The Reason for the Seasons - Earth's Axial Tilt!

Oklahoma BioDiversity Learning Center
Downloadable Activity - December 2021

During the year, the seasons change from winter to spring to summer to fall. *Why does it happen?*

Many people believe that Earth is closer to the Sun in the summer and that is why it is hotter. And, likewise, they think Earth is farthest from the Sun in the winter. Although this idea makes sense, ***it is incorrect***!

The Earth's orbit is not a perfect circle - it is a bit lop-sided. During part of the year, Earth is closer to the Sun than at other times. However, in the Northern Hemisphere, we are actually having winter when Earth is closest to the Sun and summer when it is farthest away! Compared with how far away the Sun is, this change in Earth's distance throughout the year does not make much difference to our climate.

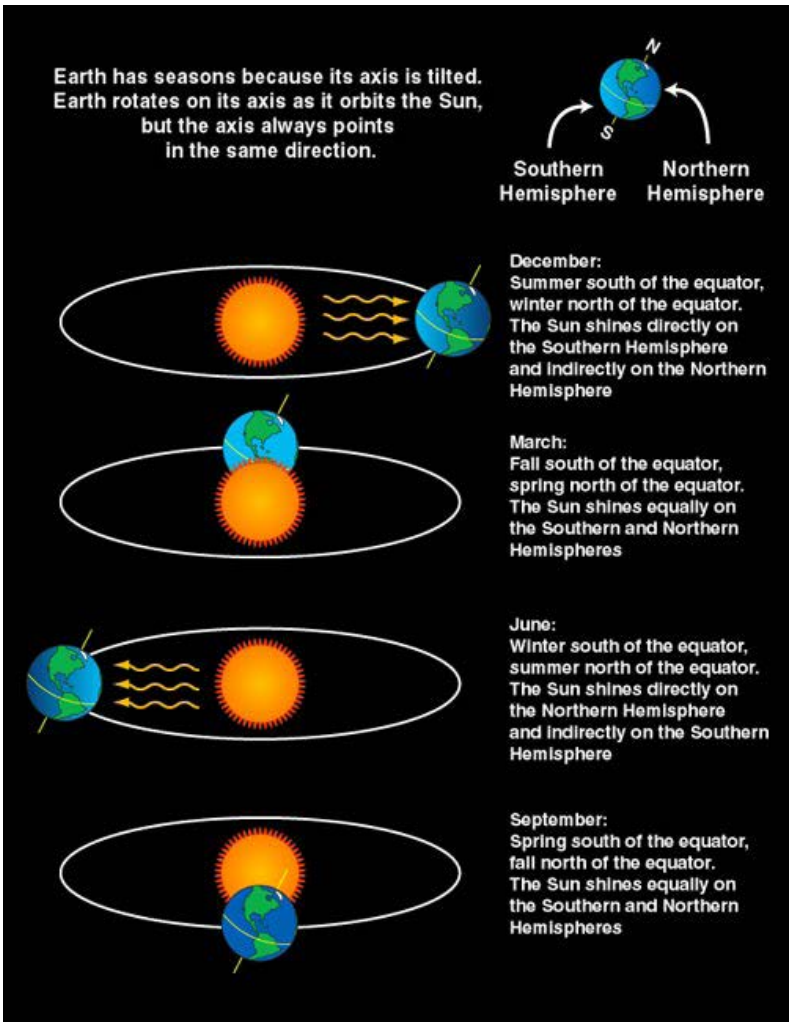
The Axial Tilt Causes the Earth's Seasons.

Earth's axis is an imaginary pole going right through the center of Earth from "top" to "bottom." Earth spins around this pole, making one complete turn each day. That is why we have day and night, and why every part of Earth's surface gets some of each.

Earth has seasons because its axis doesn't stand up straight.

In Oklahoma, we have summer in June because the Sun's rays hit that part of Earth more directly than at any other time of the year. We have winter in December, because that is when it is the South Pole is tilted toward the Sun.

The part of the Earth that is tilted towards the Sun is warmer because sunlight travels more directly to the Earth's surface and less gets scattered in the atmosphere. That means that when it is summer in the northern half of the Earth, it is winter in the southern half of the Earth. The hemisphere tilted towards the Sun has longer days and shorter nights.



But what caused Earth to tilt?

Long, long ago, when Earth was young, it is thought that something big hit Earth and knocked it off-kilter. So instead of rotating with its axis straight up and down, it leans over a bit.

By the way, that big thing that hit Earth is called

Theia. The impact of Theia also blasted a big hole in the surface of Earth and sent a huge amount of dust and rubble into our orbit. Most scientists think that the rubble became the Moon.

Winter Solstice

The Winter Solstice, or the December Solstice, is the point at which the Northern Hemisphere is tilted the farthest away from the Sun. During the Winter Solstice, the North Pole is tilted at around 23.4 degrees away from the sun. As a result, from our place on the surface of Earth, the Sun travels low across the sky across our sky along a short path resulting in the shortest day of the year and the longest night.

From the day after the Winter Solstice, the days grow longer leading up to the Summer Solstice, or the June Solstice, and the longest day of the year.

In central Oklahoma, our shortest day is about 9 hours and 45 minutes long, making the longest night 14 hours and 15 minutes. You can explore day length throughout the year and for different locations using this interactive website: ***https://www.timeanddate.com***

Sources:

https://www.space.com/winter-solstice
https://spaceplace.nasa.gov/seasons/en/

Celebrate the Light!

Many cultures across the world signify the shortest day and longest night of the year. Many celebrations and rituals focus on lighting up the dark night and celebrating the coming longer days. Here is a simple craft you can do with a upcycled pickle or jam jar to illuminate your darkest night.

What you need:

- Clean, dry glass jars big enough to hold a votive candle or tea light
- Paintbrush
- Elmer's glue
- Tissue paper in assorted colors
- Scissors
- Candles or battery powered tea lights for the jars

Instructions:

1. Mix the Elmer's glue with water, about a 50-50 mix.
2. Tear or cut the tissue paper into shapes. You can make a picture or simply a colorful pattern.
3. Hold the tissue against the outside of the jar and paint on a thin layer of watered down glue. Don't use too much glue - it doesn't take much! Cover the entire jar for the best effect.
4. Let dry.
5. Once dry put your light or candle inside and enjoy your colorful light on the darkest nights.