

NAME: _____

SCIENCE STANDARDS WITH CORRELATING WORKSHEET AND EXIT-SLIP QUESTIONS

SCIENCE STANDARDS	Correlating WS/Exit-Slip
<p>PS 4.2c - During a phase change, heat energy is absorbed or released. Energy is absorbed when a solid changes to a liquid and when a liquid changes to a gas. Energy is released when a gas changes to a liquid and when a liquid changes to a solid.</p>	<p>Pg. 4 Worksheet</p> <p>Show Off: When is energy released? When is energy absorbed?</p>
<p>PS 4.1a - The Sun is a major source of energy for Earth. Other sources of energy include nuclear and geothermal energy.</p>	<p>Pg. 7 Worksheet</p> <p>Show Off: What kind of energy does the Sun produce? Why is this important?</p>
<p>PS 4.2a - Heat moves in predictable ways, flowing from warmer objects to cooler ones, until both reach the same temperature.</p>	<p>Pg. 5 Worksheet</p> <p>Compare temperatures over cups with hot liquid and cold liquid. Compare temperature of liquids after being out over night.</p> <p>Show Off: In what direction, or how does heat flow?</p>
<p>PS 4.2d - Most substances expand when heated or contract when cooled. Water is an exception, expanding when changing to ice.</p>	<p>Pg. 6</p> <p>Balloon experiment: Magical Inflating Balloons</p> <p>Show Off: What happens substances are heated? What happens when substances are cooled?</p>

H e a t i n g , C o o l i n g , a n d W e a t h e r

NAME: _____

SCIENCE STANDARDS	Correlating WS/Exit-Slip
<p>PS 2.1a - Nearly all the atmosphere is confined to a thin shell surrounding Earth. The atmosphere is a mixture of gases, including nitrogen and oxygen with small amounts of water, carbon dioxide, and other trace gases. The atmosphere is stratified into layers, each having distinct properties. Nearly all weather occurs in the lowest layer of the atmosphere.</p>	<p>Pg. 8 Worksheet</p> <p>Show Off: Gasses in Atmosphere? Layers? Importance of Atmosphere?</p>
<p>PS2.1j - Water circulates throughout the atmosphere, lithosphere, and hydrosphere in what is known as the water cycle.</p>	<p>Pg. 9 Worksheet</p> <p>Show Off: What is the water cycle? What layers are involved? What exactly are each layer?!</p>
<p>PS2.2i - Weather describes the conditions of the atmosphere at a given location for a short period of time.</p>	<p>Pg. 10 Worksheet</p> <p>Show Off: Define weather? What is so important to powering weather systems?</p>
<p>PS2.2k - The uneven heating of the Earth's surface is the cause of weather.</p>	<p>Pg. 11 Worksheet</p> <p>Show Off: What causes weather? Why are there seasons?</p>

Heating, Cooling, and Weather

NAME: _____


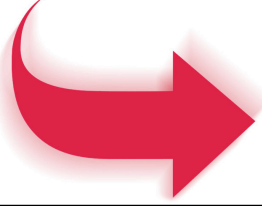


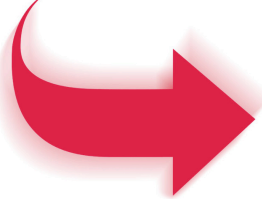


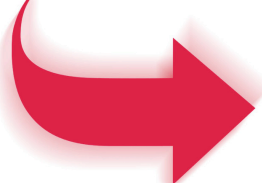

SCIENCE STANDARDS	Correlating WS/Exit-Slip
<p>PS2.2l - Air masses form when air remains nearly stationary over a large section of Earth's surface and takes on the conditions of temperature and humidity from that location. Weather conditions at a location are determined primarily by temperature, humidity, and pressure of air masses over that location.</p>	<p>Pg. 12 Worksheet</p> <p>Show Off: What is an Air Mass? What is humidity? How do clouds form?</p> <p>Pg. 13 Worksheet</p> <p>Show Off: What is air pressure? How does it change from place to place?</p>
<p>PS2.2m - Most local weather condition changes are caused by movement of air masses. PS2.2n - The movement of air masses is determined by prevailing winds and upper air currents.</p>	<p>Pg. 13 Worksheet</p>
<p>PS 2.2p - High pressure systems generally bring fair weather. Low pressure systems usually bring cloudy, unstable conditions. The general movement of highs and lows is from west to east across the United States.</p>	<p>Pg. 14 Worksheet</p> <p>Show Off: What kind of weather does high pressure systems bring? low pressure systems?</p>

NAME: _____

During a phase change, heat energy is absorbed or released.

Energy is absorbed when a solid changes to a liquid and when a liquid changes to a gas. Energy is released when a gas changes to a liquid and when a liquid changes to a solid. (PS 4.2c)

Directions: identify the phases that are undergoing a physical change. Determine whether or not Energy is ABSORBED or RELEASED.

Beginning Phase		Ending Phase
		
Phase:	Energy is	Phase:
		
Phase:	Energy is	Phase:
		
Phase:	Energy is	Phase:

Directions: Create your own example of a phase change. Identify the phase and determine whether or not energy is being absorbed or released.

Show Off: When is energy released? When is energy absorbed?

NAME: _____

**Why does Ice Cold Dr. Pepper get warmer
and Hot Cocoa get colder?**

Heat always flows from someplace hotter toward someplace cooler.

Heat moves in predictable ways, flowing from warmer objects to cooler ones, until both reach the same temperature. (PS 4.2a)



For something hot like cocoa, the heat flows from the cocoa to the air of the room. So the cocoa cools down. If you leave it overnight, it will become the same temperature as the surrounding air.

Room air is warmer than cold soda. So the heat flows from room air to the soda, and the soda warms up. If you leave the soda overnight, it will have time to reach the same temperature as the surrounding air...and the cocoa.

Directions: Read the following scenario and answer the following questions.

During Independent Reading, Alliyah sips on ice-cold, Aspire-prohibited, 603-banned Tropical Fantasy while Dameron sips on hot Dunkin Doughnuts cappuccino. IR ends and they accidentally leave their half-drunken drinks in the corner, where they were reading.

The next morning Ms.A finds the illegal drinks.

1. What happened to the icy, cold Tropical Fantasy overnight? How does heat move?

2. What happened to the super hot Cappuccino overnight? How does heat move?

Directions: In the space below or on the back, write your own story where matter is heated and cooled, explaining the direction heat travels. Refer to the Soda/Hot Cocoa example for reference.

Show Off: In what direction, or how does heat flow?

NAME: _____

M a g i c a l I n f l a t i n g B a l l o o n s

Heat causes things to expand (get bigger) and cold causes things to contract (get smaller).

Things such as air will contract and take up less room when cooled. Similarly, things will expand when they get hot. Most substances expand when heated or contract when cooled. Water is an exception, expanding when changing to ice. (PS 4.2d)

The experiment.

Question:What will happen to a regular, old balloon when placed over the top of bottle full of warm air?

Prediction: _____

Materials:

Balloons

1 Bottle full of hot water

1 bowl full of cold water

1 tub for excess water

Procedure

1. Fill the bottle with hot water.
2. Fill the bowl with cold water.
3. Let both sit for one minute. Then empty out the bottle.
4. Stretch a balloon over the mouth of the bottle.

OBSERVE:What happened? _____

5. Set the bottle with the balloon on top in the bowl of cold water.

OBSERVE:What happened? _____

Explanation:

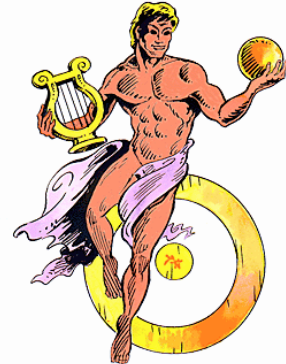
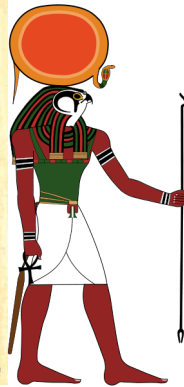
The warm water heats the bottle. When the water is poured out the heated bottle then heats the air inside of it. When the bottle is placed in the cold water, the air inside the bottle cools and contracts (gets smaller and takes up less room), causing outside air to be drawn in, pulling the balloon in and inflating it inside the bottle.

Expansion is an increase in the size of a body without the addition of material to the body. Most solids and liquids expand when they are heated and contract when they are cooled. Gases also expand when they are heated at a constant pressure. If a gas is heated in a container that prevents expansion, the pressure of the gas increases.

Heat causes expansion because it increases the vibrations of a material's atoms or molecules. In a gas, heat also increases the speed at which the atoms or molecules move about. The increased movement forces the atoms or molecules farther apart and the body becomes larger.

Show Off:What happens substances are heated? What happens when substances are cooled?

NAME: _____



There is reason why Ancient Folks praised the

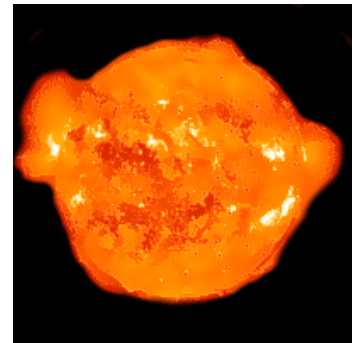
SUN

The Sun is a major source of energy for Earth.

The provides many sources of energy including heat, nuclear and geothermal energy. (PS 4.1a)

This king of our Solar System rules because compared to everything else, it is so large. It contains about 98% of all the mass, or rocks, dust, and gas in the Solar System. If the Sun were hollow a million Earths could fit inside.

Here is a close up view of the only star astronomers can see close up. Its name is Sol. Sol, which looks like a beautiful bright yellow and red fireball, is not actually on fire. It is glowing because a gas called hydrogen is turning into another gas called helium--a nuclear reaction (like the atom bomb!). These nuclear reactions create a lot of heat which makes the sun glow. Think of the metal inside a toaster, which glows even though it is not on fire. This star is so important because it provides ALL the energy necessary to sustain life on Earth.

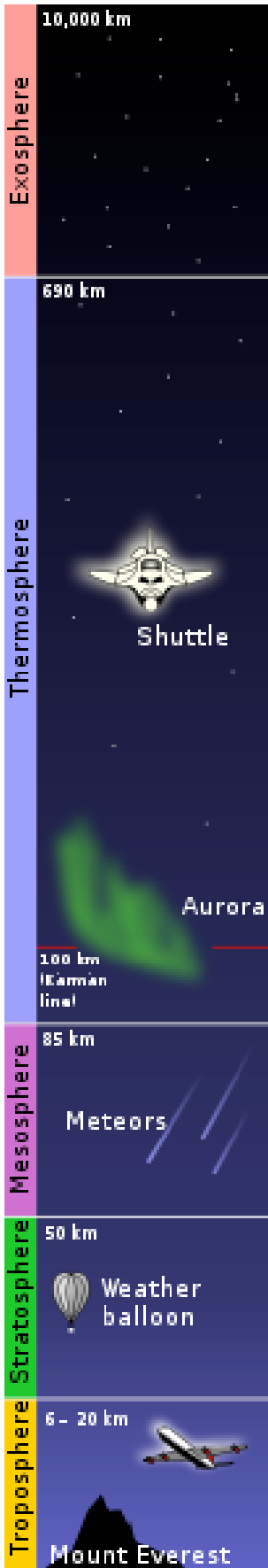


What kinds of energy does the Sun produce? _____
Why is the important to life on earth?
How big is the Sun?
Why does the Sun glow?
What is another name for the Sun?
Why do you think people worshipped the Sun like it were a god?

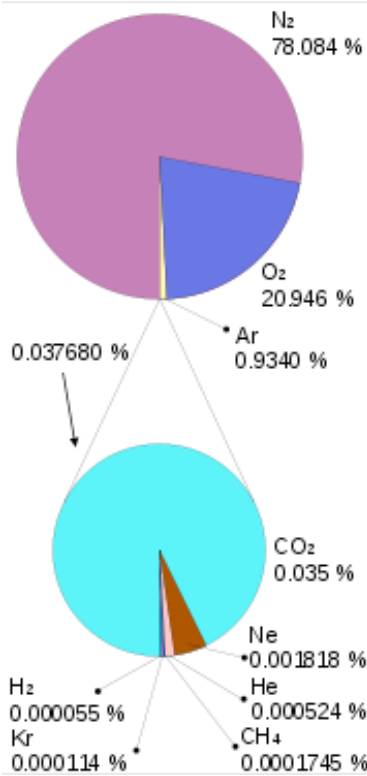
Show Off: What kind of energy does the Sun produce? Why is this important?

NAME: _____

THE ATMOSPHERE



- Protects us from the SUN heat (without it, we would not exist)
- Nearly all weather occurs in the lowest level of the atmosphere, the troposphere



The atmosphere is a mixture of gases, including nitrogen (N) and oxygen (O) with small amounts of water, carbon dioxide (CO₂), and other trace gases. Nearly all the atmosphere is confined to a thin shell surrounding Earth. The atmosphere is separated, or stratified, into layers, each having distinct properties. Nearly all weather occurs in the lowest layer of the atmosphere. (PS 2.1a)

The pie chart to the left tells us the following about the Atmosphere...

1. The atmosphere is **GASSY!** It is made up of these **THREE** gases

- _____
- _____
- _____

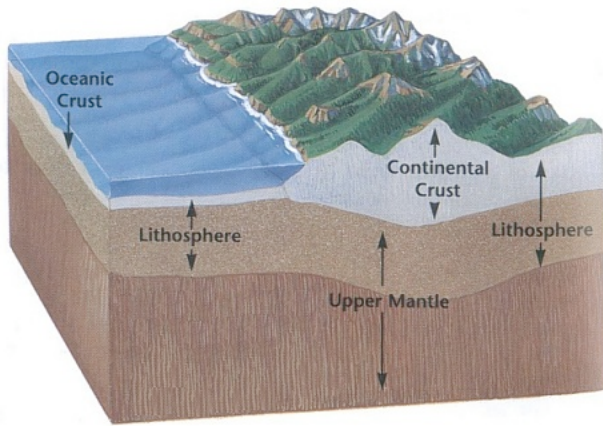
DIRECTIONS: Create a way to remember the five layers of the Atmosphere (Pictowords, Anagrams, songs, etc.), and then answer the questions below

What three gasses are in the Atmosphere?
Give TWO reasons why the atmosphere is important?
Where does almost all weather occur on Earth? Be specific.

Show Off: Gasses in Atmosphere? Layers? Importance of Atmosphere?

NAME: _____

...and you thought the Atmosphere was the only LAYER important to the Earth...



Introducing...the **LITHOSPHERE**-The outer layer of the Earth, comprising the crust and the upper part of the mantle. The lithosphere is about sixty miles thick.

annnnnd...the **HYDROSPHERE**- the water on or surrounding the surface of the globe, including the water of the oceans and the water in the atmosphere.

Water circulates throughout the atmosphere, lithosphere, and hydrosphere in what is known as the water cycle. (PS2.1j)

The Water Cycle is _____

Water Cycle	
	<p>WHAT LAYER IS THIS? (HINT: weather)</p>
	<p>WHAT LAYER IS THIS? (HINT: waterfall)</p>
	<p>WHAT LAYER IS THIS? (HINT: below ocean)</p>

Show Off: What is the water cycle? What layers are involved? What exactly are each layer?!

NAME: _____

WEATHER.

Ps2.2i Weather describes the conditions of the atmosphere at a given location for a short period of time.



The term **weather** describes the state of the atmosphere at a particular place and time – whether it is warm or cold, wet or dry, and how cloudy or windy it is, for example.

Without the **sun** there would be no weather. Sunlight is the energy which powers the world’s weather systems. By warming the air above the Earth, the atmosphere is kept in **constant motion** – creating weather



features such as wind, rain, snow, hail and thunder, as well as sunshine itself.

In some places, such as deserts or rainforests, the weather is much the **same** all year round. However in other places, like the U.S., we expect a certain kind of weather at certain times of the year.

1. Define Weather. _____.
2. What is absolutely necessary for weather? (ie weather would not exist without this) _____.
3. The energy from sunlight powers _____.
4. In what places is the weather very similar during the year? _____.
5. What layer of the atmosphere does all weather occur? _____.
6. Why doesn't weather describe conditions of the atmosphere over a LONG period of time?

Show Off: Define weather? What is so important to powering weather systems?

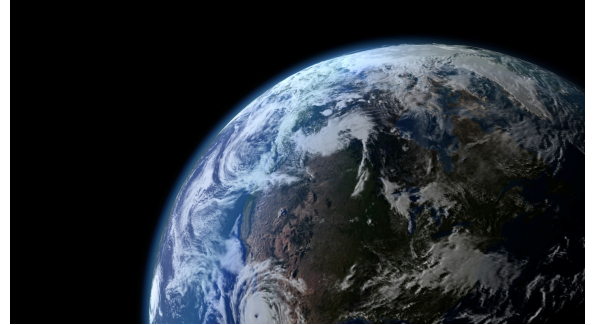
NAME: _____

CAUSES OF WEATHER

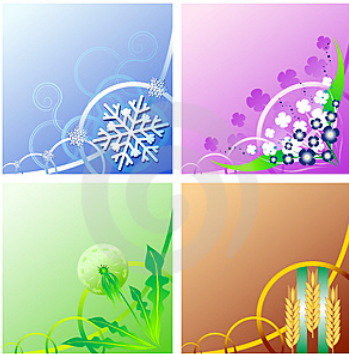
PS2.2k - The uneven heating of the Earth's surface is the cause of weather.

Heating by the sun takes place **unevenly** – with some places around the world receiving more heat than others, and the amount also changing on a daily and yearly basis.

This variation in amount of heat received is caused by the **curved surface** of the Earth. Although the sun's rays travel to Earth in straight parallel lines, they strike different areas of the surface at different angles. The sun's rays are most direct near the **Equator**, where they arrive at an angle of nearly 90°. This means they are concentrated on a smaller area and so regions around the Equator are very **hot**.



Seasons occur because the Earth is tilted at an angle on its axis. As the Earth moves around the sun during the year, different parts of the Earth are tilted towards the sun at different times.



These movements of the Earth all contribute to give the four seasons we experience. However, because of the way the seasons work, the **opposite** sides of the equator experience **opposite** seasons as the Earth moves round the sun each year. For example winter happens in Europe and the United States when it is summer on the opposite side of the world, in Australia.

1. Give two reasons why heating by the sun is uneven on ALL of Earth? (Hint: think of Earth's surface, think of earth's movement around the sun)

2. Why do seasons occur? Explain how seasons work.

3. If it's winter in South America, what season is probably taking place on the continent of Asia?

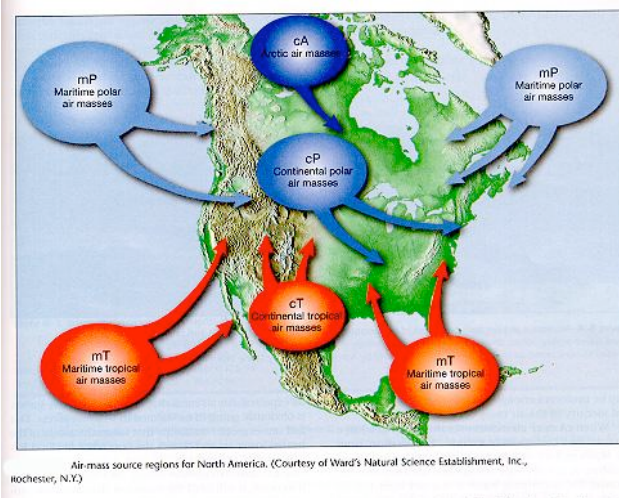
4. The uneven heating of the earth's surface is the cause of _____.

Show Off: What causes weather? Why are there seasons?

NAME: _____

It's All About the Air

PS2.21 - Air masses form when air remains nearly stationary over a large section of Earth's surface and takes on the conditions of temperature and humidity from that location.



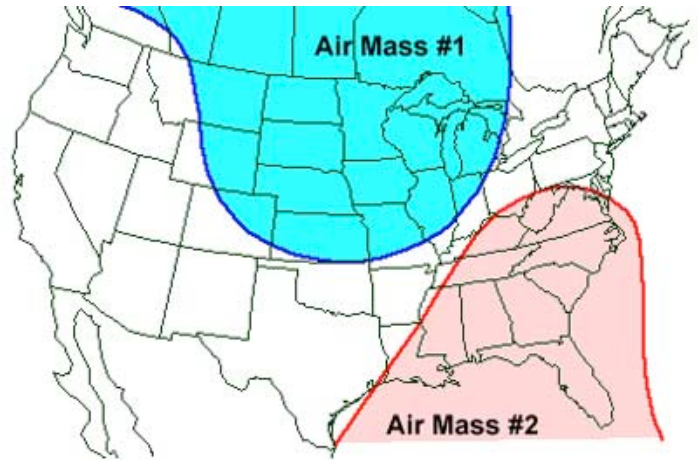
Along with sunshine, the **moisture** in the air is what creates all of our weather. These two features work together to form clouds, to make rain and thunderstorms, and to cause winds to blow. Without the sun or moisture, the Earth would have no weather.

Even on the sunniest day and over the hottest deserts, the air is full of water. Without realizing it, we are surrounded by **water** all the time. The air acts like a sponge and continually soaks up water. This water is in the form of invisible **vapor**, and has been evaporated from oceans, lakes and rivers. The actual amount of water vapor in the air (its **humidity**) depends on how hot and dry the area is.

Air

(vapors and all) moves in large pockets called **Air Masses**. Air can rise for a number of reasons. It may rise over mountainous terrain, when it is heated by warm ground and so made lighter, or if cold, heavier air pushes under it and forces it upwards.

As the air rises and cools and the water vapour turns to drops of liquid, these drops gather together to form clouds. Whilst this process is standard, the clouds that result vary in a number of ways – including their shape, color and height. These characteristics can give us some idea of what the weather will be like over the next few hours or days.



1. _____ + _____ = WEATHER
2. What is the name of the water cycle layer where all water can be found? _____
3. What is humidity? _____
4. Air will rise when it is _____.
5. _____ air is heavier and will push under warm air, forcing it further upward.
6. How do clouds form? _____

Show Off: What is an Air Mass? What is humidity? How do clouds form?

NAME: _____

We know 'bout temperature. We know 'bout humidity. What exactly is AIR PRESSURE?

PS2.21.2 Weather conditions at a location are determined primarily by temperature, humidity, and pressure of air masses over that location.

As we know, the air in the atmosphere is made up of a number of gases. These gases press down on the Earth's surface, exerting a force that we call atmospheric pressure or **air pressure**. Although we are usually unaware of this pressure, it actually presses down very hard – roughly equivalent to the force of an elephant balancing on a desk!



Air pressure varies over time and from place to place. If we travel up a mountain or go up in a hot air balloon, for example, the air pressure gets less the higher we go. We can explain this difference by comparing air pressure to a pile of blankets on your bed.

Air pressure at sea level is the equivalent of having many blankets, which would feel very heavy. If you have only one blanket though, it would feel very light, and this is like the air pressure at the top of a mountain. Each layer of air presses down on the layers below, and so the greatest pressure is at ground level where we have the maximum amount of air above.

If we go above the height of mountains and into the stratosphere, the pressure will decrease until it reaches about zero, as here there is hardly any air above it.

1. What gases are in the atmosphere? _____.
2. What is air pressure? _____.
3. How hard is this air pressing down? _____.
4. Coming up with your own analogy, write an explanation of how air pressure changes from low places to very high places for one of the first graders in Ms. Almore's mama's class.

Show Off: What is air pressure? How does it change from place to place?

PS2.2m - Most local weather condition changes are caused by movement of air masses.

Changes in air pressure bring **changes** in the weather and make winds blow. Air usually moves from areas of high pressure to areas of low pressure, and this produces winds. This can be easily remembered with the phrase: "Winds blow from high to low!"

What makes the wind blow? _____.

What direction does the wind blow? _____.

NAME: _____

High Pressure in the West, Low Pressure in the East

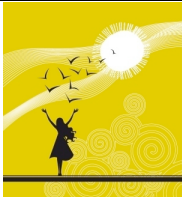

PS 2.2p - High pressure systems generally bring fair weather. Low pressure systems usually bring cloudy, unstable conditions. The general movement of highs and lows is from west to east across the United States.

Air pressure also varies over time, and these temporal differences are usually caused by the temperature of the air. Cool air is denser (heavier) than warm air. Warm air is less dense (lighter) than cool air and will therefore rise above it.

Areas of **high pressure** can be caused when cool air is sinking and pressing on the ground. At this time, the weather is usually **dry** and clear. In contrast, when warm air rises, it causes a region of **low pressure**. With low pressure, the weather is often **wet** and cloudy.

Changes in air pressure are measured on an instrument called a **barometer**. Most barometers give a reading in millibars (mb for short). Readings over 1010 mb indicate high pressure.

DIRECTIONS: Draw the weather conditions at the following pressure systems.

High Pressure System	Low Pressure System			
How is the weather in California?			How is the weather on the East Coast?	

Which air is heavier? Circle one. Cool or Warm

When cool air sinks and presses on the ground, we see areas of _____ pressure. The weather is usually _____ and _____.

When warm air rises, it causes a region of _____ pressure. The weather is often _____ and _____.

What is a barometer? _____.

How can remember what happens when air is light or heavy, high or low pressure, and dry or wet?
(example song: Cool air sinks/ pressure is high/ the weather is/ clear and dry)

Show Off: What kind of weather does high pressure systems bring? low pressure systems?