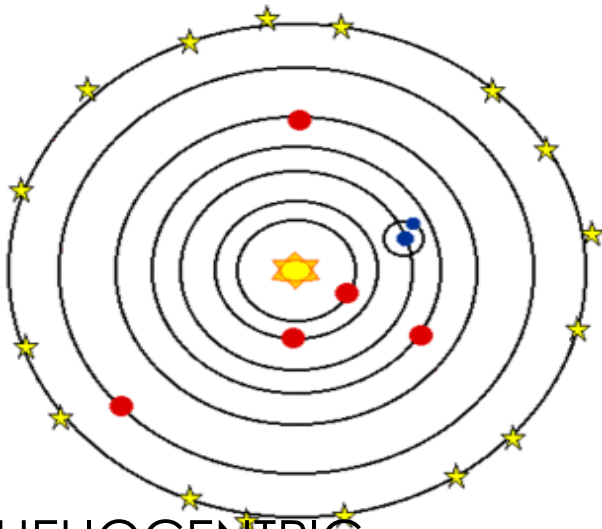


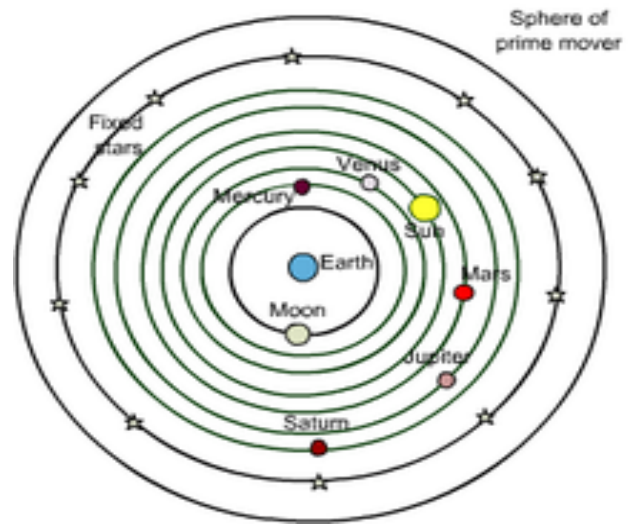
**S6E1. Students will explore current scientific views of the universe and how those views evolved**

Relate the Nature of Science to the progression of basic historical scientific models (geocentric, heliocentric) as they describe our solar system, and the Big Bang as it describes the formation of our universe.



**HELIOCENTRIC**

---



**GEOCENTRIC**

---

1. Explain what is going on in the two solar system models above:

ORIGINALLY, people thought that the earth was the center of the solar system., and that the other planets and sun revolved around it. In 1514 Copernicus published his theory that the SUN is at the center of our solar system. This is the heliocentric model, and it is what we now know is true.

2. What is the Big Bang Theory?

The theory that the universe formed when there was an explosion (the BIG BANG) and it expanded. Now it continues to expand.

They think it happened 13-14 billion years ago.

3. What evidence do scientists use to support the Big Bang Theory?

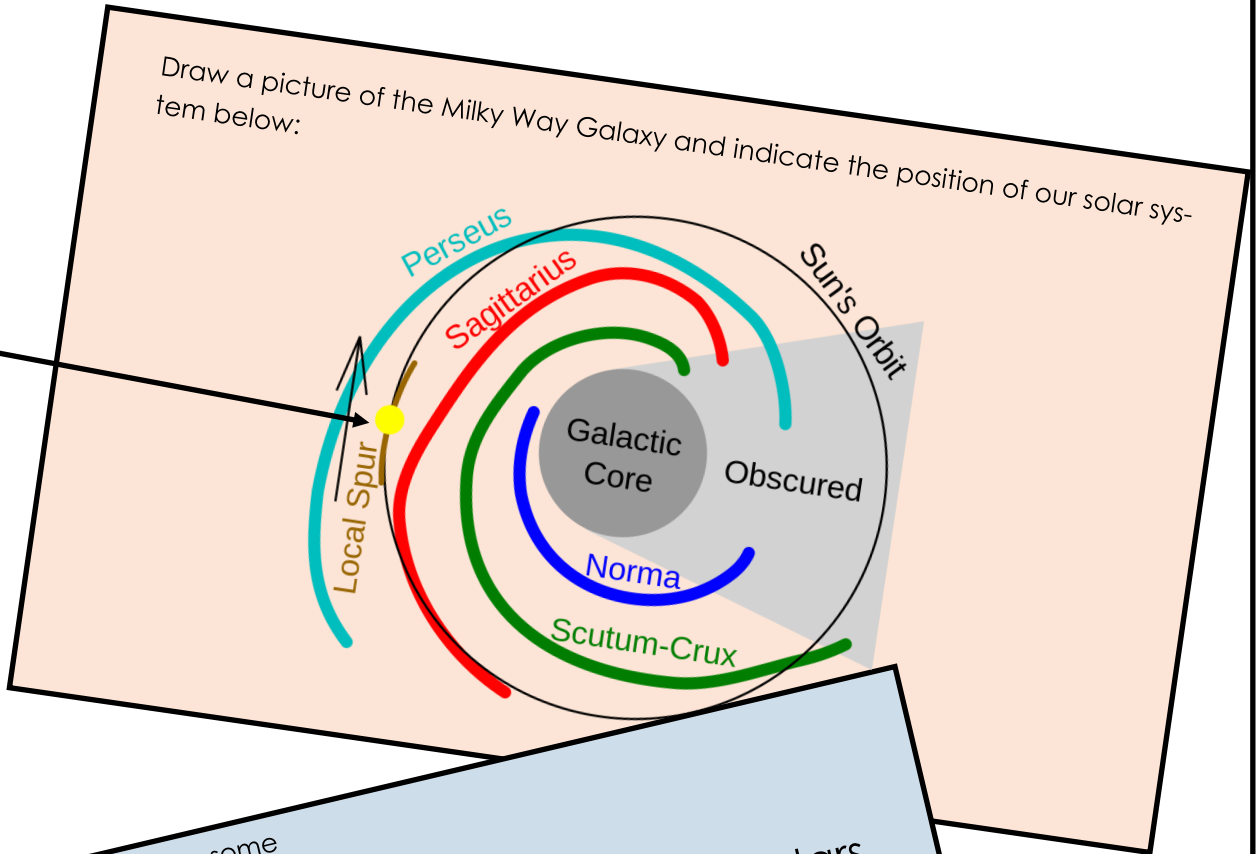
The Hubble Telescope was instrumental, since it helped astronomers to see space much better.

Galaxies are moving away from each other, demonstrating that the universe is shifting.

S6E1 b. Describe the position of the solar system in the Milky Way galaxy and the universe.

Draw a picture of the Milky Way Galaxy and indicate the position of our solar system below:

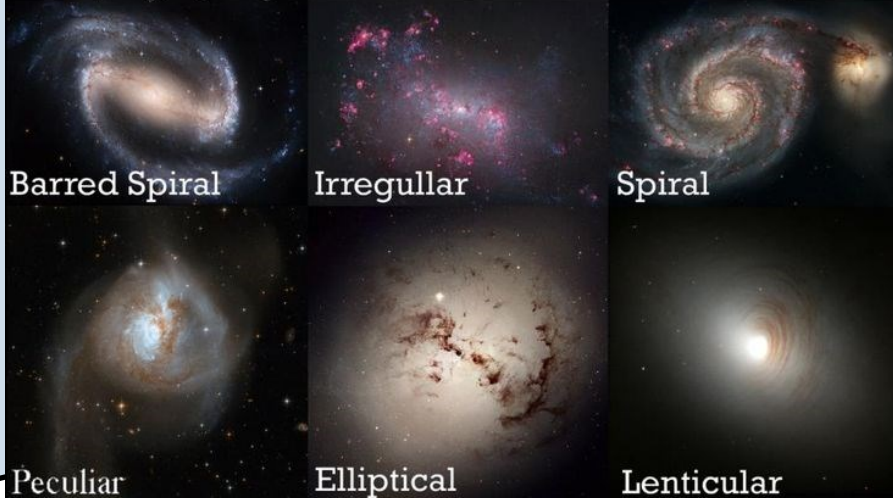
Our Solar System is here:



What is a galaxy? Draw some different shapes of galaxies found in our universe:

A galaxy is a large collection of billions of stars. They come in different shapes.

## Types of Galaxies



S6E1 c. Compare/contrast the planets in terms of size, surface and atmospheric features, relative distance from sun, ability to support life.

List the planets in order from smallest to largest:

- Mercury
- Mars
- Venus
- Earth
- Neptune
- Uranus
- Saturn
- Jupiter

List the planets in order from hottest to coldest:

- Venus (because its thick atmosphere traps heat like the greenhouse effect)
- Mercury (closest to sun but no atmosphere)
- Earth
- Mars
- Jupiter
- Saturn
- Uranus
- Neptune

List the planets in order from the Sun to Pluto:

- Mercury (MY)
- Venus (VERY)
- Earth (EDUCATED or EAGER)
- Mars (MOTHER)
- Jupiter (JUST)
- Saturn (SERVED)
- Uranus (US)
- Neptune (NACHOS)

Which planet(s) currently support life?

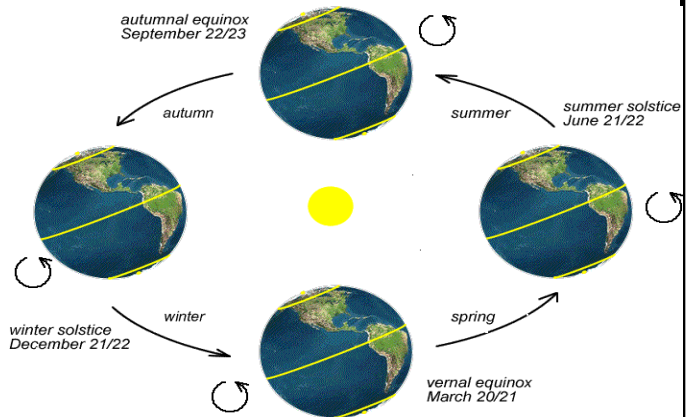
Which planet(s) do scientists think may some day be able to support life?

Planet	Atmosphere	Planet	Atmosphere
Earth	78% Nitrogen and 21% Oxygen	Venus	Dense carbon dioxide
Mars	Thin carbon dioxide	Mercury	None
Jupiter	90% hydrogen, 10% Helium	Uranus	Mostly Hydrogen and Helium, contains methane (makes it blue)
Neptune	80% Hydrogen 19% helium	Saturn	Mostly Hydrogen and Helium

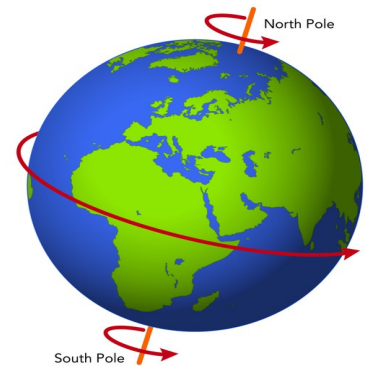
S6E1d. Explain the motion of objects in the day/night sky in terms of relative position.

Label each picture as rotation or revolution, and define each term.

REVOLUTION IS LIKE ORBITING. IT IS WHEN ONE OBJECT CIRCLES AROUND ANOTHER OBJECT. THE EARTH AND THE OTHER PLANETS REVOLVE AROUND THE SUN. THE MOON REVOLVES AROUND THE EARTH. IT TAKES EARTH 365 DAYS TO REVOLVE. (ONE YEAR)



ROTATION IS WHEN AN OBJECT SPINS ON ITS AXIS.  
EARTH ROTATES ONCE EVERY 24 HRS. (ONE DAY)



S6E1e. Explain that gravity is the force that governs the motion in the solar system.

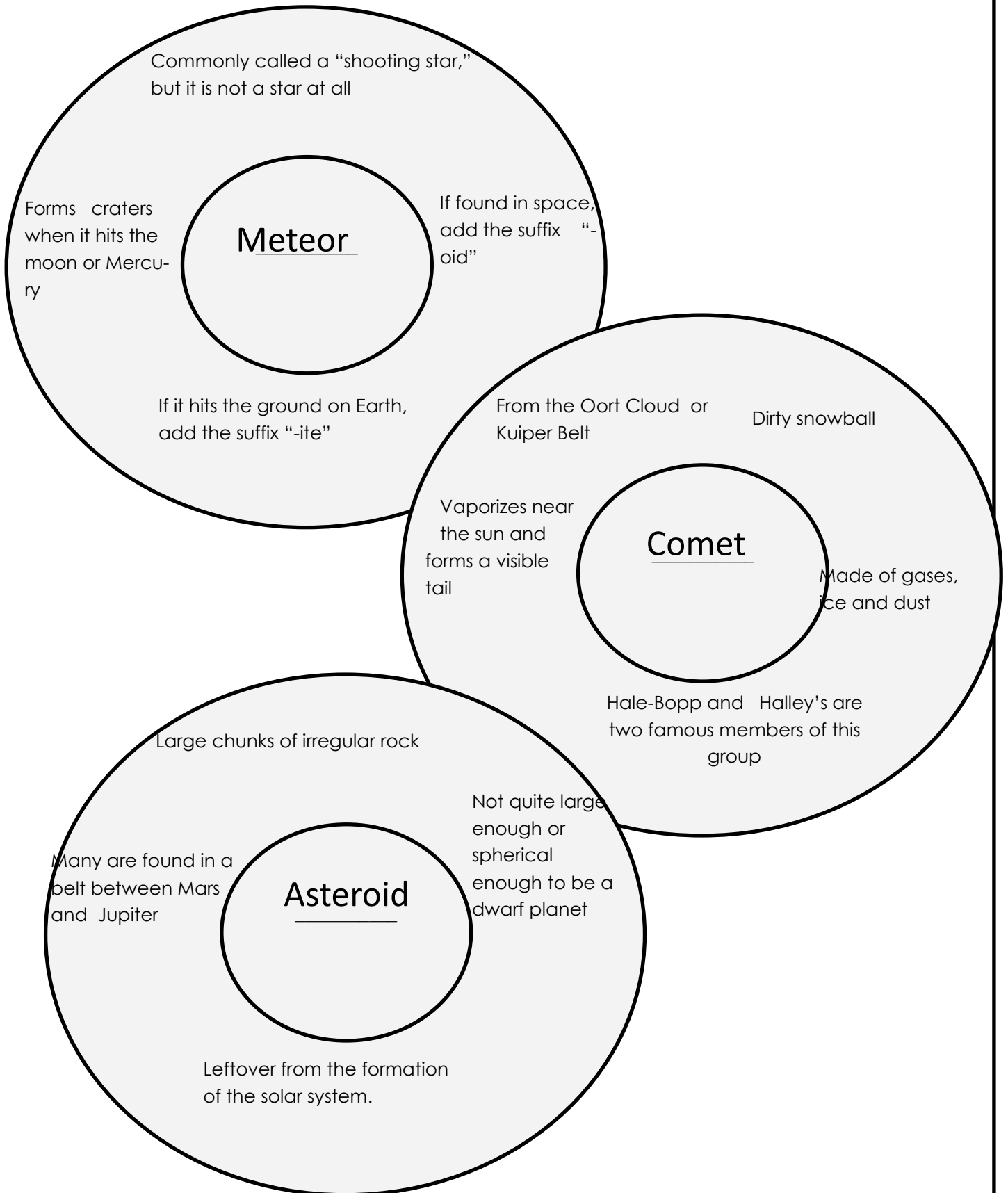
Gravity and inertia are the two forces that govern motion in our solar system. Gravity is the attraction between two objects. All objects have gravitational pulls on each other. Bigger/more massive objects have more gravity; closer objects have more gravity.

Inertia: an object in motion stays in motion, unless something stops it. A ball will roll farther on ice than on grass because there is less friction to stop it. Things in space stay in orbit unless something else crashes into it to cause it to stop.

The SUN is the largest item, everything in solar system is attracted to it. At same time they are trying to push away, which causes a constant elliptical orbit.

S6E1f: Describe the characteristics of comets, asteroids, and meteors.

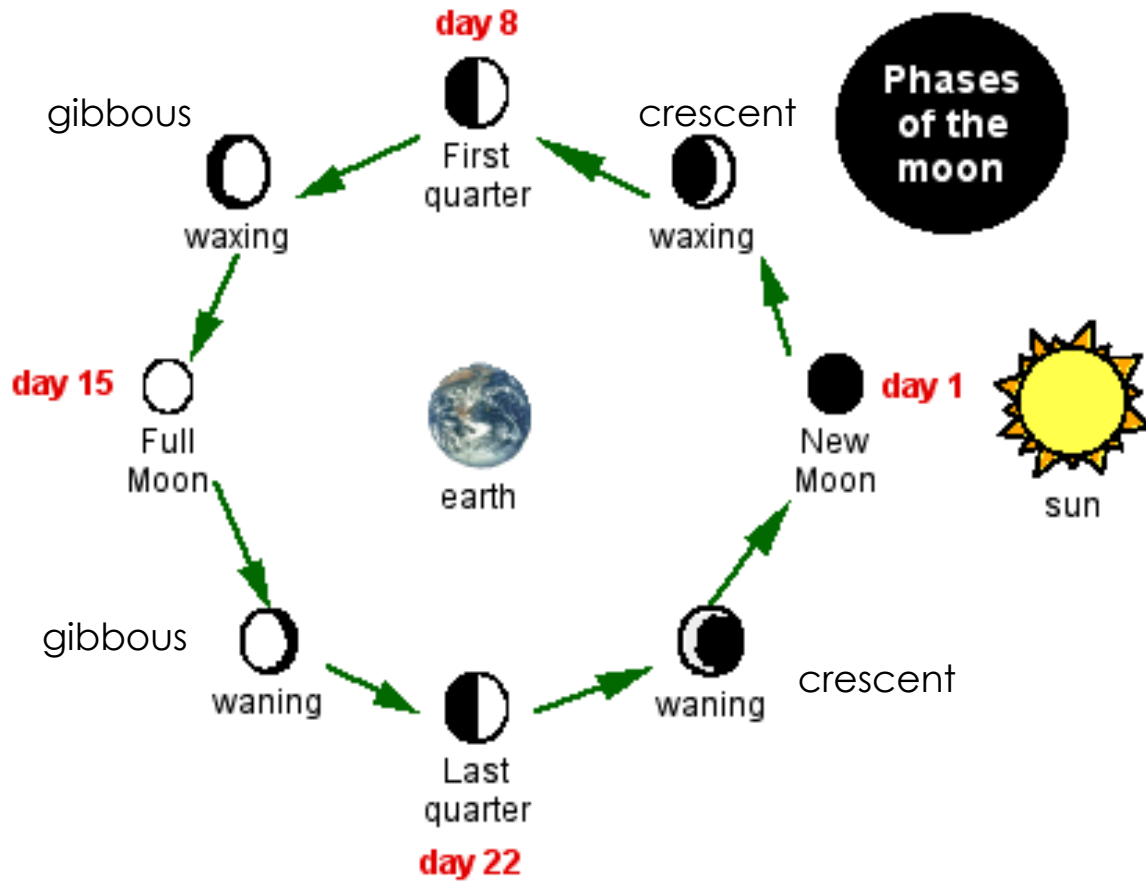
Fill in the mystery circle maps with the item they describe.



S6E2a: Demonstrate the phases of the moon by showing the alignment of the earth, moon and sun.

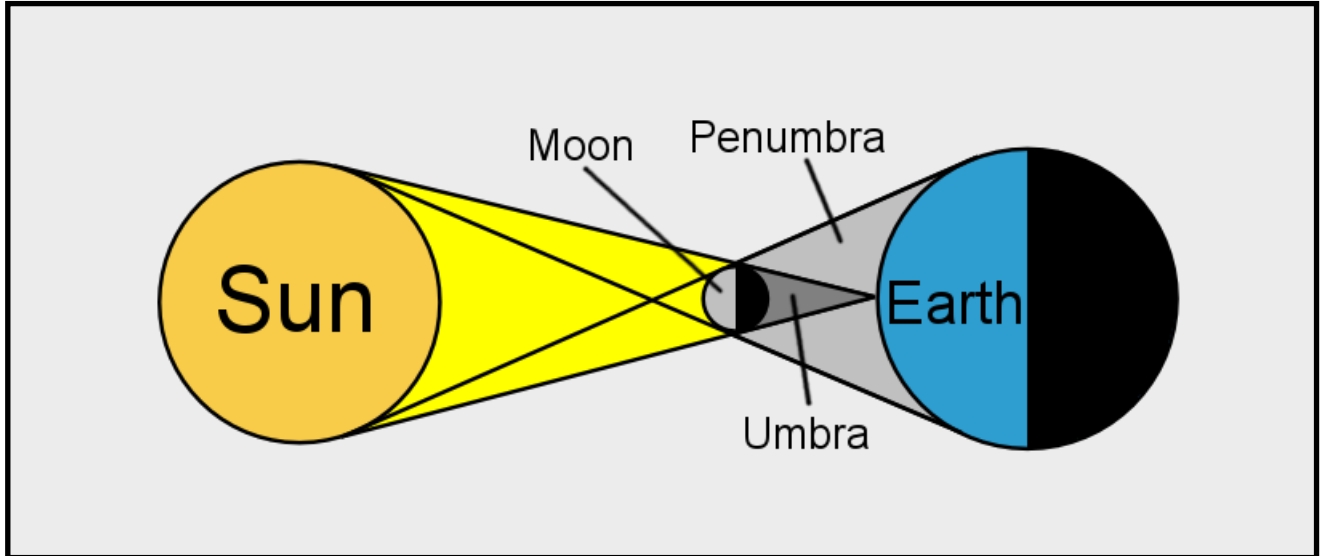
The image below is NOT TO SCALE

Please color in and label each moon phase COLOR IN THE DARK PART DARK. LEAVE LIGHT PART WHITE



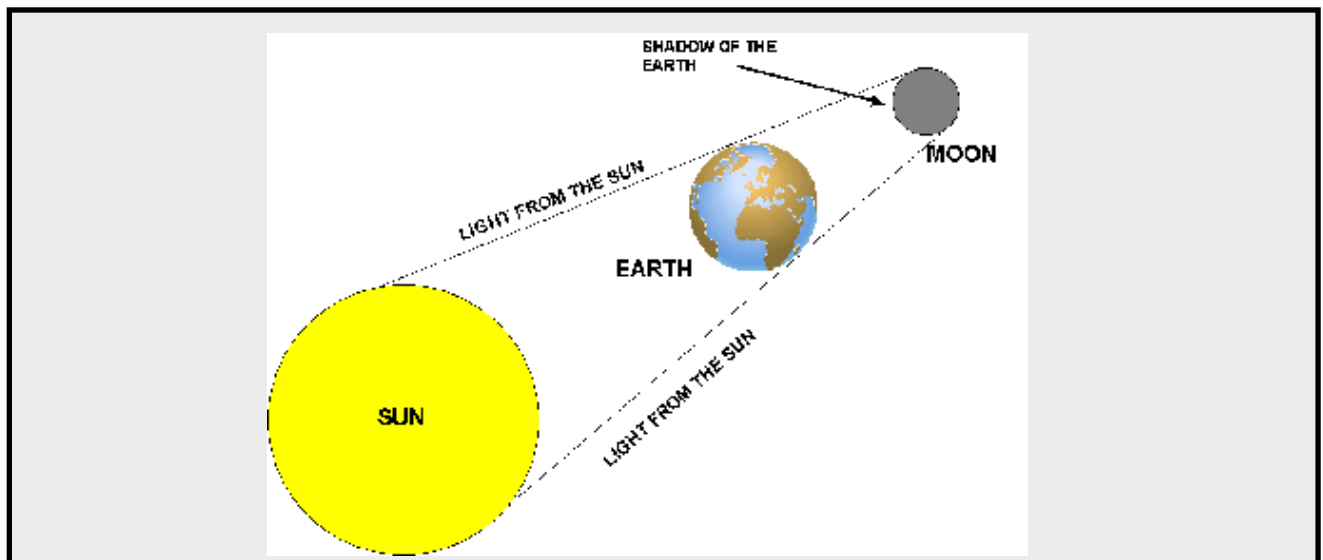
S6E2b: Explain the alignment of the Earth, Moon and Sun during solar and lunar eclipses.

1. Draw and Label a diagram of the Sun, Moon and Earth during a solar eclipse.



What moon phase must it be in order to have a TOTAL solar eclipse?

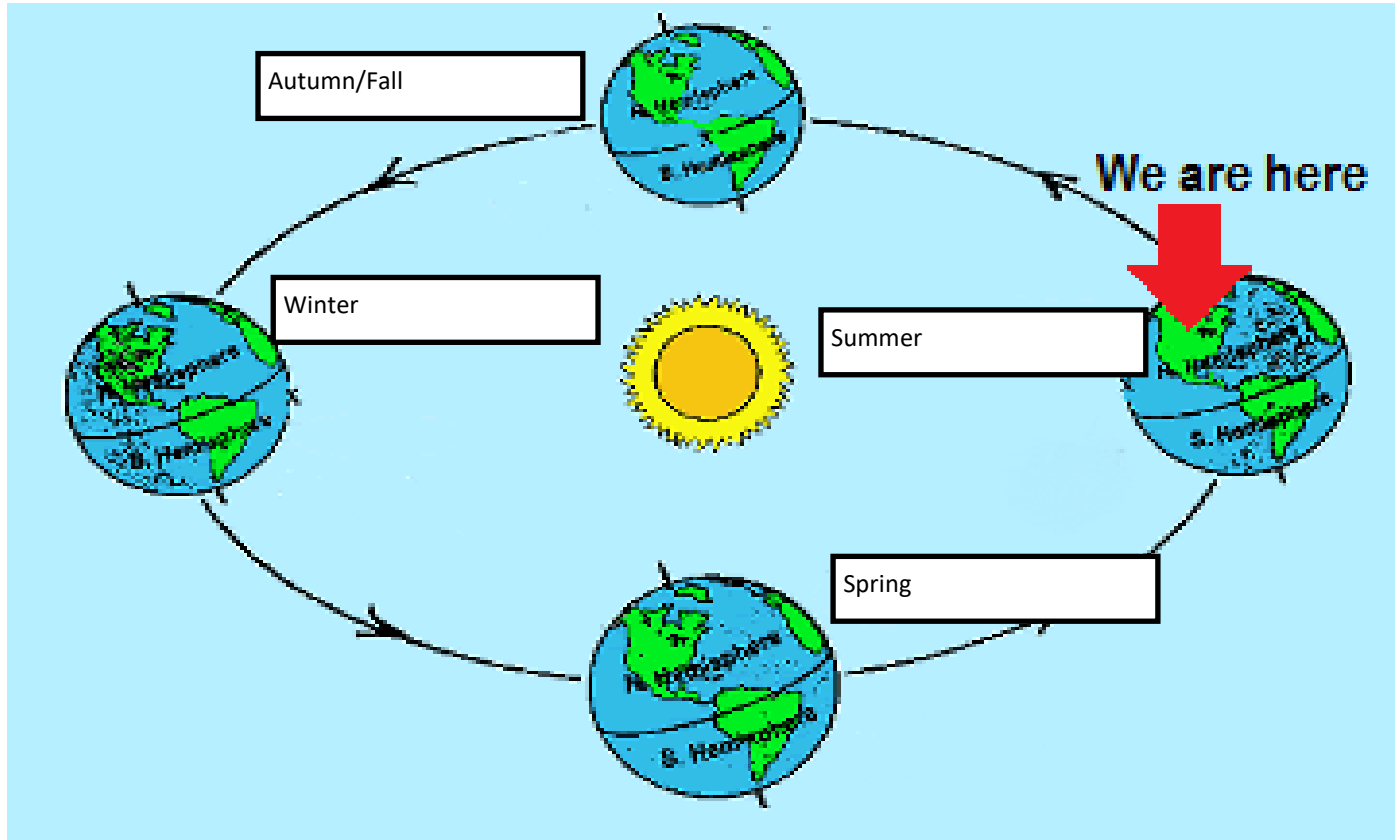
3. Draw and label a diagram of the Sun, Moon, and Earth during a lunar eclipse:



S6E2c: Relate the tilt of the Earth to the distribution of sunlight throughout the year and its effect on climate.

Label the four seasons in the diagram below:

Summer, Winter, Fall and Spring



What is the Vernal Equinox?

First day of Spring. March 20th

What is the Summer Solstice?

First day of Summer. June 21

What is the Autumnal Equinox?

September 22

What is the Winter Solstice?

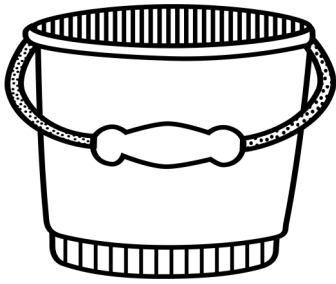
December 21



S6E3a: Explain that a large portion of the Earth's surface is water, consisting of oceans, rivers, lakes, underground water, and ice.

Label each image with the amount/proportion of Earth's water it represents: Oceans, lakes and rivers, glaciers, groundwater

OCEANS



GLACIERS/ICE



GROUNDWATER



LAKES, RIVERS AND  
STREAMS



**72 %** of Earth's surface is covered with water.

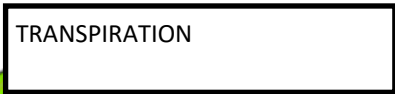
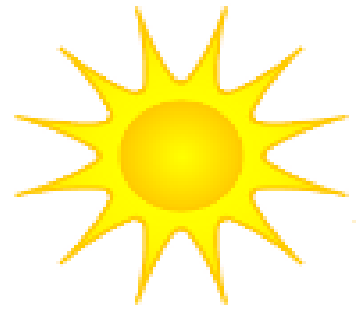
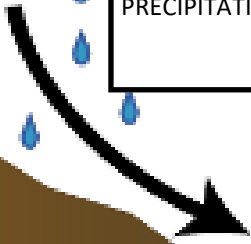
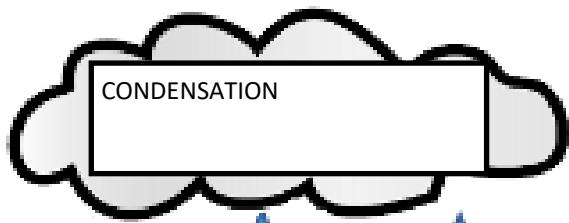
**97 %** of the water on Earth is salt water.

**3 %** of the water on Earth is fresh water

**76 %** of the Fresh water is frozen in glaciers and icebergs.

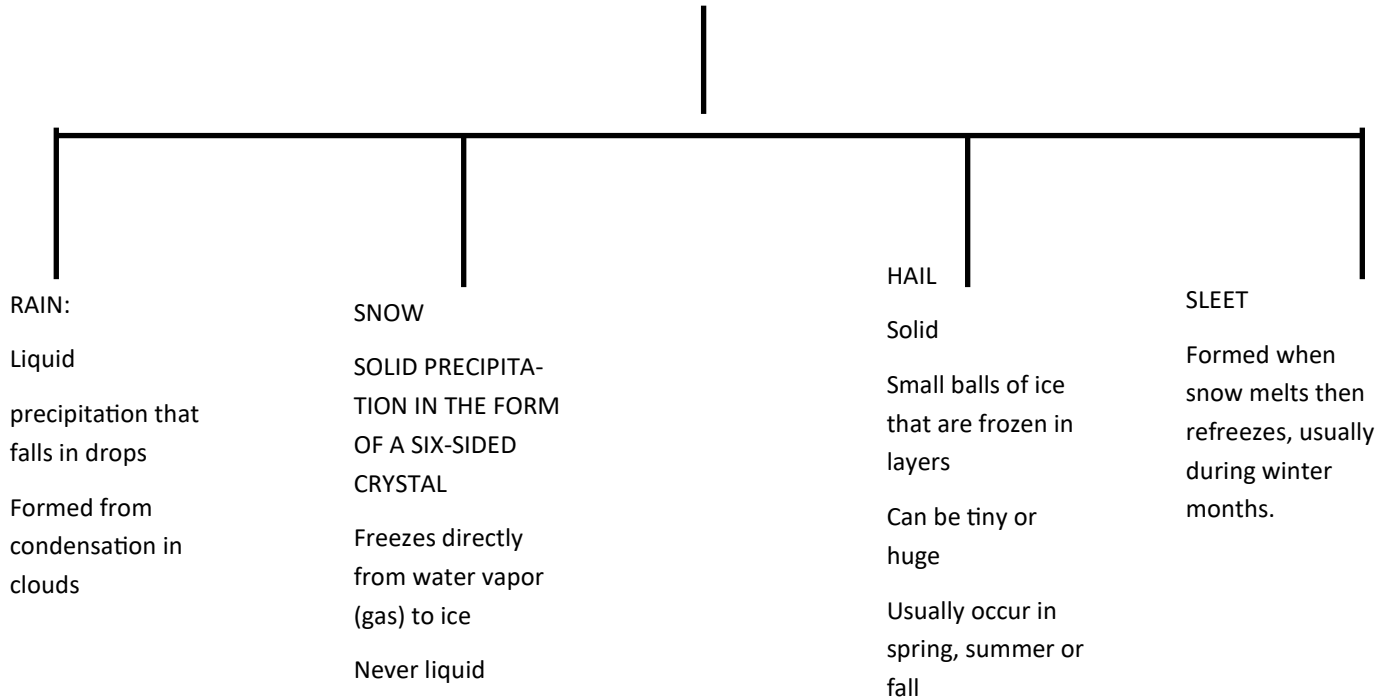
**23 %** of the fresh water is found underground

**1 %** of the fresh water is found in rivers, lakes and streams



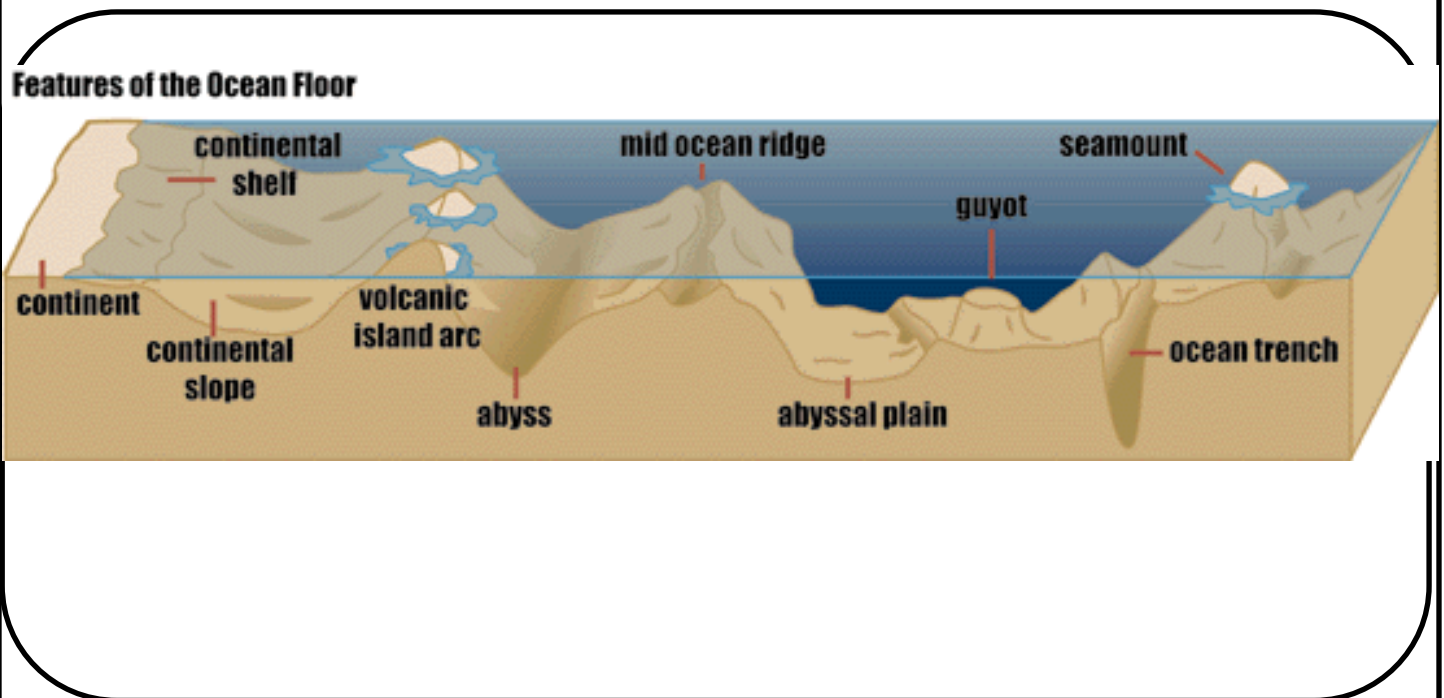
What provides the energy for evaporation?  
 SUN—IT POWERS THE WATER CYCLE

Types of precipitation



S6E3c: Describe the composition, location, and subsurface topography of the world's oceans.

Draw a diagram of the ocean floor, include the following parts: continental shelf, continental slope, abyssal plain, mid-ocean ridge, trench, volcanic island, continental rise and seamounts



Answer the following questions:

1. Which sea floor feature is created by a CONVERGENT plate boundary?

DEEP SEA TRENCHES

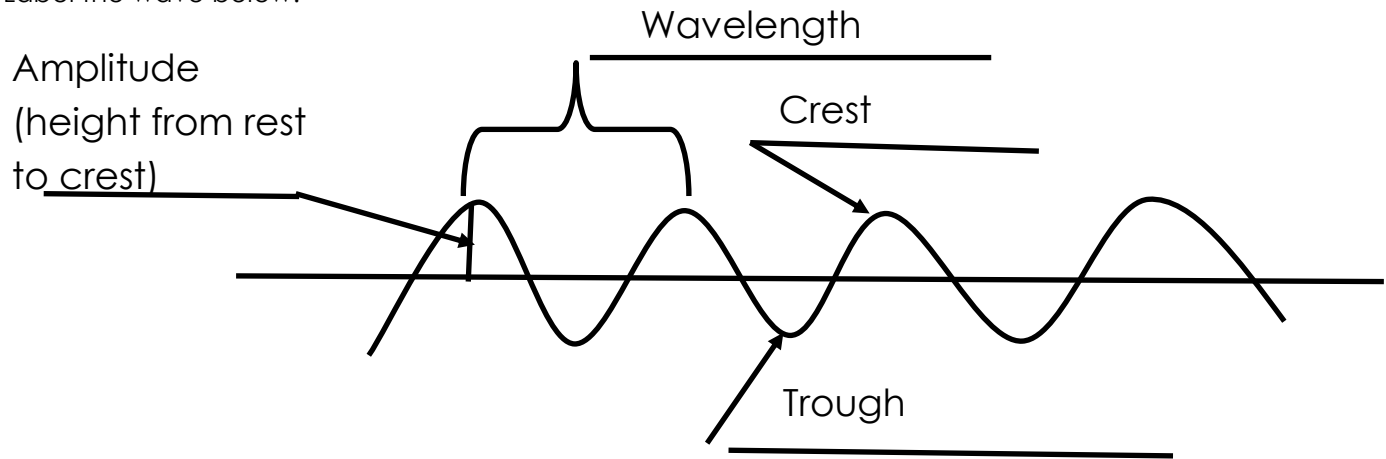
2. Which sea floor feature is created by a DIVERGENT plate boundary?

MID OCEAN RIDGE

VOLCANIC ISLANDS

S6E3d: Explain the causes of waves, currents and tides.

1. Label the wave below:



2. What causes waves?

WIND

3. What is a current?

THE HORIZONTAL MOVEMENT OF WATER (A STREAM OF OCEAN WATER)

IT FLOWS FROM ONE AREA TO ANOTHER. THERE ARE WARM WATER CURRENTS AND COLD WATER CURRENTS—  
EXAMPLE: THE GULF STREAM

4. What causes surface currents?

GLOBAL WINDS

5. What causes deep currents?

DIFFERENCES IN TEMPERATURE AND SALINITY—WHICH CAUSE DIFFERENCES IN DENSITY. COLD WATER SINKS, WARM WATER RISES. SALTIER WATER SINKS, FRESH WATER FLOATS.

6. What is a spring tide, and what causes it?

A SPRING TIDE IS AN EXTREME HIGH TIDE. THEY HAPPEN TWICE A MONTH, DURING A NEW MOON AND DURING A FULL MOON. THE GRAVITATIONAL PULL FROM THE ALIGNMENT OF THE SUN, MOON AND EARTH CAUSE A GREATER EFFECT ON THE WATER.

7. What is a neap tide, and what causes it?

A NEAP TIDE IS A TIDE THAT HAS THE LEAST DIFFERENCE BETWEEN HIGH AND LOW TIDE. IT HAPPENS AROUND THE FIRST AND THIRD QUARTER MOONS.

S6E4a: Demonstrate that land and water absorb and lose heat at different rates and explain the resulting effects on weather patterns.

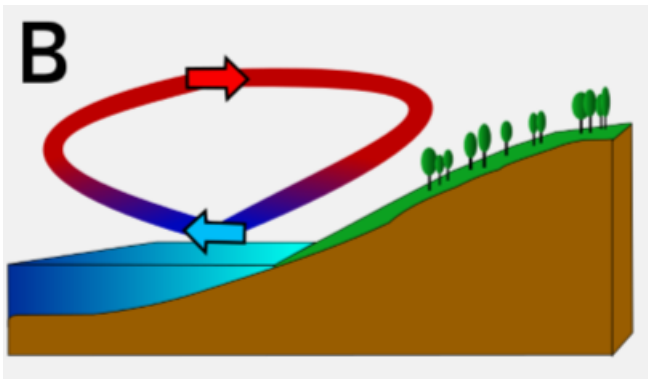
1. Which absorbs heat faster; the oceans or the land?

LAND

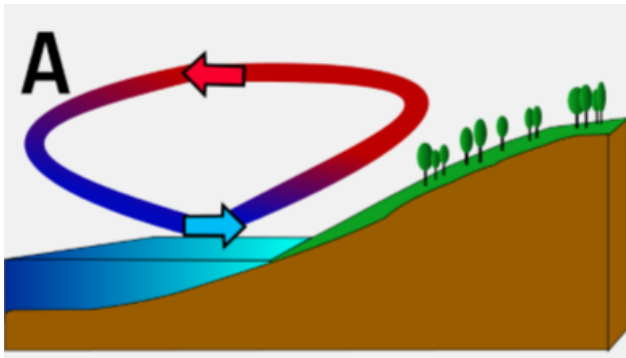
2. Which loses heat faster; the oceans or the land?

LAND

3. Draw a diagram of a land breeze:



4. Draw a diagram of a sea breeze:

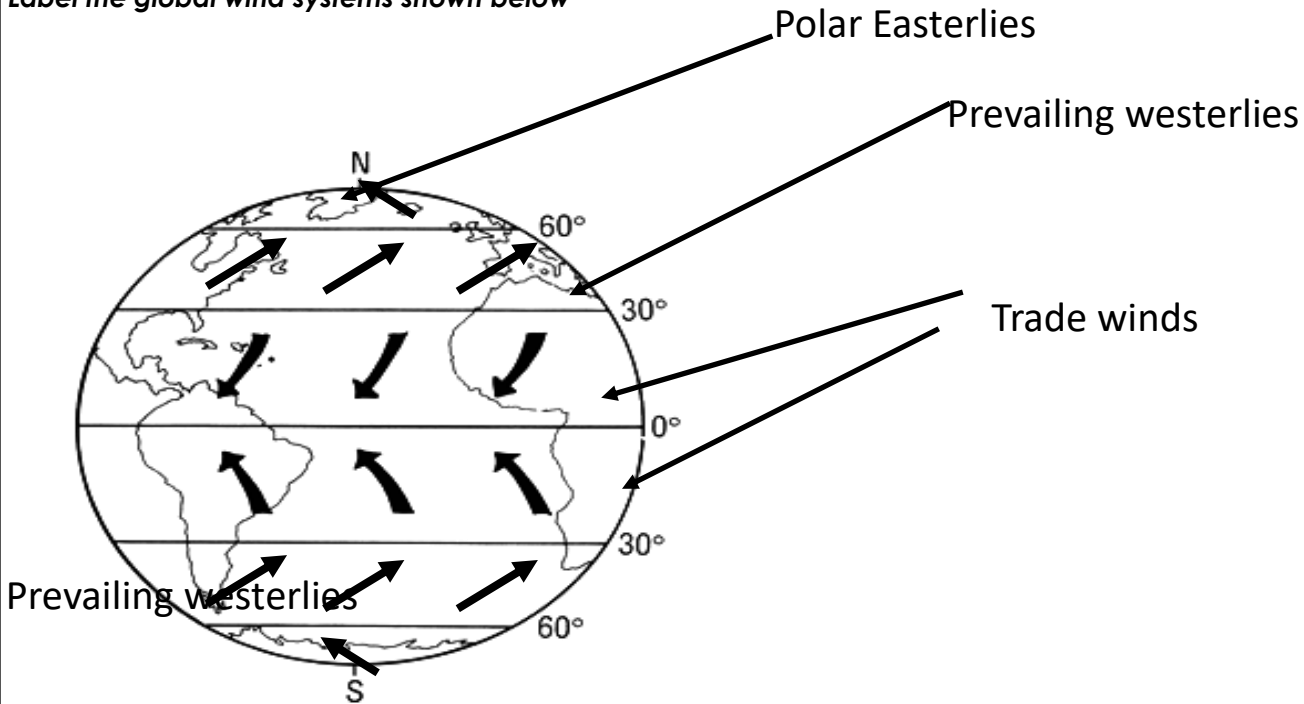


5. How are the climates of coastal areas affected by the nearby ocean?

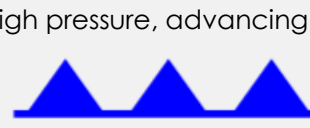

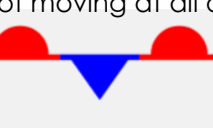

Because the ocean cools down slower, it creates a milder winter in coastal areas (because they hold heat longer) and it takes longer to re-heat in warm months, so it makes for a cooler summer.

S6E4b: Relate unequal heating of land and water surface to form large global wind systems and weather events such as tornados and thunderstorms.

Label the global wind systems shown below



1. Draw the symbols and describe the four different weather fronts:

<p>Cold Front</p> <p>High pressure, advancing mass of cold air.</p> 	<p>Warm Front</p> <p>Low pressure, advancing mass of warm air</p> 
<p>Stationary Front: between cold and warm air masses, not moving at all or moving slowly. Stays in place.</p> 	<p>Occluded Front: Cold front overtakes warm front and forces it out.</p> 

3.

2. What causes a tornado?

Updrafts and downdrafts—unstable air

Can occur during thunderstorms.

3. What causes a thunderstorm?

Moisture, unstable air, and lift

4. What must occur in order for a thunderstorm to be classified as SEVERE?

Hail, tornado, or wind gusts greater than 58 mph

S6E4c: Relate how moisture evaporating from oceans affects the weather patterns and weather events such as hurricanes.

1. What is a hurricane?

Storm with winds greater than 74 mph, forms over tropical oceans

2. What are hurricanes called everywhere else in the world?

Tropical Cyclones

3. What gives a hurricane its POWER?

Evaporating water

4. What happens to a hurricane as it travels over land?

Loses power/loses energy and becomes a tropical storm

5. When water evaporates from the ocean, what happens to the salt?

The salt stays behind, just the water evaporates.

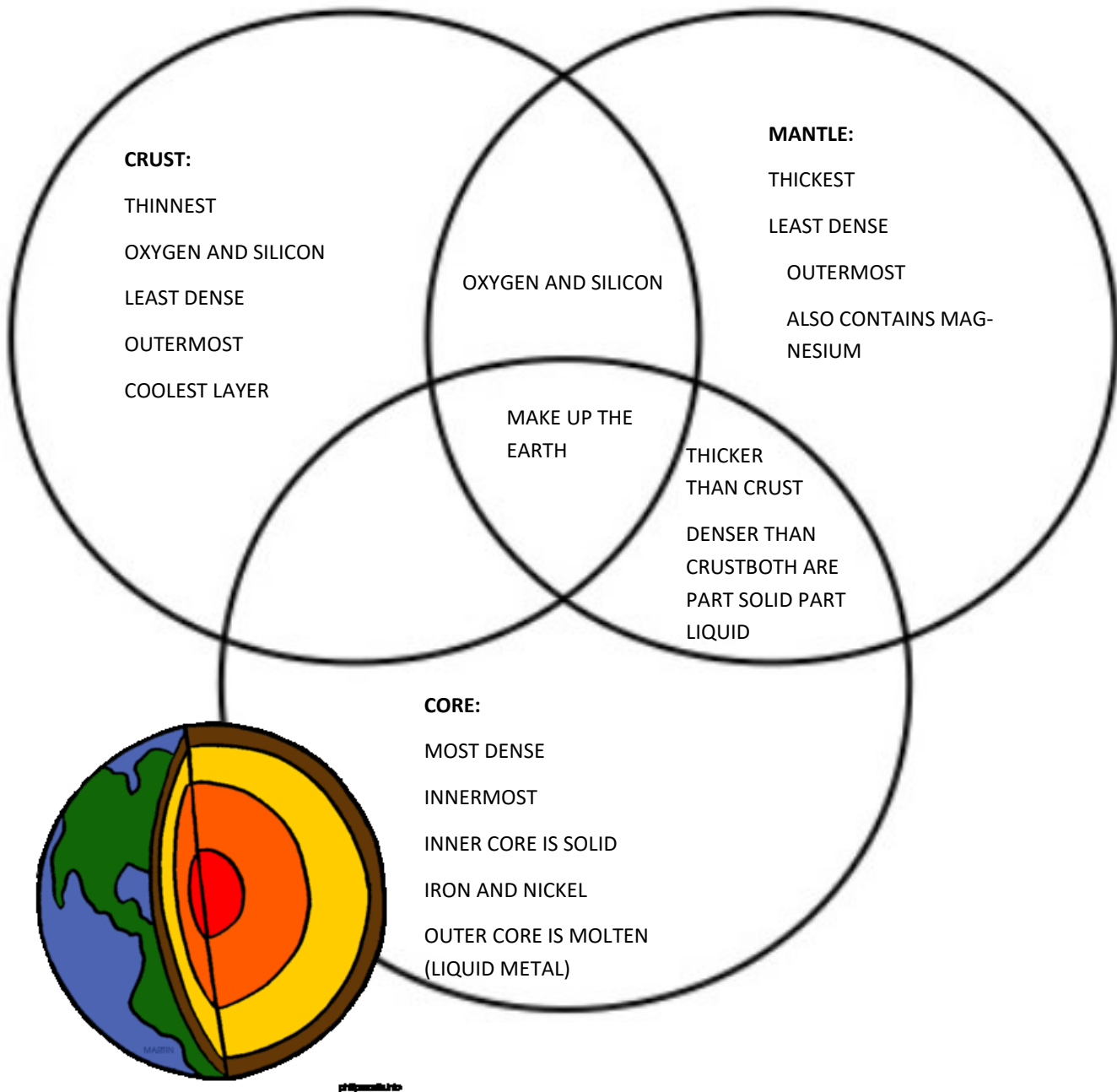
6. How does the sun's heating water in the tropics effect the climate in the rest of the world?

**The ocean in the tropics absorbs a lot of energy from the sun, acting as a giant solar panel. It influences winds, currents, and precipitation.**

7. Where does the energy that causes water in the ocean to evaporate originally come from?

THE SUN

S6E5a: Compare and contrast the Earth's crust, mantle, and core including temperature, density, and composition.





S6E5b: Investigate the contribution of minerals to rock composition.

1. A mixture of minerals is called a ROCK.
2. What is granite made of?

INTRUSIVE IGNEOUS ROCK MADE OF QUARTZ, FELDSPAR AND MICA.

3. What is basalt made of?

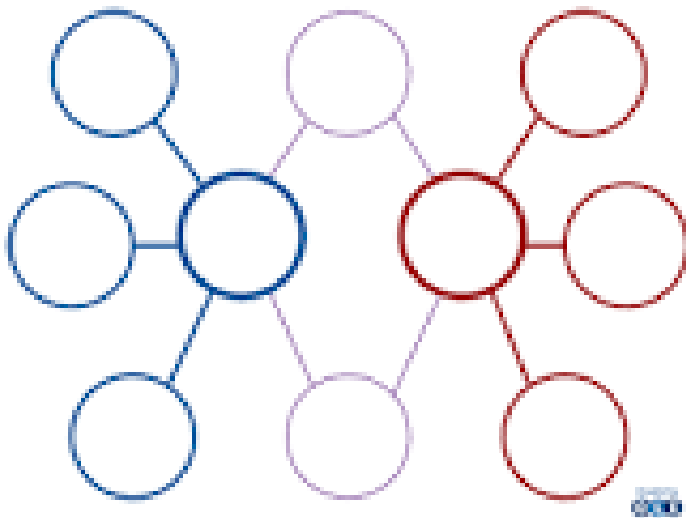
EXTRUSIVE IGNEOUS ROCK MADE OF FELDSPAR AND PYROXENE AND SMALL AMOUNTS OF IRON.

4. What is schist made of?

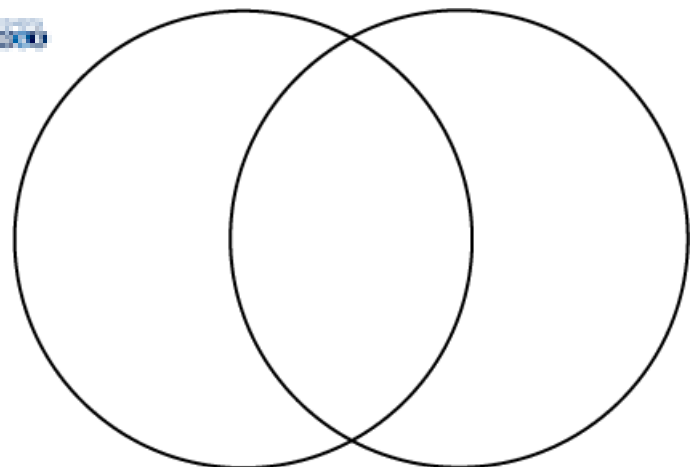
MUSCOVITE, CHLORITE, TALC, MICA, AND GRAPHITE

SMALL AMOUNTS OF QUARTZ AND FELDSPAR

**Compare and contrast two of the above rocks in a double bubble map below:**



or



S6E5c: Classify rocks by their process of formation.

### Sedimentary Rocks

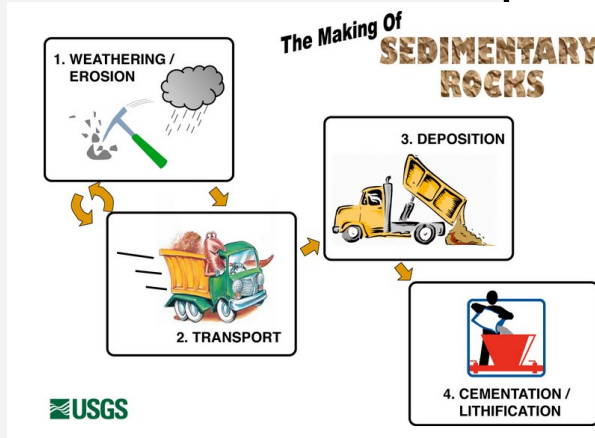
~Process of formation:

~Examples of sedimentary rock:

SANDSTONE

CONGLOMERATE

LIMESTONE



### Igneous Rocks

~Process of formation: ROCK IS MELTED AND THEN COOLED AND HARDENS TO FORM ROCK.  
Quick cooling/lava/small crystals: extrusive igneous rock.  
Slow cooling/magma/larger crystals: intrusive igneous rock.

~Examples of igneous rock:

OBSIDIAN, GRANITE, SCORIA, PUMICE, GABBRO

### Metamorphic Rocks

~Process of formation:

HEAT AND PRESSURE is applied to sedimentary or igneous rock.

CAN BE FOLIATED (STRIPED) OR NON-FOLIATED

~Examples of metamorphic rock:

GNEISS

SCHIST

MARGLE

QUARTZITE

S6E5d: Describe processes that change rocks and the surface of the Earth.

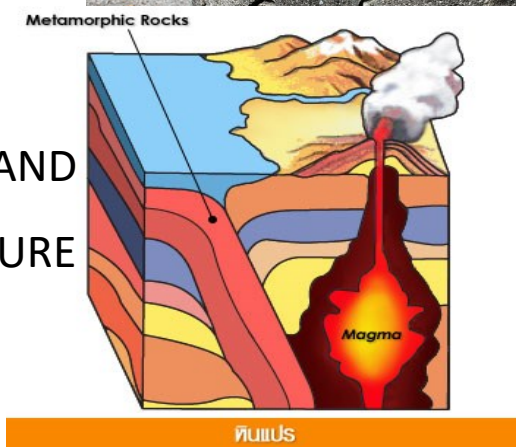
## WEATHERING



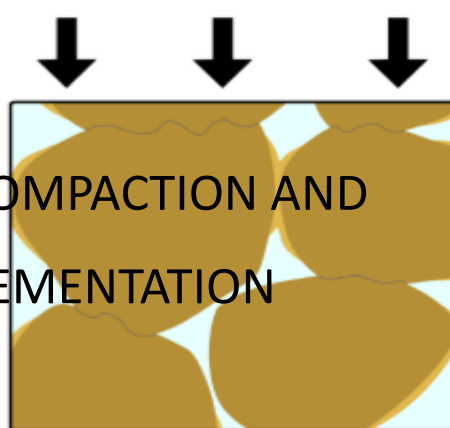
## EROSION



HEAT AND  
PRESSURE

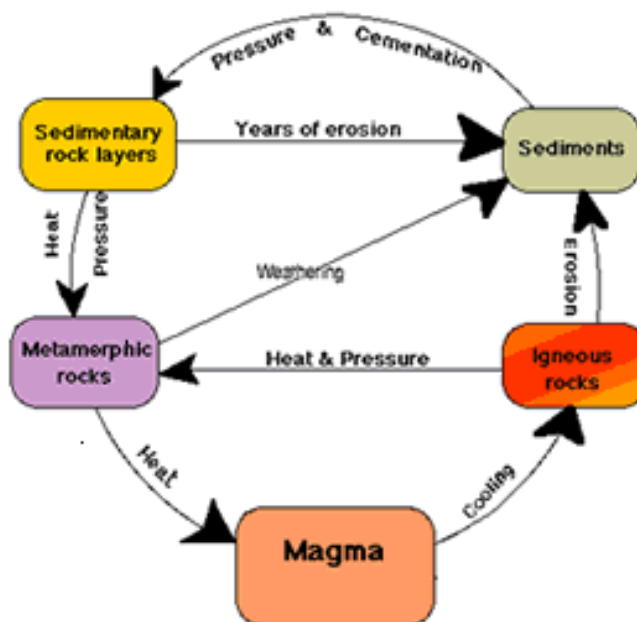


COMPACTION AND  
CEMENTATION



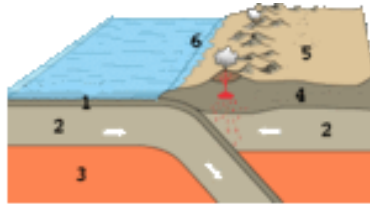
Look at the photos above. How are rocks changed throughout the process of the rock cycle? Create a flow chart (include igneous, sedimentary and metamorphic rocks) OR use the information to write a paragraph.

## Rock Cycle



S6E5e: Recognize that lithospheric plates constantly move and cause major geological events on the Earth's surface.

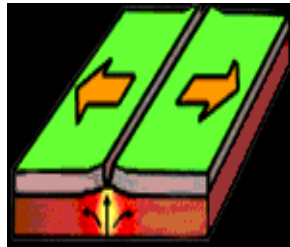
1. Draw a convergent plate boundary:



2. What type of landforms result from this type of plate boundary?

Folded mountains (continental-continental), volcanic mountains, OCEAN TRENCHES (oceanic-continental)

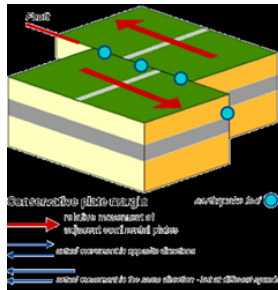
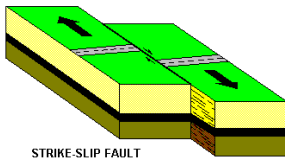
3. Draw a divergent plate boundary:



4. What type of landforms result from this type of plate boundary?

Sea floor spreading, new oceanic crust is formed, mid-ocean ridges,

5. Draw a



transform plate boundary:

6. What types of events result from activity at transform plate boundaries?

Earthquakes, Underwater earthquakes, tsunamis

S6E5f: Explain the effects of physical processes (plate tectonics, erosion, deposition, volcanic eruption, gravity) on geological features including oceans (composition, currents, and tides)

Physical Weathering: Rocks break apart  
PHYSICALLY (no chemical changes)

Example: Ice wedging, gravity, water and wind

Chemical Weathering: Chemical changes and chemical reactions break down rock.

Example: Limestone reacts with water and rock dissolves. Underground caves can form.

Erosion by Water:

Water washes over rock and smooths and wears them away. Water also tumbles rocks and sand together. The friction causes changes in the rock.

Example: river rocks, Grand Canyon

Erosion by Wind:

Wind wears away at rock and blows soil away.

Example: beaches/sand dunes can blow away if not held in place by sea grass roots and other erosion protection methods

Erosion by Gravity:

Rock falls down and breaks, glaciers and rocks slide down mountains. Mass erosions can occur.

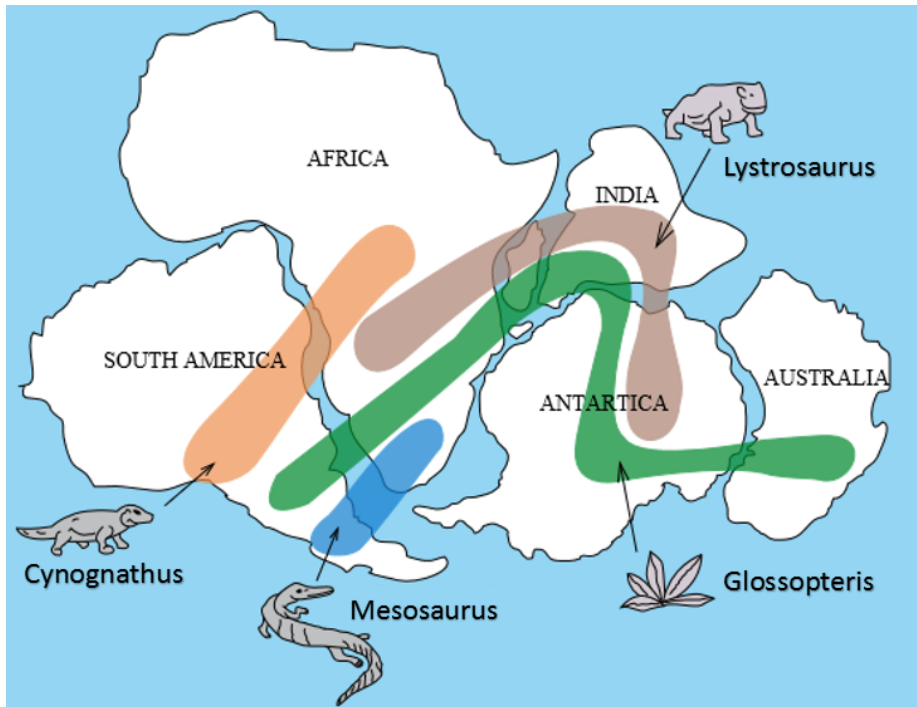
Example rocks falling from cliffs

Deposition:

When soil or sediment is dropped at a new location

Example: Deltas in rivers

S6E5g: Describe how fossils show evidence of the changing surface and climate of Earth.



1. What is the landmass in the picture above called? PANGAEA

2. How does the climate of Antarctica today differ from the climate of the Antarctica pictured above?

IN THE PICTURE IT SHOWS PLANTS AND ANIMALS—INDICATING A TEMPERATE TO TROPICAL CLIMATE. NOW ANTARCTICA IS AT THE POLES AND HAS A POLAR CLIMATE. THERE ARE NO PLANTS, AND VERY FEW ANIMALS.

3. How does the fossil evidence help support Continental Drift Theory?

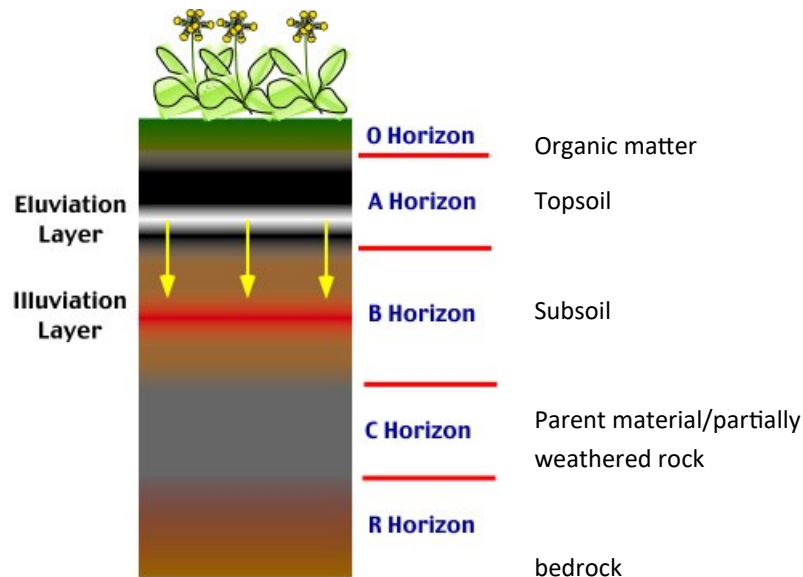
IT SHOWS FOSSILS ARE LOCATED IN A WAY THAT PROVIDES EVIDENCE THAT DIFFERENT LANDMASSES MAY HAVE BEEN CONNECTED TO EACH OTHER AND IN DIFFERENT AREAS OF THE EARTH. ALONG WITH THE GEOGRAPHICAL EVIDENCE (LIKE THE PUZZLE PIECES—IT FITS TOGETHER) IT PROVIDES SUPPORT.

4. How do continents move, and how much do they move each year?

CONTINENTS MOVE BECAUSE OF TECTONIC PLATE ACTIVITY AND SEA FLOOR SPREADING. THEY MOVE ABOUT 2.5 CM (1 INCH) PER YEAR.

S6E5h: Describe soil as consisting of weathered rocks and decomposed organic material.

1. Draw and label a soil horizon diagram in the rectangle below; write a brief description of what the layer is made of:



## 2. How does soil form?

- Parent rock is exposed
- Weathering of rock
- Decomposing of organic matter

## 3. How does topsoil differ from bedrock?

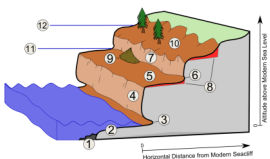


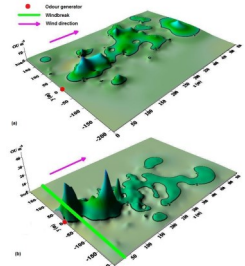

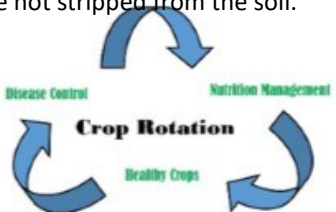
**Topsoil-looser, richer in nutrients, located on top, more weathered, may contain organic matter as well as inorganic matter**

**Bedrock-denser, less weathered, bottom layer, inorganic (rock)**

S6E5i. Explain the effects of human activity on the erosion of Earth's surface.

Human Activity	How does it cause erosion?	How can we make changes and prevent erosion?
Farming	Farmers plow fields and remove trees and plants. They make the land flat and lose soil.	Use soil conservation methods like terracing and no-till farming, plant wind breaks, etc.
Construction	Clearing land to build houses causes erosion because plant roots hold the soil together. Also construction calls for foundations, etc. to be dug.	Be conscious of the type of land you are building on. Keep trees and plants in place to conserve soil.
Mining	Dynamite, breaking up rocks, etc. erodes the surface.	Do not strip mine. Try to conserve the structures of the rock.

Draw a picture/diagram OR describe each method of soil conservation:

<p><b>Terracing:</b> If planting on a hill, plant on "steps" like a staircase so soil doesn't wash downhill</p> 	<p><b>No-till farming:</b> Plant crops without tilling soil and disturbing soil. Less disturbance=less erosion.</p> 
<p><b>Cover Crop:</b> Planting a crop all over a field in order to help prevent soil erosion, restore nutrients, prevent diseased crops, etc. Usually winter rye, soybeans or similar plants are used.</p> 	<p><b>Wind Break:</b> Planting a row of taller plants to block wind and protect crops.</p> 
<p><b>Contour Plowing:</b> NOT plowing in straight lines. The curves slow water flow and prevent erosion.</p> 	<p><b>Crop Rotation:</b> Changing the crop that is planted in a field so that the minerals are not stripped from the soil.</p> 



S6E5j. Describe methods for conserving natural resources such as water, soil, and air.

**A local company has moved into your town and is wasting all of the natural resources! Write a letter to the C.E.O. of the company explaining how he/she can help to conserve water, soil and air.**

Dear \_\_\_\_\_,

Some ideas could include:

- ~reuse graywater
- ~use energy-saving light bulbs
- ~use filters to prevent air and water pollution
- ~dispose of waste carefully
- ~use lights that automatically turn on and shut off when people enter the room
- ~reward employees for conserving energy
- ~ use renewable energy sources such as wind and solar power

*Sincerely,*

\_\_\_\_\_

**S6E6: Students will describe various sources of energy and their uses and conservation.**

a. Explain the role of the sun as the major source of energy and its relationship to wind and water energy.

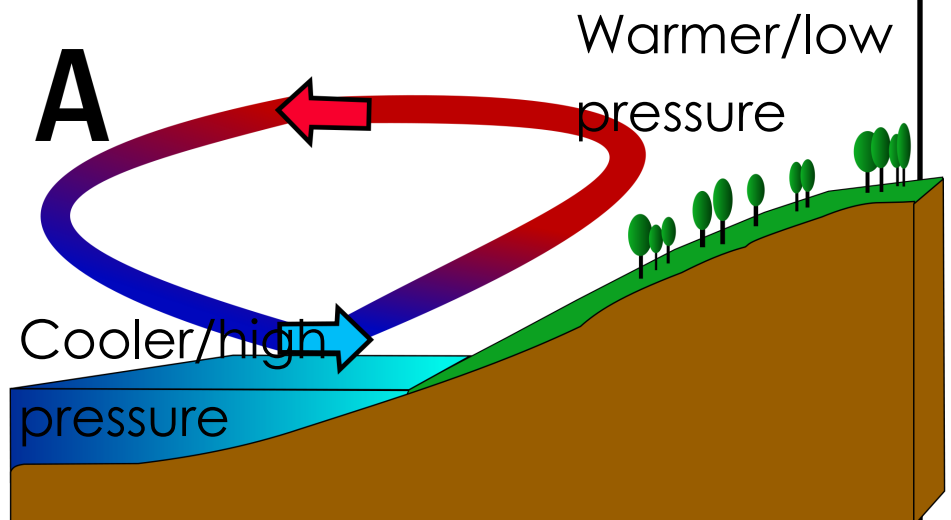
**Directions: Use the terms in the word bank to fill in the sentences and make them true.**

**Word Bank:** faster, slower, air, sun, windmill/wind turbine, low, high, faster, slower, energy, currents

1. The **SUN** is the primary (main) source of energy for Earth and everything on Earth.
2. Land heats up **FASTER** than water, and it also cools down **FASTER**.
3. Oceans and bodies of water heat up **SLOWER** than land and hold their heat **LONGER**.
3. Wind is the movement of **AIR**
4. Wind power can be harnessed using a **WINDMILL OR WIND TURBINE**.
5. Wind causes **WAVES AND SURFACE CURRENTS** in the oceans.
6. The flow of water can also be used to generate **ELECTRICITY**.
7. Wind blows from areas of **HIGH** pressure to areas of **LOW** pressure.

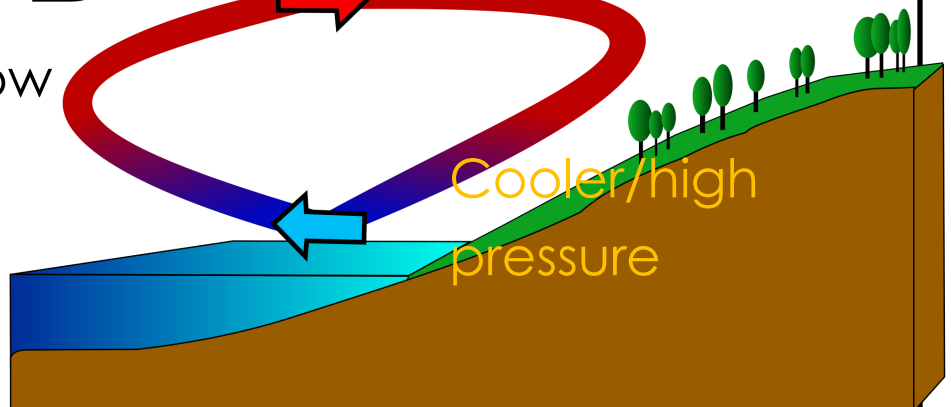
Label the Land Breeze and Sea Breeze, also label which area is warmer and which is cooler in each picture.

### Sea breeze



### B Land breeze

Warmer/low pressure



S6E6 b: Identify renewable and nonrenewable resources.

Define:

1. resource: Materials found in nature that can be used for economic gain (minerals, fossil fuels, water, forests)

2. renewable resource:

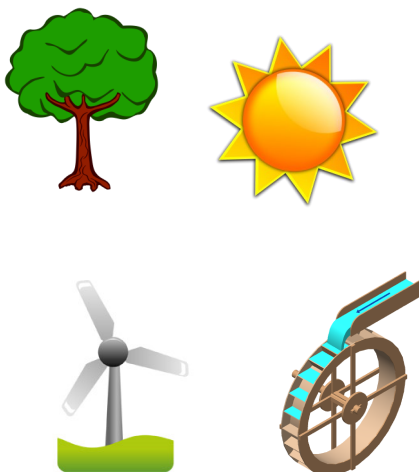
Energy from sources that are constantly being formed (relatively quickly). We do NOT use it faster than it can be replaced.

3. nonrenewable resource:

A resource that forms slower than it is consumed. (We use it faster than it is made)

Label each picture as R (renewable) or NR (nonrenewable):

Renewable:



Non-Renewable:

