

The September 2025 Chippewa Valley Astronomy Update

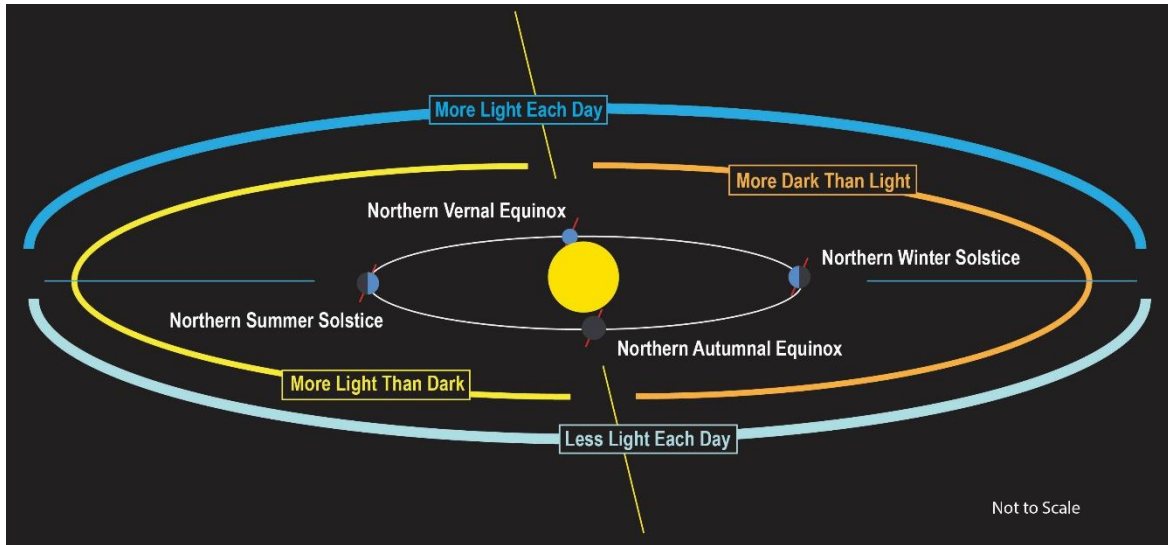


Photo caption: Seasons are caused by the tilt of the axis of the Earth (red line) compared to the Earth's counterclockwise orbit (white circle). After the northern autumnal equinox, which marks the first

day of Fall (with equal hours of sunlight and darkness), we will begin to have more hours of darkness than light. The hours of daylight decrease until the winter solstice when the hours of daylight begin to increase each day. Image credit: John A. Peterson

What every seven-year-old should know about the seasons.

Essay by John A. Peterson and Joseph M. Peterson

Monday September 22 is the first day of Fall for us in the northern hemisphere. It is the first day where there will be more darkness than sunshine and a good time to understand what every seven-year-old should know about the seasons.

Over the course of a year, every part of the earth spends half the time in sunlight and half the time in darkness. The seasons are why every day is not split half in darkness and half in sunlight.

Seasons are not caused because the Earth is sometimes closer to the sun, even though the distance to the sun changes. We have seasons because the Earth's axis is tilted compared to the orbit. Sometimes the axis is aligned in the direction of the sun and sometimes it is aligned away. When it is aligned towards the sun, that hemisphere of a planet gets more sunlight than darkness and experiences spring and summer.

When it is aligned away, it gets less sunlight than darkness and experiences autumn and winter. Twice a year, the axis is aligned neither towards nor away from the sun: the Northern Autumnal Equinox (Southern Spring Equinox) in September and the Northern Spring Equinox (Southern Autumnal Equinox) in March. Halfway between these points, when the north pole aligns away from the sun (the south pole aligns towards the sun) in December is the Northern Winter Solstice (Southern Summer Solstice). In June, the north pole aligns towards the sun (and the south pole aligns away from the sun) during the Northern Summer Solstice (Southern Winter Solstice). The winter solstice is when each day will have slightly more sunlight than the previous day until the summer solstice, when each day will have slightly less sunlight than the previous.

Around the solstices, areas near the North Pole can experience something called the midnight sun (or midday darkness). We are not far enough North to experience these events. You need to be above the Arctic Circle or below the Antarctic Circle. The amount of daylight in the summer and darkness in the winter is determined by how far away from the equator you are. Here, the longest day of summer is about 15 hours and 35 minutes. The shortest day of winter is about 8 hours and 45 minutes. In Hawaii, the longest day of summer is 13 hours and 25 minutes and the shortest day of winter is 10 hours and 50 minutes. At the equator, every day of the year has 12 hours of sunlight and 12 hours of darkness.

The more a planet's axis is tilted compared to its orbit, the more extreme the seasonal effects are. Uranus is tilted so that it is almost on its side. Most of the planet has the midnight sun during its solstices. Mercury has a tilt of zero degrees, so every place on the planet has the same amount of daylight every day. There is no midnight sun on Mercury.

--The Petersons are members of the Chippewa Valley Astronomical Society. Joseph M. Peterson is in the 2nd grade.