The Rotating Earth

Planet Earth (the planet on which we happen to live) spins on an imaginary line called an **axis**. One spin around on its axis is called a **revolution**.

The Earth orbits around the Sun. The Earth’s axis always points in the same direction (which you can see in the diagram).

So the Earth is moving in two ways. It is spinning on its axis, making day and night.

One Earth’s spin on its axis, or revolution, completes in 1 day, which is equal to 24 hours. The Earth spins at a pace that causes day and night to happen only once in the course of 1 day on the Earth.

One rotation of the Earth through its full orbit around the Sun takes a year. This pace of rotation creates temperatures on Earth that support life (not too hot and not too cold).

**Lesson Checkpoint:**

*How long does it take the Earth to make one complete rotation?*

The Earth’s Temperature Changes

As the Earth moves on its orbit around the Sun, the areas on Earth closest to the Sun receive sunlight and are warmer than those further from the Sun. Of course, as the earth rotates, the areas facing the Sun slowly change, and that means the time of day and the temperatures change.
Look at the diagram below. If you live in the Northern Hemisphere (such as the United States) you can see how close and how far away the United States is from the Sun as the seasons change.

Make up of Earth’s Atmosphere

The air that surrounds the Earth is known as the Earth’s atmosphere. The atmosphere absorbs the energy from the Sun which the Earth uses in many ways to provide a planet on which living organisms can survive. The Earth’s atmosphere is mostly made up of nitrogen, oxygen, and other gases.

Lesson Checkpoint:

What gas is the biggest part of the Earth’s atmosphere?
**Five Layers of Earth’s Atmosphere**
The atmosphere is divided into five main layers:

As you go UP from the Earth’s surface through each layer of the atmosphere, the temperature **RISES** due to the Sun’s energy. As altitude increases the air pressure decreases too.

**Troposphere**
The troposphere begins at the Earth’s surface and is about 8 to 14.5 kilometers high and is quite dense. Almost all weather occurs in this layer.

**Stratosphere**
The stratosphere is just above the troposphere and is about 50 kilometers high. This layer is dry and less dense than the troposphere. The ozone layer is a part of this layer.

**Mesosphere**
The mesosphere is just above the stratosphere and is about 85 kilometers high.

**Thermosphere**
The thermosphere is just above the mesosphere and is about 600 kilometers high. Temperatures in this region can reach above 1000 °C. This layer is known as the upper atmosphere.

**Exosphere**
The exosphere begins at the top of the thermosphere and continues until it reaches outer space.
The Ozone Layer
The ozone layer absorbs most of the sun's ultraviolet light (known as UV rays), which is a good thing since that kind of light can be EXTREMELY harmful to us on Earth.

Lesson Checkpoint:
What is the ozone layer?
Air pollution

*Air pollution* is contamination of the air by smoke from automobiles, factories, etc. and harmful gases. Air pollution is dangerous to us people and to plants and animals too!

**What are some of the pollutants of our air?**

**Carbon monoxide** is a colorless and odorless gas. It is a highly poisonous gas and can cause death. This is why many people have carbon monoxide detectors in their homes. Carbon monoxide can come from cars, gas stoves, water heaters, furnaces, and space heaters.

**Carbon dioxide** is also a colorless and odorless gas. You may know of carbon dioxide since it is the gas we breathe out and the gas that plants take in. It is also released into the air when coal, oil, and other natural gases are burned! Vehicles also release carbon dioxide into the air.

**How do we know how clean the air around us actually is?**

An *Air Quality Index* will tell you! This index uses numbers and colors to tell you about the quality of air around you. The lower the number, the healthier the air and **GREEN** is good!!

**Water can be polluted too!**

**Where does water pollution come from?**

Pollution comes from wastes from industries, people dumping contaminants into the ocean, water run off from fields that contain fertilizers and chemicals, untreated sewage drains, and from air pollution.

We need water that is NOT polluted. It’s a good thing water is recycled here on Earth!!

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Water, water everywhere:
The hydrosphere includes all the water on Earth, 97% of which is salt water (the oceans).

Salty water…good for surfing, not for drinking!

Salinity is the measure of how salty water is. The Earth contains a LOT of salt water and not so much freshwater. Rivers contain freshwater and where rivers and oceans meet, there is low salinity. Oceans have high salinity!

The Water Cycle
The water cycle involves evaporation, transpiration, condensation, precipitation, and water runoff here on Earth.

The sun is the main energy supply for the water cycle.
The Water Cycle Process

- **Evaporation** is when a liquid changes into a gas. Evaporation occurs when the sun warms the water on Earth and some of that water changes into water vapor. The water vapor then goes into the air.

- **Transpiration** helps the evaporation process. It is when plants give off water vapor through their leaves into the air.

- **Condensation** is the changing of a gas back into a liquid. This occurs in the clouds, when the water vapor from Earth becomes condensed into clouds.

- **Precipitation** moves the water from the clouds back to Earth. You know the kinds of precipitation: rain, hail, sleet, and snow.

- **Water runoff** is the water that flows over the ground, in fields and roads for example, and flows downward towards rivers, lakes, and oceans.

- **Groundwater** is water that soaks into the ground, below the Earth’s surface.

**Lesson Checkpoint:**

What are the steps to the water cycle process?

I have heard of Aqua Man, but what is an Aquifer?

An **aquifer** is a layer of rock and soil which holds groundwater.