

8th grade Science STAAR Review

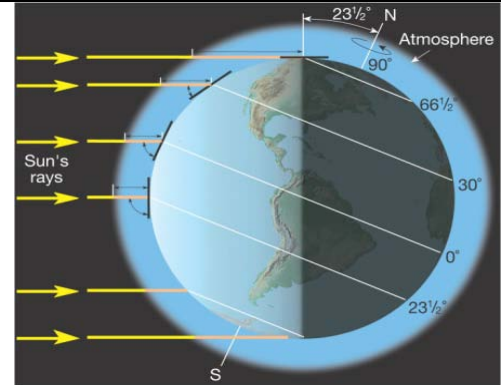
Objective 3: Earth & Space

8.7A model and illustrate how the tilted Earth rotates on its axis, causing day and night, and revolves around the Sun causing changes in seasons

Earth

Day & Night

The Earth rotates or spins around its axis. The **axis** is an imaginary line running through the center of the earth from the North Pole to the South Pole. This rotation takes 24 hours causing the sun to rise and set (night and day). Earth's axis tilts **23.5 degrees**.

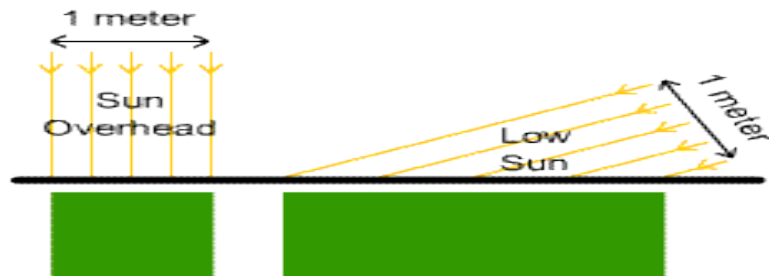


1 rotation = 24 hours or 1 day

Earth & Sun

Year & Seasons

It takes just over **365 days** or **one year** for the Earth to complete one revolution around the Sun. However because of its tilt, the Sun's rays hit the Northern Hemisphere longer and more directly in the summer than in the winter. When it's summer in the **Northern Hemisphere**, it is winter in the **Southern Hemisphere**.



Earth & Sun

*Seasons – caused by **tilt of the axis***

One hemisphere is **Tilted** away from the Sun and receives less direct solar rays from the Sun. The area around the **Equator** isn't affected by Earth's **Tilt**. Because it's in the middle, it will always have direct solar rays all year round. And this is the **reasons for the seasons** in the Northern and Southern Hemispheres. Around the equator there's only one season, Summer.



QUESTIONS:

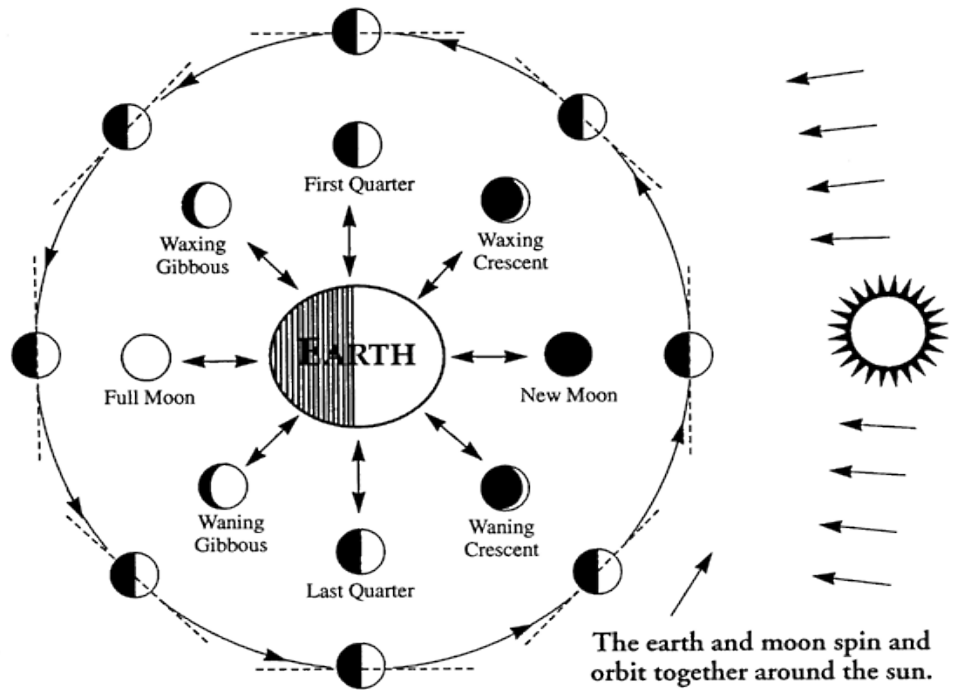
1. What is the difference between Earth's rotation and revolution?

2. Why do day and night occur? Draw a detailed picture to describe the process. Make sure to label and identify any important factors such as Earth's axis, the North Star, and the direction Earth moves.





3.. What causes seasons to occur? Use 2-3 sentences to explain the process.

8.7 B demonstrate and predict the sequence of events in the lunar cycle

Phases of the Moon







Earth, Moon & Sun

<i>Phases</i>	<i>Description of Lunar Phases</i>
	New Moon: The lighted side of the Moon faces away from the Earth. This means that the Sun, Earth, and Moon are almost in a straight line.
	First Quarter: The right half of the Moon appears lighted and the left side of the Moon appears dark.
	Full Moon: The lighted side of the Moon faces the Earth. This means that the Earth, Sun, and Moon are nearly in a straight line, with the Earth in the middle.
	Last Quarter: Sometimes called Third Quarter. The left half of the Moon appears lighted, and the right side of the Moon appears dark.




8.8 A describe components of the universe, including stars, nebulae, and galaxies, and use models such as the Hertzsprung-Russell diagram for classification

Components of the Universe

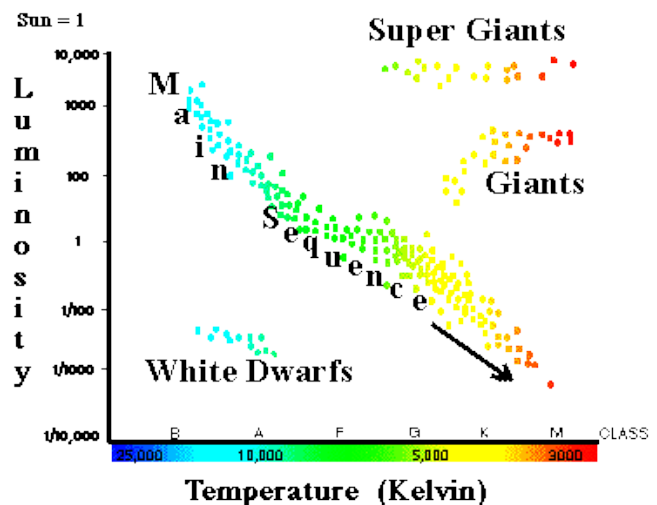
Nebulae	Huge clouds of dust and gas.	
Asteroids	Large rock that orbits the sun	
Comet	Made of ice, dust & small rock.	
Star	A star is ball of hydrogen and helium fueled by fusion.	

Galaxy	A collection of stars held together by the gravity . Our Solar System is in the Milky Way Galaxy (Spiral).
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Types of Galaxies

<i>Spiral</i>	<i>Elliptical</i>	<i>Irregular</i>
		

Hertzsprung – Russell Diagram



Star Classification

Stars are classified by their **spectra** (the elements that they absorb) and **surface temperature**. There are seven main types of stars. In order of decreasing temperature, **O, B, A, F, G, K, and M**. O and B stars are uncommon but very bright; M stars are common but dim. An easy way to remember is: "**Oh Be A Fine Girl (or guy) Kiss Me.**"

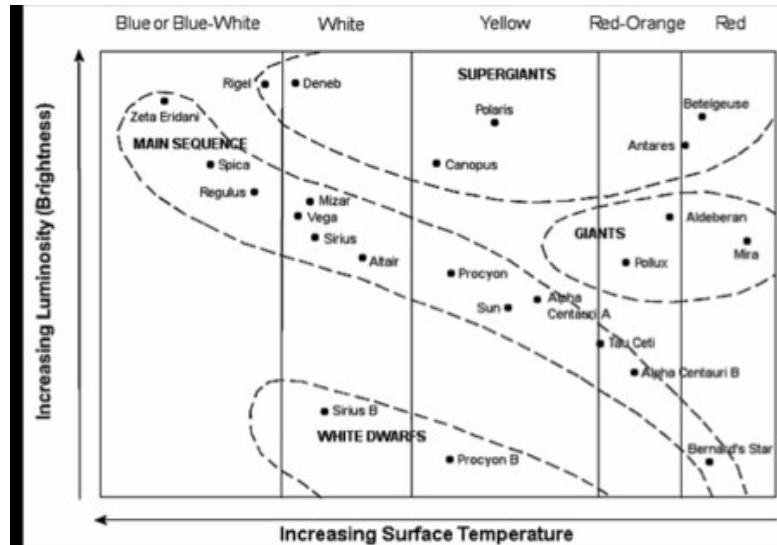
Class	Brightness	Temperature	Color
O	Brightest	30,000-60,000	Blue
B		10,000-30,000	Blue-White
A		7,5000-10,000	White
F		6,000-7,5000	Yellow-White
G		5,000-6,000	Yellow
K		3,500-5,000	Orange
M	Very Dim	2,000-3,000	Red

Hertzsprung – Russell Diagram

The H-R Diagram is a graph that plots stars color (spectral type or surface temperature) vs. its luminosity (brightness). This diagram shows 3 different types of stars:

1. Most stars, including the sun, are "**main sequence stars**," fueled by nuclear fusion converting hydrogen into helium. For these stars, the hotter they are, the brighter.
2. As stars begin to die, they become **giants and supergiants** (above the main sequence). These stars have depleted their hydrogen supply and are very old.
3. Smaller stars (like our Sun) eventually become faint **white dwarfs** (hot, white, dim stars) that are below the main sequence. These hot, shrinking stars have depleted their nuclear fuels and will eventually become cold, dark, black dwarfs.

1. Use the information in the diagram below to answer the question. Massive stars tend to be either blue or white in color. What does this color tell us about these stars?



2. Use the information in the diagram above to answer the question.

The Hertzsprung-Russell diagram classifies stars by their surface temperature and luminosity. If a star has a low surface temperature and is considered very dim, where would you expect it to be located on the Hertzsprung-Russell diagram?

3. Which of the following can be found in galaxies?

- A. Stars, interstellar gas, and dust
- B. Stars, mini-galaxies, dust
- C. Dust, gas, and millions of black holes
- D. Lenticular galaxies and irregular galaxies

4. What are black holes, and how are they created?

5. What are nebulae, and how are they important?

6. How are stars different from each other?

7. What is the Hertzsprung-Russell Diagram, and how is it used to classify stars?

8. How are galaxies classified?

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.

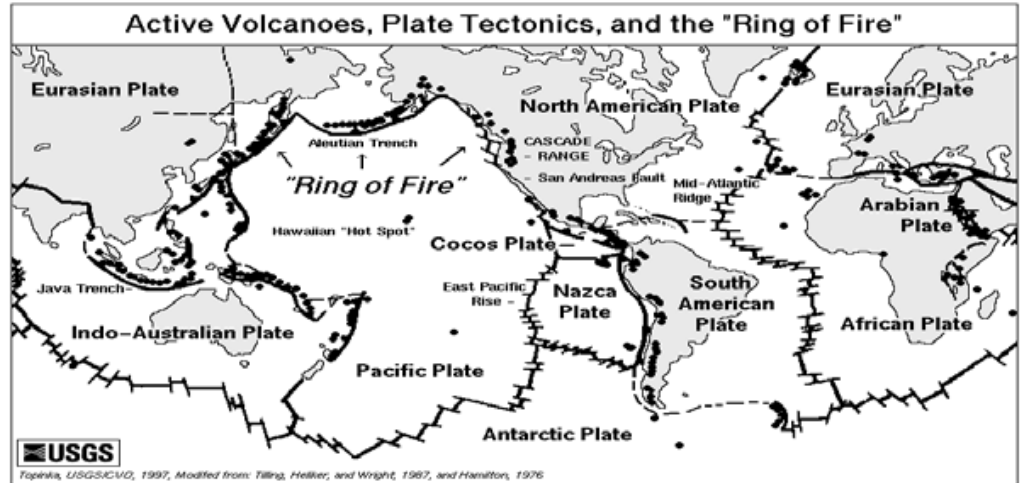
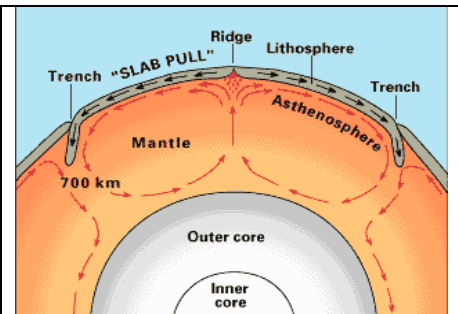


Plate Boundaries

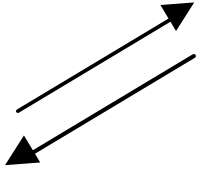

The tectonic plates are **floating** on top of magma which causes them to move. Tectonic plates collide with one another along the Plates Boundaries. There are several types of plate boundaries.

1. Transform
2. Divergent
3. Convergent


Caused by convection currents in the magma.

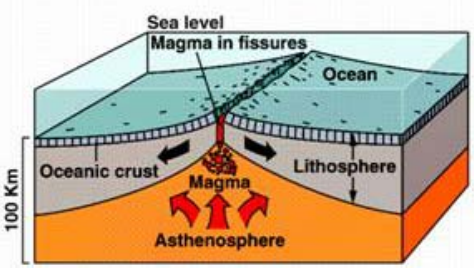


Transform Boundary


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>  <p style="text-align: center;">Transform boundary</p>

Divergent Boundary

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

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

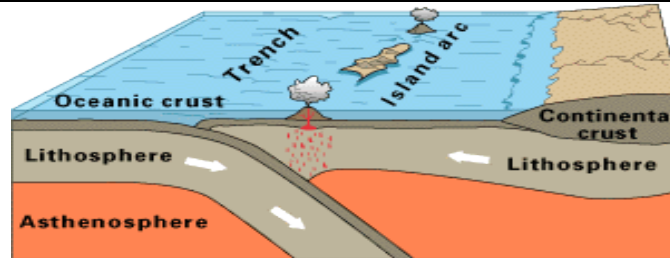
<i>Type of boundary</i>	<i>Description</i>
Convergent 	Where two plates push against each other. As two plates rub against one another, a number of small and large earthquakes are common near convergent boundaries.

There are 3 kinds of Convergent Boundaries:

- A. **Oceanic Plate to Oceanic Plate**
- B. **Oceanic Plate to Continental Plate**
- C. **Continental Plate to Continental Plate**

A. Convergent Boundary: Oceanic Plate to Oceanic Plate

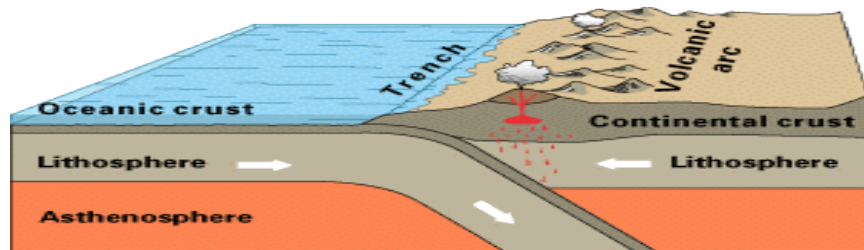
<i>Kind of Convergent Boundary</i>	<i>Description</i>
Oceanic Plate to Oceanic Plate	When two oceanic plates converge, one is usually subducted under the other, and in the process a trench is formed.



Oceanic-oceanic convergence

B. Convergent Boundary: Oceanic Plate to Continental Plate

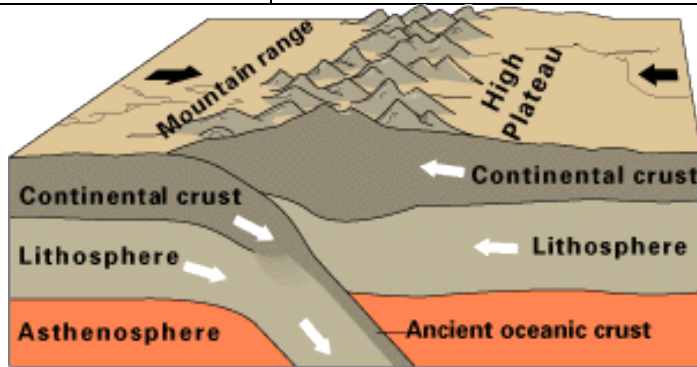
<i>Kind of Convergent Boundary</i>	<i>Description of Energy</i>
Oceanic Plate to Continental Plate	When an oceanic plate and continental plate converge, one is usually subducted under the other causing volcanoes and mountains.



Oceanic-continental convergence

C. Convergent Boundary: Continental to Continental Plate

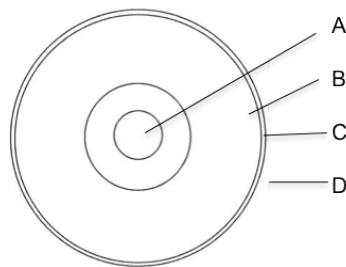
<i>Kind of Convergent Boundary</i>	<i>Description of Energy</i>
Continental to Continental Plate	When two continental plates converge, one is usually subducted under the other causing mountains .



Continental-continental convergence

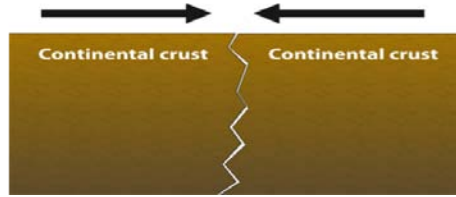
QUESTIONS:

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

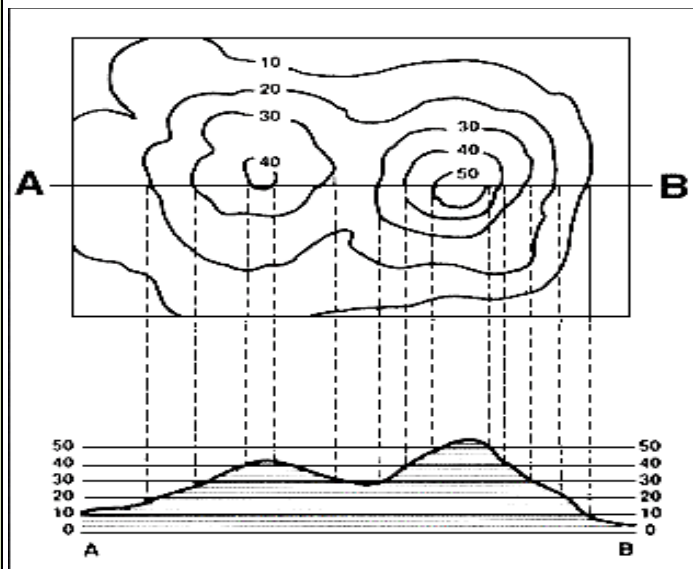
Topographic Maps are 2-D drawings of 3-D land features.

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. When contour lines are close together, the slope is very steep. When contour lines are far apart, the slope is very shallow.

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.



Which is higher, hill A or hill B? _____

Which is steeper, hill A or hill B? _____

How many feet of elevation are there between contour lines?

How high is hill A?

How high is 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.

8.7 C relate the position of the Moon and Sun to their effect on ocean tides

Tides

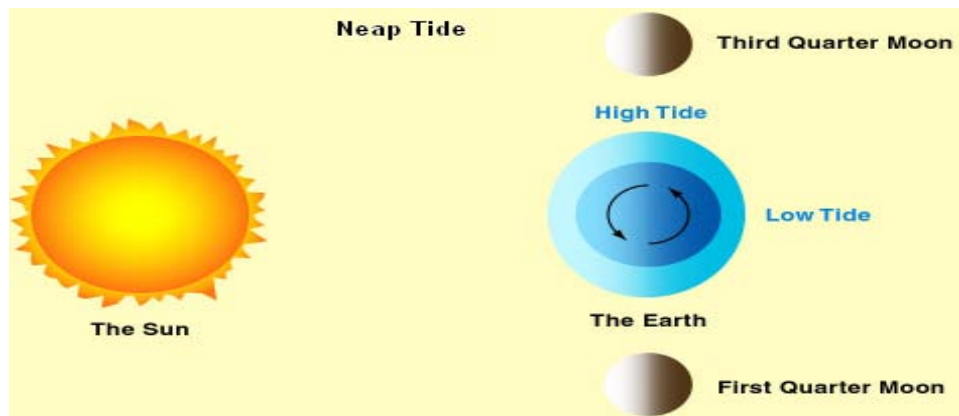
Tides are the periodic rise and fall of the ocean waters. They are caused by the gravitational pulls of the Moon and Sun, as well as the rotation of the Earth. The Sun and Moon pull on the Earth, the water, even you!



Spring Tide



Neap Tide



8.8 B recognize that the Sun is a medium-sized star near the edge of a disc-shaped galaxy of stars and that the Sun is many thousands of times closer to Earth than any other star



The Sun

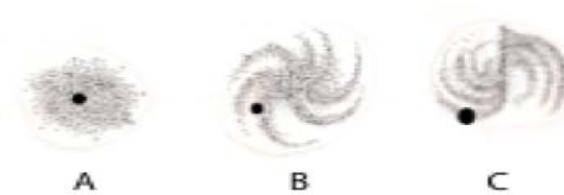
Did you know?

Our Sun is a medium size yellow star near the edge of a disc-shape galaxy of stars. The Sun is many thousands of times closer to Earth than any other star.



QUESTIONS:

- Which of the models below is the best representation of the location of the Sun in the Milky Way galaxy?



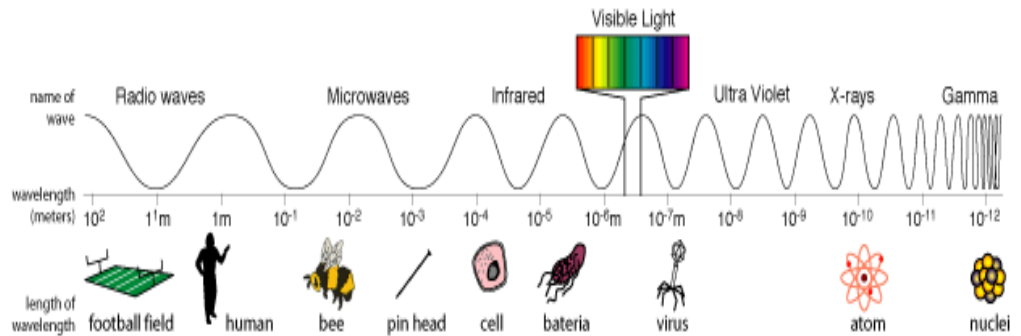
- Describe the location of our Sun and other stars near it in relation to the Milky Way galaxy.
- Compare a planet, a star, and a galaxy in terms of: (a) size (b) light emitting ability and (c) location.

Components of Universe	Size	Light emitting ability	Location
Planet			
Star			
Galaxy			

8.8 C explore how different wavelengths of the electromagnetic spectrum such as light and radio waves are used to gain information about distances and properties of components in the universe

Electromagnetic Spectrum

Electromagnetic Waves have different wavelengths. Waves in the electromagnetic spectrum vary in size. All electromagnetic waves travel at the same speed - **the speed of light**.



Radio waves and visible light are types of electromagnetic waves. They differ from each other in wavelength. **Wavelength** is the distance between one wave crest to the next. Other examples are [microwaves](#), [infrared](#), [ultraviolet](#), [X-rays](#) and gamma-ray.

Each type of wave on the spectrum has a different effect and use. Scientists use the electromagnetic radiation given off by **components in the universe to measure distances in space and the composition of objects in our universe**.

Radio Waves

Objects in space, such as planets, comets, giant clouds of gas, stars and galaxies, give off light at many different wavelengths. Some of the light they give off has very large wavelengths – sometimes as long as a mile!

Radio telescopes look at planets, comets, giant clouds of gas, stars and galaxies. By studying the **radio waves** originating from these sources astronomers *can learn about their composition, structure, and motion*. **Radio astronomy has the advantage because sunlight, clouds, and rain do not affect observations**.

Radio Telescope



Electromagnetic waves are important because they provide scientists with important information about components of our universe. Electromagnetic waves are also used to measure distance in space.

How the EM spectrum can be use to gain in information about the Properties of Components in the Universe

Images from telescopes engineered to detect different types of electromagnetic radiation show the same astronomical object in different ways. Skilled observers can recognize certain properties of the object from these images. For instance, in the case of a nebula, the gaseous remnant of an exploding star, the color and intensity of visible light and other portions of the spectrum indicate which elements are present and in what quantity. Infrared images provide information about planets, comets, newly forming stars, and other relatively cool bodies. X- ray telescopes capture and show radiation from very hot regions in stars and from violent events like explosions or collisions.



Crab Nebula X-Ray



Crab Nebula Infrared

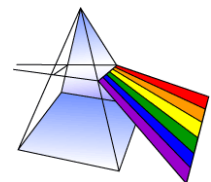
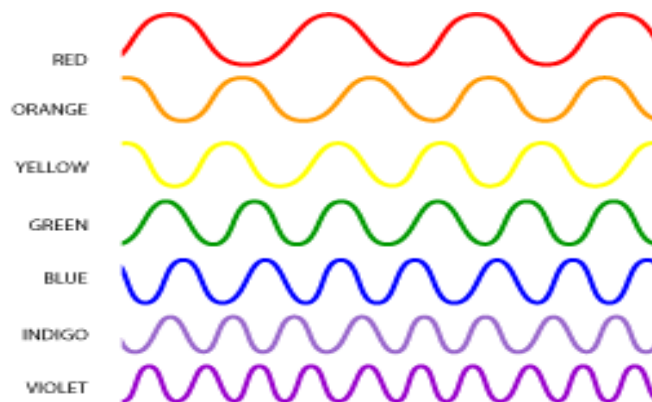


X-ray, Infrared, Visible

Light Waves

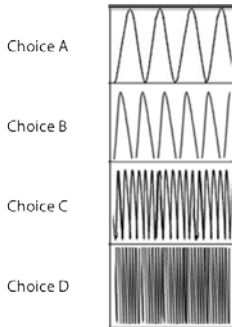
Visible light waves are the only electromagnetic waves we can see. We see these waves as the colors of the rainbow. Each color has a different wavelength. Red has the longest wavelength and violet has the shortest wavelength. When all the waves are seen together, they make white light.

Visible light helps scientists understand the chemical composition of stars.



QUESTIONS:

1. How do astronomers use the electromagnetic spectrum to gain information about the properties of the components of the universe?
2. How do astronomers know that galaxies are moving away from Earth?
3. Look at the electromagnetic spectrum provided above. What kind of waves are the longest in the electromagnetic spectrum?
4. Which one of the choices below is the best representation of a Gamma Ray?



5. Look at the electromagnetic spectrum. List the following waves in order of HIGHEST to LOWEST frequency. (gamma rays, radio waves, orange light, infrared rays, microwaves, violet light)
6. What are radio telescopes used for?

8.8 D model and describe how light years are used to measure distances and sizes in the universe

Light Years

Distances in space are SO large that it does not make sense to use a typical unit such as kilometers or miles when measuring distances. Instead, astronomers use a special unit called a **light-year** to measure the **distance** between stars and galaxies.

A light-year is the distance that light travels in one year. Proxima Centauri is 4.3 light-years away. It takes 4.3 years for light from this star to travel the distance needed to reach Earth.

Speed of light = 300 million meters per sec or 186,282 miles per sec!



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?

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



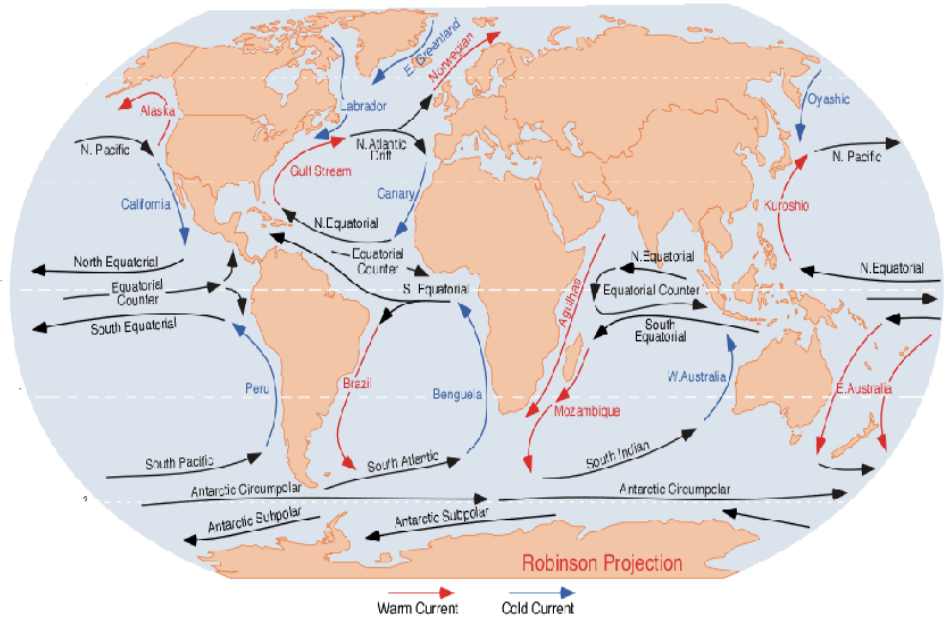
Unequal Heating in the Oceans and Atmosphere

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?

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

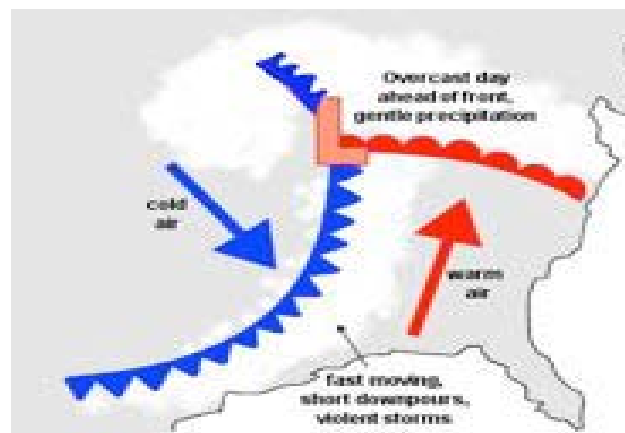
Weather Map

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

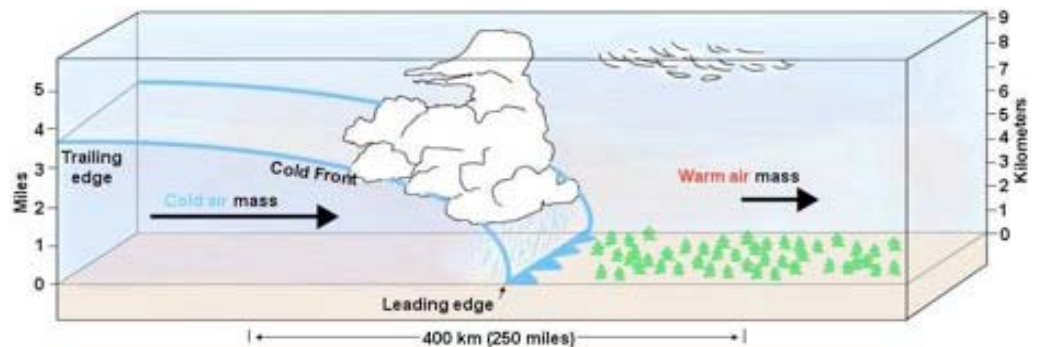


Cold Front

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



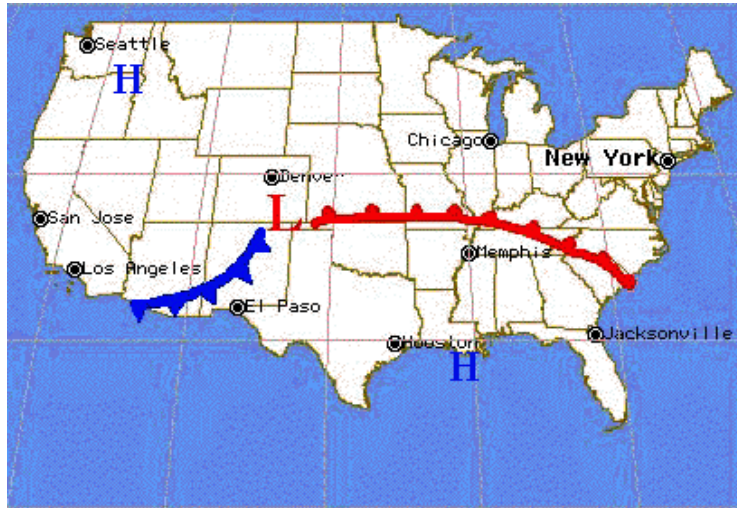
Cold fronts are fast moving with steep frontal boundary that force the warm air to rise quickly, resulting in rapid phase changes. Cold fronts are characterized by dramatic storms, cumulonimbus clouds, thunder, lightning and sometimes tornadoes.



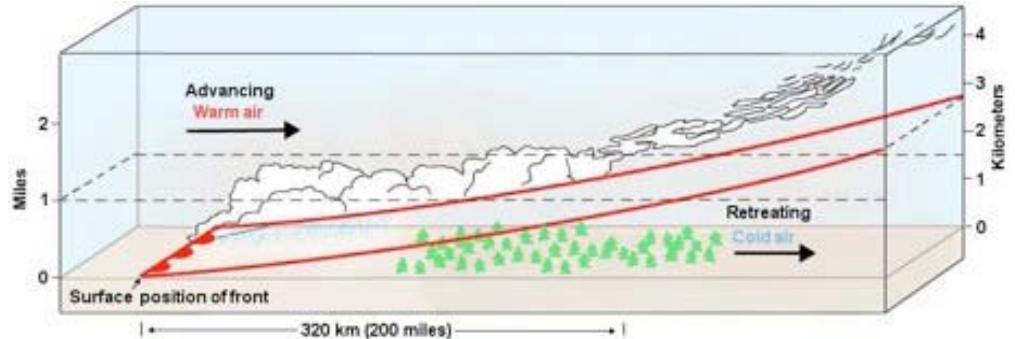
Precipitation occurs at the frontal boundary and tends to be heavy but of short duration; local air temperature changes from warm to cool after the front passes.

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:

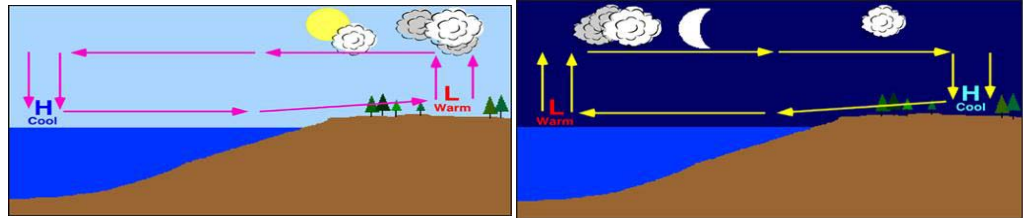
1. What is the density of air over an area called as symbolized in the graphic below?



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

Oceans Affect Climate On Land

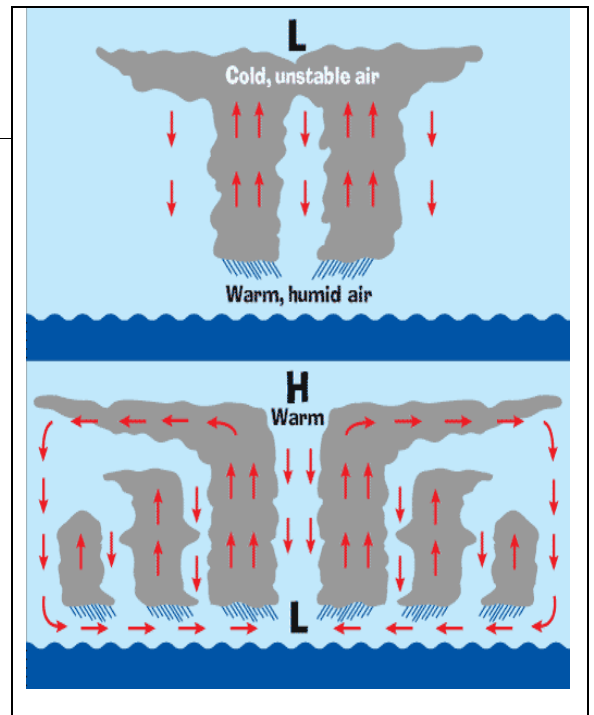
When the sunrays hit the surface of the Earth, it is heated. However, there is big a difference between how fast the land and the sea are heated. The land is heated a lot faster than the sea. The air above land is heated faster than the air above the sea. The hot air above land rise high into the sky, 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**.



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.

Hurricanes

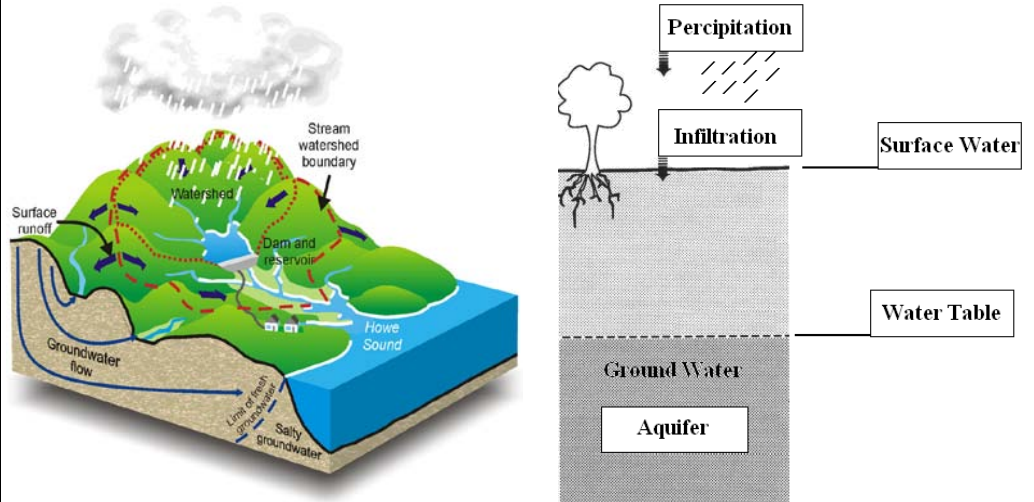
Hurricanes get their energy from warm ocean waters. As ocean water increases in temperature, it slowly turns into water vapor. The warmer the water temperature is, the higher the water vapor rises. After the water vapor has risen, it begins condensing into rain in the form of clouds. When the clouds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



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

<i>Parts</i>	<i>Description</i>
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.

6.11 B
understand that
gravity is the
force that governs
the motion of our
solar system

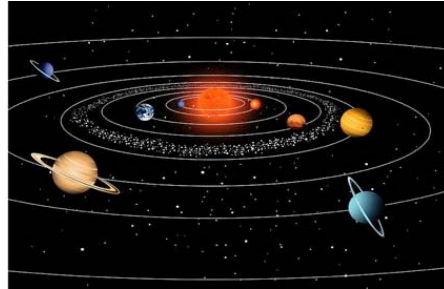
Newton's Law of Universal Gravitation

The law that says every object in the universe attracts every other object



Our Solar System

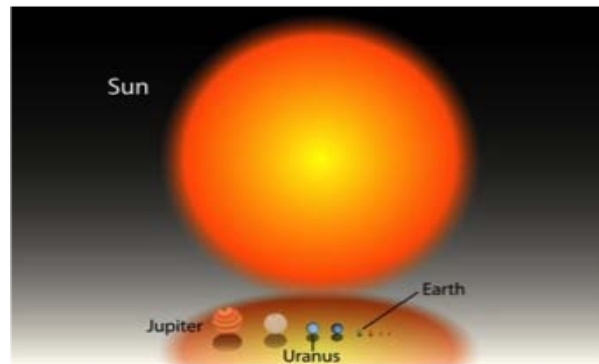
Our solar system resides in the Milky Way galaxy and is made up of the Sun, eight planets, and many moons, asteroids, meteoroids, and comets. All of the celestial bodies in the solar system move in predictable patterns known as orbits, and this motion is controlled by gravity.



Gravity is a force of attraction between two or more masses. Everything that has mass has gravity. **The more mass you have, the stronger the gravitational force you give off.**

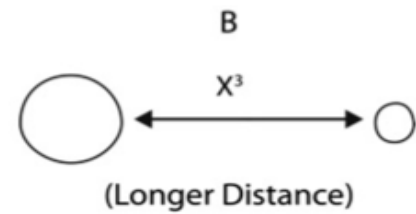
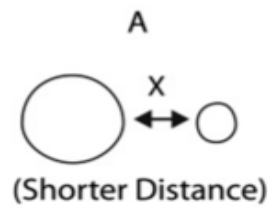
For example, Earth has more mass than the Moon, so its gravitational field is stronger.

So what planet do you think should be listed as having the greatest gravitational force?

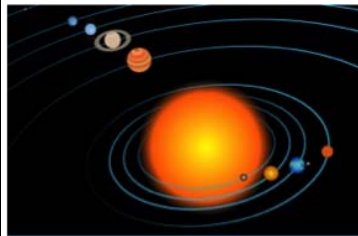


In addition, as the distance between two masses increases, the gravitation attraction between them decreases.

For example, Earth's gravitation pull on us is strongest when we are standing on its surface compared to if we were floating in space, thousands of miles away.



Which diagram above, A or B, has the greatest gravitation attraction?



The celestial body in our solar system with the most mass and hence strongest gravitational force is the Sun. Because the Sun has the strongest gravitation field, it has the strongest influence on the motion of the other bodies in the solar system (i.e., planets).

Celestial objects, such as planets, moons, asteroids, comets, meteors, and even satellites, move within the solar system, around more massive objects (e.g., the Sun), along paths known as orbits. These paths are **determined by the momentum with which these objects are travelling and by the gravitational force they experience from other, more massive objects.**

For example, Earth's orbit around the Sun is determined by **the balance of the Sun's gravitational pull on Earth and Earth's momentum as it travels around the Sun.**



Without the Sun's gravitational pull, Earth would not move in a circle around the Sun, but would continue moving straight throughout the Milky Way. Without Earth's momentum, the Sun would pull Earth into it. **YIKES!**

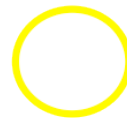
Explain to your partner why the planets do not crash into each other.

QUESTIONS:

1. Why do the planets in our solar system orbit the Sun?
 - A. The Sun has the strongest magnetic pull
 - B. The Sun is the celestial body with the greatest mass
 - C. The Sun is the brightest celestial body in our solar system.
 - D. The Sun was created millions of years before our planet.

2. Which two forces control the orbit of a planet?
 - A. The force of motion and the force of the Sun
 - B. The force of gravity and the force of motion
 - C. The force of Newton and the force of gravity
 - D. The force of attraction and the force of planetary motion

3. Examine the figure below. Which objects show the strongest gravitational force of attraction?



Sun

Planet B



Planet A

- A. The Sun and Planet A because Planet A has a greater mass than planet B
- B. The Sun and Planet B because Planet B has a greater mass than planet A
- C. The gravitation force of attraction is the same between the Sun and planet A and between the Sun and planet B.
- D. None of these answers are correct