Lesson Plan

Subject: Earth Science Grade Level: Gifted 6th

10-19-15 to 10-23-15

Content Standard:

S6E4. Students will understand how the distribution of land and oceans affects climate and weather. a. Demonstrate that land and water absorb and lose heat at different rates and explain the resulting effects on weather patterns. Relate how moisture evaporating from the oceans affects the weather patterns and weather events such as hurricanes

S6E5. Students will investigate the scientific view of how the earth's surface is formed.

Vocabulary: global winds, Coriolis effect, polar easterlies, westerlies, trade winds, jet stream, doldrums, horse latitudes,wind, cumulus clouds, cirrus clouds, stratus clouds, condensation, evaporation, runoff, hurricane, tornado, cyclone

Parallel
Alternative
Station
Team
Independent

	Beginning May include: Opening, warm up, review, anticipatory set, etc	**Middle** May include: Instruction, checking for understanding, independent or group practice	**End** May include: Closing, assessments, extension of lesson, etc.
Monday	Review with video	Task: Student will visit stations based on types of clouds, water cycle severe storms- each station has a reading selection with questions, and culminating project	3-2-1
Tuesday	Test on Global winds	Task: Student will visit stations based on types of clouds, water cycle severe storms- each station has a reading selection with questions, and culminating project	
Wednesday	Opening: What is a rock and mineral?	Video of rocks and minerals Complete Venn Diagram to compare/contrast rocks and minerals	**3-2-1** HW: Directed Reading A
Thursday	Opening: What is a Mineral? Read passage and answer questions	Explain the difference two groups of minerals. Task 1: Identify minerals lab	Explain the two groups of minerals and give example HW: Textbook pg 70-73 Write questions and answers
Friday		STEM- Boys	

Marzano's Essential 9 (Highlight Strategies Used)	Multiple Intelligence (Highlight Accessed Intelligences)
• Identifying Similarities and Difference • Summarizing and Note-taking • Reinforcing Effort and Providing Recognition • Homework and Practice • Nonlinguistic Representations • Cooperative Learning • Setting Objectives and Providing Feedback • Generating and Testing Hypotheses • Cues, Questions, and Advance Organizers	• Verbal-Linguistic • Logical-Mathematical • Visual-Spatial • Bodily-Kinesthetic • Musical • Interpersonal • Intrapersonal • Naturalistic

Doldrums

What, Where, and How:

- Do you ever get the doldrums (feel sluggish)? The word "doldrums" can be used to describe a person who doesn't feel like doing anything (someone who isn't active). Just like people, winds can also be inactive and called "doldrums". Areas on the Earth which are known for having little or no winds are called the doldrums. The doldrums are located at the equator.

Why do the doldrums occur?

- Remember how we learned that air near the equator expands and rises? The rising air is a vertical movement. Because there is no horizontal movement of air, the winds at the equator are very weak and the doldrums are created.

Characteristics:

- The doldrums are an area of low pressure. Rising warm, humid air condenses and forms clouds at the doldrums. Trade winds also converge (come together) here.

Horse Latitudes

What, Where, and How:

- Just like the doldrums, the horse latitudes are also an area with weak winds. The horse latitudes are located at 30-degrees latitude (remember: both North and South latitudes). Long ago, when sailors would travel at this latitude their ships would get stuck for weeks because there was no wind to power their sails. The region was called the "horse latitudes," because sailors would throw their horses overboard or eat them after running out of food and water for them!!!

Why do the horse latitudes occur?

- Just like at the equator, there is no horizontal movement of air at 30-degrees latitude. Since the movement of air is strictly vertical, there is very little wind.

Characteristics:

- Air sinks at 30-degrees latitude and causes high pressure. Many of the world's deserts are located at this latitude.

Wind Belts

There are 3 major global wind belts: the trade winds, the prevailing westerlies, and the polar easterlies.

Trade Winds:

- This is how the trade winds are formed:
  1. Air sinks at 30-degrees latitude.
  2. The air blows toward the equator.
  3. The wind is deflected (curved) due to the Coriolis effect.

- These events produce the trade winds which occur between 30-degrees North latitude and the equator **AND** 30-degrees South latitude and the equator. So, there are trade winds in each hemisphere.

- The winds blow from the east to the west, but are curved a little bit due to the Coriolis effect. (see picture on pg. 52 in book if necessary)

Westerlies:

- This is how the westerlies are formed:
  1. The air that sinks at 30-degrees latitude also blows towards the poles.
  2. The wind blows from west to east and is deflected by the Coriolis effect.

- The westerlies occur between 30-degrees and 60-degrees latitude in each hemisphere (north and south). The westerlies blow from the west to the east but are curved a bit. (see picture on pg. 52 in book if necessary)

Polar Easterlies:

- This is how the polar easterlies are formed:
  1. At the poles, cold air sinks.
  2. The air flows back towards the equator.
  3. The air is deflected by the Coriolis effect.

- The polar easterlies are located between 60-degrees and 90-degrees latitude in both the northern and southern hemispheres. They blow from the east to the west but are slightly curved due to the Coriolis effect. (see picture on pg. 52 in book if necessary)

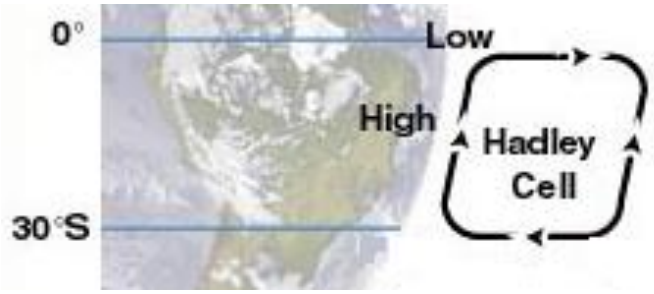
Circulation Cells

Remember the dishsoap and food-coloring lab? The experiment demonstrated how convection works on Earth. Air circulates from the equator to the pole due to convection, but there are actually 3 different circulation cells in each hemisphere: the Hadley cell, the Ferrel cell, and the Polar cell.

Hadley Cell:

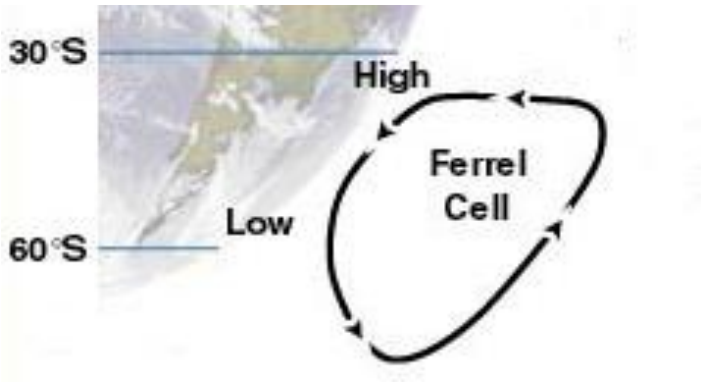
- The Hadley cell circulation forms when warm air at the equator rises and begins to move toward the poles. The air continues to move towards the poles until it reaches 30-degrees latitude. At this latitude the air sinks and then flows back towards the equator. The Hadley cell is located between 0-degrees and 30-

degrees latitude in both hemispheres. Look at the picture of the Hadley cell in the Southern hemisphere below.



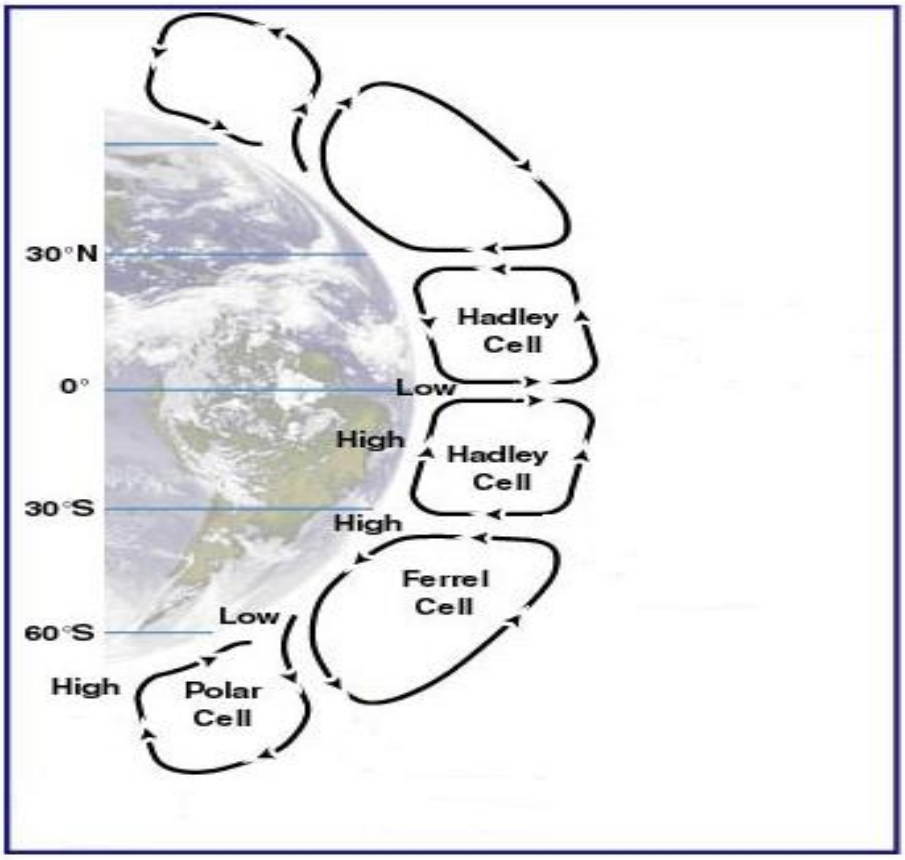
Ferrel Cell:

- The Ferrel cell is formed when air sinks at 30-degrees latitude and travels on the Earth's surface towards the poles. When the air reaches 60-degrees latitude it rises and flows back towards the equator. The Ferrel cell is located between 30-degrees and 60-degrees latitude in both hemispheres. Look at the picture of the Ferrel cell in the Southern hemisphere below.



Polar Cell:

The polar cell forms when the air at 60-degrees latitude) rises and travels toward the poles. At the pole (90-degrees latitude) the air sinks and travels back towards the equator on the surface.



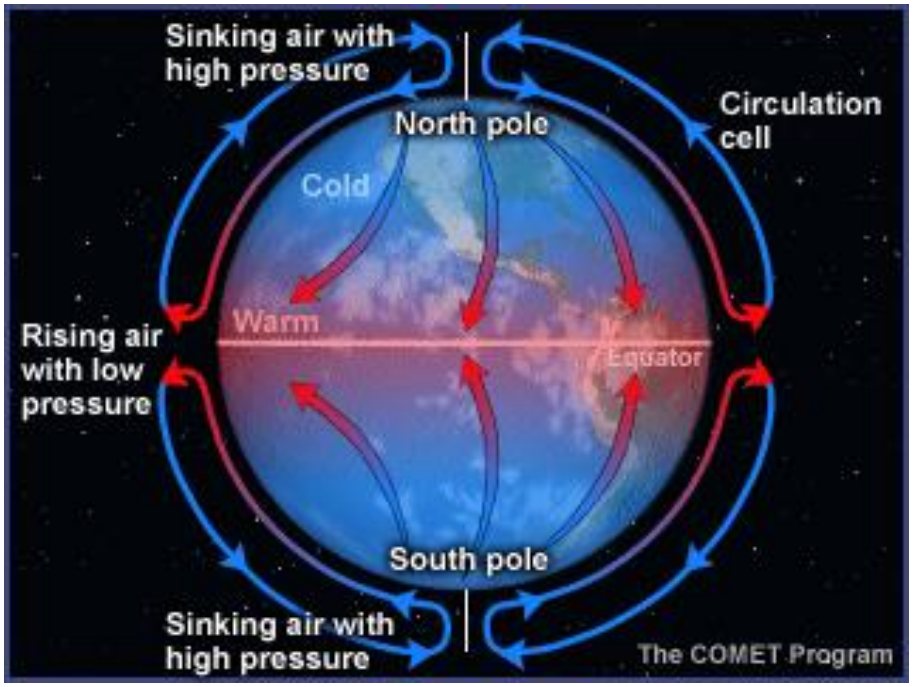
High pressure exists as 30-degrees latitude and 90-degrees latitude because air is sinking.
Low pressure exists at the equator and 60-degrees latitude because air is expanding and rising.

Circulation in a Rotating vs. Non-Rotating Earth

Remember the dishpan and food-coloring lab we saw? The food coloring convected and transferred heat from the equator to the poles. Is this exactly how air convection works on Earth?....let's find out!

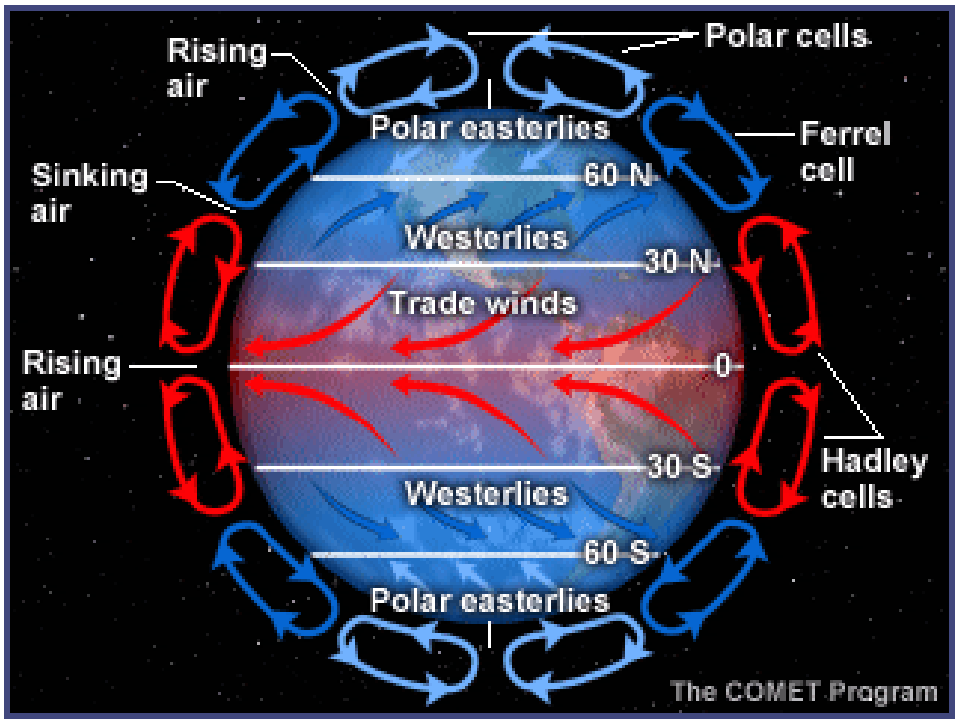
Non-rotating Earth:

- If Earth didn't rotate we would see only 1 convection cell in each hemisphere. This is how the convection cell would form:
  1. Air at the equator gets heated up, it expands, and rises.
  2. The air at the equator is low pressure.
  3. Air at the poles is cool. It condenses and sinks.
  4. The air at the poles is high pressure.
  5. Air always moves from HIGH to LOW pressure, so air from the poles travels towards the equator. Once the air at the equator is heated, it rises and expands back towards the poles.



Rotating Earth:

We know that our Earth rotates so convection is different than the non-rotating convection model. The Coriolis effect results from Earth's rotation. The Coriolis effect has an affect upon our winds and it actually creates multiple convection cells in each hemisphere (instead of just 1).



So, because our Earth rotates the Coriolis effect helps create multiple convection cells. There are 3 convection cells in each hemisphere. Look at the direction the arrows are pointing and draw how each cell convects on a rotating Earth (**You do not need to label the names**).

Global Wind Belts and Circulation Cells

1. Doldrums:

What are the doldrums? :

Where are the doldrums located? :

What are the characteristics of the doldrums and why do they occur? :

How did the doldrums get its name?:

Horse Latitudes:

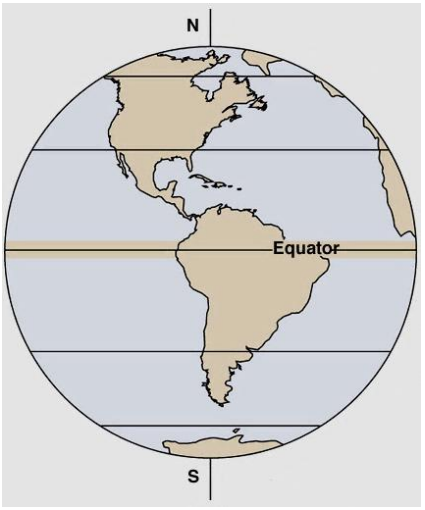
What are the horse latitudes? :

Where are the horse latitudes located? :

What are the characteristics of the horse latitudes and why do they occur? :

How did the horse latitudes get its name?:

Complete the picture: Label the horse latitudes, doldrums, and the latitudes at which each occurs.



2. Wind Belts

What are the 3 wind belts: Latitudes at which they occur: Direction of travel:

1._____ _____ _____
2._____ _____ _____
3._____ _____ _____

Label each wind belt and the direction the wind flows.

3. Circulation Cells

What are the 3 circulation cells:

1._____
2._____
3._____

Latitudes at which they occur:

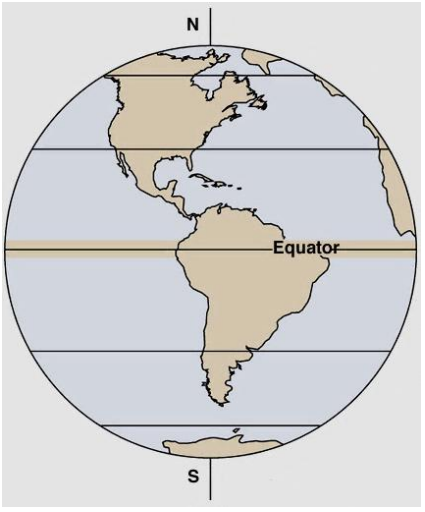
_____
_____
_____

Label each cell and the draw the direction of air circulation. Label areas of high and low pressure.

4. Circulation in rotating vs. non-rotating Earth

Draw a picture of how convection occurs on a non-rotating Earth.

Draw a picture of how convection occurs on a rotating Earth.



What is responsible for the differences in convection?

Follow along with the class-constructed global map and construct your own global map below. (Be sure to include all relevant information/relationships)

End Project: Draw a representation of global winds

doldrums

tradewinds
horse latitudes
westerlies
polar easterlies

CLOUDS AND PRECIPITATION and the WATER CYCLE

A cloud is a visible aggregate of tiny water droplets and/or ice crystals suspended in the atmosphere. Clouds can exist in a variety of shapes and sizes. Some clouds are accompanied by precipitation: rain, snow, hail, sleet, and even freezing rain. The purpose of this module is to introduce a number of cloud classifications, different types of precipitation, and the mechanisms responsible for producing them which includes the water cycle.

Background:

Water is known to exist in three different states; as a solid, liquid or gas.

Clouds, snow, and rain are all made of some form of water. A cloud is comprised of tiny water droplets and/or ice crystals. A snowflake is an aggregate of many ice crystals. Rain is just liquid water.

Water Vapor:

Water existing as a gas is called water vapor. When referring to the amount of moisture in the air, we are actually referring to the amount of water vapor. If the air is described as "moist", that means the air contains large amounts of water vapor. Common sources of moisture for the United States are the warm moist air masses that flow northward from the Gulf of Mexico. If we say that the air is dry, it means it has a low amount of water vapor mixed in with it. Water vapor is invisible to the eye; but its importance can not be undervalued. It is primarily in the vapor phase that "water" is transported from place to place on a global scale. The atmosphere transports huge quantities of water (vapor) and energy, redistributing these so as to maintain a balance of water and energy all over the globe. Again water vapor is the gas form of water. All matter exists as a solid, liquid, or gas.

Temperature (ºC)	Vapor Capacity (g/m3)
-20	1.1
-15	1.6
-10	2.3
-5	3.4
0	4.8
5	6.8
10	9.4
15	12.9
20	17.3
25	23.2
30	30.5

At any given temperature, there is a maximum amount of water vapor that can exist in a volume of air. Once the maximum water vapor concentration is reached for a particular temperature, any additional vapor will change phase to liquid or solid (rain or snow). The higher the temperature, the more water vapor a volume of air is capable of holding. As air warms, the capacity for holding water vapor increases, and as it cools, the capacity decreases.

Cloud Types:

Clouds are classified into a system that uses Latin words to describe common the appearance of clouds as seen by an observer on the ground.

High-Level Clouds = cirrus
Mid-Level Clouds = cumulus
Low-Level Clouds = stratus

Cirrus Clouds

“thin and wispy “ The most common form of thin and often wispy cirrus clouds. Typically greater than 20,000 feet (6,000 meters), cirrus of ice crystals that originate from the freezing of Cirrus generally occur in fair weather and point movement at their elevation.

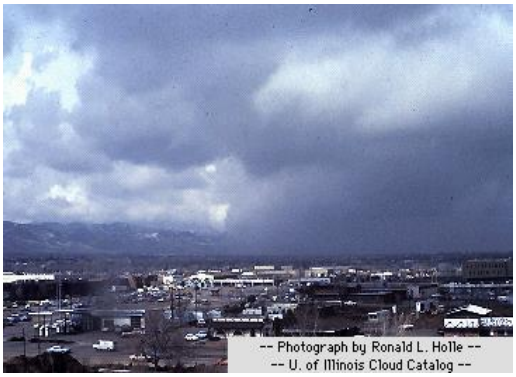
high-level clouds are found at heights clouds are composed water droplets. in the direction of air

Cumulus Clouds

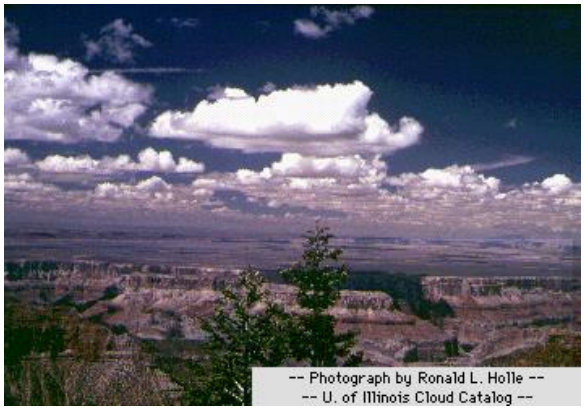
The bases of mid-level clouds typically appear between 6,500 to 20,000 feet (2,000 to 6,000 meters). Because of their lower altitudes, they are composed primarily of water droplets, however, they can also be composed of ice crystals when temperatures are cold enough. Altocumulus may appear as parallel bands. The presence of altocumulus clouds on a warm and humid summer morning is commonly followed by thunderstorms later in the day.

Low-level Clouds

Low clouds are composed of mostly water droplets since their bases generally lie below 6,500 feet (2,000 meters). However, when temperatures are cold enough, these clouds may also contain ice particles and snow. Stratus clouds are dark, low-level clouds accompanied by light to moderately falling precipitation



Fair Weather Cumulus Clouds



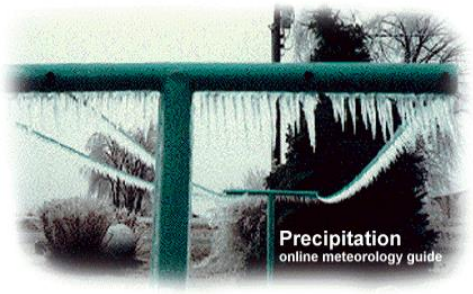
“puffy cotton balls floating in the sky”

Fair weather cumulus have the appearance of floating cotton and have a lifetime of 5-40 minutes. Known for their flat bases and distinct outlines, fair weather cumulus exhibit only slight vertical growth, with the cloud tops designating the limit of the rising air. Given suitable conditions, however, harmless fair weather cumulus can later develop into powerful thunderstorms.

Cirrostratus Clouds

Cirrostratus are sheet-like, high-level clouds composed of ice crystals. Though cirrostratus can cover the entire sky and be up to several thousand feet thick, they are relatively transparent, as the sun or the moon can easily be seen through them. Sometimes the only indication of their presence is given by an observed halo around the sun or moon. Halos result from the refraction of light by the cloud's ice crystals.

The formation of clouds can lead to precipitation.



When cloud particles become too heavy to remain suspended in the air, they fall to the earth. Precipitation occurs in a variety of forms: hail, rain, freezing rain, sleet or snow.

Saturation When a volume of air filled to its capacity for water vapor, it is said to be saturated. When air is saturated it cannot hold any more water vapor. What air is saturated its relative humidity is 100%. When the air is saturated with water vapor, the result is precipitation. . Precipitation may be composed snow, rain, drizzle, or hail. Saturation can be achieved in two different ways.

1. As a volume of air cools in temperature, its capacity to hold water vapor decreases.

2. Saturation can also occur if water vapor is added to a volume of air until it is filled to its capacity.

Rain

Rain develops when growing cloud droplets become too heavy to remain in the cloud and as a result, fall toward the surface as rain (due to the force of gravity).

Hail:

Hail is a large frozen raindrop produced by intense thunderstorms. As the snowflakes fall, liquid water freezes onto them forming ice pellets. The pellet gets larger and larger as more and more droplets become attached to the first pellet. Upon reaching the bottom of the cloud, these ice pellets are sometimes brought backup to the top of the cloud, where they continue to attract more rain drops. As the rain drops (inside the cloud) become stuck to the ice pellets, it continues to grow and grow. As the ice pellets once again fall through the cloud, another layer of ice is added and the hail stone grows even larger.

Freezing Rain

Ice storms can be the most devastating form of winter weather. Ice storms are often the cause of automobile accidents, power outages and personal injury. Regular rain falls through the sky, except it freezes upon impact with the cold surfaces of the ground.

Sleet

Sleet is less prevalent than freezing rain and is defined as frozen raindrops that bounce on impact with the ground or other objects. It is very similar to freezing rain in that it causes surfaces to become very slick, but its easily visible.

Snow

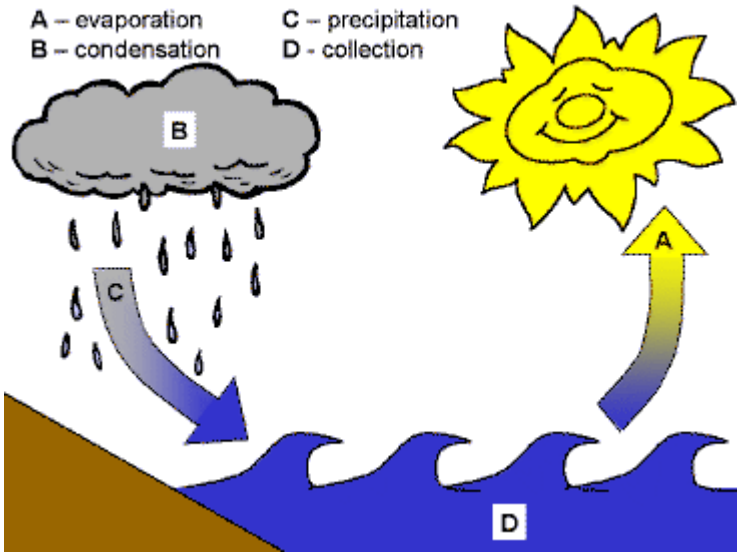
Snowflakes are simply aggregates of ice crystals that collect to each other as they fall toward the surface. Since the snowflakes do not pass through a layer of air warm enough to cause them to melt, they remain in tact and reach the ground as snow.

THE WATER CYCLE:

adapted from the work of Amber Wozniak: awozniak@nmu.edu

Run and get a glass of water and put it on the table next to you. Take a good long look at the water. Now -- can you guess how old it is?

The water in your glass may have fallen from the sky as rain just last week, but the water itself has been around pretty much as long as the earth has! When the first fish crawled out of the ocean onto the land, your glass of water was part of that ocean. When the Brontosaurus walked through lakes feeding on plants, your glass of water was part of those lakes. When kings and princesses, knights and squires took a drink from their wells, your glass of water was part of those wells.



The earth has a limited amount of water. That water keeps going around and around and around and around in what we call the "Water Cycle". This cycle is made up of a few main parts:

- evaporation (and transpiration)
- condensation
- precipitation
- collection

Evaporation: Evaporation is when the sun heats up water in rivers or lakes or the ocean and turns it into vapor or steam. The water vapor then goes into the air.

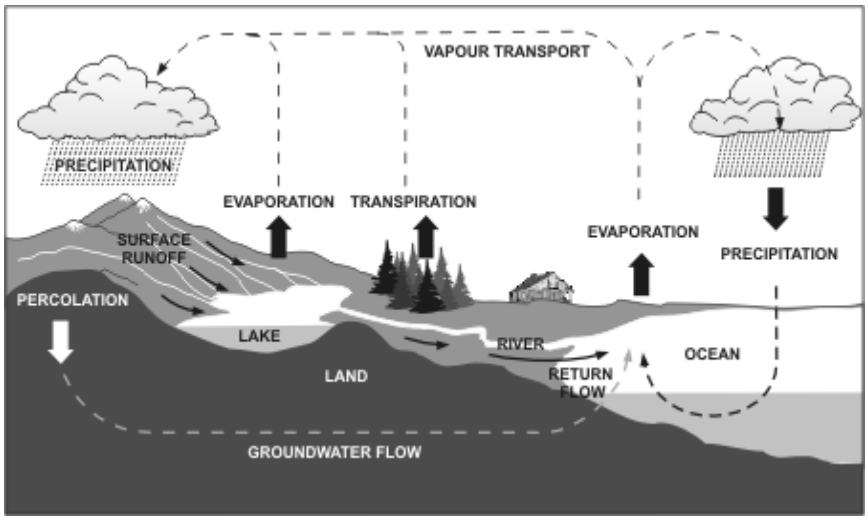
Transpiration: is the process by which plants lose water out of their leaves. Transpiration gives the water vapor back up into the air. Water vapor reaches the atmosphere primarily through evaporation and transpiration

Condensation: Occurs when water vapor in the air gets cold and changes back into liquid, forming clouds. You can see the same sort of thing at home... pour a glass of cold water on a hot day and watch what happens. Water forms on the outside of the glass. That water didn't somehow leak through the glass! It actually came from the air. Water vapor in the warm air, turns back into liquid when it touches the cold glass.

Precipitation: Precipitation occurs when so much water has condensed that the air cannot hold it anymore. The clouds get heavy and water falls back to the earth in the form of rain, hail, sleet or snow.

Collection: When water falls back to earth as precipitation, it may fall back in the oceans, lakes or rivers or it may end up on land. When it ends up on land, it will either soak into the earth or become part of the "ground water" that plants and animals use to drink or it may run over the soil and collect in the oceans, lakes or rivers where the cycle starts all over again.

A More Detailed Water Cycle Illustration



The oceans cover more than 70% of Earth's surface. Each year, approximately a 1-meter layer of the ocean surface is evaporated into the atmosphere. An equal amount is returned to the oceans by the combination of precipitation and runoff from rivers and streams.

While there is a world-wide balance in the amount of precipitation and evaporation, a local balance does not exist at most locations on Earth. Imbalances are reflected in the types of climates observed. Moist climates (such as tropical rain forests) are found where precipitation exceeds evaporation, while dry climates (deserts) prevail where evaporation exceeds precip

CLOUDS AND PRECIPITATION and the WATER CYCLE

Please read the accompanying text. Answer the following questions in complete sentences:

1. A cloud is a visible aggregate of _____ and/or _____ suspended in the atmosphere.
2. What are the three stages water may exist as?
3. Water existing as a gas is called _____.
4. When referring to the amount of moisture in the air, we are actually referring to the amount of _____.
5. If the air is described as "moist", that means the air contains large amounts of _____.
6. If we say that the air is dry, it means it has a low amount of _____.
7. Can you see water vapor?
8. Once the maximum water vapor concentration is reached, what happens when any additional vapor is added?
9. The higher the temperature, the _____water vapor a volume of air is capable of holding.
10. Where is water vapor less, in cold air or in warm air.
11. Clouds are classified into a system that uses _____ words.
12. Where are cirrus clouds found?
13. What are they usually composed of?
14. What can you determine about the temperature of the atmosphere where cirrus clouds are located?
15. Cumulus clouds on a warm day may sometimes be indicative of a _____ later is the day.
16. Low clouds are of mostly composed of _____
17. Sometimes the only indication of the presence of cirrostratus clouds is by an observed _____ around moon.
18. What is a synonym for the word “halo"?
19. What happens when cloud particles become too heavy?
20. When a volume of air filled to its capacity for water vapor, it is said to be _____.
21. When air is saturated its relative humidity is _____%.

22. When the air is saturated with water vapor, the result is _____.

23. As air cools in temperature, its capacity to hold water vapor _____..

24. What is hail?

25. Does freezing rain fall as a liquid or as a solid (ice)?

26. Is the water on earth limited or unlimited?

27. What is evaporation?

28. What is transpiration?

29. What is condensation?

30. How much of the Earth's surface is covered by water?

End Project 1 Diagram the water cycle.

End Project 2 Create a Cloud Flipbook

Cloud Classification Flipbook

Directions and Rubric

Directions:

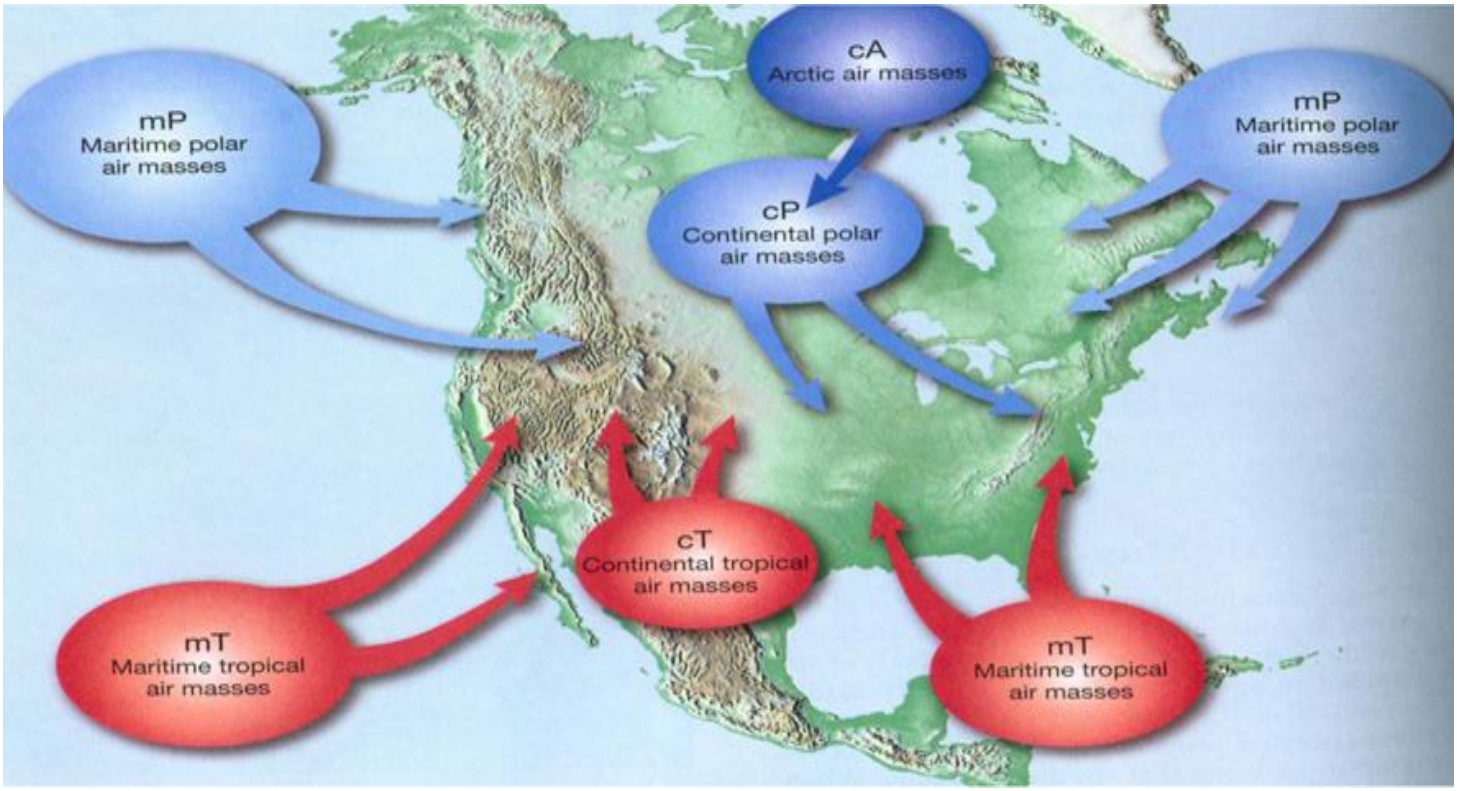
- Using your book, you are going to create a flipbook that tells and models the different characteristics of different clouds.
- The clouds that need to be included in your flipbook are …
    - *CIRRUS, CIRROCUMULUS, CUMULONIMBUS, CIRROSTRATUS, ALTOCUMULUS, ALTOSTRATUS, NIMBOSTRATUS, STRATUS, AND CUMULUS*
- For each different cloud you need to tell:
    - The altitude where they are located (the number of meters/feet and whether it is a high, medium, or low altitude).
    - Describe the color, size, and shape of the cloud.
    - Describe what type of weather is usually associated with that type of cloud.
- For each cloud, you need to draw or create a model of what it looks like. You may use markers, or glue and cotton balls.

Rubric:

Project Requirements	Possible Points
You must label the correct name on the flap for each different cloud.	***9 points*** = Each flap is labeled with the correct cloud name. (1 point for each label)
You must have the altitude (feet/meters and high, medium, or low) for each type of cloud.	***27 points*** = Each cloud flap must have the correct altitude measurement (feet/meters) and tell whether it is a high, medium, or low altitude. (3 points for each cloud type)
You must describe the color, size, and shape of each cloud.	***27 points*** = Each cloud type must have an accurate description of its size, shape, and color. (3 points for each cloud type)
You must describe what type of weather goes with each different type of cloud.	***27 points*** = Each cloud type has an accurate description of the type of weather associated with it. (3 points for each cloud type)
You must create a visual example of each different type of cloud using either markers or cotton balls.	***10 points*** = Each cloud type has an accurate visual example. (1 point for each model) (1 point for effort)
	Total Possible Points: 100

Air Mass Notes

Guiding Questions



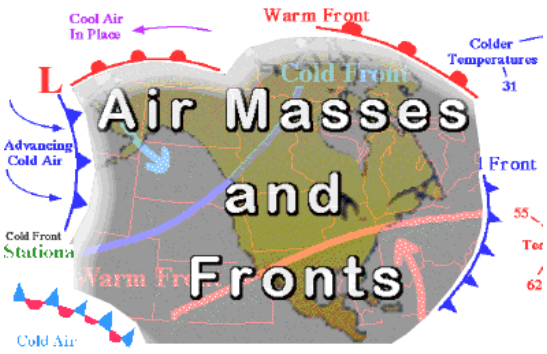
- How are air masses formed and how are they different?
- How do air masses and air fronts change our local weather conditions?

- **What are air masses?**
  - Large Bodies of air
  - Form when the air over a large region sits in one place for many days
  - The air gradually takes on the characteristics of the land or water below it
- **How do air masses affect our weather?**
  - As an air mass moves, it brings its characteristics with it
  - Changes weather
- **What are the two characteristics that describe air masses?**
  - Two words each
    - One for moisture
    - One for temperature
- **When describing moisture what words can we use?**
  - The first word of an air mass tells one where the mass was formed (over water or land)
  - **Continental**
    - Air masses formed over **land**
    - **DRY**
  - **Maritime**
    - Air masses formed over **water**
    - **WET**
- **When describing temperature what words can we use?**
  - The second word of an air mass tells whether an air mass was formed close to the equator or pole

- **Tropical**
  - Air masses formed near the **equator**
  - **WARM AIR**
- **Polar**
  - Air masses formed closer to the **poles**
  - **COLD AIR**

- **What are the 4 Major Air Masses?**
  - The four major air masses are:
    - Maritime Tropical (moist warm air)
    - Continental Tropical (dry warm air)
    - Maritime Polar (moist cold air)
    - Continental Polar (dry cold air)
- **What moves air masses?**
  - Winds
  - Air masses can travel away from the regions where they form
    - Can move with global winds
    - Can move with jet streams
  - As the air mass moves it changes

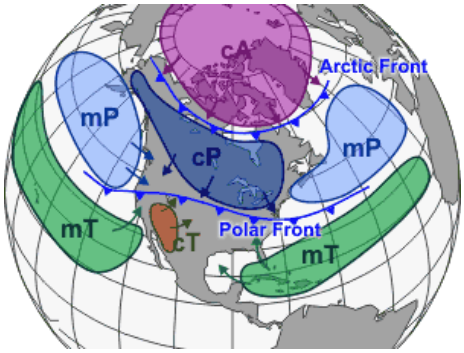
WHAT IS AN AIR MASS?



The purpose of this module:

You will be able to describe from where AIR MASSES originate and some basic properties about each air mass affecting the United States. Not all air masses are the same. When two different types of air masses collide with each other, different types of weather related events might occur.

Just as any country or state has boundaries, so do air masses. The boundaries of an air mass are called a front. This module examines air masses, the next module examines fronts, with detailed explanations about cold fronts and warm fronts.



Air Masses = uniform bodies of air

DEFINTION: An air mass is a large body of air that has similar temperature and moisture properties throughout. Air masses are extremely large. Judging from the picture below, an air mass can easily encompass 10 or even more entire states! An air mass takes on the temperature and humidity content (moisture level) of the area in which it forms. Thus, an air mass over an ocean area would probably be moister that an air mass formed over a desert. Likewise, an air mass formed over Canada would probably be a cold air mass, whereas an air mass formed over Mexico would likely be a warm (and dry) air mass.

REVIEW:

Air masses are classified by two characteristics: ***Temperature* and *Humidity***

- An air mass is that forms over a warm region is a warm air mass.
- An air mass is cold if it forms over a cold region.
- An air mass is dry if it forms over a dry region.
- An air mass is moist if it forms over a "water" region (ocean).

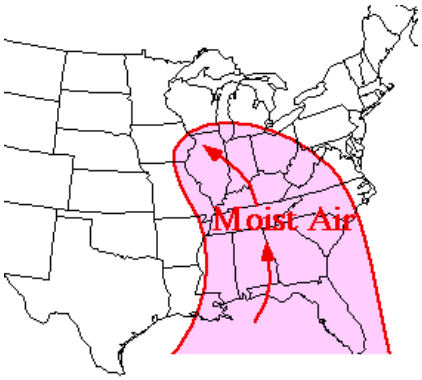
THE ROLE OF AIR PRESSURE:

- warm air masses usually and have low air pressure (unstable weather)
- cold air masses have high air pressure (stable weather)
- Low pressure systems are usually cloudy, windy, and rainy
- High pressure systems bring clear skies and bright sunny days

THE ROLE OF THE JET STREAM:

- The Jet Streams Move air masses from **west to east**

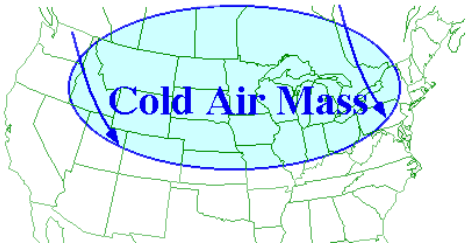
Let's examine the some typical air masses.



Maritime Tropical Air Masses

The maritime tropical air masses originate over the warm waters of the tropics and Gulf of Mexico. Here the heat and moisture of waters below are transferred to overlying air above. The northward movement of tropical air masses transports warm moist air into the United States, increasing the potential for precipitation.

Continental Polar Air Masses = cold temperatures and little moisture



In contrast, continental polar air masses (cP), originate over the northern plains of Canada. These air masses are typically transported in a south or southeast direction. Air masses formed over Canada are obviously cold. Those who live in northern portions of the United States expect cold weather during the winter months. These conditions usually result from the invasion of cold arctic air masses that originate from the snow-covered regions of northern Canada. However since there are no large oceans, or seas in Canada, these air masses are also considered to be dry air masses, too. When a cold dry air mass meats a warm humid air mass the result is a lot of rain, snow, or even tornadoes!

Once an air mass moves out of its source region, it is modified as it encounters surface conditions different than those found in the source region. For example, as a polar air mass moves southward, it encounters warmer landmasses and consequently, is heated by the ground below. Air masses typically clash in the middle latitudes (the United States), producing some very interesting weather – thunderstorms and tornadoes.

Since the terrain is generally flat in the central United States with no large mountain ranges, arctic air masses entering the United States and can easily slide all the way to Texas and Florida!

Continental Arctic (cA):

- Extremely cold temperatures and very little moisture.
- Originate north of the Arctic Circle
- Such air masses often plunge south across Canada and the USA during winter, but very rarely form during the summer because the sun warms the Arctic.

Continental polar (cP):

- Cold and dry, but not as cold as Arctic air masses.
- Often dominate the weather picture across the USA during winter.
- During the summer, usually influence only the northern USA.
- These air masses are the ones responsible for bringing clear and pleasant weather during the summer to the North.

Maritime polar (mP):

- Cool and moist. They usually bring cloudy, damp weather to the USA.
- Maritime polar air masses form over the northern Atlantic and northern Pacific. They most often influence the Pacific Northwest and the Northeast.
- Can form and are usually not as cold as continental polar air masses.

Maritime tropical (mT):

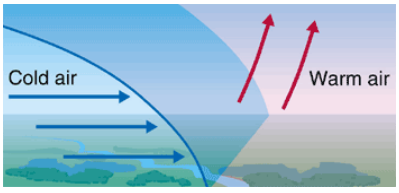
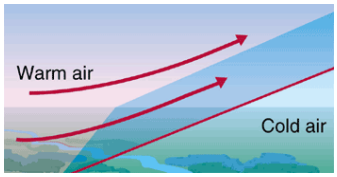
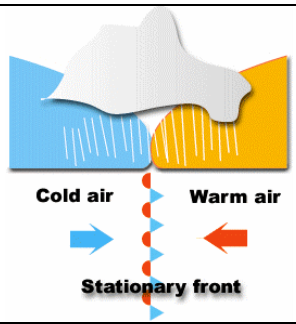
- Warm temperatures with a lot of moisture.
- Maritime tropical air masses are most common across the eastern USA and originate over the warm waters of the southern Atlantic Ocean and the Gulf of Mexico.
- These air masses can form year round, but they are most prevalent across the USA during summer.
- Maritime tropical air masses are responsible for the hot, humid days of summer across the South and the East.

Continental Tropical (cT):

- Hot and very dry. They usually form over the Desert Southwest and northern Mexico during summer.
- They can bring record heat to the Plains and the Mississippi Valley during summer, but they usually do not make it to the East and the Southeast.
- As they move eastward, moisture evaporates into the air, making the air mass more like a maritime tropical air mass.

Guiding Questions

- How are air fronts different and how can they be used to forecast weather?
- How do air masses and air fronts change our local weather conditions?
- **What is it called when 2 air masses meet?**
  - Front
- **What happens at a front?**
  - Weather Changes
  - Clouds and precipitation are often formed
- **What are the four different types of fronts?**
  - Cold Front
  - Warm Front

	Cold Front	Warm Front	Stationary Front
Description (State what type of air mass meets the other type of air mass)	• Mass of cold, dense air moves in • Warmer air ahead of it is pushed upward (its less dense) and condenses forming precipitation	• Mass of warm air moves in • Warm air moves above/on top the cold air (its less dense) • Moisture in the warm air condenses, producing cloud-covered skies.	• Occurs when air masses meet and stop moving. • The air can still move sideways • Whatever front advances first decides which it will be
Weather that occurs at the boundary	Heavy Storms	Hours of rain or snow	X
What type of cloud do you find at the front?	Cumulonimbus	Cirrus and Stratus	Cirrus and Stratus
Weather you will find after	Cool and Clear Skies	Warmer Weather	Either the weather of a warm front or a cold front
Picture			

  - Occluded Front – We won't focus on this one
  - Stationary Front

Air Masses and Front

Guiding Questions

- How are air fronts different and how can they be used to forecast weather?
- How do air masses and air fronts change our local weather conditions?

Air Masses Review

Fill in the blanks in the table below

Type	**Where it Forms** (Over ocean or land)	**Temperature** (Warm or cold)	**Humidity** (Moist/wet or dry)
Maritime tropical			
Maritime polar			
Continental tropical			
Continental polar			

1. What is a front?

Label the following with the type of front it is.

C = Cold Front **W = Warm Front** **S = Stationary**

_____2. Cool air mass is in place - warm air mass moves in.

_____3. Warm air mass is in place - cool air mass moves in.

_____4. Brings gentle rain that may last for hours or days.

_____5. Neither air mass moves

_____6. Strong winds are formed followed by heavy rain, crashing thunder, and flashing lightning.

_____7. When the front passes, the temperature warms up and it becomes humid.

_____8. When the front passes, the weather turns cooler.

_____9. Air masses move sideways.

_____10. Tornadoes could occur.

11. Draw BOTH warm front and a cold front in action.

Name _____ Class_____Date_____

Severe Weather- Use Textbook

Complete this worksheet after you finish reading the section "Severe Weather." The table below will help you to compare and contrast the different types of severe storms. Fill in the table according to the directions.

1. Describe the conditions under which each storm is most likely to occur. Name the regions where these storms occur most frequently.

2. Describe how each storm forms.

	Conditions/Region	Formation	Aftermath
Hailstrom			
Thunderstorm			

Draw a diagram of what you see with the formation of a tornado. Be sure to watch as the water spins in the tube