**Study Guide Science 5th grade -Weather and Climate 2**

**Weather-** the day to day changes of:

temperature, precipitation, wind, and air pressure.

**Climate-** long term patterns over a period of time of an area. The average over many years. Climate changes very slowly.

**3 Major Climate Zones**

1. Tropical –warm and wet most of the year (equator)

2. Temperate (go through cycles of cold and snowy or hot and dry) in between areas

Temperate zones usually have four seasons (winter, spring, summer, fall)

3. Polar (cold and dry most of the year (North/South Poles)



**Temperature** – the measurement of the condition of the air. How warm or cool is the air?

**Wind Direction** – Which way is the wind blowing? Named for the direction from which it is blowing. IF the wind is blowing from the SW (Southwest) then the winds are considered SW winds.

**Types of Precipitation** – water that falls from clouds in either liquid or solid form.

1. Rain

2. Sleet

3. Hail

4. Snow

5. Freezing Rain (the atmosphere is warm but the temperature on the ground is freezing-so the rain freezes on contact)

**Air Pressure – the weight of the air. This is BAROMETRIC PRESSURE!**

**Cold air** is **h**eavy and wants to sink, therefore making the air feel **h**eavy and creating

**HIGH PRESSURE. (cold air is more dense so it drops)**

***The Weather is Cold and Dry when it is HIGH***

**Warm air** is **L**ight and wants to rise, therefore making the air feel **L**ight and creating

**LOW PRESSURE. (warm air is less dense so it floats or rises)**

***Warm and Wet Weather is What Low Pressure Gets***

**HIGH PRESSURE ALWAYS FLOWS INTO LOW PRESSURE. Cold air always wants to warm up. H L**

**Differences in Air Pressure/Temperature Cause Wind**

Air moves from places with high pressure to places with low air pressure.

This creates wind (the uneven heating of air-some air is warmer than other air)

The greater the difference in air pressure between the two places- and the shorter the distance between them- the stronger the wind.

**Cloud Chart**

 **Cloud Type Weather and Location**

|  |  |
| --- | --- |
| Cirrus (Curl) 689381_cirrus_clouds | High clouds, clear skies, warm temperatures, no precipitation, formed from ice crystals, called thin, wispy or stringy |
| Cumulus (Heap) MCj03111160000[1] | Middle clouds, partly cloudy skies, mild temperatures, look like fluffy cotton balls possible precipitation (10-50%) |
| Stratus clouds2 | Low clouds, looks like a flat blanket, arranged in layers, cloudy skies, usually gray in color, cool temperatures, good chance for precipitation (50% or higher) |
| Cumulonimbus cumulonimbus-cloud-akbhhf-sw | Storm clouds that form in all layers of the atmosphere, strong winds, heavy precipitation. Dark in color.Nimb- (means rain producing)  |

**Rain Shadow**



**Mountain and Valley Breezes**



**Valley Breeze**- During the day, the sun heats up valley air rapidly. This causes it to rise, causing a warm, up slope wind.

**Mountain Breeze**-At night, the process is reversed. Mountain air cools rapidly at night and "falls" down slope, causing a wind going in the other direction.

**Land and Sea Breezes (High Pressure goes to Low Pressure)**

 **Low Pressure High Pressure**

 **Air is warm and light Air is cool and heavy**

 **because the warm land is because the cool water is**

 **heating up the air above it. cooling the air above it.**



When you are on the beach, **during the day** the sun heats **the land faster than the water** and makes the air above it hot this air rises and pulls in air from the sea to replace it, this is a **sea breeze.**

 **High Pressure Low Pressure**

 **Air is cool and heavy Air is warm and light**

 **because the cool land is because the warmer water is**

 **cooling the air above it. heating up the air above it.**



**At night the land cools down** and when it is colder than the sea (**which remains almost the same temperature day and night**) then hot air rises from the sea surface and it pulls in air form the land, this is a **land breeze.**

**Jet Stream**



**A tubular ribbon of high-speed winds, generally from the West and moving East and at a high altitude (height) of 20,000 to 40,000 feet**

**Air Mass**

An air mass is a large body of air that has similar temperature and moisture properties throughout.

**Air Masses can be warm/wet, warm/dry, cold/dry, cold/wet etc. depending on where it originated (or came from).**

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 **Polar Air Mass from Canada Maritime (Wet Mass from the Gulf of Mexico)**

**Fronts**

The line between two chunks (masses) of cold and warm air.

Fronts are boundary lines where to air masses meet. Storms often occur at fronts.

**Cold Front- Cold Air Replaces Warm Air**

 **(shown by a blue line with triangles pointing to where the air is moving)**

**The warm air, which holds a lot of water vapor, gets pushed upward quickly.**

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**When a cold front passes through, temperatures can drop more than 15 degrees within the first hour. Also, usually causes heavy rains, sometimes with hail, thunder and lightning. This type of storm is often violent, but it ends quickly.**

**Warm Front- Warm Air replaces Cold Air**

**(Shown by solid red line with semicircles pointing towards the colder air and in the direction of movement.)**

**The warm, humid air eventually rises high enough for water droplets and clouds to form, and rain to fall.**

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**When a warm front passes through, the air becomes noticeably warmer and more humid than it was before. Precipitation will be steady rain and will last longer than a cold front.**

**Weather Instruments (Tools Meteorologists use to measure weather)**

|  |  |
| --- | --- |
| **Name of Tool** | **What it Measures** |
| **H**ygrometer | the **H**umidity or moisture in the air (how much water vapor) |
| **T**hermometer | **T**emperature |
| Anemometer  | Wind Speed (how many miles per hour) |
| **R**ain Gauge | Precipitation (Amount of **R**ainfall**)** |
| Wind Vane (Weather Vane), Wind Sock | Wind Direction (North, East, South, West) |
| Barometer | **Measures** air pressure **(high or low)** Based on inches or bpms |
| Doppler Radar | Direction and speed of rain drops as radar energy bounces off them |
| Weather Balloon | A balloon sent into the atmosphere to take measurements of air pressure, temperature etc. in the layers of the atmosphere |