

I am something in nature that you can't see, but you can feel me, and sometimes even hear me. What am I?

How does temperature affect air movement?

You're riding in an elevator and suddenly you can hardly hear. You swallow. POP. Oh, much better! What caused your ears to pop? It's called air pressure.



Air Pressure and Wind

The earth is surrounded by a layer of air. Air is made of matter and has mass. Air presses down on the surface of the earth and on you too! This pressing down of air is called **air pressure**. Usually, you don't notice the pressure of the air, but you do notice its effects. If you have ever flown in an airplane, you may have felt the effects of air pressure. The change in air pressure pushes on your eardrum. Then, when you swallow, the eardrum makes a popping sound.

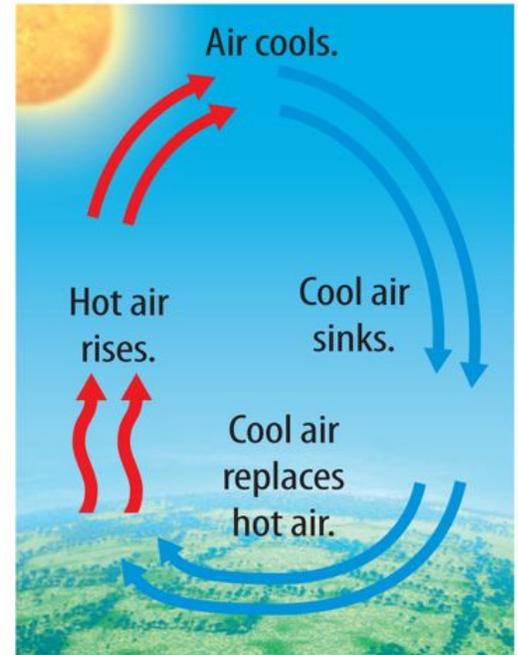
As you go higher above the earth, the air pressure changes. When you are high above the surface of the earth, there is less air above you than when you are on the earth. Less air is pressing down on you. Therefore, air pressure is lower.



Air temperature also changes as you go higher above the earth. Since the surface of the earth heats the air above it, the air is warmer near the ground. As you go higher above the earth, the air gets colder.

Air pressure on the earth's surface also changes. Changes in temperature cause changes in air pressure. As the air near the surface of the earth becomes warmer, the particles of air move farther apart. The air becomes lighter and also rises. The lighter air pushes down on the surface of the earth with less pressure. A **low-pressure area** forms.

Cold air is heavier than warm air. Its matter is more closely packed together. It pushes down harder



on the earth's surface than warm air does. Therefore, a cold air mass is called a **high-pressure area**.

As you can see in the picture, air moves from a place with high pressure to a place with low pressure. The moving air is called wind. When the cooler air from a high-pressure area sinks toward the earth, it causes wind. Then you feel a nice, cool breeze.



Measuring Wind Direction and Speed

Even though the wind is invisible, you can tell its direction by watching things move. You can see the direction that a flag moves or that trees bend in the wind. You can even get a quick idea of the wind's direction by wetting your finger and holding it up. Your finger will feel cooler on the side of the wind it's blowing from.

For a more exact measurement of the wind's direction, scientists use a **wind vane**. A wind vane rotates on top of a pole. It has a tail that can be pushed by the wind. The tail of the



vane swings away from the wind. An arrow on the opposite end of the vane points into the wind. Some wind vanes have markers or cross bars showing the four main directions, *north, south, east, and west*. Wind vanes are one of the oldest tools for observing weather.

A **windsock** shows wind direction. A wind sock also gives a good idea of how fast the wind is blowing. If the sock stands straight out, the wind is blowing fast and strong. If the windsock barely lifts in the breeze, the wind force is quite low. Airports often have wind socks set up so that pilots can tell the direction and strength of the wind. There are also wind socks at sports stadiums. Kickers in football use the windsock to help guide where they should kick the ball.

However, exact wind speed is measured using a tool called an **anemometer**. Anemometers are usually placed high above a roof or atop the mast of a boat. Sometimes anemometers are connected to wind vanes.

An anemometer has three or four cups attached to the top of a pole. The cups are often shaped like small, hollow balls that are cut in half. As the wind blows, it pushes the cups and causes this part of the anemometer to spin. The number of turns per minute is changed to wind speed by gears, similar to the speedometer of an automobile. When the wind blows fast, the anemometer spins very fast. Anemometers are often hooked up electrically to a dial that shows the wind speed.



THE ROBINSON ANEMOMETER.