

FYI

Earth in Space

The apparent movements of the sun across the sky are caused by the movements and positioning of Earth in space, as well as by the rotation of Earth on its axis.

- Earth **rotates** on its axis. One rotation, which takes 24 hours, defines one day.
- Earth **revolves** around the sun. One revolution, which takes 365.25 days, defines one year.

The term “orbit” is also used to describe Earth’s motion around the sun. To **orbit** is to revolve or go around, and the path of Earth as it revolves around the sun—indeed, the path traveled by any astronomical body around another—is called an orbit. The term “orbit” is thus both a noun—the path—and a verb—to travel the path.

The **ecliptic** is the plane of Earth’s orbit around the sun extended to meet the celestial sphere.

- Earth’s axis is tilted relative to the ecliptic. The angle of this tilt, which is about 23.5° , stays the same relative to the celestial sphere throughout Earth’s orbit.

The angle stays the same, but Earth’s position in its orbit around the sun changes. Thus, Earth is oriented differently relative to the sun at different times of year. This changing angle of Earth’s axis relative to the sun is the cause of seasons on Earth.

For part of the year, the North Pole is tilted generally toward the sun, while the South Pole is tilted generally away from the sun. Then, during another part of the year, this reverses, with the South Pole tilted generally toward the sun and the North Pole tilted generally away.

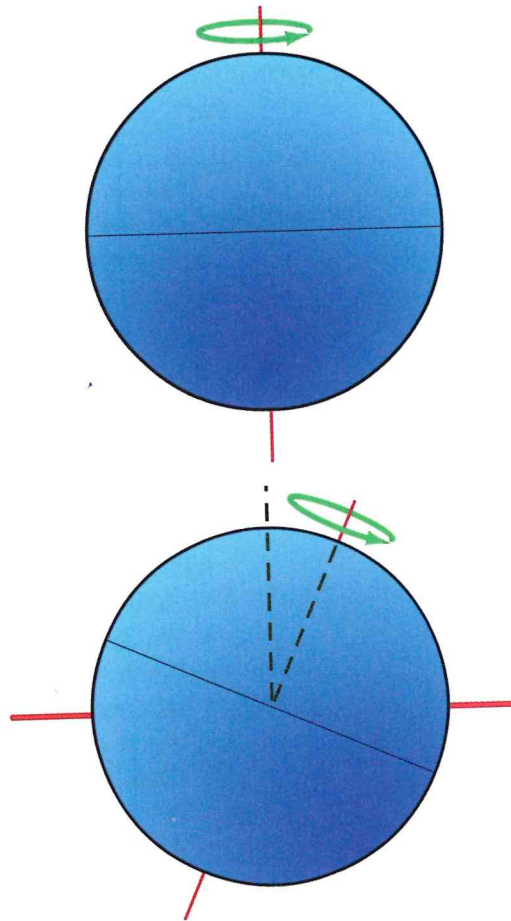


Figure 2-2: Diagrams showing that Earth rotates on its axis (top) and that Earth’s axis is tilted relative to the ecliptic (bottom)

When a pole is tilted toward the sun, the sun never sets at that pole. In other words, the sun is visible in the sky all the time. For this reason, the sun in the far north in the summer is called the “midnight sun.” The midnight sun isn’t limited to just the poles. Areas near the poles also experience this perpetual day in the summer months.

Earth’s rotation causes the sun to appear to move across the sky over the course of a day. At the poles, the sun appears to move in a circle, parallel to the horizon. For all other locations on Earth, the sun’s apparent path is tilted relative to the horizon. For most locations, this tilt is enough to make the sun rise above and drop below the horizon, causing day and night. However, for areas near the poles, the tilt is sometimes not enough to do this. Instead, the sun dips close to the horizon, but doesn’t drop below it.

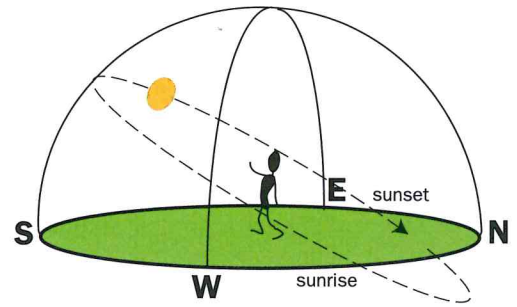


Figure 2-3: Diagram showing the sun’s apparent path across the sky as viewed from a location where Earth’s tilt relative to the ecliptic causes the sun’s daily path to be tilted relative to the horizon. For most, but not all, locations on Earth, the tilt is such that the sun’s daily path takes the sun below the horizon. (NOT to scale)



Checking In

1. Describe how Earth moves over a period of 30 days. Use the terms rotate, revolve, and orbit.
2. How does the apparent path of the sun across the sky differ near the poles from other points on Earth?