

Unit 1 Air Pressure Creates Wind / Unit 2 Weather Forecast

There are six main components of weather. They are temperature, atmospheric pressure, wind, humidity, precipitation, and cloudiness.



Temperature is measured with a thermometer and refers to how hot or cold the atmosphere is. The coldest weather usually happens near the poles, while the warmest weather usually happens near the Equator.



Atmospheric pressure is the weight of the atmosphere overhead. Changes in atmospheric pressure signal shifts in the weather. A high-pressure system usually brings cool temperatures and clear skies. A low-pressure system can bring warmer weather, storms, and rain.



Wind is the movement of air. Wind forms because of differences in temperature and atmospheric pressure between nearby regions. Winds tend to blow from areas of high pressure, where it's colder, to areas of low pressure, where it's warmer.



Humidity is the amount of water vapor in the air. Water vapor is a gas in the atmosphere that helps make clouds, rain, or snow. Humidity is usually expressed as relative humidity, or the percentage of the maximum amount of water air can hold at a given temperature.



A relative humidity of 100 percent means the air can't hold any more water vapor. Excess water vapor falls as **precipitation**. Clouds and precipitation occur when air cools below its saturation point.



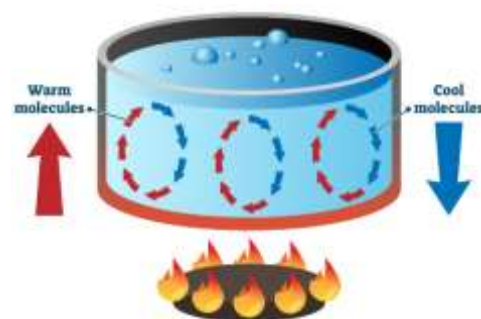
Clouds can affect the amount of sunlight reaching the Earth's surface. Cloudy days are cooler than clear ones because clouds prevent more of the sun's radiation from reaching the Earth's surface. The opposite is true at night—then, clouds act as a blanket, keeping the Earth warm.

Unit 3 How Does Heat Move Liquids? / Unit 4 Water Moves Around the World

Heat Convection

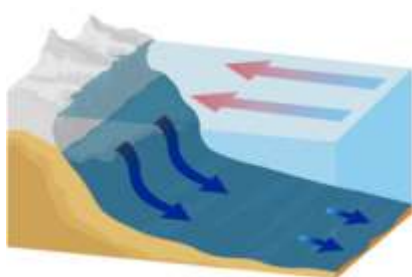
Convection is heat transfer by mass motion of a fluid such as air or water when the heated fluid is caused to move away from the source of heat, carrying energy with it. Hot water is less dense than cold water and rises, causing convection currents which transport energy.

Convection can also lead to circulation in a liquid, as in the heating of a pot of water over a flame. Heated water expands and becomes more buoyant. Cooler, denser water near the surface descends and patterns of circulation can be formed.



Ocean Currents

Ocean currents result from two processes - the action of wind on the surface of the water, and from variation in water temperature that causes movement- a process known as convection. Convection occurs because the oceanic waters heat up becoming less dense. This water moves above the cooler water and give off its heat to the surrounding environment. As it cools, it begins to sink, and the process begins again. Convection results in the continual circulation of ocean water on a global scale.



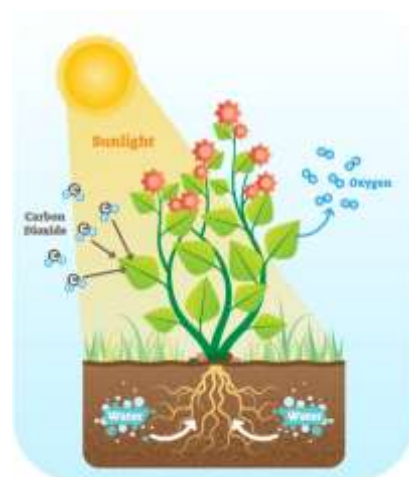
In the Earth's Polar regions, ocean water gets very cold, forming sea ice. As a consequence, the surrounding seawater gets saltier, because when sea ice forms, the salt is left behind. As the seawater gets saltier, its density increases, and it starts to sink. Surface water is pulled in to replace the sinking water, which in turn eventually becomes cold and salty enough to sink. This initiates the deep-ocean currents driving the global conveyor belt.

Unit 5 Growing Mushrooms / Unit 6 I Am Not a plant!

Fungi vs Plants

Both fungi and plants were considered to be of the same group of living things till recently. However, they are now categorized under different groups. Plants and fungi make up two of the five groups that comprise the kingdom of living things on earth.

The most important difference is that plants can **make their own food**, while fungi cannot. As you know, plants use carbon dioxide, sunlight, and water to create their own food. This process is known as photosynthesis. Fungi, on the other hand, are incapable of making their own food. They usually eat off their host as parasites or decompose matter and take it as their food.



This brings us to the second difference. Fungi do not possess **chlorophyll**, that green substance that gives plants their beautiful green color and helps in photosynthesis.

The next difference is their method of **reproduction**. As we all know, reproduction is one of the main things that differentiate a living thing from a nonliving one. Plants reproduce through pollen and seeds. However, fungi reproduce through numerous spores. They do not have pollen, fruit or seeds.



Another important difference between them relates to **the way they are attached**. All plants have a system of roots that attach the plant to the ground and help it in soaking moisture. However, if you were to look at fungi very closely, you would find them spreading a sort of net of filaments on the surface of the plant or whatever they are attaching to. This helps them attach to their host. There are no complex root systems, stems or leaves in fungi.



Unit 7 Water Drops / Unit 8 A Water Strider

Surface tension is an effect where the surface of a liquid is strong. The surface can hold up a weight, and the surface of a water droplet holds the droplet together, in a ball shape. Some small things can float on a surface because of surface tension, even though they normally could not float. Some insects (e.g. water striders) can run on the surface of water because of this. This property is caused by the molecules in the liquid being attracted to each other (cohesion), and is responsible for many of the behaviors of liquids.

Surface Tension in Everyday Life



When water falls in drops from a tap, each drop gradually forms at the tip of the nozzle.



Water striders use the high surface tension of water and long legs to help them stay above water. They use the surface tension through their highly adapted legs and distributed weight.



A razor blade floats when it's gently placed on water even though the density of steel is nearly eight times greater than the density of water. The water surface forms the film that can't be broken by the thickness of the blade.










A liquid tries to acquire a minimum surface area because of its surface tension. Sphere has the smallest surface area, so raindrops are spherical.



After you dip a paintbrush in water, bristles are drawn close together because of the surface tension formed between adjacent hairs.

Unit 9 Speed Racers / Unit 10 A Race to Grandfather's House

Fastest Man 	<p>Usain Bolt, Jamaican sprinter</p> <p>He holds the Olympic and world records for the 100 meters at 9.69 seconds, 9.58 seconds. His speed is 44.72 km/h.</p>
Fastest Land Animal 	<p>A cheetah</p> <p>A cheetah's slender, long-legged body is built for speed. It can run up to 130 km/h.</p>
Fastest Fish 	<p>A sailfish</p> <p>Sailfish are a type of billfish which prefer the warmer waters of the Atlantic and Pacific. It is clocked at speeds of up to 110 km/h.</p>
Fastest Bird 	<p>A peregrine</p> <p>It is a large, crow-sized falcon with a blue-gray back. It can reach speeds over 322 km/h, which means it is the fastest animal in the world.</p>
Fastest Wind 	<p>Oklahoma tornadoes</p> <p>On May 3, 1999, scientists measured the highest recorded wind speed near Moore, Oklahoma. It destroyed 250 houses and was 511 km/h.</p>
Fastest Spacecraft 	<p>Parker Solar Probe</p> <p>NASA's Parker Solar Probe launched in 2018. It is the closest spacecraft to the sun and reached 692,000 km/h.</p>
Light 	<p>The speed of light in a vacuum is 299,792 km/s. In theory, nothing can travel faster than light. If you could travel at the speed of light, you could go around the Earth 7.5 times in one second.</p>

Unit 11 The Changing Volume of Gases / Unit 12 Cold Air, Hot Air

Formula for Charles' Law

$$V/T = k$$

V is the volume of gas, T is the temperature of gas (measured in kelvins) and k is a constant.

According to this formula, at a fixed pressure, the volume of a gas is proportional to the temperature of the gas. As the temperature increases, the volume of the gas also increases.

6 Facts about Charles' Law

1. Jacques Charles, who formulated Charles' Law of Ideal Gases, is also the inventor of the first hydrogen gas balloon, which made its first flight in August, 1783.
2. On heating up a fixed mass of gas, that is, increasing the temperature, the volume also increases. Similarly, on cooling, the volume of the gas decreases.
3. Air conditioners and Fans function using Charles' Law. Hot air rises up and cold air comes down. Fans function on revolving the air, whereas air conditioners also give off a blast of cold air from compressed coolants.
4. Breads and cakes also use Charles' Law of Ideal Gases. Carbon dioxide trapped in fermented dough, expands on baking and causes fluffy breads and cakes.
5. If you keep aerosol and deodorant spray cans in sunlight, they can burst. Compressed gases will expand when the temperature inside the cans increases.
6. Steam engines and car combustion engines also work on the principle that gases expand as temperatures increase. Charles Law is used to apply mechanical movements in these engines.

Unit 13 Stems Carry Water / Unit 14 Grandmother's Garden

Herbaceous stems are thin, soft, and green in color except those that grow underground, like potato and onion stems. They live through only one growing season. There are four types of herbaceous stems.



A **climber** is a long, slender stem that climbs up a support. e.g.) bean, cucumber, ivy, etc.



A **bulb** is a short stem that function as food storage organs. It doesn't support the plant, but contains food reserves. e.g.) onion, garlic, tulip, etc.



A **tuber** is the thickened part of an underground stem of a plant. Most tubers are formed in the ground. e.g.) potato, yam, etc.



A **stolon (runner)** is a slender stem that grows horizontally at the soil surface or just below ground. e.g.) strawberries, ginger, mint, etc.

Woody stems are taller, thicker, and harder than herbaceous stems. When they are fully grown, there is making of bark. Plants with woody stems may be trees or shrubs.



A **tree** will usually have a thick main stem. It grows taller than shrubs. The branches start forming some distance above the ground.



A **shrub** has many thin stems, which have many branches.

Unit 15 What's the Weather Like Today?

What Is Meteorology?

Meteorology is the study of the Earth's atmosphere and the variations in temperature and moisture patterns that produce different weather conditions. Some of the major subjects of study are such phenomena as precipitation (rain and snow), thunderstorms, tornadoes, hurricanes, and typhoons.

Modern meteorology focuses primarily on the typical weather patterns observed, including thunderstorms, extratropical cyclones, fronts, hurricanes, typhoons, and various tropical water waves. Meteorology is usually considered to describe and study the physical basis for individual events. In contrast, climatology describes and studies the origin of atmospheric patterns observed over time.

Types of Meteorologists

- Climate meteorologists look at long term weather data from hundreds to millions of years ago in order to help predict future climate trends.
- Atmospheric meteorologists study the atmosphere's motions and how they affect the environment.
- Forensic meteorologists investigate claims for insurance company. They even research weather or past weather for a court of law.
- Broadcast meteorologists report the weather conditions for television and radio.
- Environmental meteorologists study and report on ways to reduce air pollution. They contribute to the study of global warming and ozone depletion.

Unit 16 Hydro Helpers

What Is a Hydrologist?

A hydrologist is a scientist who researches the distribution, circulation, and physical properties of the earth's underground and surface waters. They help environmental and other scientists preserve and clean up the environment, as well as search for groundwater.

Hydrologists work in offices, classrooms, laboratories, and in the field. The federal government and state governments, and engineering firms employ the majority of hydrologists. Hydrologists out in the field may need to wade into lakes and rivers to collect samples and inspect equipment. Their work may be affected by strong water currents and bad weather.

What Does a Hydrologist Do?

- Plan and collect surface water or groundwater and monitor data
- Work with local, state, and federal agencies on water resource issues
- Process meteorological and hydrologic data
- Install and maintain water property and water quality instrumentation
- Determine the nature and extent of contamination in groundwater