

8.9.A describe the historical development of evidence that supports plate tectonic theory

Theory of Continental Drift

Theory of Continental Drift was proposed by Alfred Wegener in the early 1900's.

Theory stated that the continents were once joined in a large land mass called Pangaea. They have been drifting away from each other for millions of years.



Pangaea

Pangaea -This super-continent was made up of all the continents on Earth. Over time, these continents have broken apart, and slowly drifted away from one another. This drift continues today.



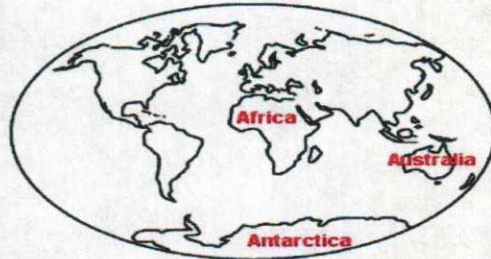
Evidence of Continental Drift

4 Pieces of Evidence Supported Wegener's Theory

1. The continents fit together like puzzle pieces.
2. Similar fossils were found on opposite continents.
3. Similar land features (like mountain ranges) were found on opposite continents.
4. Tropical regions have evidence of once being arctic glaciers, which suggests the continents have moved over time.

QUESTIONS:

1. A scientist found fossils of the same tropical fern in Africa, Antarctica, and Australia.



What conclusion can the scientist make?

- A. The fern can live in any climate
 - B. Birds who eat the fern also live in Africa, Antarctica, and Australia.
 - C. More evidence is needed to make a good conclusion.
 - D. The continents have moved.
2. Explain in your own words the Theory of Plate Tectonics.
3. If a photo of Earth, from space, was taken 25 million years from now, would the landmasses appear the same as they currently do or different? Why do you think this?

8.9.B relate plate tectonics to the formation of crustal features

Plate Tectonics

Plate Tectonics is the movement of large sections of the Earth's crust called **Tectonic Plates**. The plates are like the skin of the planet. They constantly move. When we say moving, we're talking centimeters each year.

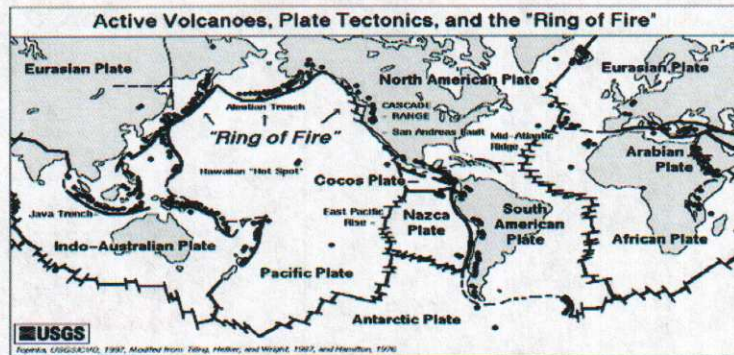
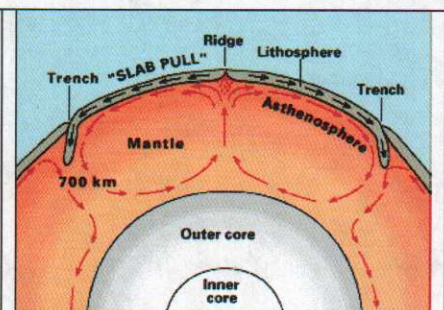


Plate Boundaries


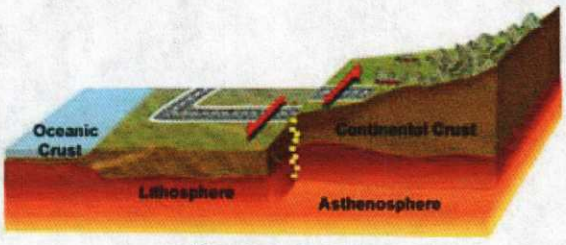
The tectonic plates are **floating** on top of magma which causes them to move. Tectonic plates collide with one another along the Plates Boundaries. There are several types of plate boundaries.

1. Transform
2. Divergent
3. Convergent


Caused by convection currents in the magma.

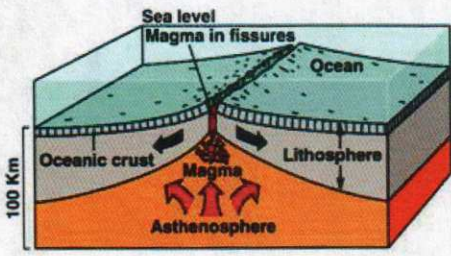


Transform Boundary

Type of boundary	Description
Transform 	<p>Where the two plates slide against each other in a sideways motion. Occasionally this energy is released suddenly in the form of large earthquakes.</p> 

Divergent Boundary

Type of boundary	Description
Divergent 	<p>Where two tectonic plates are moving away from one another.</p>

<p>A Divergent Boundary</p> 	<p>Examples:</p> <ul style="list-style-type: none"> - mid-ocean ridge - fault block mountains - rift valleys
--	---

Convergent Boundary

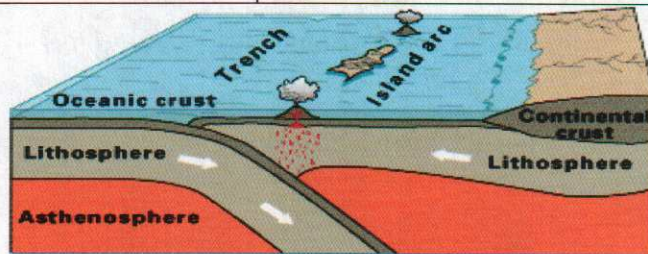
<i>Type of boundary</i>	<i>Description</i>
Convergent → ←	Where two plates push against each other. As two plates rub against one another, a number of small and large earthquakes are common near convergent boundaries.

There are 3 kinds of Convergent Boundaries:

- A. Ocean Plate to Ocean Plate
- B. Ocean Plate to Continental Plate
- C. Continental Plate to Continental Plate

A. Convergent Boundary: Ocean Plate to Ocean Plate

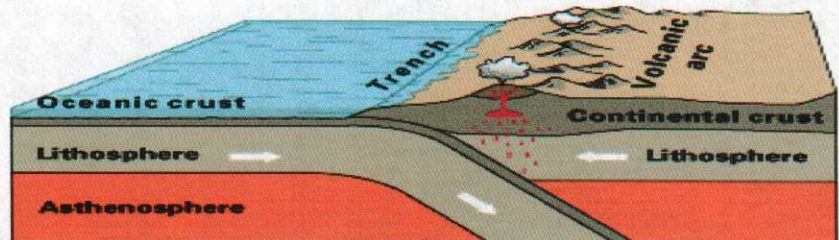
<i>Kind of Convergent Boundary</i>	<i>Description</i>
Ocean Plate to Ocean Plate	When two oceanic plates converge, one is usually subducted under the other, and in the process a trench is formed.



Oceanic-oceanic convergence

B. Convergent Boundary: Ocean Plate to Continental Plate

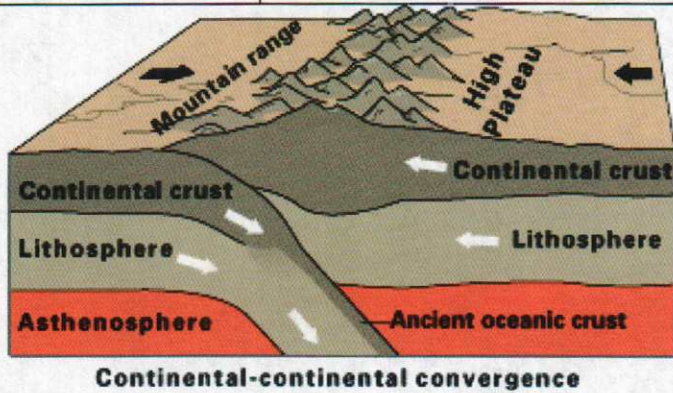
<i>Kind of Convergent Boundary</i>	<i>Description of Energy</i>
Ocean Plate to Continental Plate	When an oceanic plate and continental plate converge, one is usually subducted under the other causing volcanoes and mountains.



Oceanic-continental convergence

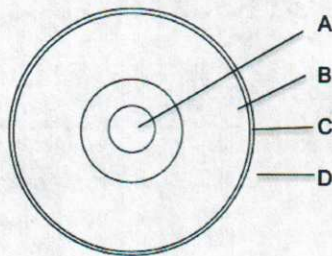
C. Convergent Boundary: Continental to Continental Plate

<i>Kind of Convergent Boundary</i>	<i>Description of Energy</i>
Continental to Continental Plate	When two continental plates converge, one is usually subducted under the other causing mountains.



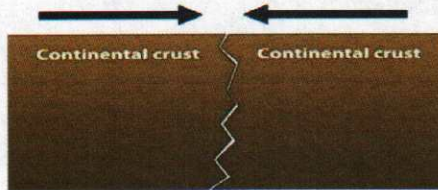
QUESTIONS:

1. What features of Earth's crust do convergent, divergent, and transform boundaries form?
2. What land features formed by the movement of tectonic plates can be observed using images from space?
3. Which layer contains the tectonic plates?



- A. Core
- B. Asthenosphere
- C. Lithosphere
- D. Atmosphere

4. What crustal feature may be formed when the two plates shown below collide?



5. How has satellite technology supported Plate Tectonic Theory?

- a. Can see crustal features have formed along boundaries
- b. Actual movement of the plates can be seen
- c. Can see how the continents once fit together
- d. Can predict earthquakes and volcanic eruptions

8.9.C interpret topographic maps and satellite views to identify land and erosional features and predict how these features may be reshaped by weathering

Topographic Maps

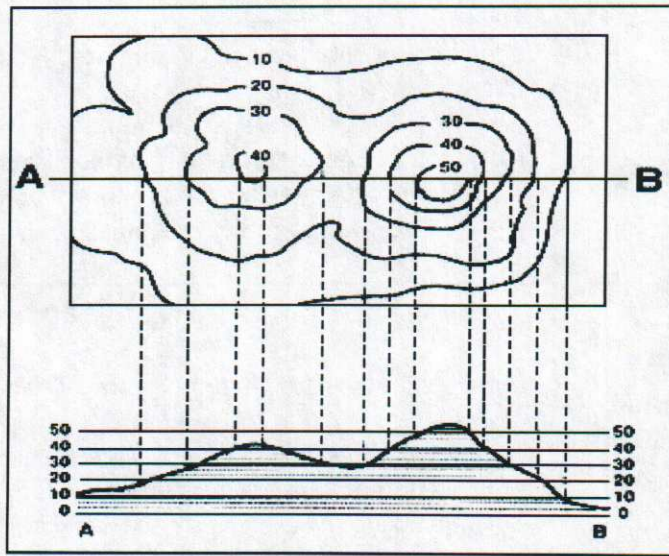
Topographic Maps are 2-D drawings of 3-D land features.

A topographic map is often a very large scale map that shows the shape of the land's surface. **Contour lines** are imaginary lines that connect places of equal elevation. If you were taking a hike along a hillside and not walking either uphill or downhill, you would be walking on a contour line. When contour lines are close together, the slope is very steep. When contour lines are far apart, the slope is very shallow. This type of map is helpful when planning a hike. It is also used when planning the site for a building or the path of a new road. Contour lines sometimes called "level lines" because they show points that are at the same level.

Scenario A:

Look at diagram below to answer the questions that follow.

The top of this drawing is a topographic map showing the hills that are illustrated at the bottom. On this map, the vertical distance between each contour line is 10 feet.



1. Which is higher, hill A or hill B? _____
2. Which is steeper, hill A or hill B? _____
3. How many feet of elevation are there between contour lines? _____
4. How high is hill A? _____
5. How high is hill B? _____
6. Are the contour lines closer together on hill A or hill B? _____

Scenario B: Satellite Views/ Erosion

Satellite views-Images taken over time that can be used for comparison and interpretation of erosional features such as these taken of the Yellow River Delta. What happened to the land between 1989 and 2009? _____



1989



2009

Scenario C:



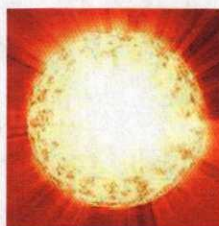
Study the diagram above showing an island before and after a hurricane. What most likely caused the changes to the island seen in the diagram?

- A The rainwater from the hurricane raised the level of the ocean.
- B The island sank deeper into the ocean during the hurricane.
- C Ocean waves caused by the hurricane eroded sand from the beaches.
- D Rivers on the island deposited new sand on the beach.

Scenario D:

Define and give examples of erosion, decomposition, and weathering.

8.10.A recognize that the Sun provides the energy that drives convection within the atmosphere and oceans, producing winds and ocean currents



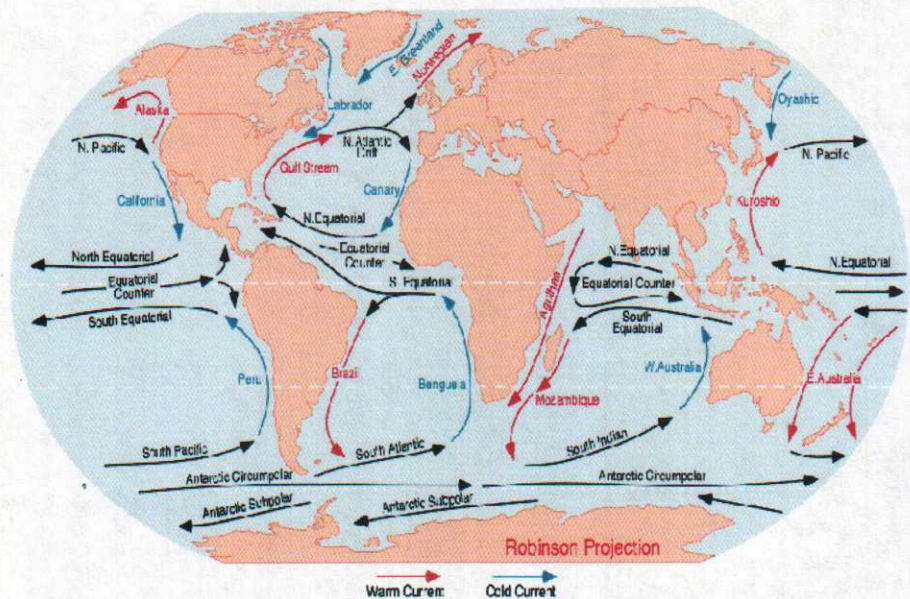
Unequal Heating in the Oceans and Atmosphere

The source of almost all Earth's heat energy is the Sun. The Sun gives off its heat in the form of electromagnetic radiation, which travels through space. The Sun's heat is distributed throughout the atmosphere, land, and the oceans by radiation, conduction, and convection, providing the energy to make weather.

Ocean Currents

Ocean currents are mainly caused by wind and differences in temperature. Currents are responsible for a vast amount of movement of the water found in the Earth's oceans.

The ocean plays a starring role in whatever happens with the environment. One big part of its role is to soak up energy (heat) and distribute it more evenly around the Earth. **Ocean currents influence the weather in coastal areas.**



Wind Currents



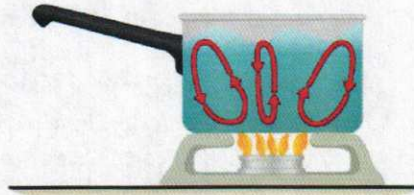
High pressure → Low pressure

Wind can be defined as air moving from an area of high pressure to an area of low pressure in the atmosphere. The greater the difference between high and low pressures, the faster the air moves. If all areas across Earth's surface had the same air pressure, there would be no wind. The Sun, however, heats some parts of Earth more than others, creating pressure differences. Thus, **winds are driven by solar energy.**

QUESTIONS:

1. What is the source for almost all of Earth's energy? _____
2. Are all areas of Earth equally heated by the Sun? Why or why not?

3. A pot of water and rice is boiling on the stove. Grains of rice rise to the surface of the water and then sink back down to the bottom of the pot.



What type of energy transfer is occurring to make the rice rise and fall?

- A. Subduction
- B. Conduction
- C. Convection
- D. Radiation

2. What is convection?

3. Explain and illustrate how wind is formed?

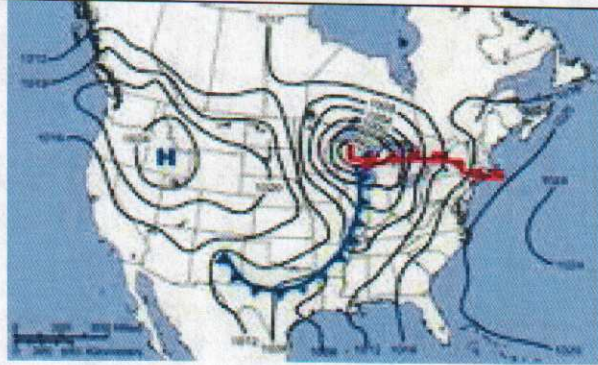
4. Discuss how ocean currents formed?

8.10.B identify how global patterns of atmospheric movement influence local weather using weather maps that show high and low pressures and fronts

Weather Map

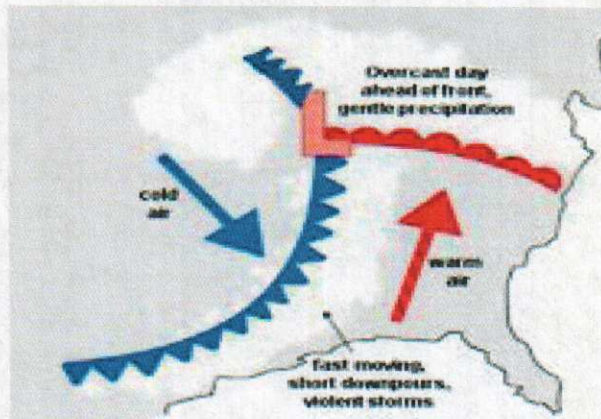
A weather map or chart shows the weather conditions at a specific point in time over



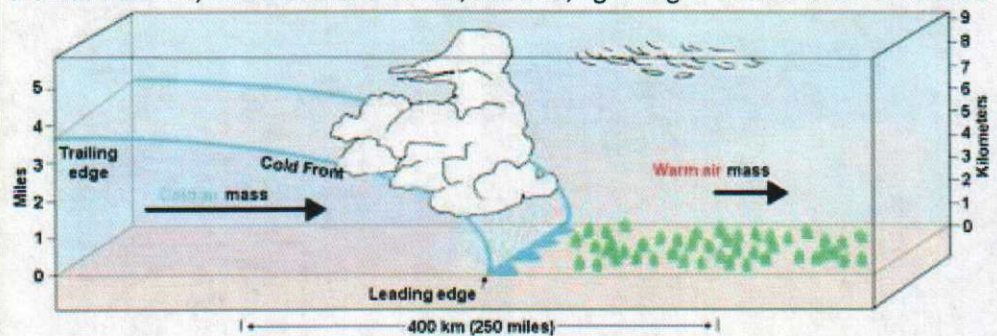


Cold Front

Forms at the surface of Earth when a cold, dry air mass overtakes a warmer, humid air mass



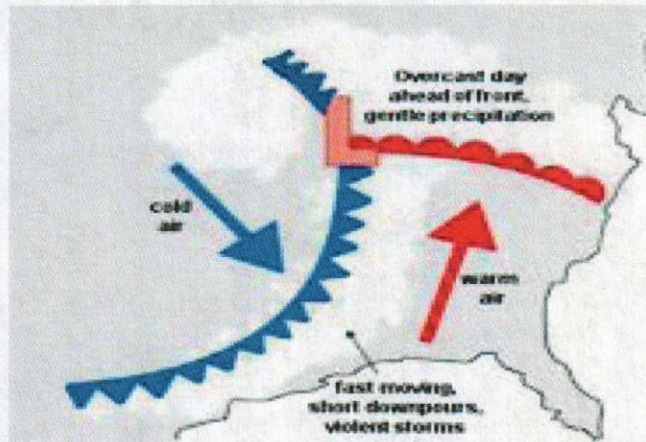
Cold fronts are fast moving with steep frontal boundary that force the warm air to rise quickly, resulting in rapid phase changes. Cold fronts are characterized by dramatic storms, cumulonimbus clouds, thunder, lightning and sometimes tornadoes.



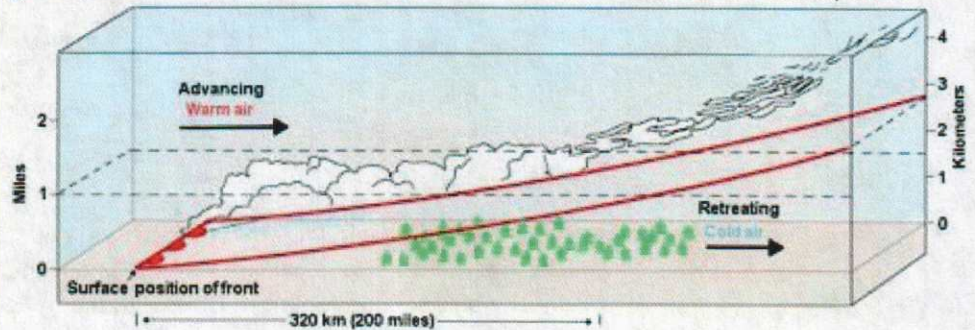
Precipitation occurs at the frontal boundary and tends to be heavy but of short duration; local air temperature changes from warm to cool after the front passes.

Warm Front

Forms at the surface of Earth when a warm, moist air mass overtakes a cool, dense and dryer air mass



Precipitation occurs ahead of the frontal boundary and tends to be prolonged but gentle; local air temperature changes from cool to warm after the front passes.

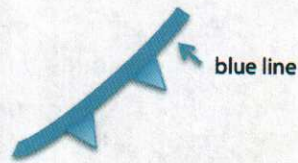


QUESTIONS:

1. What is the weight of air over an area called as symbolized in the graphic below?



2. What does the symbol in the picture below represent on a weather map?



3. A hot air balloon rises into the cool, morning sky. Why can the balloon rise?



4. A line of tornadoes and thunderstorms sweep through an area. What has occurred to produce such violent storms?

5. A student is drawing a weather map. An area of low pressure is moving up from the Gulf Coast and overriding colder air. How should this be marked on the map? Draw it below.

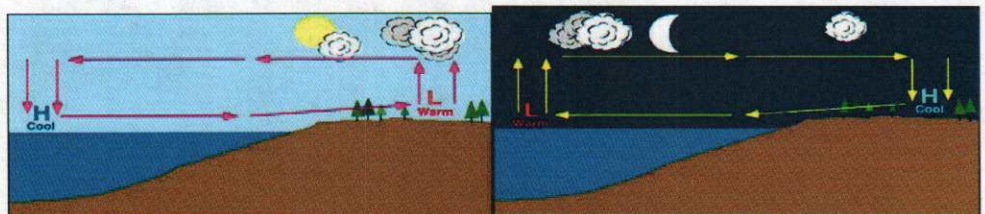
6. How are cold fronts different from warm fronts?

7. What is the role of air pressure in the formation of weather conditions?

8.10.C identify the role of the oceans in the formation of weather systems such as hurricanes

Oceans Affect Climate On Land

When the sunrays hit the surface of the Earth, it is heated. However, there is big a difference between how fast the land and the sea are heated. The land is heated a lot faster than the sea. The air above land is heated faster than the air above the sea. The hot air above land rise high into the sky, where it cools off. High in the sky the cold air now moves out over the sea. Here it sinks down pressing cool air towards land. The air moving towards land is what we know as wind (**convection current**). At night the opposite happens. That means it is the **sun** that makes the **wind blow**.



Oceans Affect Climate On Land

Warm air holds more water vapor than cold air does. When warm, moist air is cooled, clouds form and can produce precipitation (rain or snow). This warm air can be cooled by rising into the colder upper atmosphere, by moving over cold ocean or lakes or by mixing with colder air. Example: A Front Boundary – The edge where cool, dry air meets warm, moist air often causes stormy weather.

Warm front



Cold front

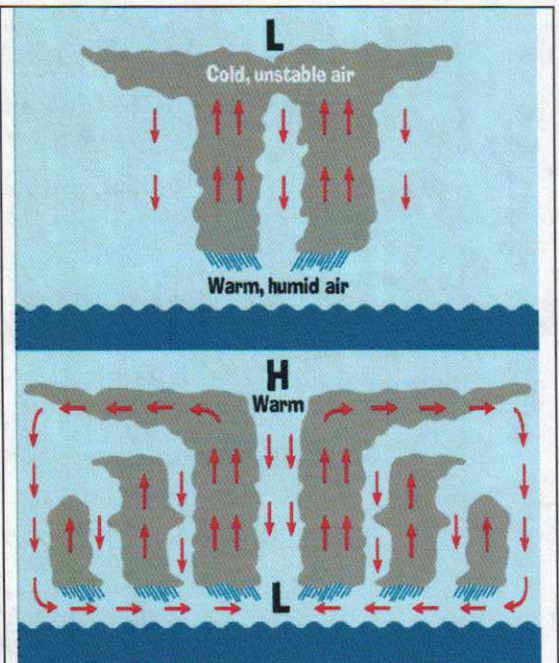


Stationary front



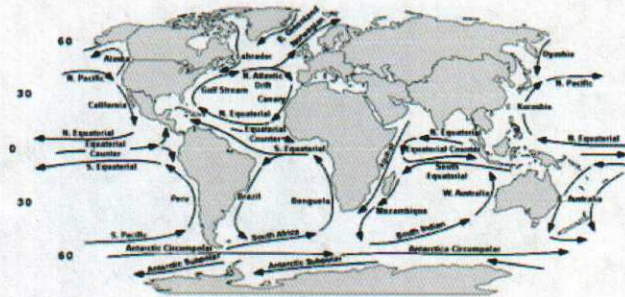
Hurricanes

Hurricanes get their energy from warm ocean waters. As ocean water increases in temperature, it slowly turns into water vapor. The warmer the water temperature is, the higher the water vapor rises. After the water vapor has risen, it begins condensing into rain in the form of clouds. When the clouds release the rain, heat is released as well. When this heat stays in the same area, the eye of the hurricane is formed.



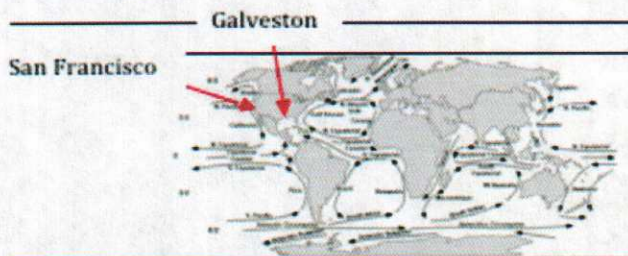
QUESTIONS:

1. What causes a hurricane to form?
2. Stavanger, Norway has a warmer climate than the rest of Norway.



What could cause this?

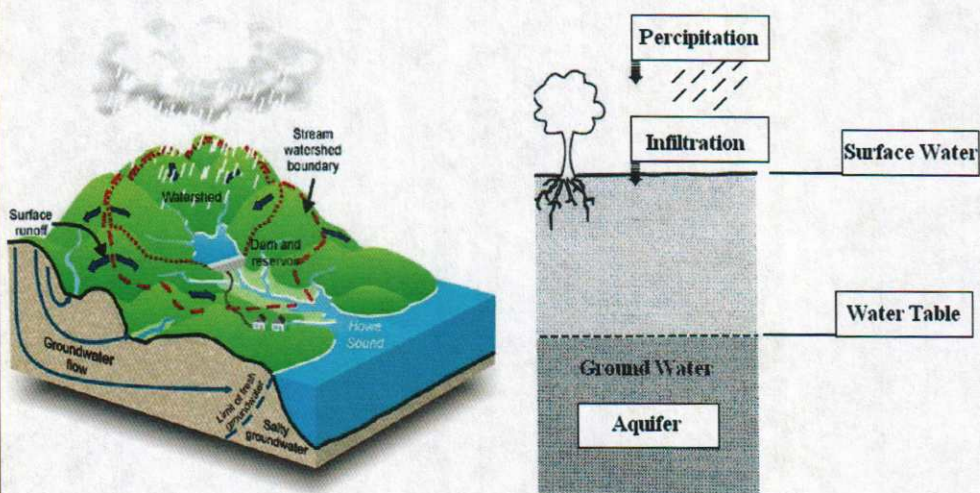
- a. Stavanger is the southernmost city.
 - b. The Gulf Stream current carries warm water to the Stavanger area.
 - c. The Arctic current carries cold water toward Norway.
 - d. There is no sea ice in the region to create the cold, deep ocean currents.
3. Galveston, Texas has warm, humid weather much of the year while the weather in San Francisco, California is typically cool. What is regulating the weather in these areas?



7.8.C model the effects of human activity on groundwater and surface water in a watershed

Watershed

Watershed - An area of land where all water from rain and melted snow that is under land or drains off of land goes into a larger body of water.



Watershed

Parts	Description
Surface Water	Water above the Earth's surface that eventually moves into a river, stream, or lake.
Ground Water	Water that seeps into the ground but eventually moves into a river, stream, or lake.
Aquifer	A groundwater reservoir that can store and release large amounts water below the surface
Infiltration	The process of surface water entering the soil

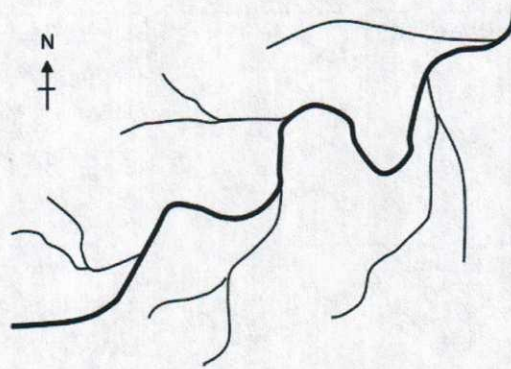
Human Effects on Watersheds

Overdraft	Over-use or overdraft can cause problems to humans & the environment. One big problem is a lowering of the water table beyond the reach of existing wells.
Subsidence	Subsidence occurs when too much water is pumped out from underground causing the ground to actually collapse. Causes sinkholes .
Pollution	Pollution of groundwater from pollutants released to the ground can work their way down into groundwater and contaminant an aquifer.

QUESTIONS:

1. What is a watershed?
2. What is the source of groundwater?
3. How can human activity contaminate or deplete water resources?
4. Which of the following is NOT a groundwater issue?
 - A. Subsidence
 - B. Pollution of aquifers
 - C. Lower water tables due to over use of the resource
 - D. Diversion of the water of rivers and lakes

5. Which is a FALSE statement about the river systems in the diagram?



- A. Water flows from the source toward the stream's mouth.
- B. The water in the trunk stream transports more water than a tributary.
- C. Water in rivers and streams is able to transport sediment.
- D. The overall drainage in this system is toward the southeast.

6. Why is it important that community planners understand the local watershed's surface water and groundwater characteristics when developing a growth plan for their community?