

## EARTH'S FRESHWATER AND ATMOSPHERE

### 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 is why we have seasons).

So the Earth has a 24-hour day and night. An hour is 1/24 of a day.

One Earth's spin is called a day, which is equal to 24 hours. It is day on the parts of Earth that face the Sun and night on the parts of Earth that are facing away from the Sun.

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.



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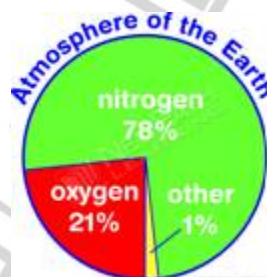
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### Lesson Checkpoint:

**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 about 50 to 85 kilometers high.

### Thermosphere

The thermosphere begins at the top of the mesosphere and extends to about 600 kilometers high. Temperature increases with altitude in this layer. This layer is known as the ionosphere.

### Exosphere

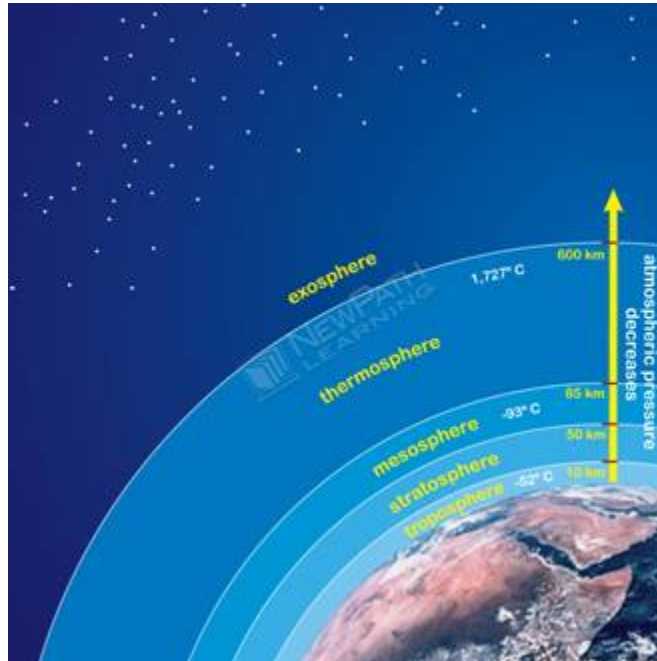
The **exosphere** begins at the top of the thermosphere and continues until it reaches outer space.



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## 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 health of the air. The higher the number, the healthier the air is.



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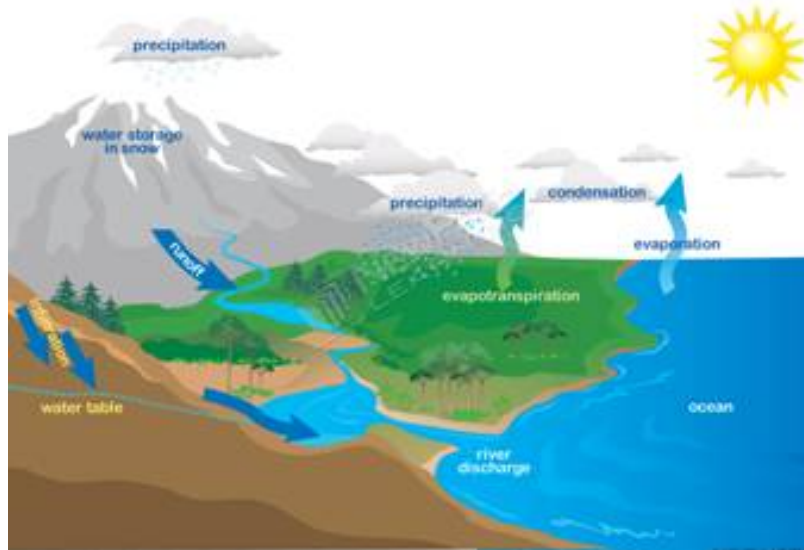
101 – 150	unhealthy for sensitive groups
51 – 100	moderate
0 – 50	good

## 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!!



### Water, water everywhere:

The hydrosphere is the part of Earth that is covered by water. 97% of this water is salt water (the oceans).

### Salty water.

**Salinity** is the amount of salt in water. The ocean has a LOT of salt water and a high salinity! Rivers have low salinity!



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### 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.

- 🌍 **Ground surface**

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

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

