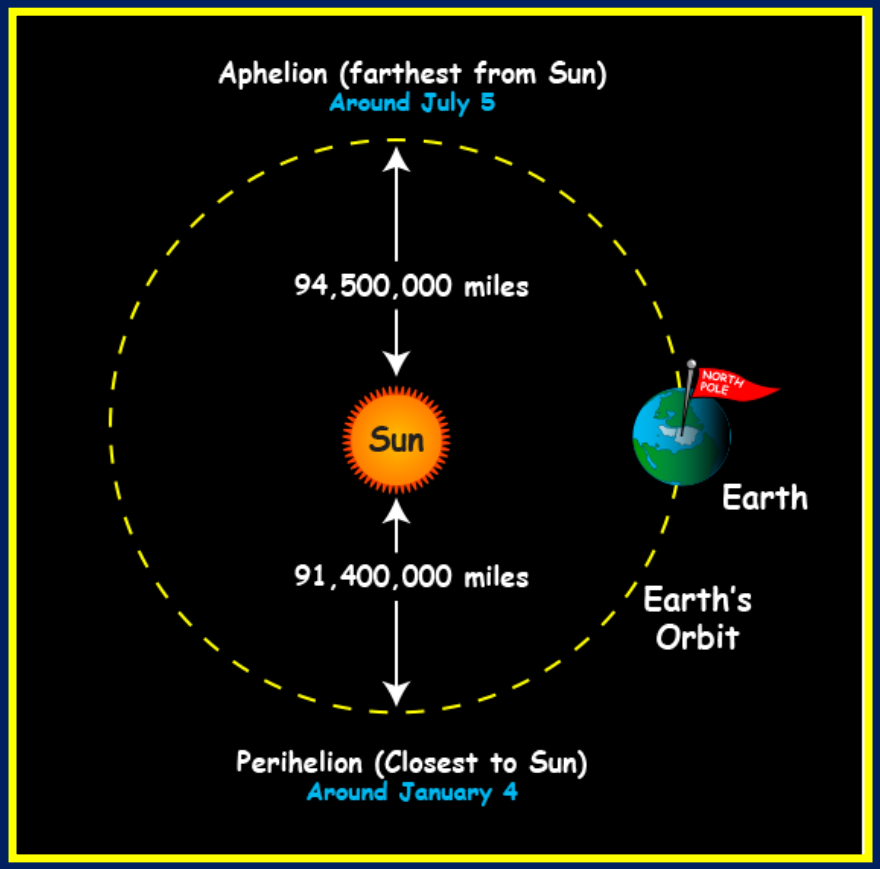
I Can Statements

At the end of this lesson, you should be able to say, with confidence:

- I can explain the difference between Earth's rotation and Earth Orbit around the Sun
- I can explain why the angle and intensity of sunlight differs in each hemisphere during different seasons of the year.
- I can distinguish between the winter and summer solstice.
- I can distinguish between the spring and autumn equinox.

Earth's Orbit Around the Sun

The Earth orbits the sun in an elliptical pattern.

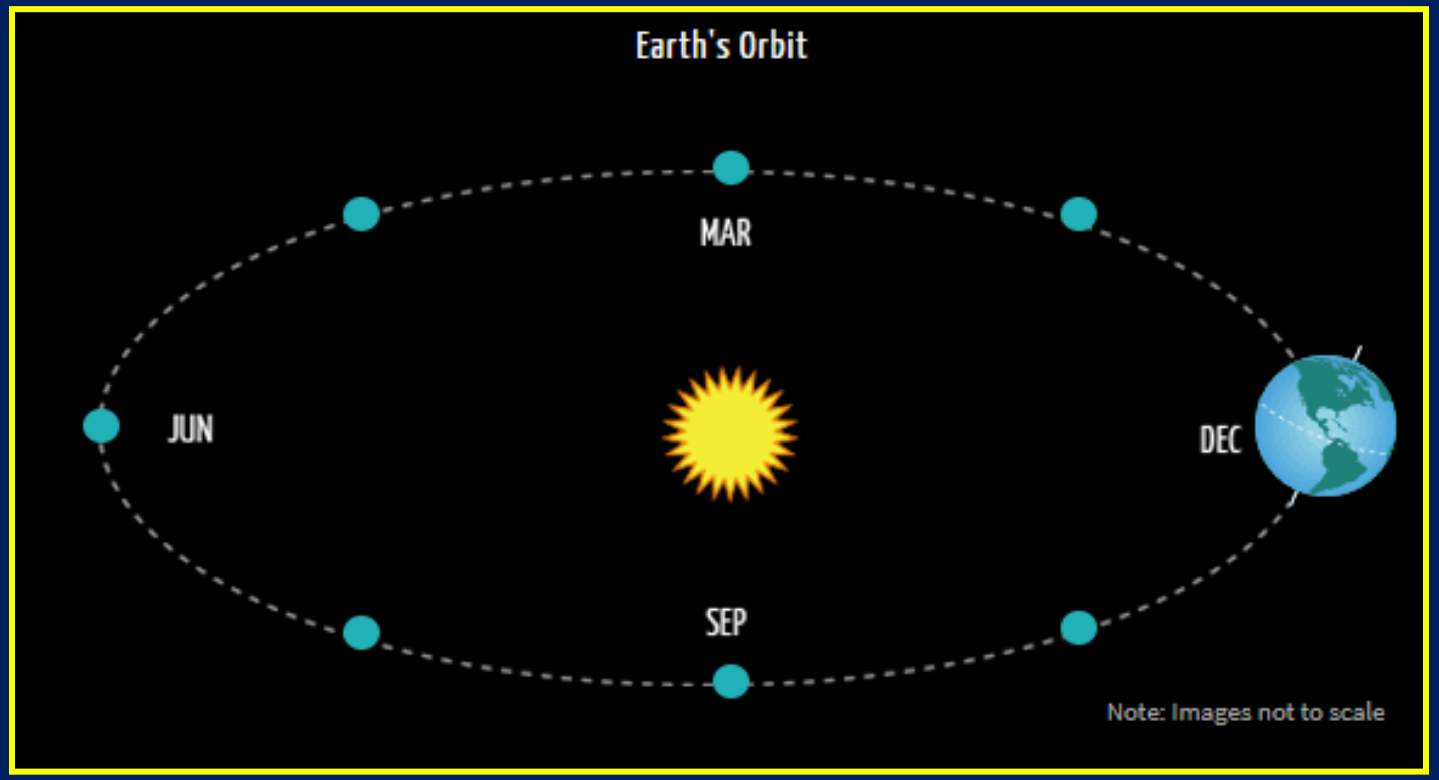


The Earth is closest to the Sun on January 3rd.

The Earth is the farthest from the Sun on July 4th.

One Year

The Earth orbits the Sun, every 365.25 days, or each year.



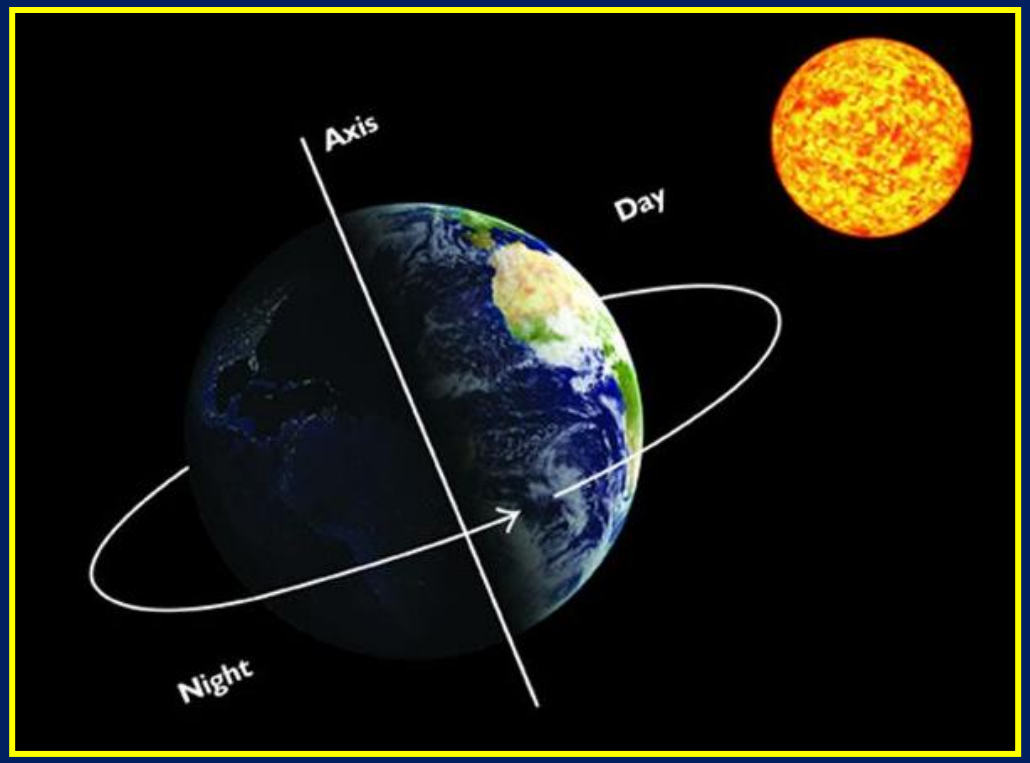
Leap Year

To account for the 0.25, one day is added to the calendar every four years.

We call that day a leap day and the year it occurs a leap year.

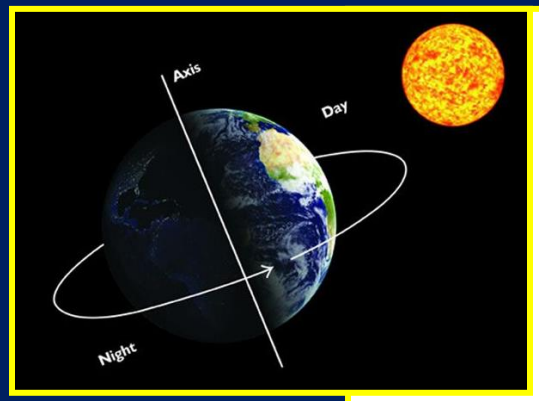
Earth's Rotation

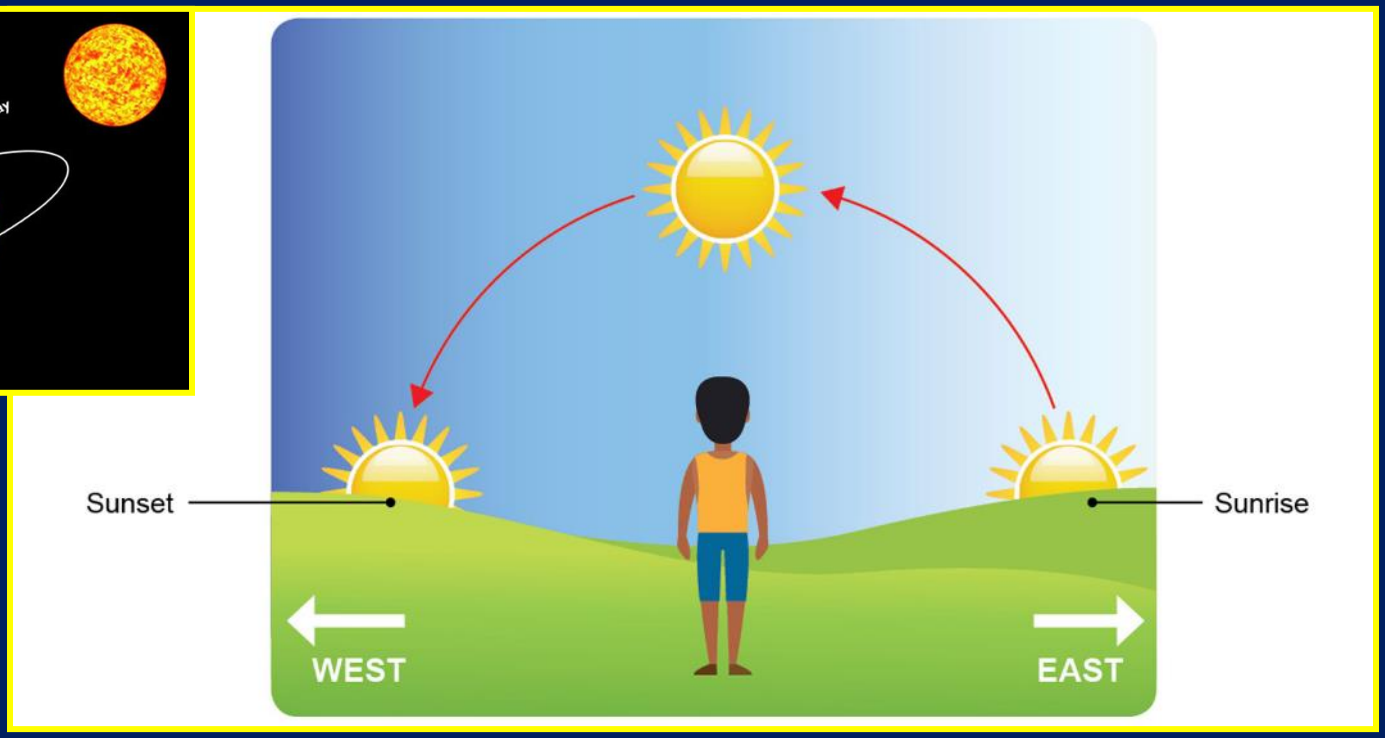
As the Earth orbits the Sun, the Earth rotates around its own axis, every 24 hours or one day.



Counter-Clockwise Rotation

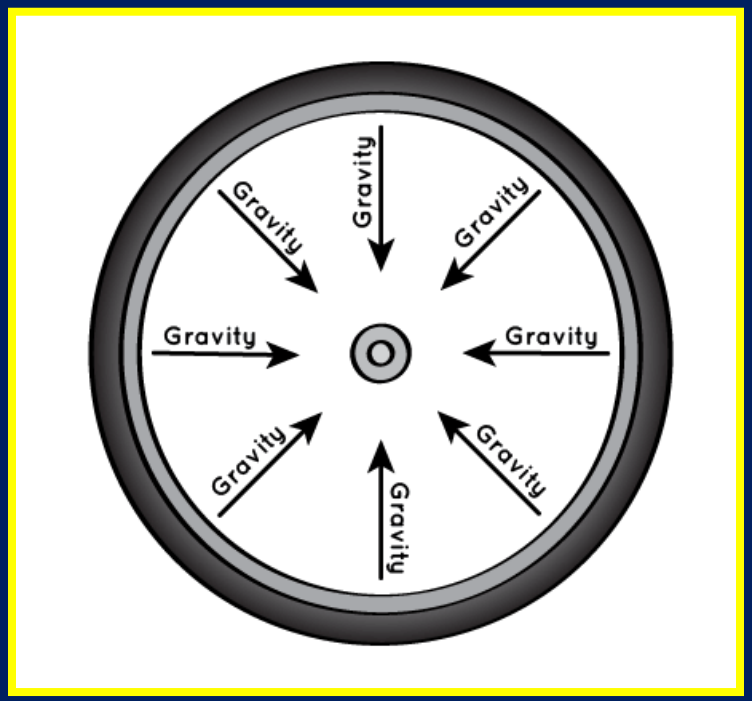
Earth rotates in a counter-clockwise direction, causing the Sun to rise in the East and set in the West.





Earth's Shape

Earth's gravity pulls equally on all the materials in and on Earth towards the center, causing the Earth to form a sphere.



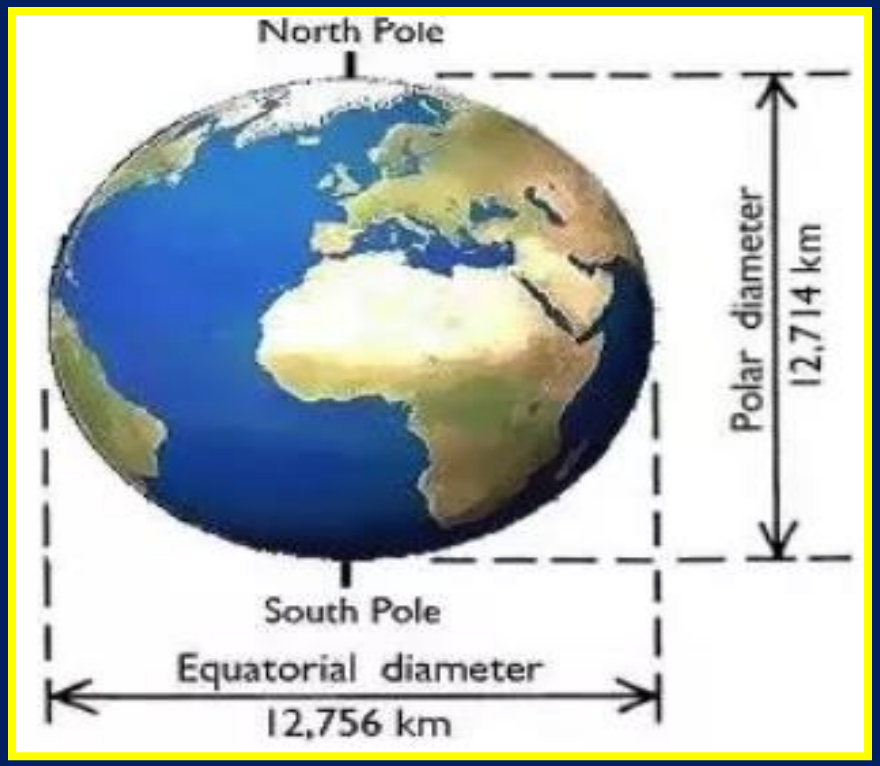
However, because Earth rotates, the Earth is not a perfectly round sphere.

Equatorial Bulge

Much like the skirt of an ice skater, the material at the equator wants to spin outward, as Earth rotates. This creates what is called an equatorial bulge.

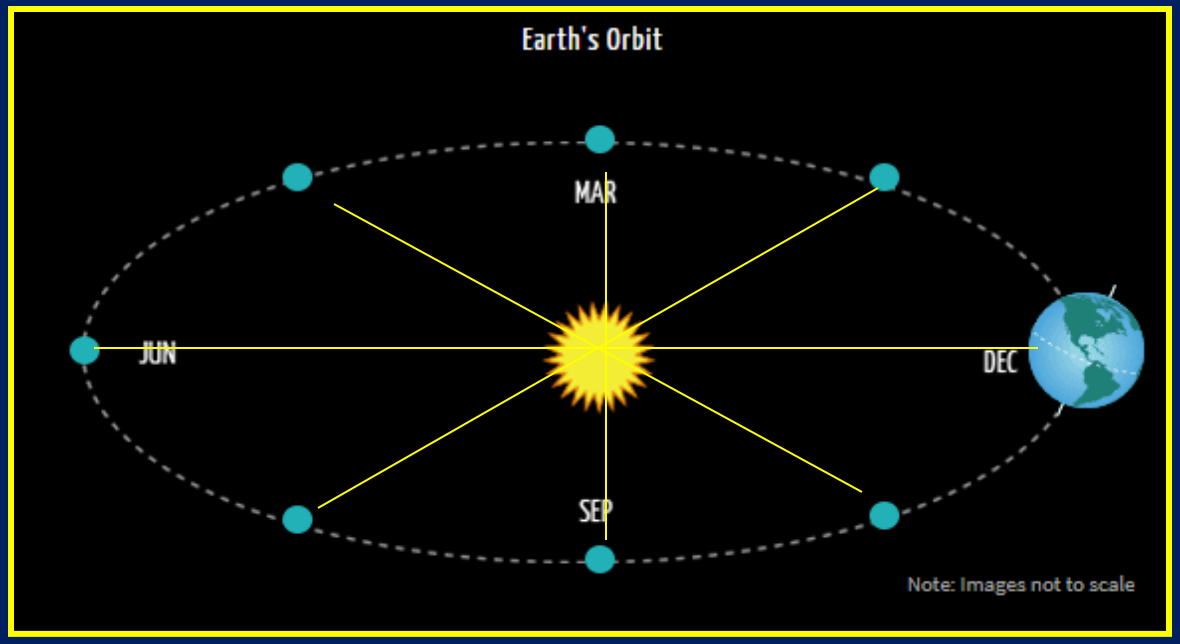
Equatorial Bulge

The diameter of Earth at the equator is about 50 km greater than the diameter at the poles.



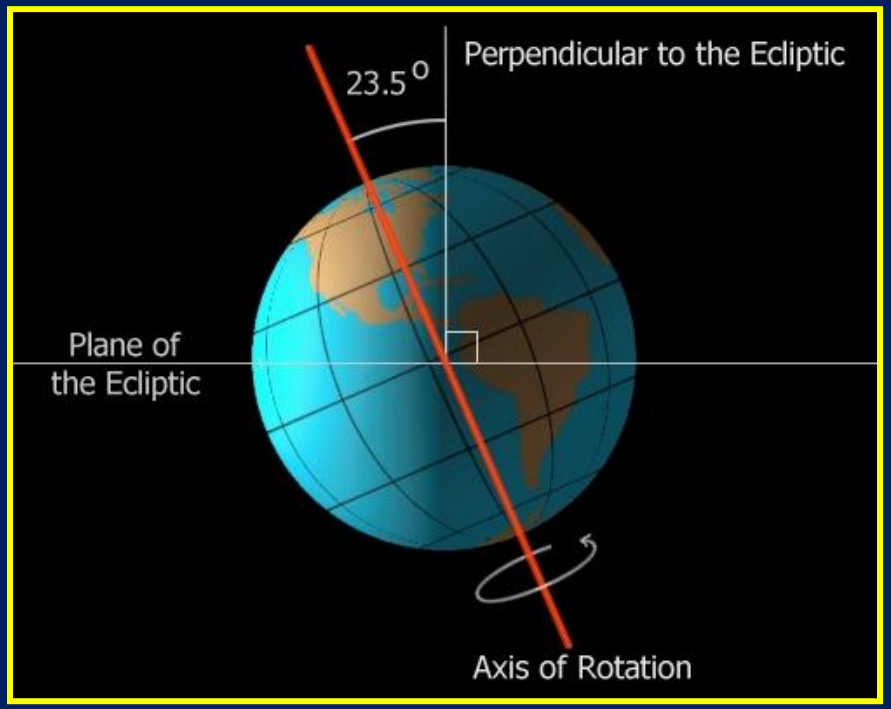
Earth's Ecliptic Planet

If you were to draw an imaginary line from the Earth to the Sun, during any part of Earth's orbit about the Sun, you would find that the Earth remains on one plane in space, called the Ecliptic Plane.



Tilted Axis

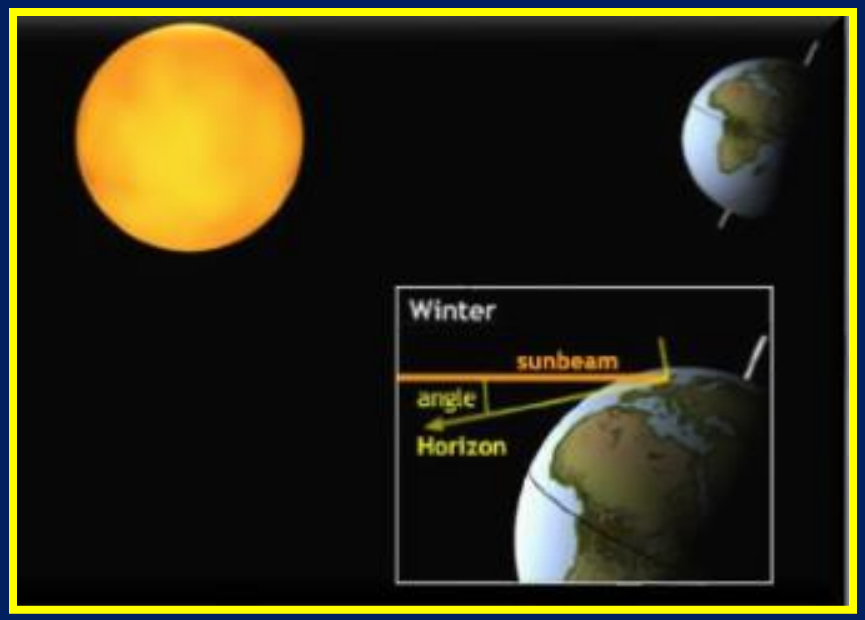
The earth's axis, with respect to the ecliptic plane, is tilted at an angle of about 23.5 degrees.



This tilted axis is the reason we have different seasons.

Winter

In winter, the northern hemisphere is tilted away from the sun, causing the Sunlight to strike Earth at a shallow angle, making the sunlight less intense.



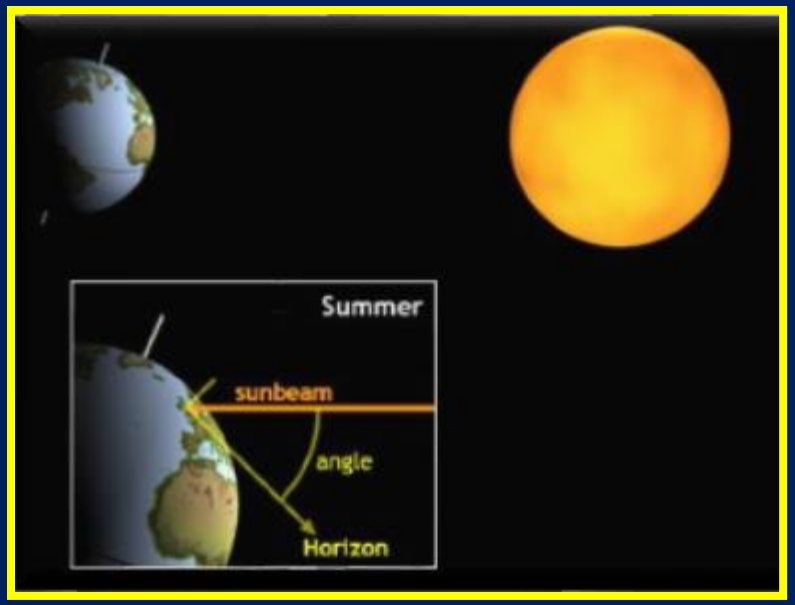
Winter

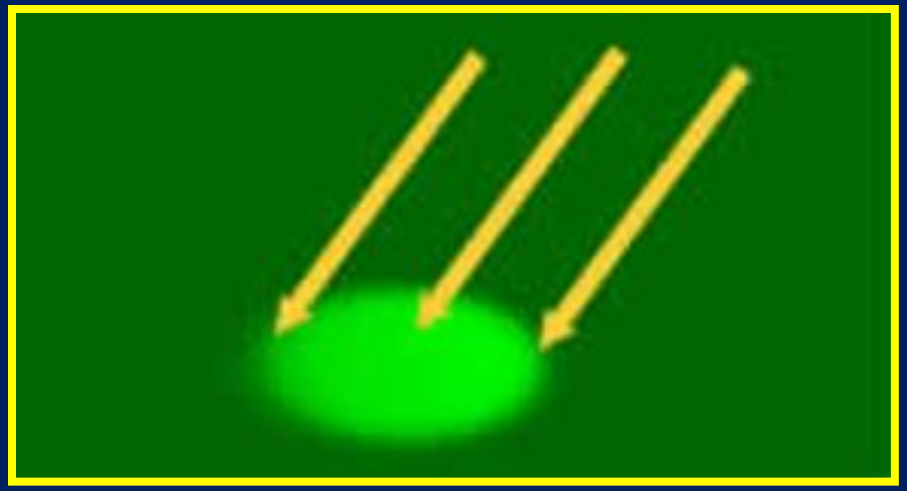
Due to the tilt, the Sun also sits lower in the sky, taking less time to travel across the horizon, making the days shorter.

Shorter days and less intense light results in cooler temperatures.

Summer

In summer, the northern hemisphere is tilted towards the sun and the sunlight strikes the Earth more directly, making the sunlight more intense.





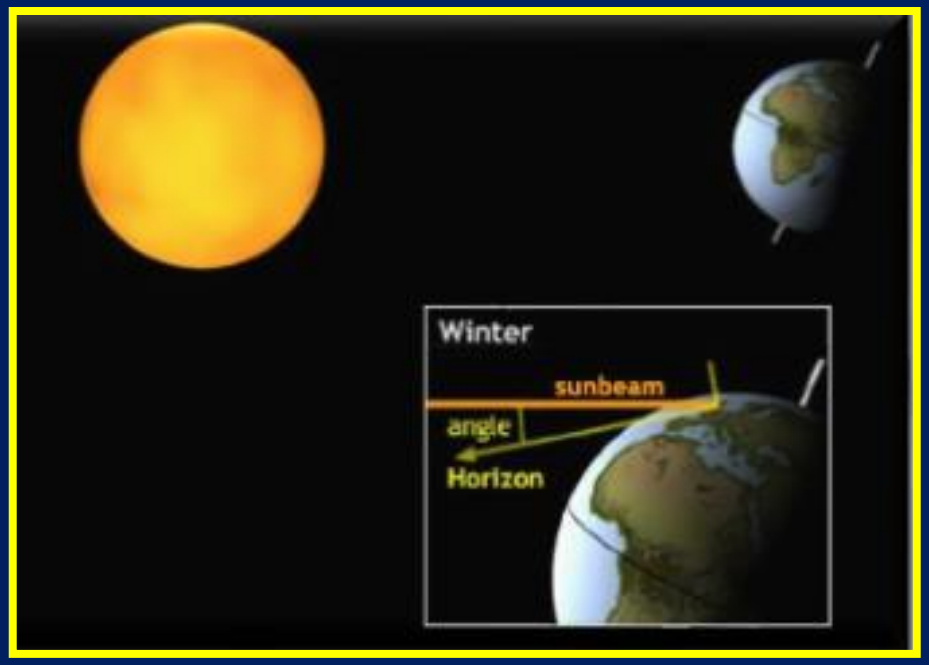
Summer

The Sun also sits higher in the sky, it takes longer to travel across the horizon, resulting in longer days.

Longer days and more intense light results in warmer temperatures.

At and Near the Poles

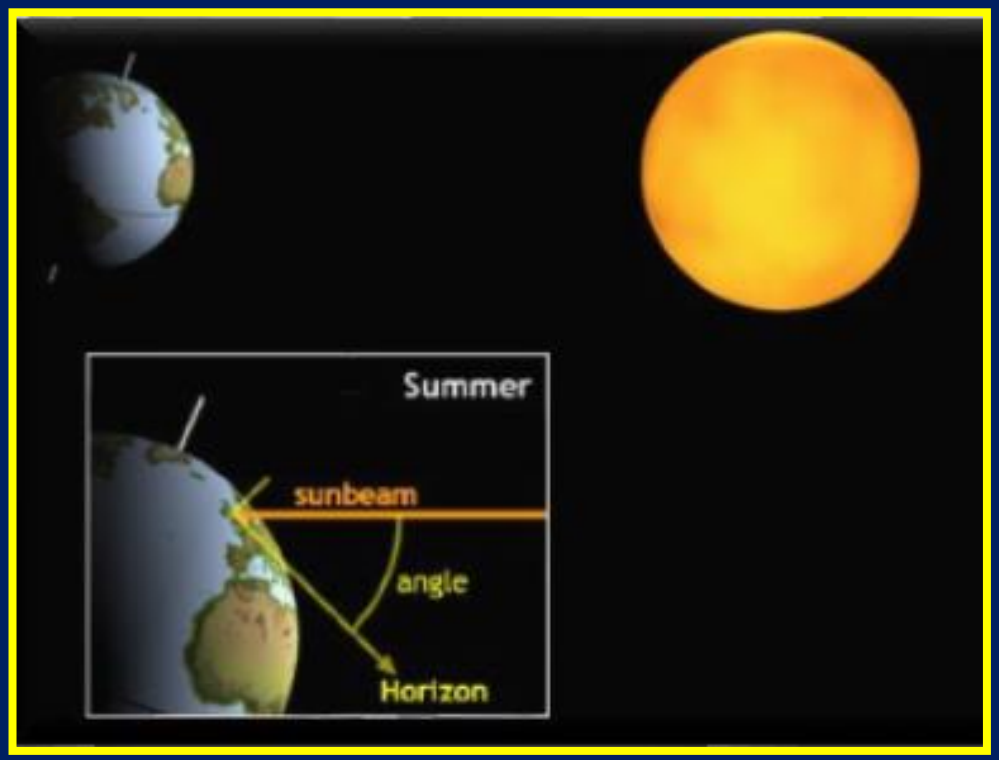
During the winter, sunlight doesn't reach either poles at all. So the Sun never rises and it stays dark all day.



St. Petersburg, Russia
3:00 p.m. during the Winter

At and Near the Poles

During the summer, the sun never sets at the Poles. In Russia, they call this time period the "White Nights".



St. Petersburg, Russia
3:00 a.m. during the Summer

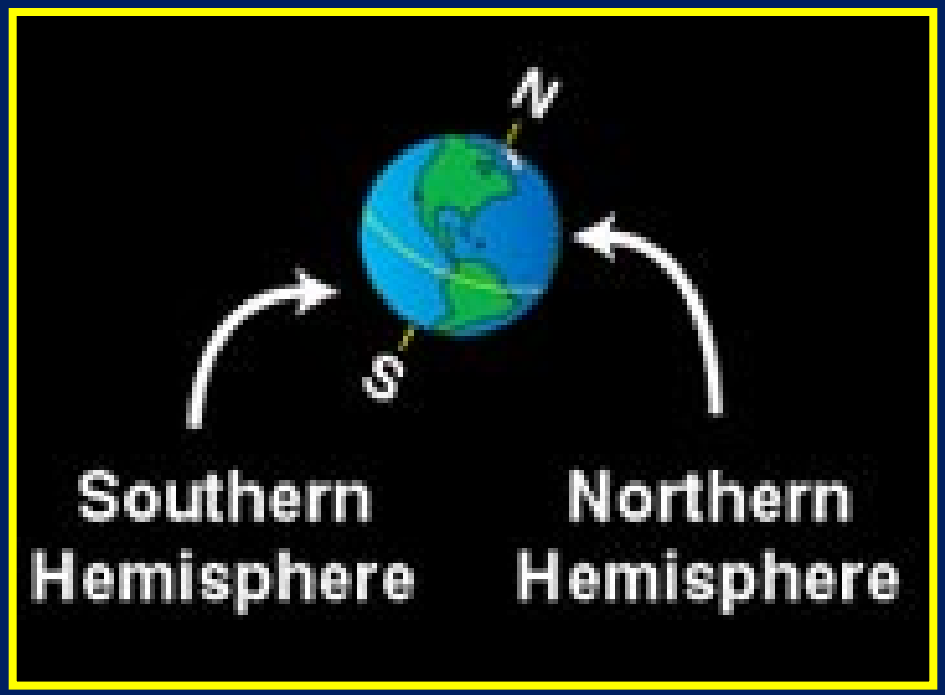
Equator

Even with Earth's tilted axis, the Sun always strikes the equator at the same angle, so there are no seasons at the equator.

Also, the Sun rises at 6:00 A.M. and sets at 6:00 p.m. each day.

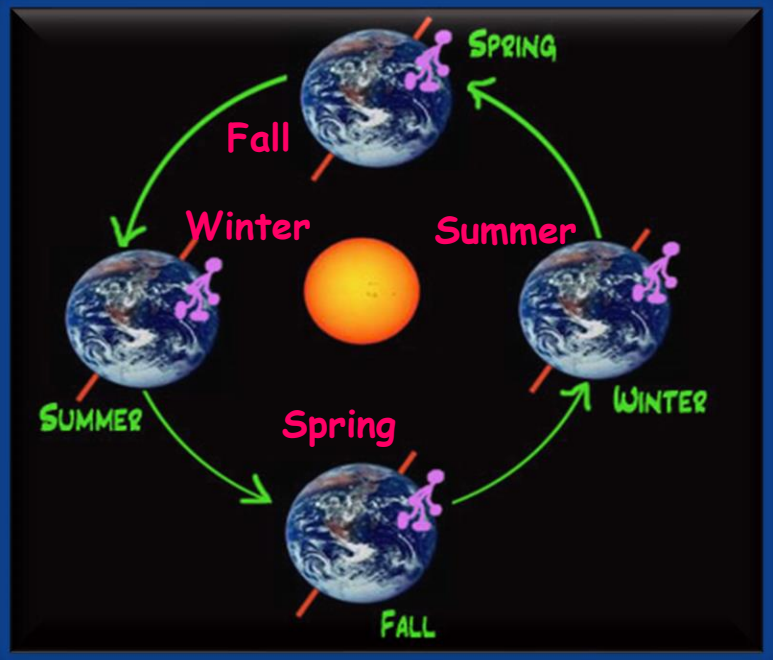
Hemispheres

The equator divides the earth into the northern hemisphere and the southern hemisphere.



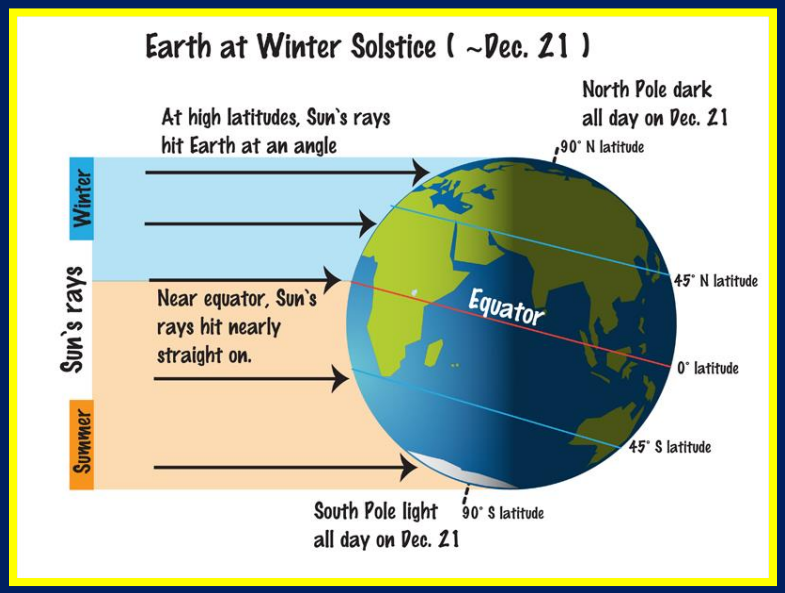
Hemispheres

Due to the Earth's tilted axis, each hemisphere experiences opposite seasons throughout the year.



Solstices

Solstices are days when the Sun reaches its highest and lowest heights in the sky at noon resulting in the longest and shortest days of the year.



Each hemisphere experiences an opposite solstice.

Winter Solstice

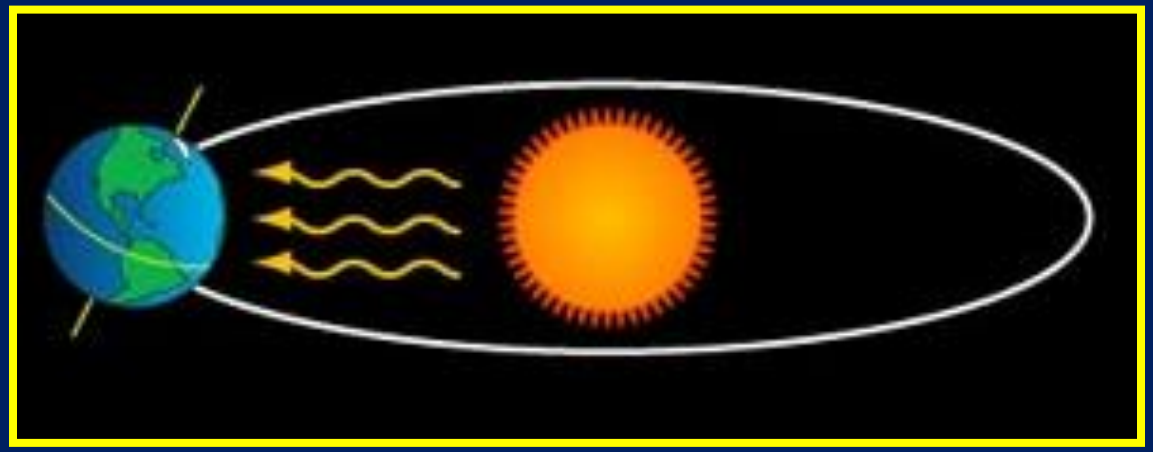
The winter solstice in the Northern hemisphere occurs on December 21st.

On this day, the Sun sits lower in the sky than any other day making it the shortest day of the year, as well as the first day of winter.

Summer Solstice in the Southern Hemisphere

Summer Solstice

The summer solstice in the Northern hemisphere occurs on June 21st.

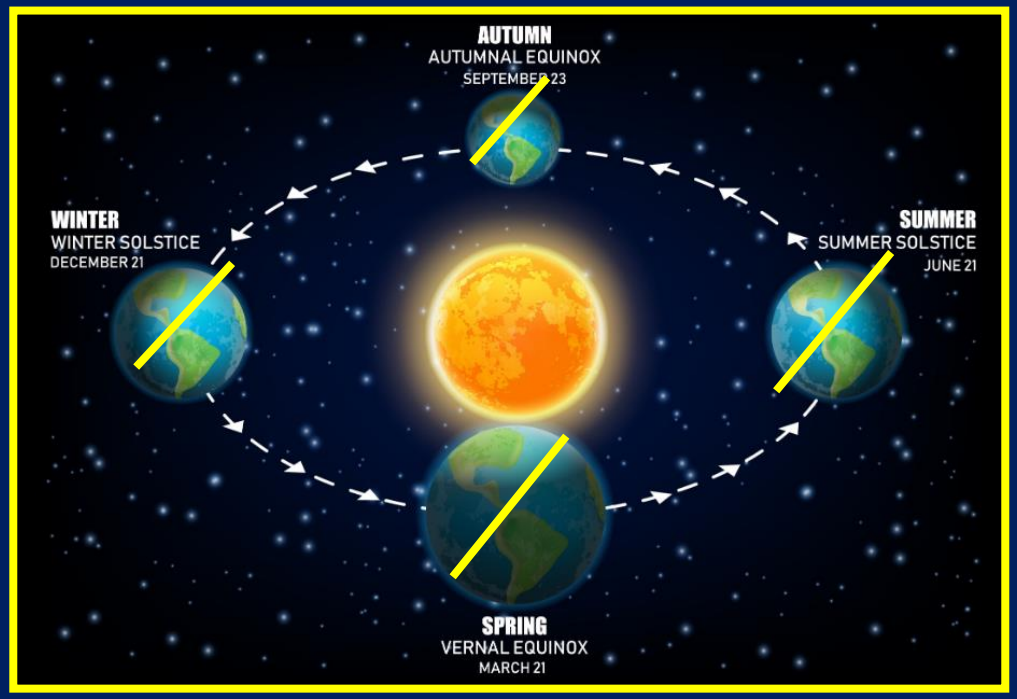


On this day, the Sun sits higher in the sky than any other day making it the longest day of the year, as well as the first day of summer.

Winter Solstice in the Southern Hemisphere

Equinoxes

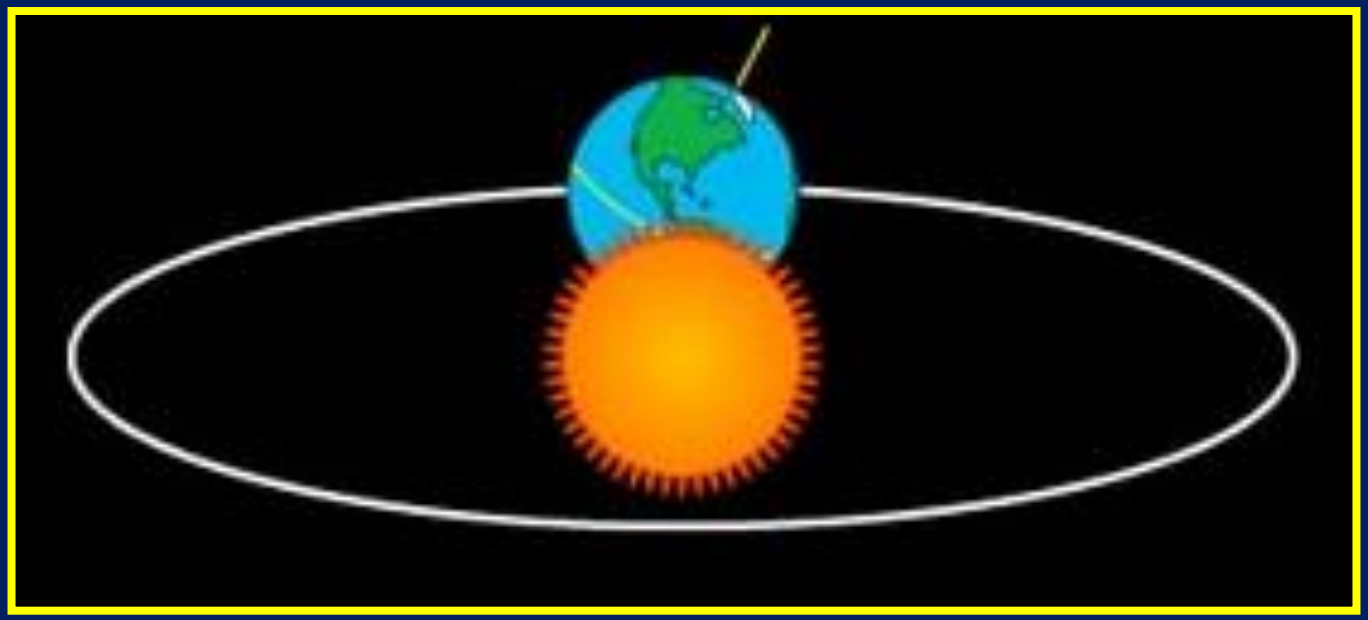
The equinoxes occur when the Earth is not tilted towards or away from the Sun.



On these dates, the length of day and night are equal or exactly 12 hours long.

Spring Equinox

The spring equinox, also called the vernal equinox, occurs on March 21st in the northern hemisphere.



Autumn equinox in the Southern Hemisphere

Autumn Equinox

The autumn equinox occurs on September 21st in the northern hemisphere.

Spring equinox in the Southern Hemisphere

The End