

Read About Earth's Orbit and Rotation

EARTH'S ORBIT AND ROTATION DEFINITION

The Earth moves in two different ways. Earth *orbits* the sun once a year and *rotates* on its axis once a day. The Earth's *orbit* makes a circle around the sun. At the same time the Earth orbits around the sun, it also spins. In science, we call that rotating on its axis. Since the Earth orbits the sun AND rotates on its axis at the same time we experience seasons, day and night, and changing shadows throughout the day.

To better understand Earth's rotation around the sun....

LET'S BREAK IT DOWN!

Earth's rotation on its axis occurs every 24 hours.

Earth is always moving. Each day, the Earth makes one complete rotation on its axis. The axis is the imaginary line through the earth that extends from the North Pole to the South Pole.

As Earth rotates, it seems like the sun is moving across the sky, but it's really the Earth that is spinning. It takes 24 hours to complete one rotation, which is why there are 24 hours in one day.

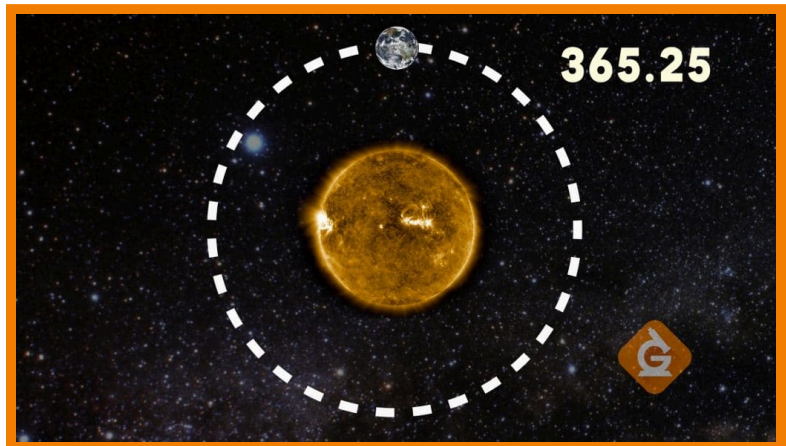
In other words, if the sun is visible in the morning starting around 6:00 AM, the Earth will spin completely around by the next morning at 6:00 AM and you will see the sun in about the same place.



The Earth orbits around the sun every 365.25 days.

While the Earth is rotating on its axis, it also orbits the sun. It takes a little more than 365 days for the Earth to make a complete trip around the sun.

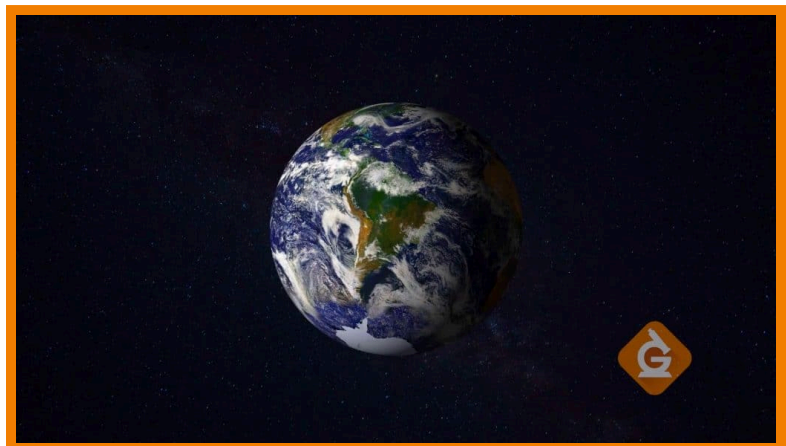
Other planets have different orbital times. It takes only 87 days for Mercury to orbit the sun, but 12 years for Jupiter to make the journey.



Scientists used to think that the Earth was the center of the universe, but phenomena such as stellar parallax have proven that this is not true because the position of some stars change as we orbit.

Earth's rotation causes observable patterns like night and day.

The light from the sun shines on half of the Earth at any given time. That side is warmer and brighter. The other side of the Earth faces away from the sun (it's dark) so it is cooler and darker. Since the Earth is always spinning, there is a line between day and night and we pass through it each day.



Another pattern caused by the Earth's rotation is the length of our shadows. Shadows are longer in the afternoon than at noon. If you study shadows and their appearance throughout the day, you can use this information to help estimate the time. Sundials are designed using this idea.

It is important to remember that the sun doesn't travel across the sky. It looks that way because **the Earth is spinning.**

Earth's orbit causes some stars to be visible only in certain months.

Another pattern we can observe due to the earth's orbit around the sun has to do with constellations. The night sky looks different throughout the year because we can only see in one direction (away from the sun). As the Earth orbits, our view changes. This is why we see different constellations at different times of the year.



EXAMPLES OF EARTH'S ORBIT AND ROTATION



Scientists use the movement of pendulums to provide evidence that the Earth is rotating. A pendulum is a weight hanging from a fixed point so that it can swing freely back and forth. When you move the base of the pendulum, the weight continues to travel in the same path.

FEBRUARY						
SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	29 DAYS EVERY 4 YEARS LEAP YEAR					

Leap years have one extra day added to February. Since it takes 365.25 days to complete one orbit, we account for the extra .25 days by adding an extra day to our calendar every four years. So most of the time our calendar has 365 days, but in a leap year it has 366 days!



There are 24 time zones on Earth. The globe is divided into time zones to help us account for the movement of the sun's light across the globe. This way 9:00 am is morning *everywhere*. Otherwise, 9:00 am would be morning for you but night somewhere else – it would get confusing.

VOCABULARY ON EARTH'S ORBIT AND ROTATION

Earth's Orbit

An orbit is the path an object follows as it moves around another one. Earth moves in a circle around the sun once every 365.25 days. We call that path Earth's orbit.

Earth's Rotation

The action of the earth turning or spinning around its center. If you stand in one place and turn all the way around, you have rotated. The earth rotates (spins) once every 24 hours.

Solar system

Our solar system is made up of the sun, 8 planets and their moons. The planets all orbit around the sun and moons orbit around a planet.

Shadow

A dark shape made when an object blocks light. When you stand outside, your body blocks sunlight and that makes a shadow.

Foucault pendulum

A tool that provides evidence that the earth is rotating. It is made of a heavy weight hanging from a long wire which swings back and forth. The direction of the swinging ball appears to change due to Earth's rotation.

Constellations A group of stars that form a recognizable shape such as the big dipper. Today there are about 90 constellations.

EARTH'S ORBIT AND ROTATION DISCUSSION QUESTIONS

The shadow of a groundhog (or anything else) is determined by what?

The length of a shadow is determined by where the sun appears to be in the sky. If the sun is close to the horizon, a shadow will be long. If the sun is directly overhead, the shadow will be very short.

What happens when Earth rotates on its axis and how long does it take?

Earth rotates once on its axis once every 24 hours. During that time, all locations on Earth experience day and night because they will be facing toward the sun for part of the day and away from the sun for another part (night).

How many times does Earth rotate on its axis in one year?

Earth rotates (spins) 365.25 times in a year. It rotates once every twenty four hours, while also orbiting the sun once every 365.25 days. These two motions are happening at the same time.

Why do we have a leap year in our calendar every four years?

Since it takes Earth 365.25 days to orbit the sun, but our normal calendar is 365 days, we add an extra day to our calendar every four years. ($4 \text{ years} \times 0.25 \text{ day} = 1 \text{ day added every 4 years.}$)

What evidence do we have that the Earth rotates?

An invention called a Foucault pendulum provides evidence that the Earth is rotating on its axis. The swinging pendulum would always trace a straight line as it swings back and forth if it were sitting on an unmoving surface. However, as time goes by the path of the pendulum changes, providing evidence that the surface it is sitting on (the earth) is rotating.

What is a geocentric view of the universe? What evidence showed us it is not correct?

A geocentric view of the universe is the idea that everything orbits around the Earth. Since the sun appears to move across the sky, it is easy to understand why humans believed this for a long time. A concept called stellar parallax provided evidence that we orbit the sun.
