

Getting to Know: Earth

In the entire universe, Earth is the only planet we know of that is capable of supporting life. Scientists are actively hunting for other planets similar to our own, because if we can find a one with similar characteristics, there is a chance it could also support life. As of now, Earth is the only planet with life that we know of, but who can say what we will learn tomorrow?

Why is Earth unique?

One reason that Earth can support life is its atmosphere and its distance from the Sun. Earth is at just the right distance for moderate temperatures, which help life to flourish. Consider our nearest neighbors: Venus and Mars—Venus has a thick atmosphere and is closer to the Sun than Earth. Average temperatures in Venus' atmosphere are 464°C! Mars has a very thin atmosphere and is farther from the Sun than Earth is. The average temperature of the Martian atmosphere is -63°C! Earth's atmosphere and distance help maintain an average atmospheric temperature of 15°C. Because Earth's temperatures are moderate, water can exist in all three states in the Earth's system—as a solid, liquid, or gas. Water is essential to support life as we know it.



Earth supports a wide variety of life.

How is water an important feature of Earth?

Earth is not the only body in the solar system that has water. Scientists have discovered ice on Mars and water vapor in Venus' atmosphere. However, Earth is the only body in the solar system in which water is abundant. In fact, more than 70% of Earth's surface is covered in water. All of the organisms on Earth need water to survive.

Water has also played a large role in sculpting Earth's landforms. Earth has a variety of landforms that are not present elsewhere in the solar system. In addition to mountains and valleys, we have canyons and deltas. Water continually shapes Earth's surface.

How is Earth's atmosphere unique?

Earth's atmosphere is made up of a mixture of gases, including nitrogen, oxygen, carbon dioxide, and water vapor. Most organisms need these gases to live. The atmosphere is also where Earth's weather takes place, which contributes to the movement of water and air around the planet. Finally, Earth's atmosphere has a protective *ozone layer*, which shields life on Earth from much of the Sun's harmful ultraviolet radiation. It is important to remember, however, that ozone formed at Earth's surface is an air pollutant and does not protect humans from ultraviolet radiation.



Misconception 1: *We need plenty of ozone to protect Earth from the Sun's radiation. Why do people worry about a hole in the ozone layer?*

Ozone in the stratosphere does shield Earth from ultraviolet radiation and is important to maintaining a temperature balance on the surface of the planet. Ozone in the troposphere, however, increases the greenhouse effect and contributes to smog, so it is not desirable in that layer.

Why does the moon orbit the Earth?

Another unique feature of Earth is its moon. The moon is much smaller than Earth. As a result, Earth exerts a strong gravitational pull on the moon, enabling the moon to orbit Earth. As the moon orbits Earth, its gravitational attraction causes tides on Earth. For this reason, ocean levels rise and fall in a regular pattern. The tides have an important influence on life on Earth.



The moon is Earth's only satellite.

How do night and day occur on Earth?

Every 24 hours, Earth makes a complete rotation or spin on its axis. This rotation causes night and day. At any given time, half of Earth's surface is facing toward the Sun. We experience this period as daytime. At the same time, the part of Earth's surface that is facing away from the Sun is experiencing night.



Misconception 2: *I always thought that Earth's revolution around the Sun causes night and day. Is that true?*

Night and day are caused by the rotation of Earth as it spins on its axis every day. Earth's revolution around the Sun takes about 365 days. This period is known as a year.