Air Pressure and Hot Air Balloons!

Hot Air Balloons!!!

- Have you ever seen a hot air balloon?
- What makes it fly through the air?

Air pressure is a big part of how hot air balloons work.

An Ocean of Air?

- The air that surrounds us is composed of many different elements such as oxygen, nitrogen, and hydrogen.
- These elements, in their gaseous state, fly around freely.
- Every time they bump into each other, or another object, they push using a tiny bit of energy.

Air Pressure

- Because there are millions of particles in the atmosphere, the energy released upon interactions adds up quickly.
- This is called air pressure.
- The air pressure at sea level is about 1 kilogram per square centimeter.

Don’t Get Pushed Around!

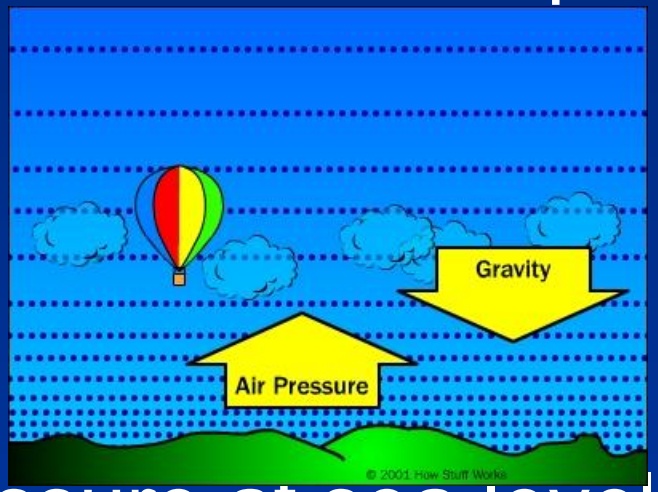
- Our bodies do not feel the air pressure normally because it disperses evenly around us.
- Hold out your hand, palm up.
- The air pressure exerted on the top of your hand is equal to the pressure of the air pushing up on the bottom of your hand.
- The forces cancel out, and you don’t feel the effects of air pressure.

Gravity

- In a scenario where only air pressure exists, everything would be evenly balanced out.
- However, we live on a planet in which gravity plays a huge part.

Gravity vs. Air Pressure

- Gravity pulls downward on everything, and its effects extend to even our atmosphere.
- But the air pressure creates an upward force to counteract gravity.



- There is more air pressure at sea level because the air at that level has to support all the air above it.

Altitude and Air Pressure

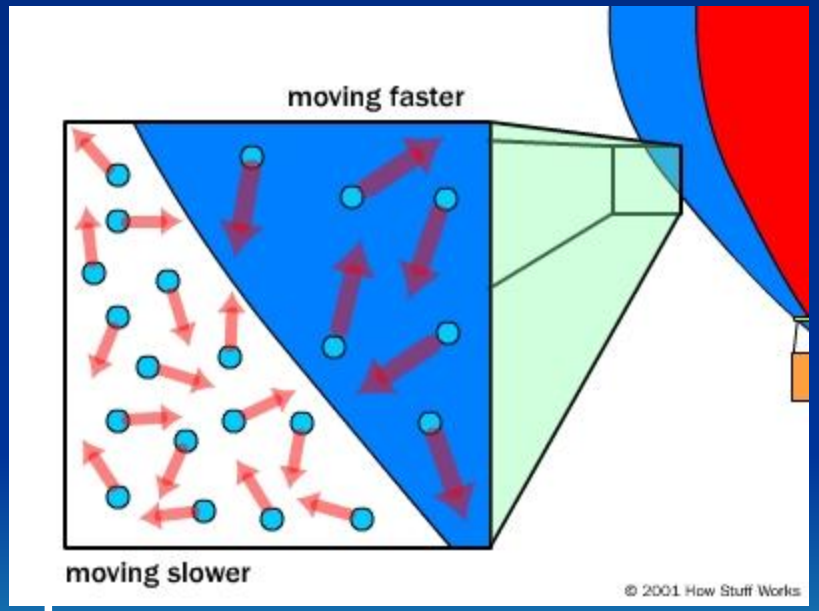
- As you move away from sea level, the air pressure lessens.
- The air pressure at the top of Mount Everest is incredibly low because there is much less air above for it to support.
- Climbers often breathe pressurized air when at high altitudes because their lungs cannot force such low pressure air into their bodies.

Hot Air Balloons

- This difference of air pressure causes an upward buoyant force all around us.
- This means that there is less air pressure above an object, than below it.
- This basic fact helps hot air balloons fly through the air.

Why HOT air balloons?

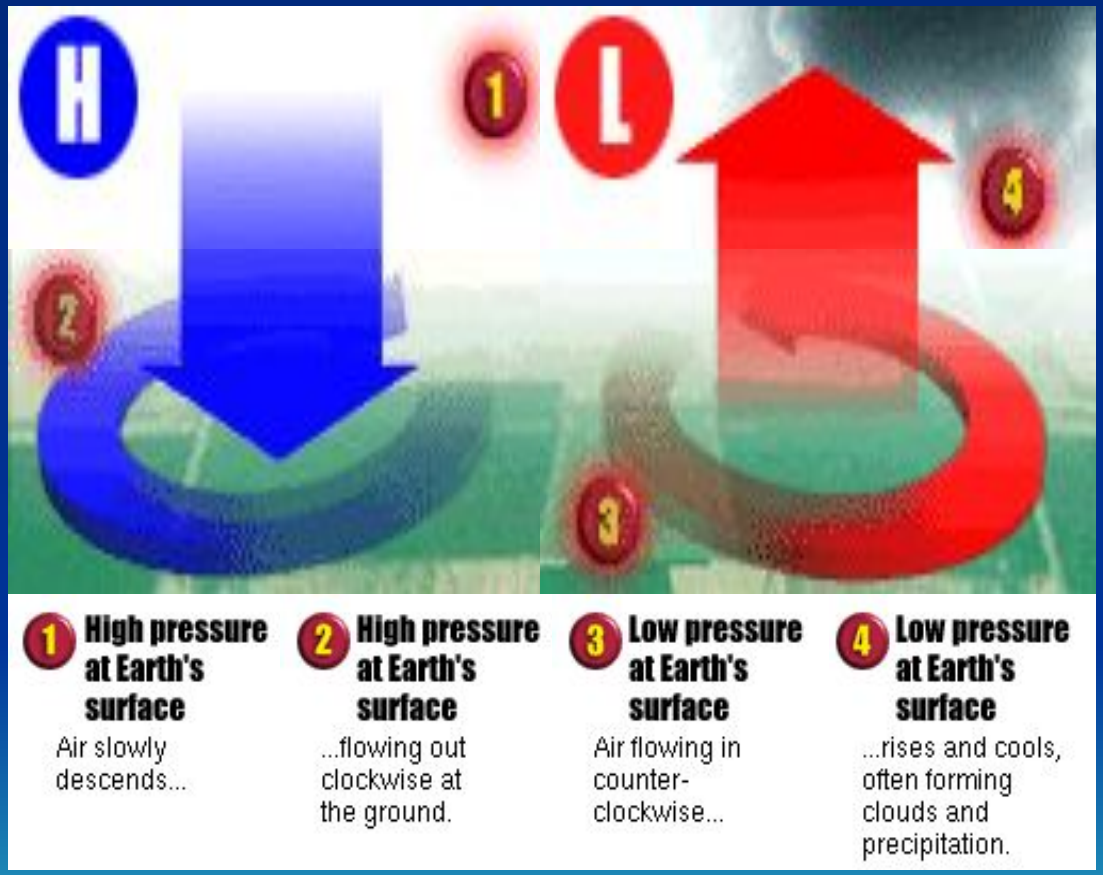
- Hot air is pumped into the balloon because as air is heated, the molecules in the air move faster.
- In the balloons, this makes the air inside the balloon move much faster than the cool air of our atmosphere.



Up, Up, and Away!!

- The molecules that are moving faster hit the walls of the balloons more often, and at a greater force.
- This means that it takes less hot air molecules to equal the same air pressure of cooler air molecules.
- The hotter, less dense air inside the balloon help it rise against the cooler, denser atmospheric air.

How Air Pressure Affects the Weather



- Atmospheric air pressure is never constant, but a column of air may have a relatively higher or lower pressure than nearby columns
- Vertical and horizontal air pressure gradients affect wind and precipitation.
- All weather is the effect of Earth correcting a temporary imbalance in the pressure or temperature gradient

To Learn More about Pressure Systems and Weather

- USA Today Weather Center: http://www.usatoday.com/weather/wstorm0.htm
- Accuweather FAQ: http://www.accuweather.com/iwxpage/paws/weathermapfaq.htm