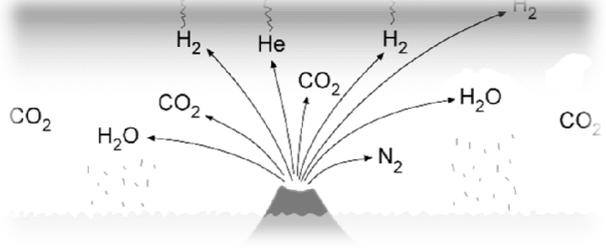
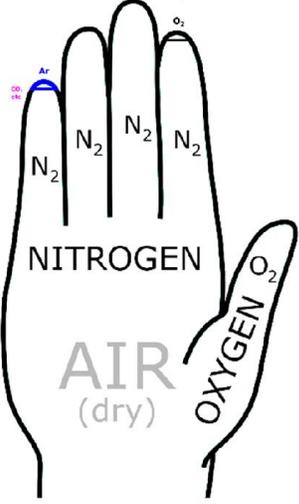
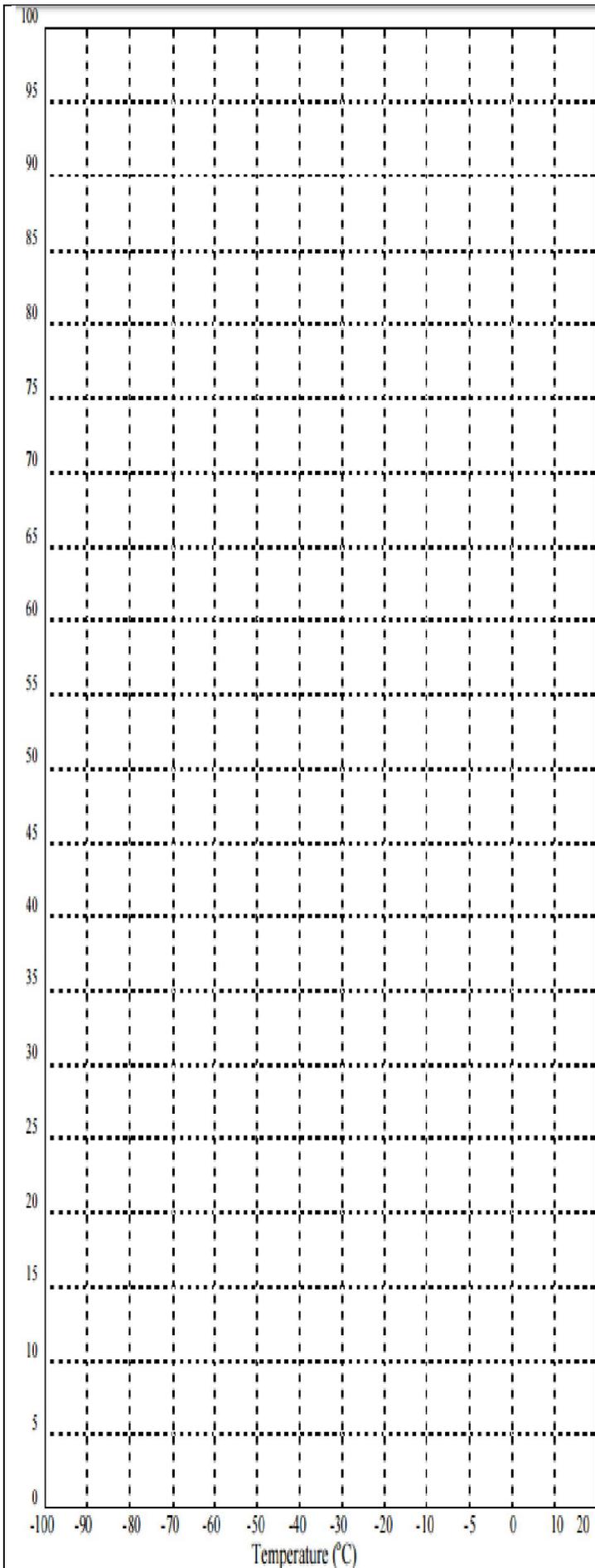


Composition and Structure of the Atmosphere

Date:

SWBAT: Describe the composition of the atmosphere. Diagram/describe the layers of the earth’s atmosphere.

Term	Description	
Weather	Definition:	
Climate	Definition:	
Atmospheric Beginnings	<p>_____</p> <p>_____</p> <p>from inside Earth, heavy gases are pulled by gravity creating the atmosphere</p>	
Atmosphere Components	<p>99 % of atmosphere is made of 2 elements!</p> <ul style="list-style-type: none"> • 78% : _____ <ul style="list-style-type: none"> ○ _____ component of atmosphere! • 21% : _____ • 1% : _____ 	
Water Vapor	<p>Definition:</p> <p>Changes depending on origin of air:</p> <ul style="list-style-type: none"> • _____ - originated over _____ • _____ - originated over _____ 	
Ozone Layer	<p>• Ozone = O₃</p> <p>Definition:</p> <ul style="list-style-type: none"> • Absorbs radiation that helps block out some harmful UV rays emitted by sun (SKIN CANCER!) • Damaged by _____ 	
Atmospheric Pressure	<p>Definition:</p> <ul style="list-style-type: none"> • As you move through the atmosphere you will experience a gradual change in pressure • Pressure slowly decreases the farther you go up 	
Atmospheric Layers	<p>4 Layers</p> <ul style="list-style-type: none"> • 99% of Earth’s atmosphere is within 30 km of Earth’s surface. • Changes in _____ separate the layers 	



Thermosphere

- _____ and outermost layer of the atmosphere
 - Subdivided into:
 -
 -
- Temperature _____ with increasing altitude
(Extremely high temperatures due to solar radiation)

Mesosphere

- _____ layer of the atmosphere
- **Temperature _____ with increasing altitude**
 - Coldest layer
- _____:
boundary between the mesosphere and the thermosphere
 - (Height: 85 – 90 km and Temperature: -90 °C)

Stratosphere

- _____ layer of the atmosphere
- **Temperature _____ with increasing altitude**
- This temperature increase is due to: _____
- _____:
boundary between the stratosphere and the mesosphere
 - (Height: 46 – 54 km and Temperature: -2 to 0 °C)

Troposphere

- _____ **layer of the atmosphere**
- Temperature _____ with increasing altitude
- **Includes all** _____
- _____:
boundary between the troposphere and the stratosphere
 - (Height: 12 – 18 km and Temperature: -60 °C)

Atmospheric Heat

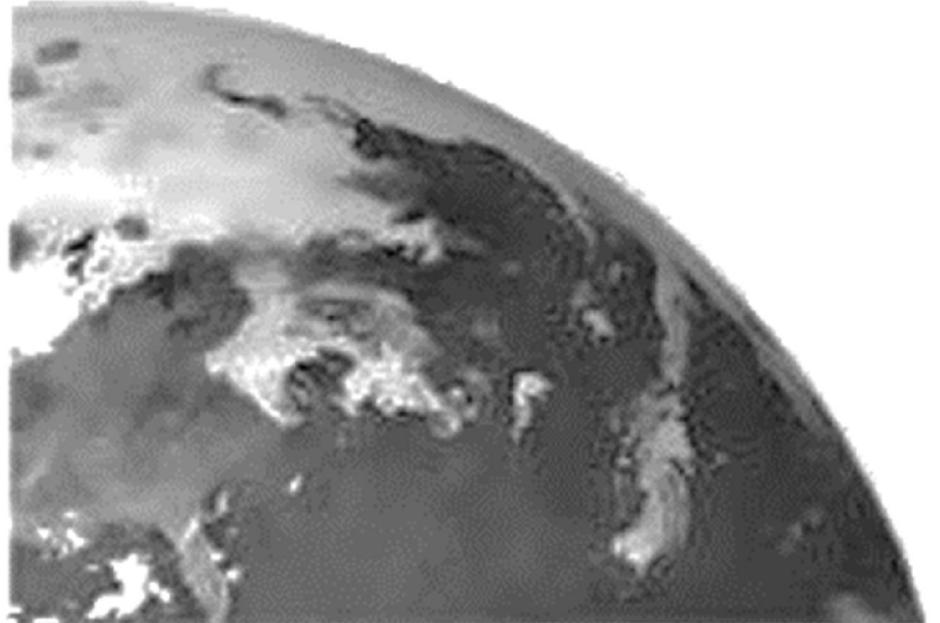
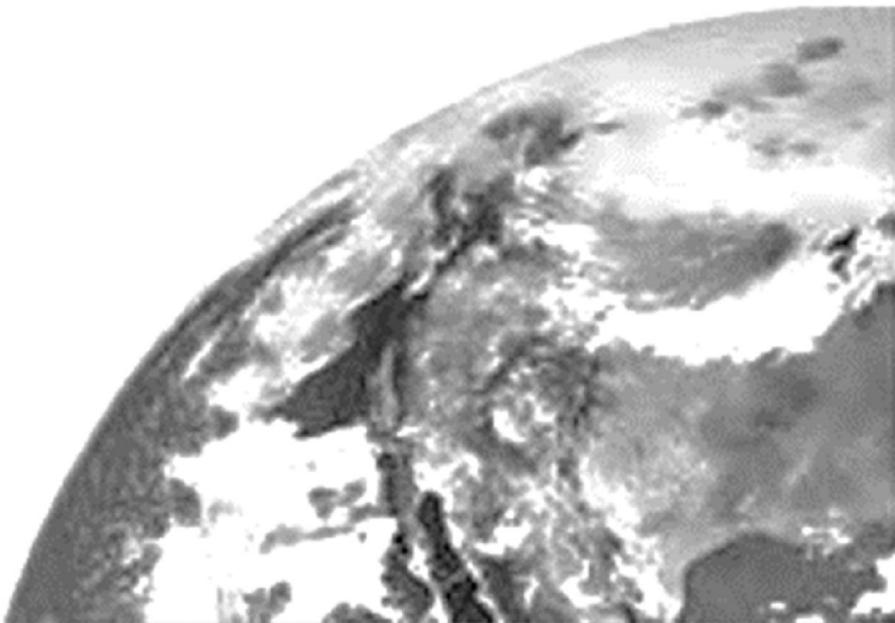
Date:

SWBAT: Compare and contrast methods of heat transfer.

Term	Description
Heat	Example:
Conduction	Definition: Transfer of heat <ul style="list-style-type: none"> • Heat flows from the _____ object to the _____ one • Conductors vs. Non-conductors: <ul style="list-style-type: none"> ○ Some materials are very good at transferring heat, like metals (conductors), while others are not, like air (non-conductor)
Convection	Definition: Transfer of heat <ul style="list-style-type: none"> • When you boil a pot of water the warm water at the bottom of the pot expands and rises.
Radiation	Definition: Transfer of heat <ul style="list-style-type: none"> • Most heating of the atmosphere comes from radiation
Solar Radiation	When radiation strikes an object 3 results: <ol style="list-style-type: none"> 1. Some energy is _____ by the object 2. Substances such as water/air are transparent to radiation and transmit it (energy passes through it) 3. Some radiation may _____ the object without being absorbed or transmitted.
Greenhouse Effect	<p>The Sun radiates energy to the Earth and naturally _____</p> <ul style="list-style-type: none"> ○ Some heat re-radiates and escapes into space. ○ Some heat gets trapped by the atmosphere and warms the air. • Greenhouse gases in the atmosphere absorb some of the Earth's re-radiated heat, but are transparent to incoming solar radiation
Greenhouse Gases	<p style="text-align: center;">PRODUCED BY HUMANS AND MADE NATURALLY!</p> <p>_____ (H₂O), Carbon Dioxide (CO₂), and Methane (CH₄)</p> <ul style="list-style-type: none"> • Carbon dioxide is most often the focus of public discussion <ul style="list-style-type: none"> ○ Humans burning fossil fuels releases carbon dioxide into the atmosphere increasing the greenhouse effect leading to global warming. ○ Industrial factories could decrease the carbon dioxide levels in the atmosphere by transitioning from burning fossil fuels to using alternative energies • A human enhanced greenhouse effect _____
Aspects that Impact Global Temperature	
Land vs. Water	<ul style="list-style-type: none"> • Land heats more rapidly than _____ Land reaches _____ - temperatures than water <p>How might this affect a coastal city vs. a land locked city?</p> <ul style="list-style-type: none"> • Temperatures of a body of water influence the temperatures of the air above it
Altitude	<ul style="list-style-type: none"> • Places at higher altitudes have _____ temperatures than places at lower altitudes <ul style="list-style-type: none"> ○ Ex. Boone vs. Wilmington
World Temperature	<ul style="list-style-type: none"> • _____ - lines that connect points of equal temperature • By studying isotherm maps you can detect patterns and see the effects of phenomena.

Natural Greenhouse Effect

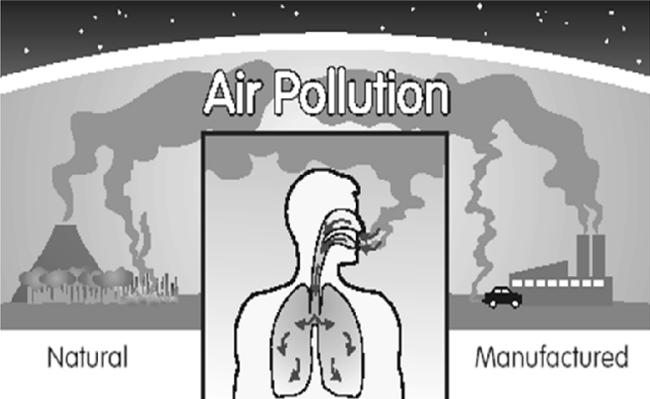
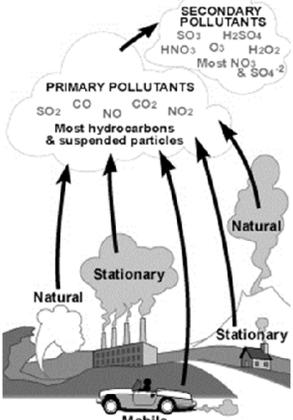
Human Enhanced Greenhouse Effect



Air Quality

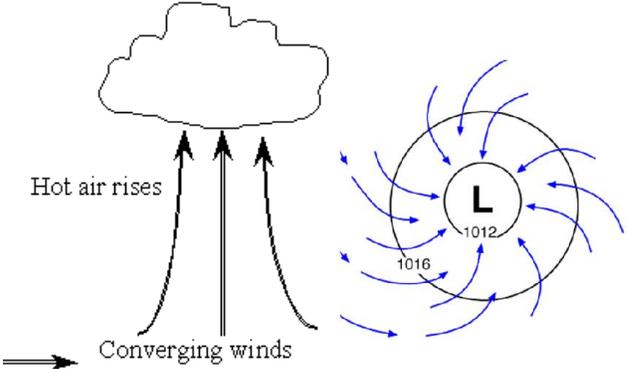
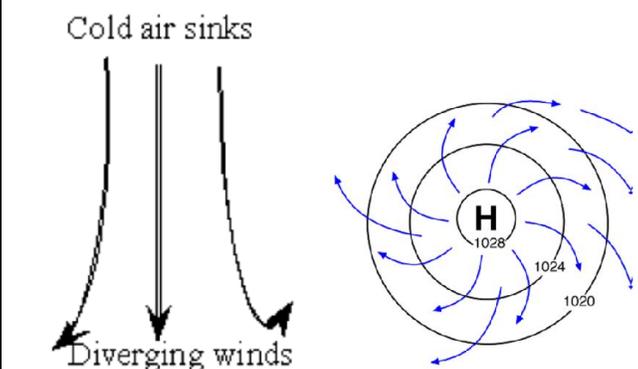
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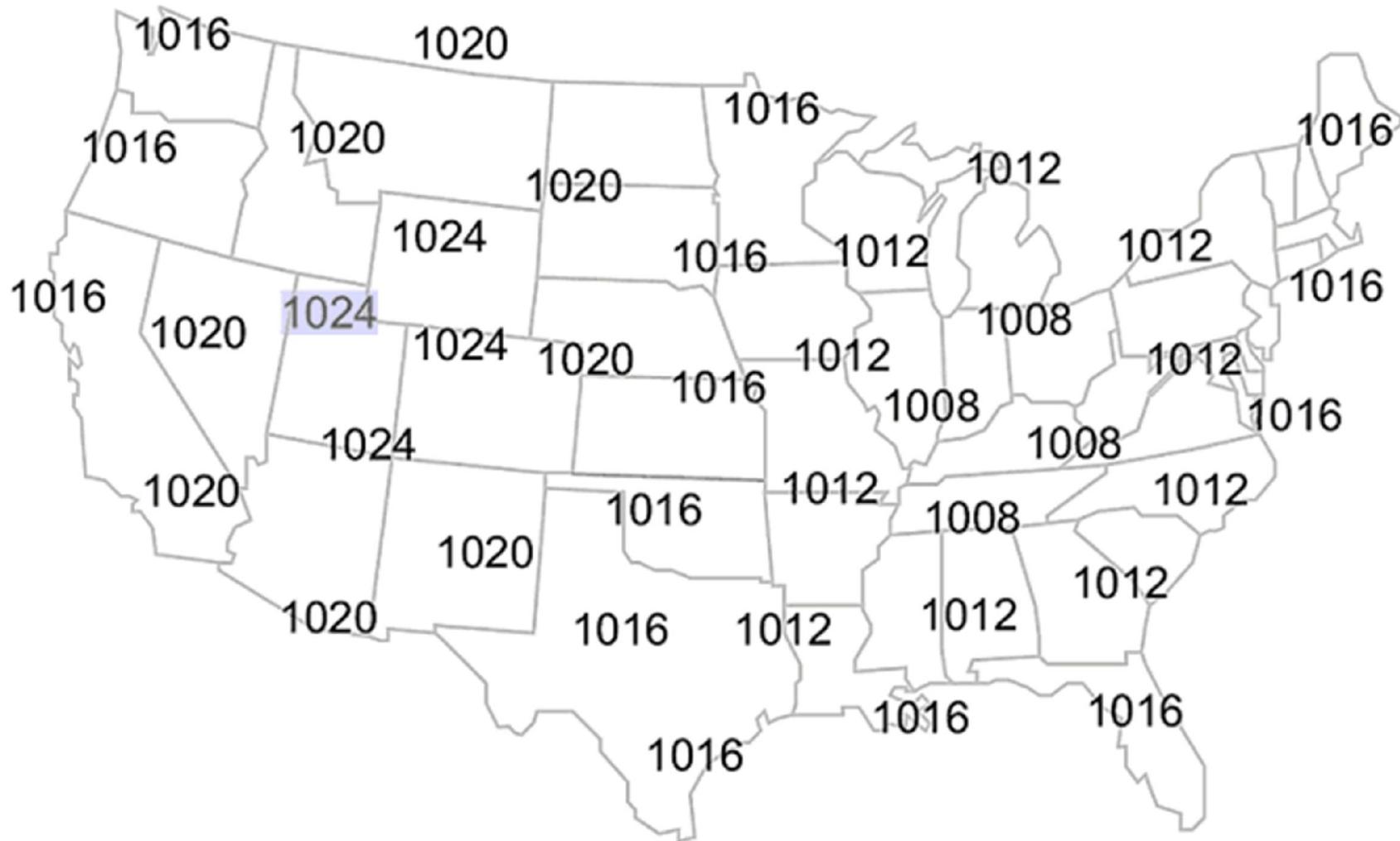
SWBAT: Discuss a variety of air pollutants and how they can be harmful to humans and the environment.

Term	Description
<p>Air Pollution</p>	<p>Definition:</p> <ul style="list-style-type: none"> • Can be man-made or natural  
<p>Main Types of Air Pollution</p>	<ul style="list-style-type: none"> • _____ – Created by volcanoes and factories. Sulfur can bond with oxygen in air to create acid rain. • _____ – Created by thunderstorms and combustion engines. Toxic • _____ – Created by volcanoes and combustion engines. Can be toxic • _____ – airborne solids. Can cause cancer • _____ - (CFC's) a pollutant found in <u>aerosols</u>, breaks down ozone Loss of ozone can lead to harmful UV radiation – HEALTH RISK!
<p>Sources of Air Pollution</p>	<ul style="list-style-type: none"> • _____ – Coal power plants, Industrial Factories • _____ – cars, planes, ships • _____ – aerosols, paint, hair spray • Waste Deposition- landfills create gases as waste breaks down 
<p>Solutions to Air Pollution</p>	<ul style="list-style-type: none"> • _____ - remove gases or particles from a point source location. • Regulation- Country uses standards to prevent too much pollution to come from one location <ul style="list-style-type: none"> ○ Ex. Clean Air Act of 1963
<p>Air Quality Index</p>	<p>Definition:</p>

Humidity and Dew Point		
Date:		
SWBAT: Determine and measure relative humidity and dew point temperature		
Term	Description	
Water in the Atmosphere	Gas →	Liquid →
Changing States	<ul style="list-style-type: none"> • Solid to liquid: _____ <ul style="list-style-type: none"> ○ Ice absorbs heat and turns to liquid • Liquid to solid: _____ <ul style="list-style-type: none"> ○ Water loses heat, and turns to ice • Gas to liquid: _____ <ul style="list-style-type: none"> ○ Heat is released into surroundings 	<ul style="list-style-type: none"> • Liquid to gas: _____ <ul style="list-style-type: none"> ○ Heat is absorbed from surrounding • Solid to gas: _____ <ul style="list-style-type: none"> ○ Heat absorbed • Gas to solid: _____ <ul style="list-style-type: none"> ○ Heat released
Humidity	Definition: <ul style="list-style-type: none"> • Air that has reached its water vapor capacity is said to be _____ • Humidity depends on _____ since different temperatures have different saturation points 	
Relative Humidity (RH)	Definition: <ul style="list-style-type: none"> ○ Indicates _____ the air is to saturation $\frac{\text{Actual Moisture}}{\text{Maximum Moisture}} \times 100 = \text{Relative Humidity}$	
Hot Air vs. Cold Air	<ul style="list-style-type: none"> • The warmer the air, the _____ it can hold • By changing the temperature of the air you can increase or decrease the relative humidity <p>Constant water vapor + higher temp = lower RH Constant water vapor + lower temp = higher RH</p> <p>Warm, saturated air contains _____ than cold saturated air</p>	
Specific Humidity	Definition:	
Hygrometer: Psychrometer	Measures: <ul style="list-style-type: none"> • Made of two thermometers: 1 dry (air temp) and 1 wet (evaporation causes temp to go down) • Compare both thermometers in table to find RH In a cloud there is no evaporation because air already saturated! So the wet and dry bulb will be the same! • Hair Hygrometer: Human hair stretches when humidity increases 	
Heat Index	Definition: <ul style="list-style-type: none"> • High air temp + low RH = air temp feels lower than it really is • High air temp + high RH = air temp feels higher than it really is 	
Dew Point	Definition: <ul style="list-style-type: none"> • If the temperature drops to the dew point then the moisture in the air will begin to condense and form dew (> 0 °C) or frost (< 0 °C) 	

Clouds and Precipitation							
Date:							
SWBAT: Describe and identify the various cloud types. Describe the various types of precipitation and where they form.							
Term	Description						
Clouds	Definition:						
Recipe for Clouds	1. _____ : air must be saturated. 2. _____ : air must be cooled to the dew point 3. _____ : provides a surface for condensation to occur Ex: dust, salt, smoke.						
Cloud Formation	As warm air rises and expands, it cools: <ul style="list-style-type: none"> When air reaches a level where its temperature is _____, condensation occurs to form a cloud. The level where condensation forms is called the _____ <ul style="list-style-type: none"> The base of the cloud forms here 						
Orographic Lifting	Definition:						
Frontal Wedging	Definition:						
Convergence	Definition:						
Localized Convection	Definition:						
Stability	Rising moving air = _____ <ul style="list-style-type: none"> Warm air rises into cold air. 			Non- moving air = _____ <ul style="list-style-type: none"> Warm air above cold air Called: 			
Cloud Types	<u>Form</u> <ul style="list-style-type: none"> _____ – “hair like”, high altitude, wispy _____ – “pile/pillow”, rounded _____ – “ layer”, sheets or layered, no distinction between individual clouds 			<u>Height</u> <ul style="list-style-type: none"> High: _____ us, _____ ostratus, _____ ocumulus Middle: _____ stratus, _____ cumulus Low: _____, _____ cumulus, nimbo_____ Nimbus = “ _____ ” 			
Vertical Clouds	<ul style="list-style-type: none"> _____ – puffy cloud usually found at low cloud levels _____ - formed from rising of unstable air <ul style="list-style-type: none"> Often associated with thunder, lightning, and hail 						
Fog	Definition:						
Precipitation	Collision-Coalescence	Drizzle:	Rain:	Snow:	Sleet:	Freezing Rain:	Hail:
Cloud Seeding	Definition: <ul style="list-style-type: none"> Achieved by adding condensation nuclei to clouds 						

Air Pressure and Wind		
Date:		
SWBAT: Describe the effect of air pressure on wind & compare air pressure changes with regards to temp, humidity & altitude		
Term	Description	
Air Pressure	Definition:	
Barometer	Definition: Mercury or Aneroid Barometer measured in (inches of mercury) or (pounds per inch ²) or (millibars)	
Isobars	Definition: <ul style="list-style-type: none"> The spacing between each isobar indicates pressure change 	
Air Pressure Differences	_____ creates air pressure differences	
	<ul style="list-style-type: none"> This <u>difference in air pressure</u> causes a phenomena called <u>wind</u>. <ul style="list-style-type: none"> Wind is when air flows from areas of high air pressure to areas of low air pressure 	
	<u>Low Pressure</u>	<u>High Pressure</u>
	<ul style="list-style-type: none"> _____ Rising This leads to clouds and precipitation Winds rotate in a _____ motion Low Pressure = _____ 	<ul style="list-style-type: none"> _____ Sinking This leads to a clear sky Winds blowing away in _____ motion High Pressure = _____ Cold air sinks 
	Wind is caused by _____	
	<ul style="list-style-type: none"> The greater the difference the greater the wind speed. By looking at your isobars the closer the lines are together, the steeper the pressure gradient <ul style="list-style-type: none"> Close Isobars= _____ Widely Spaced Isobars= Low Winds 	
Coriolis Effect	Definition: In the Northern Hemisphere to the _____; In the Southern Hemisphere to the _____	
Global Winds	Winds caused by _____ of Earth's atmosphere.	
	<ul style="list-style-type: none"> Hot Equatorial air expands, rises and flows toward poles Cold Polar air is denser so it flows toward the equator 	
Wind Cells	Due to the Earth rotation there are six cells of air on earth	
	<ul style="list-style-type: none"> High pressure around 30°N and 30°S. Low pressure around 60°N, 60°S, and 0°. High Pressure _____ Low Pressure _____ 	
	Trade Winds - blow from	Westerlies – blow from
		Polar Easterlies – blow from



1. Label the center of the high pressure area with a large “H”
2. Label the center of the low pressure area with a large “L”
3. Draw rain drops or snowflakes in the states you would expect to see them in
4. Leave the states you would expect to see clear skies empty
5. Draw arrows around the “H” on your map to indicate the wind direction
6. Draw arrows around the “L” on your map to indicate the wind direction