Weather Unit Study Guide - 2018

Weather vs Climate

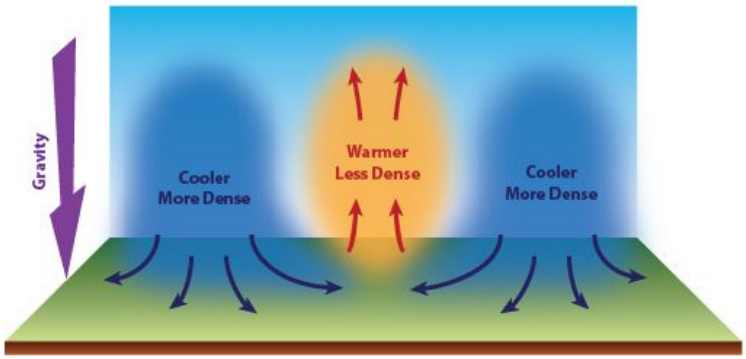
What does weather measure? The condition of the earth's atmosphere at a particular time and place.

How are climate and weather different?

Climate is the average weather over a long period of time (20 to 30 years), whereas weather is what happens at shorter time and includes temperature, humidity, dew point, air pressure etc...

Bill Nye video - rewatch to help you review.

How do cold air and warm air behave differently?



The particles in cold air are closer together than those in warm air.
Cold air is more dense (forming high pressure) than warm air (forming low pressure). That's why warm air rises and cool air sinks.

Air masses and fronts

What are the 4 types of air masses?An air mass is a huge body of air that stays together as it moves. It has about the same temperature and humidity all through it, they can be warm and wet, warm and dry, cool and wet and cool and dry.

What are the two types of fronts?A warm front is located at the start of a warm air mass, it could be wet or dry. A cold front is found at the start of a cold air mass, which could be either wet or dry.

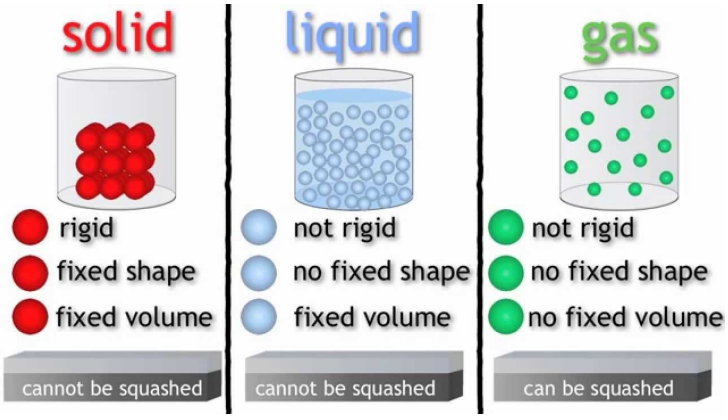
What happens when different air masses collide? Give examples.Cold fronts **cause** violent weather like thunderstorms. Warm fronts are when a warm air mass hits into a cold air mass which **causes** snow or gentle rain. The weather that **follows** a cold front is clear skies and cold temperatures. The weather that **follows** a warm front is humid air and warm temperatures
When two fronts meet they collide they don't mix and this often results in wind or storms and other extreme types of weather

What type of weather would you experience as different air masses and fronts pass by your area?

States of Matter

What are the 3 primary states of matter? How are they different? Tell me about how the particles in each move, be detailed.

Solids: Solid molecules are closer together but move very little. They have a given shape.



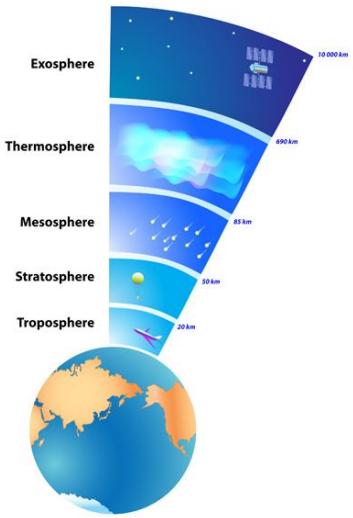
Liquids: Take the shape of their containers, they have no specific formation. They move around and pass each other without touching.
Gases: Gas molecules are spread out, and will keep expanding until it fills its container. They also have the most kinetic energy. They move around quickly and spread out. They go in straight lines, but when they hit something, they change direction.

PearDeck

Layers of the Atmosphere

List the layers of the atmosphere and properties of each.

Layers of the atmosphere



- Troposphere: First layer and where commercial/passenger airplanes and birds fly. It is where weather occurs. It is the layer of the atmosphere where we live.
- The jet stream occurs between the Troposphere and the Stratosphere
- Stratosphere: the second lowest layer in the atmosphere it contains the ozone layer(there was a big hole in the ozone layer) when warm air hits this layer it spreads out, cools off, and then sinks. The ozone layer protects us from harmful rays of the sun
- Mesosphere: This is the coldest layer in the atmosphere. It's also where meteors burn up if they don't make it through the atmosphere.
- Thermosphere: Second highest layer of the atmosphere
    - Ionosphere: the Ionosphere is the first portion of the Thermosphere. It contains charged atoms and the Aurora Borealis (Northern Lights). Radio waves are also reflected back to earth in this layer
    - Exosphere: highest layer in the atmosphere (700 to 10,000 km high). Satellites orbit Earth in this layer, making it possible to use cell phones and watch TV

Energy transfer

What are the 3 types of energy transfer? How are they different?

Conduction is the transfer of heat between two objects that are touching.
Convection is the way heat moves through gases and liquids.
Radiation is the way heat moves through empty space

Interpreting Weather data - See the GC assignment from Thursday.

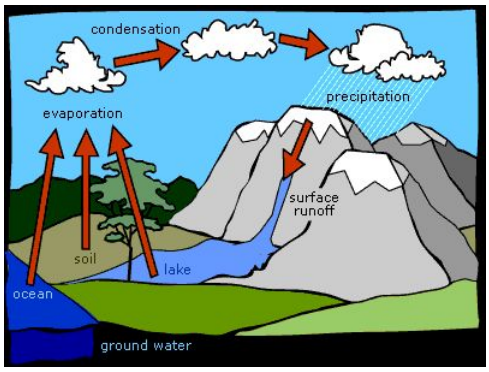
Temperature, Dew Point, Pressure.

How can you use weather data to identify fronts, and air masses?

When pressure increases (high pressure) the air mass is a cold air mass, if the dew point and the temperature are close together then it is a cool and wet air mass. If the pressure is dropping the air mass is a warm air mass (low pressure) and if the dew point and the temperature are further apart, the air mass is called a warm and dry air mass. The fronts

occur when we have a change in pressure, cold front are found at the valleys of the pressure graph, while warm fronts are found at the peaks of the pressure graph.

Water cycle/ **The Hydrologic Cycle**



The hydrologic Cycle (Water Cycle):the continuous movement of water on, above, and below the surface of the earth.
The water cycle is driven by the sun and gravity - refer back to your notes and drawing here.

Property of Water

Why is it important that water has a high specific heat?

The high specific heat of water allows water to store large amounts of energy before it changes temperature. The energy is stored in the bonds between water molecules. This is why we get land breezes and sea breezes.

Why is it important that water expands when it freezes? If water did not expand all our lakes and seas would freeze from the bottom up and make it difficult for living things in the water.

Thermohaline Circulation/Global Ocean Conveyor Belt

Why is this circulation important? It keeps the equator region cooler and warms the polars circulating matter and energy around our planet.

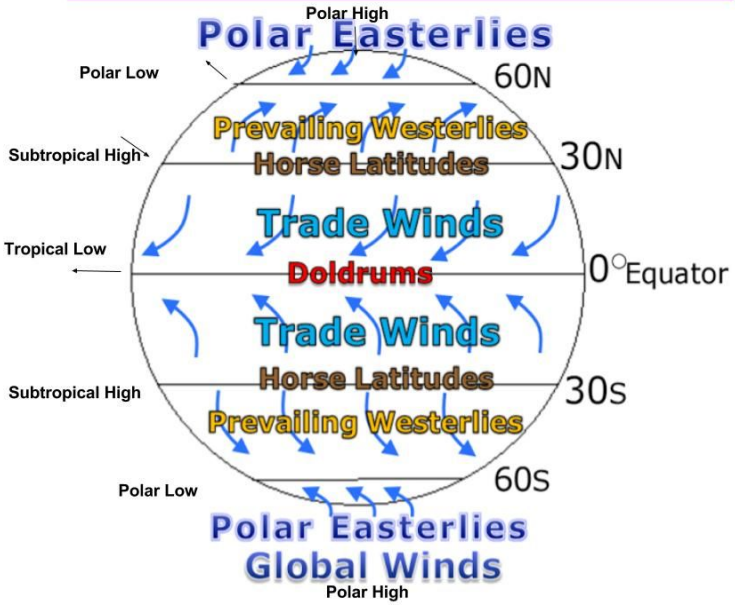
What is Wind? How do we name them?

Wind is the movement of air, from high pressure to low pressure.
Winds are named based on the direction or place that they comes from. For example, sea breezes comes from the sea, and north winds comes from the north.

Global Winds

Identify the different areas where winds form and where there are no winds on a globe

- Polar easterlies
- Prevailing westerlies
- Horse latitudes (on tropic of cancer)
- Trade winds
- Doldrums (on equator)
- Trade Winds
- Horse latitudes (on Tropic of Capricorn)
- Prevailing Westerlies



The types of winds are: Polar Easterlies, Prevailing Westerlies, Horse latitudes have no wind, Trade winds, doldrums are at the equator and there is no wind, Trade Winds,

Horse latitude, jet streams are any of the high-speed, high altitude air currents that circle the earth in a westerly direction

The jet stream: any of the high-speed, high altitude air currents that circle the earth in a westerly direction

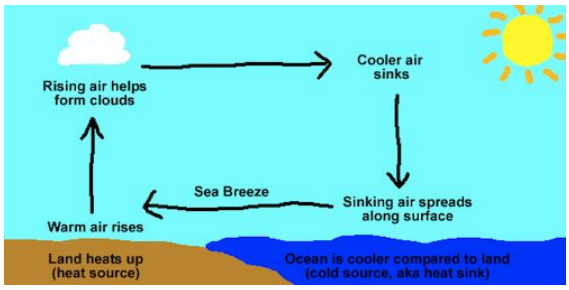
Warm air rises and hits the stratosphere and then spreads out. The stratosphere is cold so it starts to cool down and starts to fall. Once it hits the Earth it spreads out and warms up and then this all happens again

You should know how to label the various high and lows.

What is the importance of the coriolis force? A rotating body deflects air causing storms to rotate.

Sea and land breezes

Draw and explain a sea breeze and a land breeze. How are they different and why do they occur?

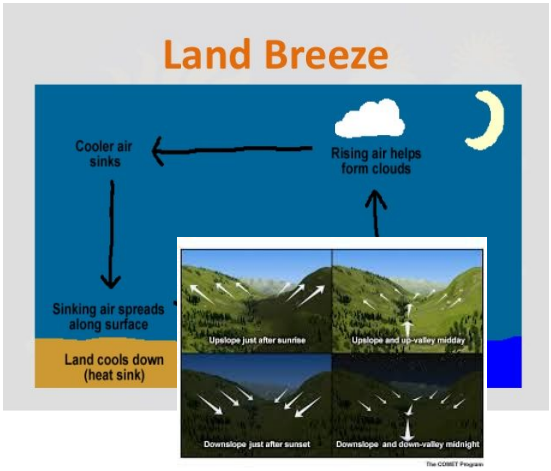


Sea breezes happen during the day and land breezes happen at night.

Sea breeze is caused by air Rising over the warmer land (day) and is replaced by cooler air from above the sea. The water at During the day the water is cooler than the sand because the water can absorb heat and hold it for longer than the land.

Land Breeze: happens during the night and the breeze comes from the land to the sea. The warm air rises and that helps form clouds

The water at night is warmer than the sand because the water can absorb heat and hold it for longer than the land



Mountain winds

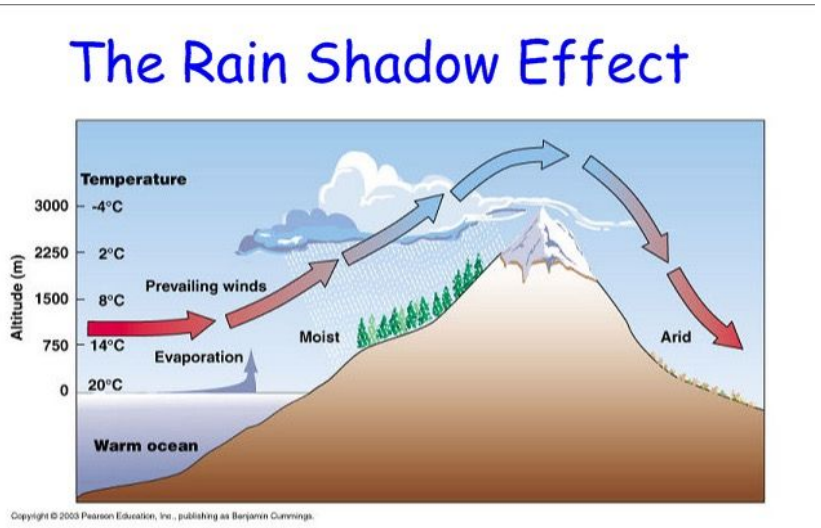
What causes these? Why does the direction change?

Mountains can create strong winds. Warm air rises up the mountain (day), cool air sinks down the mountain (night). Remember that the land heats up during sunny days and warms the air which rises up the mountain.. At high altitudes the air is much color as we move higher in the troposphere. At night, the cooler air sinks down the mountain.

Mountain rain shadow effect

What is the cause of this? Don't forget to mention dew point and condensation.

Mountain Rain Shadow Effect:As winds move the warm moist air up the mountain it gets colder. The colder the air is not able to hold as much moisture as it could when it was warm.. The temperature of the air also drops to close to the dew point and condensation occurs in the form of clouds. The colder it gets the more condensation occurs until the cloud drops most it's water on one side of the mountain, as the wind comes down the mountain, it gets warmer (land is warmer as the air travels down along the mountain) and it stops raining and the clouds evaporate. The dew point of the air that warms up as it travels down the mountain remains low while the air warms causing the air to feel very dry. One side of the mountain is wet and rainy and the other side is cooler and dry.



An Inconvenient Truth

What are ways that you can impact global warming, be specific and explain how this helps?