

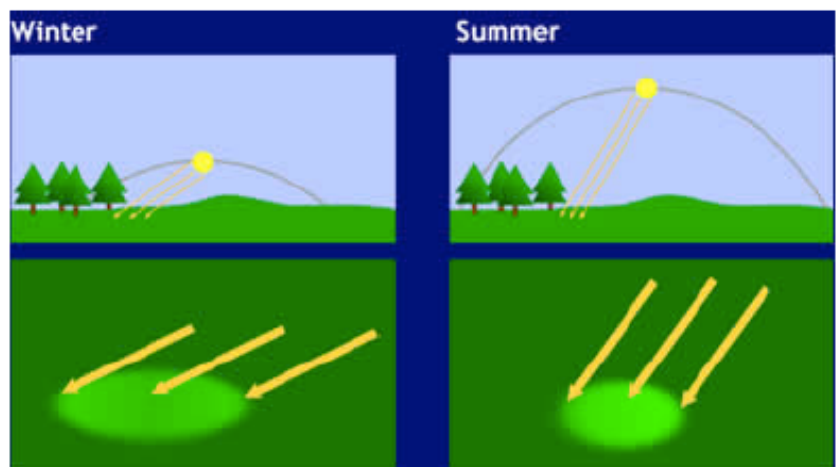
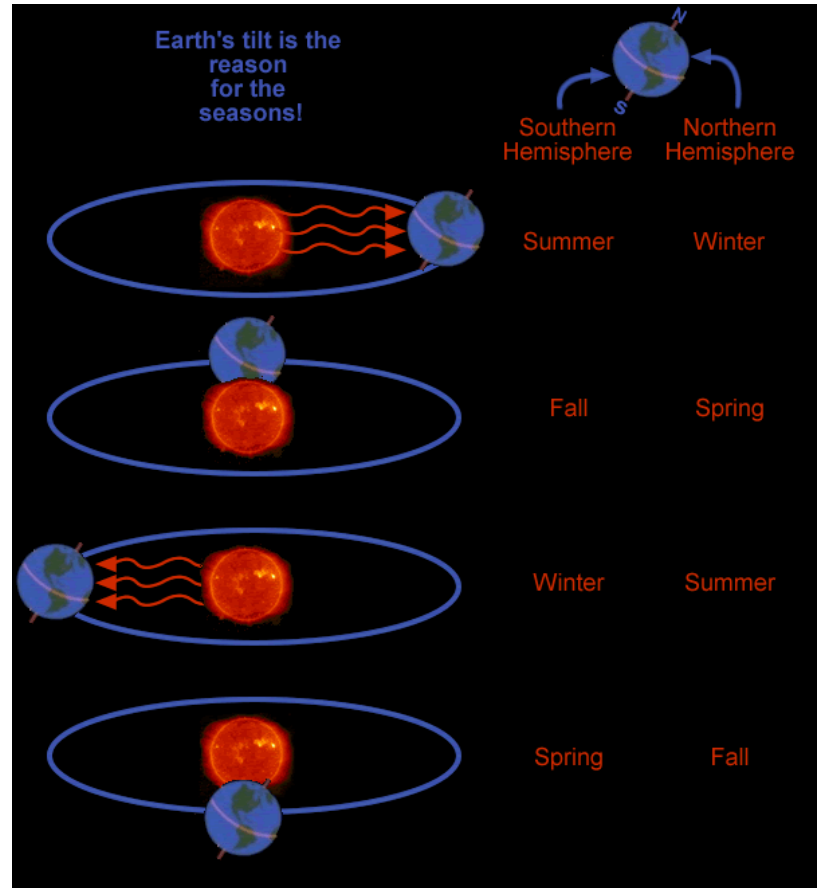
Reason for Seasons

Like all the planets in our solar system, Earth orbits around the Sun. Earth also rotates on its axis, which is currently tilted 23.5 degrees to the plane of its orbit. While the tilt of Earth's axis will change very little over your lifetime the part of Earth that is exposed to the most solar energy-energy from the Sun-does change, and on a regular basis. This is because the tilted Earth orbits the Sun.

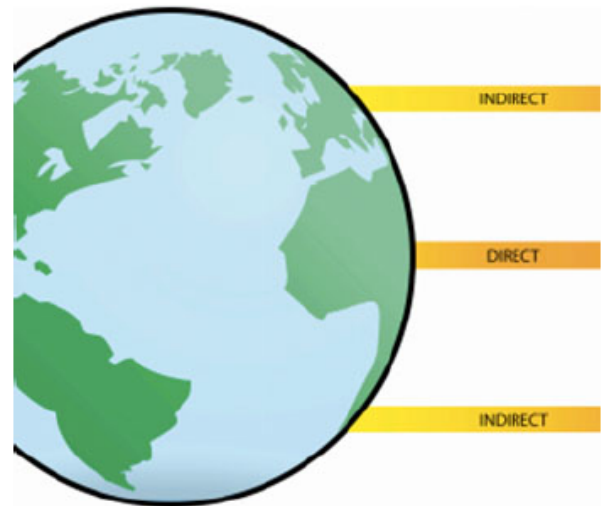
What do you think causes the seasons? Many people believe that seasons depend on the distance between Earth and the Sun. That might seem logical, but consider this: earth travels in an ellipse, or oval, around the Sun. Due to this ellipse, Earth is slightly closer to the Sun in December than in June. If the distance from the Sun were responsible for how warm Earth is, it would mean that everyone on Earth would have summer in December. You know this is not true if you live in the Northern Hemisphere.

Earth's revolution and the tilt of its axis that are responsible for changes in seasons. These factors affect the amount of solar energy that reaches each part of Earth at any time. The tilt of Earth on its axis affects the angle at which the Sun's rays pass through the atmosphere and strike Earth's surface. The higher the Sun's angle the more intense the solar radiation and the less atmosphere the rays must pass through. The lower the Sun's angle, the less intense the solar radiation and the more atmosphere the rays must pass through.

The tilt of Earth also affects the length of daylight in any particular area. Between March 21 and September 21 on average, the Northern Hemisphere tilts towards the Sun. During this period the surface of Earth in the Northern Hemisphere receives longer periods of daylight than the surface of Earth in the Southern Hemisphere. More direct sunlight for longer periods causes warmer weather. However, between September 21 and March 21, the Southern Hemisphere tilts towards the sun and has warmer weather. On December 21 (December 22, depending on the year), the Southern Hemisphere celebrates the first day of summer-called the summer solstice; on that same day, the Northern Hemisphere experiences its first day of Winter-the winter solstice!



On two days of the year (somewhere around March 21 and September 21), the Sun is over Earth's equator and neither hemisphere tilts toward the Sun. On those two days, the surface of Earth in both hemispheres receives equal amounts of energy from the Sun. Night and day are almost equal in length all over the world except at the poles. These two days are called the equinox. (To remember this term, think of "equal night.") Equinoxes occur midway between the solstices.



On average, December 21 has the shortest period of daylight in the Northern Hemisphere. But December 21 is not usually the coldest day of the year because it takes several weeks in fall and early winter before the atmosphere and oceans cool off. There is a lag, or delay, in seasonal temperatures, and the coldest period in the Northern Hemisphere therefore may not arrive until early February. The same seasonal temperature delay occurs in spring and summer.

The amount of solar energy that reaches each hemisphere affects the temperature of Earth's surface. Even though the Sun is closer to Earth in winter than in summer in the Northern Hemisphere, the Sun's rays do not hit Earth directly. The rays hit it at an angle after passing through the atmosphere. During winter, there are also fewer hours of daylight, which accounts for some of the chill winter.

Seasons on other planets

Did you know that other planets also have different seasons? The spin axis of Uranus, for example, points to the Sun. That means that Uranus is tilted about 98 degrees to the plane of the ecliptic (the plane along which the Sun exists), compared to Earth's current tilt of 23.5 degrees. With Uranus completely on its side, one hemisphere always has summer during half of Uranus's 84-year orbit! This pattern creates 42-years of one season of warmth (summer) and 42 years of one season of cold (winter). The side that is facing the Sun would be in summer and the other side winter. Other planets also have interesting relationships to the Sun that cause different seasonal characteristics.

