The Earth Science Chronicle

Message from Mrs. Braun

Dear Student,

Congratulations on your hard work this school year. It has not gone unnoticed. I am so proud of your academic success, and most importantly, I know you are too. This "limited edition" newspaper, *The Earth Science Chronicle*, will put you on the fast track to what awaits you on this year's science LEAP and SLT assessments. Please take some time to check it out to better prepare you for these tests.

Science is all around us—from what makes your smart phone work to how ingredients are combined to create your favorite snack foods. It is part of our everyday lives. This issue of *The Earth Science Chronicle* is packed with information to help you stay motivated and achieve success beyond your wildest dreams.

If you want to be successful on the LEAP and SLT tests, review material carefully and thoroughly. As you go through any topic, if you need further review, check out the review resources page of my website. It is full of topic reviews, released test questions, review games and more! We will go through the packets as well as example test questions both as homework and in class.

Each of you possess the skills you need to be successful on this test. Just remember to keep calm and stay focused. With the preparation you have had throughout the years, the extra boost from this publication and your own personal drive to finish strong, I am confident that you will rock on the science LEAP and SLT tests!

"Challenges are what make life interesting and overcoming them is what makes life meaningful."

Joshua Marine

Newton Who???

Born two to three months prematurely on January 4, 1643, in a hamlet in Lincolnshire, England, Isaac Newton was a tiny baby who, according to his mother, could have fit inside a quart mug. A practical child, he enjoyed constructing models, including a tiny mill that actually ground flour—powered by a mouse running in a wheel.

Admitted to the University of Cambridge on 1661, Newton at first failed to shine as a student. In 1665 the school temporarily closed because of a bubonic plague epidemic and Newton returned home to Lincolnshire for two years. It was then that the apple-falling brainstorm occurred.

Newton's Laws of Motion

Law 1 – an object in motion will stay in motion and an object at rest will stay at rest unless an outside force acts on it.

Law 2 – acceleration of an object depends directly upon the mass of the object and the net force acting upon the object.

Law 3 - for every action there is an equal and opposite reaction.

Newton's 1st Law of Motion

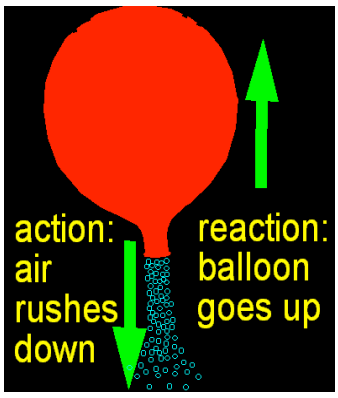
An object in motion will stay in motion unless acted on by an outside force (like a seatbelt).

Newton's 2nd Law of Motion

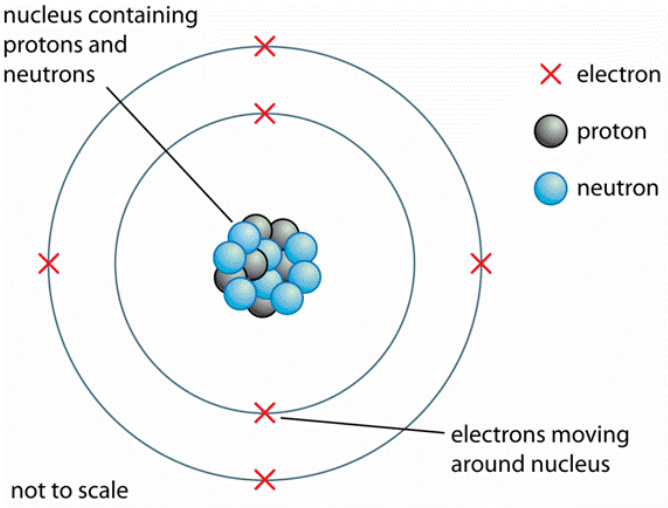
It takes **MORE** force to move a huge rock

than it does to move a pebble.

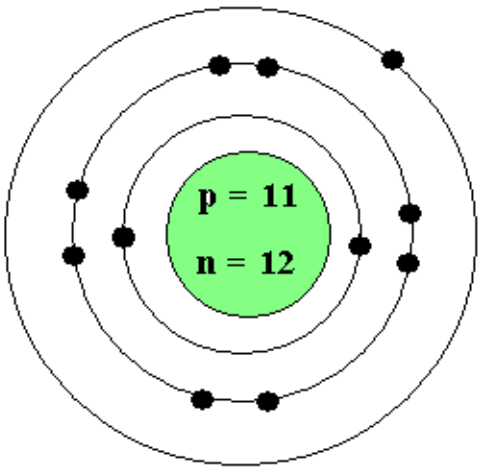
Newton's 3rd Law of Motion

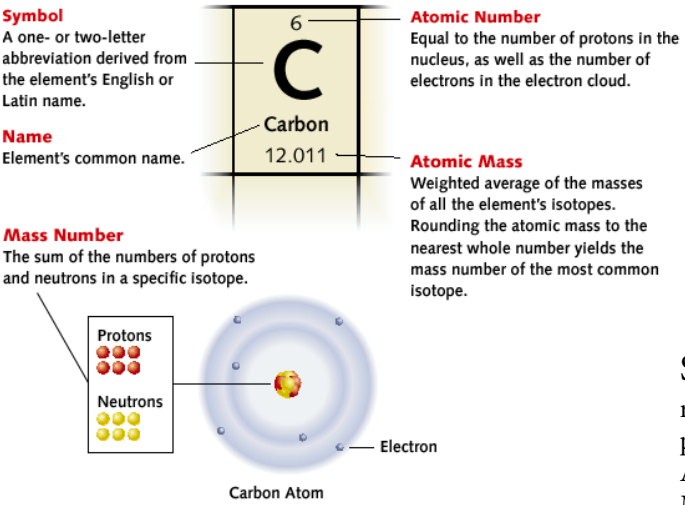


Within the typical atom, there are three **subatomic particles**: **protons**, **neutrons**, and **electrons**. The **Bohr Model** shows the three basic subatomic particles in a simple manner. Most of an **atom's mass** is in the ***nucleus***, a small dense area at the center of every atom. The nucleus is made up of **protons** and **neutrons**. All of the **positivity** of an atom is contained in the **nucleus**, because the protons have a positive charge. Neutrons are neutral, meaning they have no charge. **Electrons**, which have a **negative charge**, are located **outside of the nucleus**.



Bohr Model





What is APEMAN?

A.P.E
A- Atomic Numer
P- Protons
E- Electrons
M.A.N
M-Mass
A-Atomic Number
N- Neutrons

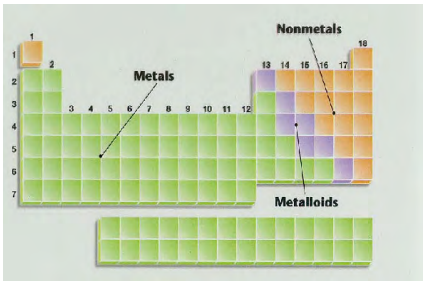
Say what? The APE MAN acronym is used to help students remember how to calculate information regarding elements on the periodic table.
Atomic number = # of Protons = # of Electrons
Mass number - Atomic number = Neutrons

What is an atom's atomic number?

The number of protons in the nucleus of an atom determines an element's atomic number. In other words, each element has a unique number that identifies how many protons are in one atom of that element. For example, all hydrogen atoms, and only hydrogen atoms, contain one proton and have an atomic number of 1. All carbon atoms, and only carbon atoms, contain six protons and have an atomic number of 6.

What is an atom's mass number?

All atoms have a mass number which is derived as follows.



The Periodic Table of Elements

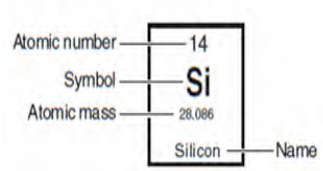
The **periodic table of elements** is a chart that organizes elements based on similar properties. The left side has **metals,** the right side has **nonmetals,** and elements on the stair-step line are **metalloids**.

- **Metals –** shiny, ductile (can be pulled/drawn), malleable (can be flattened into a sheet), and good conductors of electricity.
- **Nonmetals –** dull, brittle, and poor conductors of electricity.
- **Metalloids –** have some properties of both metals and nonmetals.

Figure out which Element each clue is referring to.

1. Half a dime
2. A distributor of traffic tickets
3. What you do with the dead
4. Foolish prisoner

Answers: 1. Nickel 2. Copper 3. Barium 4. Silicon

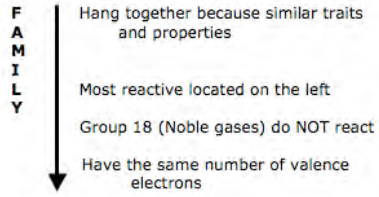


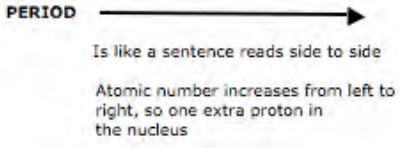
Atomic Number – number of protons that an element has; determines the identity of an element; this number also equals the number of electrons in an atom. So don't forget that the atomic number = the number of protons which also = the number of electrons in a neutral atom.

Symbol – element's abbreviation; first letter is capitalized and second letter (if it has one) is lowercase.

Family/Group – vertical column of the periodic table; elements in the same group have the same number of valence electrons and therefore often have similar properties.

Period/Row – horizontal row of the periodic table; elements are arranged in increasing order of atomic number.





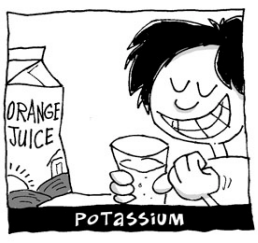
What is Chocolate made of???

6	67	27	57	52
C	Ho	Co	La	Te
Carbon	Holmium	Cobalt	Lanthanum	Tellurium
12.01	164.93	58.93	138.91	127.60

Element Jokes:

- Don't trust an atom... they make everything up!!!!!
- I heard Oxygen and Magnesium were together, and I was like OMg!

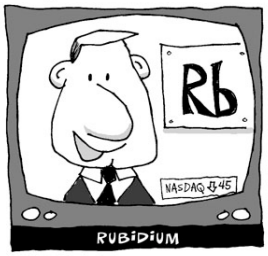
7 Up, the lemon-lime soda, originally contained lithium and was called "Bib-Label Lithiated Lemon-Lime Soda." Sounds yummy, doesn't it?



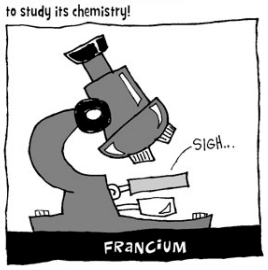
<What do orange juice, bananas, broccoli, raisins, and avocados have in common? They all are great sources of potassium. If you don't get enough, you'll feel tired and your heartbeat can be irregular. Yet another reason to eat those fruits and veggies!

>Since 1960, official time has been measured by the vibrations of cesium atoms (each cesium atom vibrates 9,192,631,770 times in one second!) in atomic clocks.

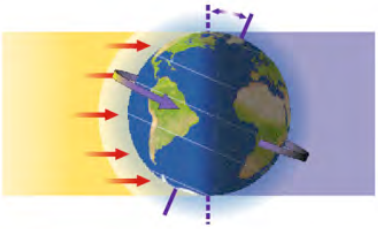
The vacuums inside television and computer screens are protected from leaking by rubidium. It safely combines with any air that sneaks in.



Francium doesn't have a practical use yet — it's so rare, there's not even enough of it available to allow scientists to study its chemistry!



Rotate- To spin on an Axis



The Rotation of The Earth

Rotation is the process of the earth spinning on its axis. It takes 24 hours to rotate fully one time. The side facing the sun is in daylight, and the side facing away is in night.

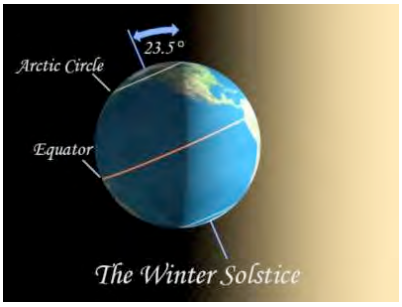
What time of day do you feel the most heat outside? Is it hottest during the middle of the night, during the morning, or during the afternoon? The Sun produces so much heat, that it only takes a few hours for it to raise the temperature of the Earth's surface by several degrees. After rising in the east on a cool morning, the energy from our Sun begins to shine down on us, warming everything around us. As the day progresses, it gets warmer and warmer. After setting in the west, our atmosphere begins cooling down very quickly. What would happen if the Sun didn't rise one day? How long would it take for everything around you to freeze? Within a few days it would be very cold indeed.

Rotation of the Earth causes Day and Night

Revolve- To move around the sun

Like all planets in our solar system, the Earth is in an elliptical orbit around our Sun. In Earth's case, its orbit is nearly circular, so that the difference between Earth's farthest point from the Sun and its closest point is very small.

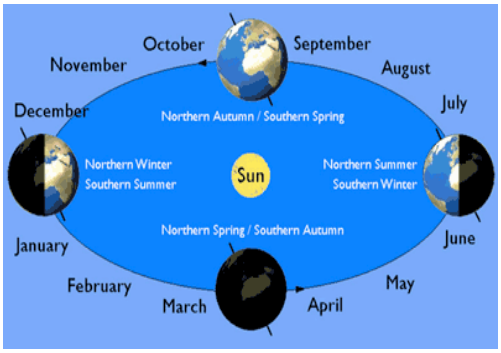
It takes roughly 365 days for the Earth to go around the Sun once. This means that the Earth is rushing through space around the Sun at a rate of about 67,000 miles per hour! The time it takes for the Earth to go around the Sun one full time is what we call a year.



Remember:
The earth is closest to the sun during January and farthest during July.

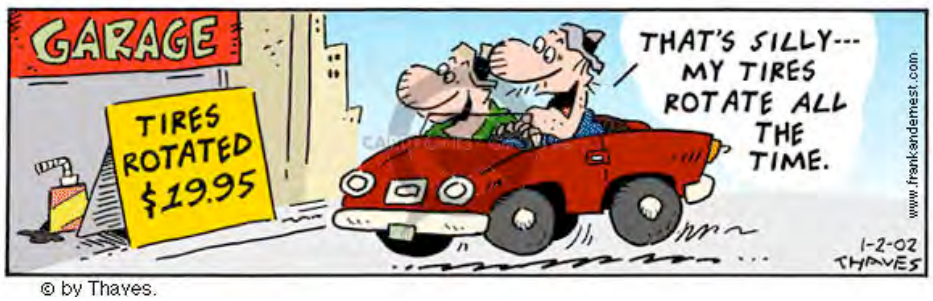
Seasons are created by two very important events – the tilt of the Earth on its axis, and the revolution of the Earth around the sun that gives us our year. Because the sun never changes, only the movement of the Earth creates changes in light and darkness, and in temperature.

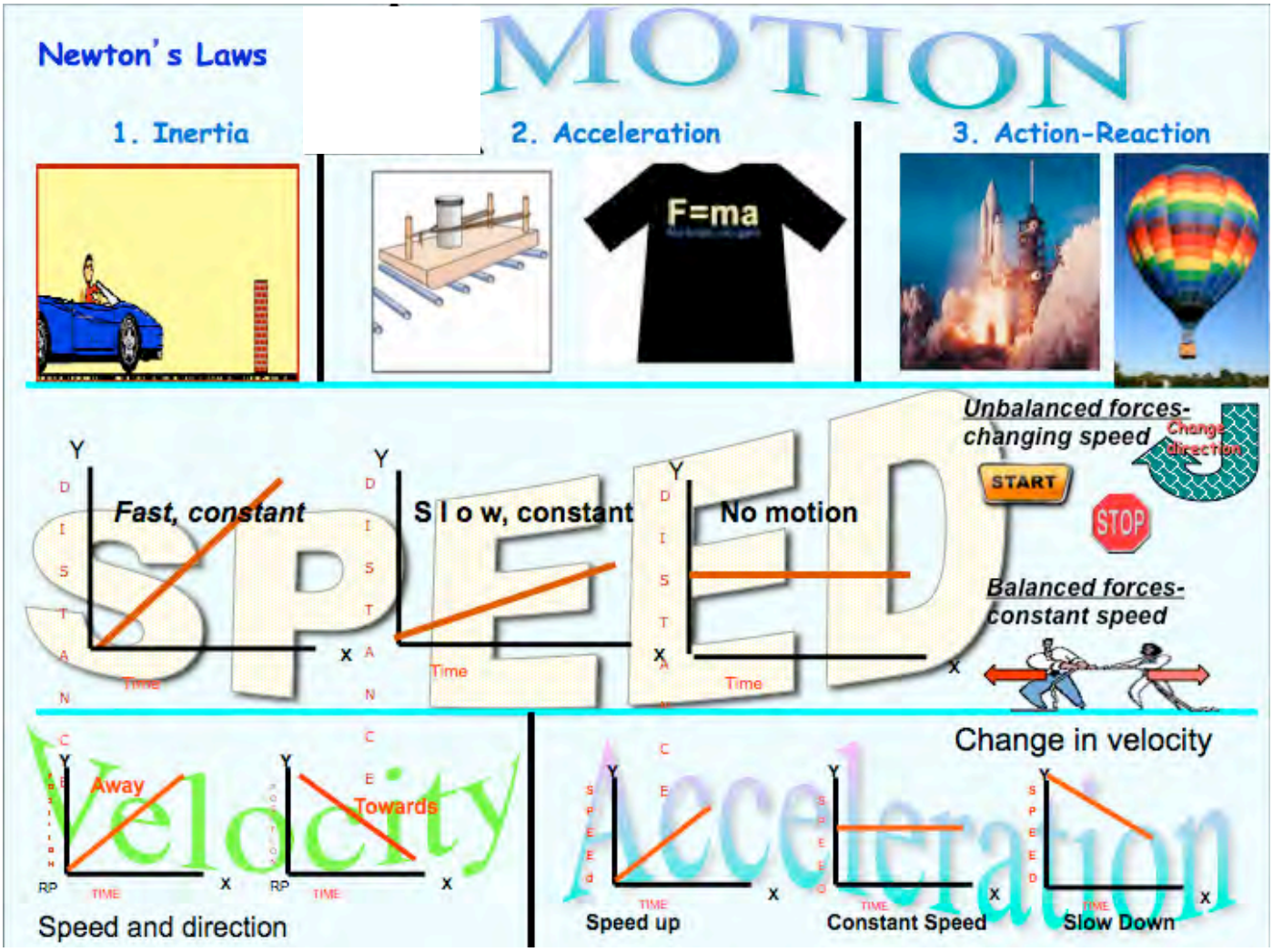
No TILT = No SEASONS



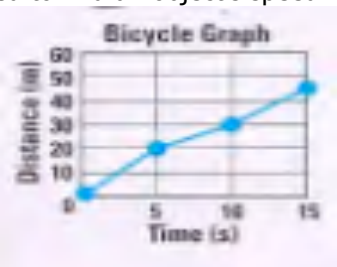
The tilt of the Earth's axis as it revolves around the Sun causes seasons.

Seasons change on or around the 21st of four months: June, September, December and March. In the Northern Hemisphere, December begins winter, March brings on spring, June means summer is beginning and September gives autumn weather. In the Southern hemisphere, the opposite is true. December starts summer, March is the beginning of fall, June starts the winter season and September brings spring.





SPEED – change in distance over time.
A distance-time line graph can be used to find an object's speed.

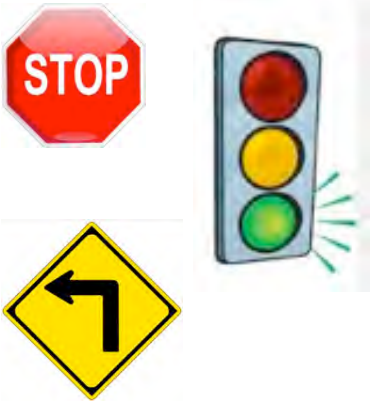


1. What is the bicycle's average speed?

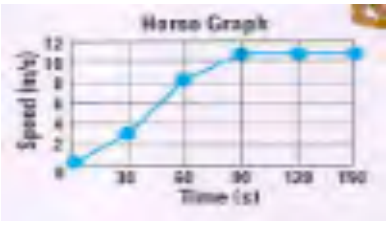
2. During which time period was the speed the greatest?

Answer: 1. 3 m/s 2. 0-5 seconds

Velocity – speed in a given direction. An object's velocity changes when it speeds up, slows down, or changes direction.



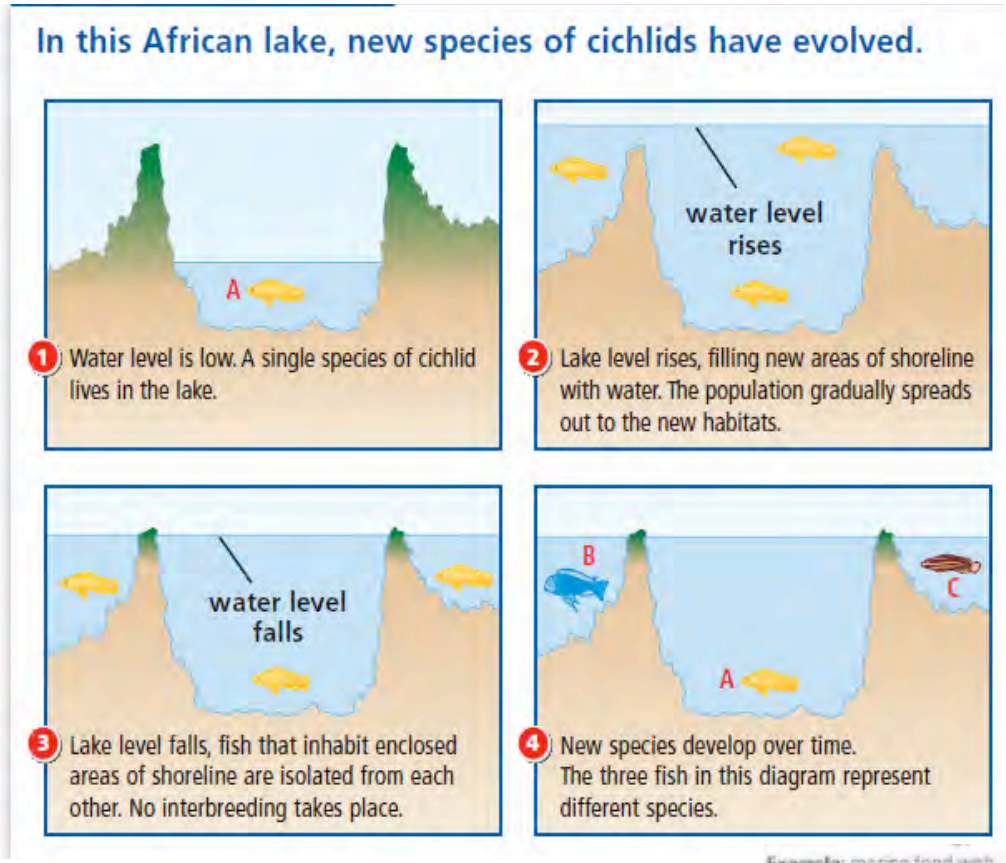
Acceleration – change in velocity divided by change in time. If an object is moving in only one direction, speed can be used instead of velocity. A velocity-time line graph can be used to find an object's acceleration.

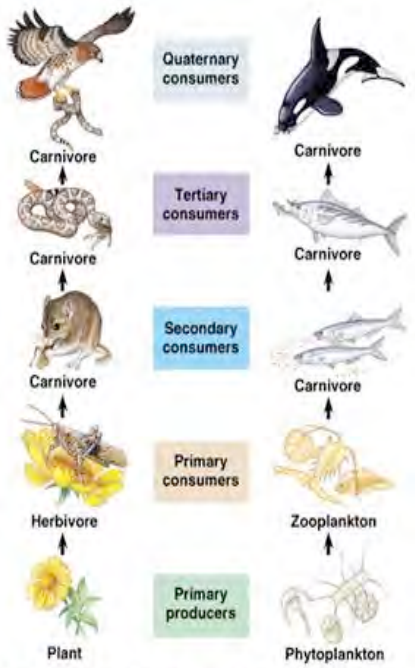


1. During which time period is the horse's acceleration greatest?

2. When is the acceleration equal to zero?

Answer: 1. 30-60 seconds 2. 90-150 seconds





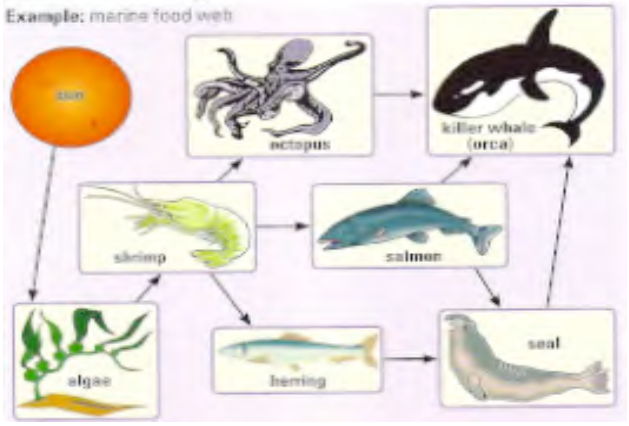
Use the food web to the right to answer the following questions.

1. Are the shrimp predators or prey?

2. Describe the relationship between the algae and shrimp.

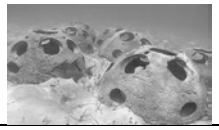
3. How is the octopus both predator and prey?

4. What will likely happen to the salmon population if the seal population decreases?



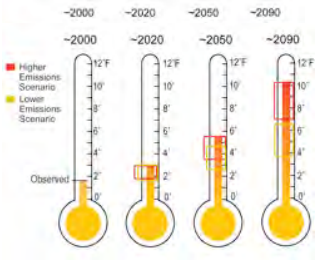
Answers: 1. Prey 2. Algae gives energy to the shrimp 3. The octopus is a predator when hunting shrimp and prey when hunted by a killer whale 4. Salmon population would most likely increase.

Human Activity and its Impact on an Ecosystem

Rain water containing soil contaminated with agricultural fertilizers reaches the ocean; the buildup of soil destroys coral reef habitats; the nutrients in the runoff affect oxygen levels and change the ocean's ecosystem, resulting in fish deaths and/or "dead zones". 	Sunken human-created structures (like old trucks, boats, or bridges) provide a home for marine life like corals and sponges; over time, a greater number and a greater diversity of other marine life develop in the area. 	Humans remove fish until that species' population is greatly reduced or even eliminated; the population of the prey of the target fish greatly increases; the population of the natural predators of the target fish greatly decreases. 

Gas is Produced

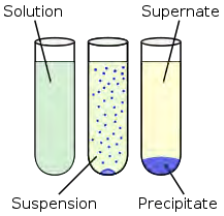
Light is Given Off



Temperature Change

EVIDENCE OF A CHEMICAL REACTION

New Substance is Formed (Kernel to Popcorn)



A Precipitate is Formed (solid from two liquids)

Chemical Formulas Help:

- Identify a substance
- Determine the number of elements in a compound or molecule

H_2O

Molecule – substance made of two or more atoms.	**Molecule Example:** O_2 - 2 oxygen atoms
Compound – Molecule made of two or more elements.	**Compound Example:** NH_3 – 1 Nitrogen atom and 3 Hydrogen atoms
Subscript – number at lower right of element's symbol in a formula; shows the number of atoms for each element; if there is no subscript, then there is only ONE atom of that element.	

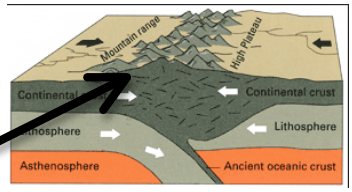
R = Reactant (what you start with)
I = Yields/ ⟶
P = Product (what you end up with)

Law of Conservation of Mass – mass is neither created nor destroyed during a chemical reaction.
total mass of reactant = total mass of product

Is the following chemical reaction balances????	
$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$	
CH_4 = 1 C and 4 H, $2O_2$ = 4 O so we have **1 C**, **4 H**, and **4 O**	CO_2 = 1 C and 2 O, $2H_2O$ = 4 H and 2 O so we have **1 C**, **4 H**, and **4 O**

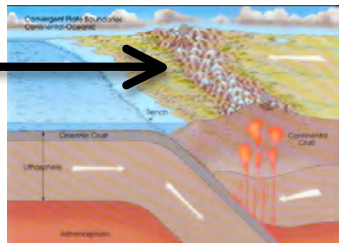
Convergent Boundary – location where tectonic plates **collide** together. There are three types:

1. Continental/Continental
   * forms mountains



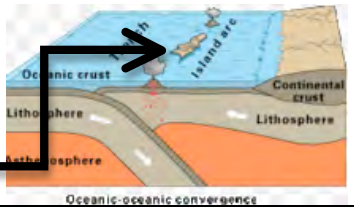
Himalaya Mts.

2. Continental/Oceanic
   * forms volcanic mts.

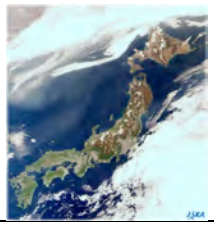


Andes Mts.

3. Oceanic/Oceanic
   * forms volcanic island arcs

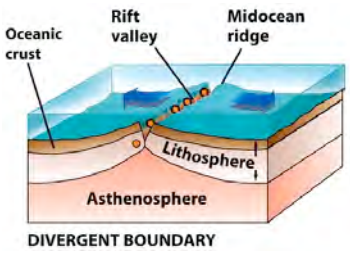


Japan

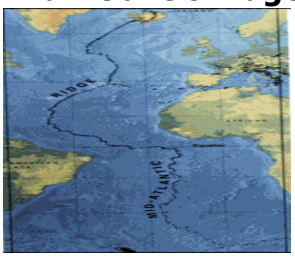


Divergent Boundary - location where tectonic plates move away from each other. Can result in:

- Seafloor spreading
- Earthquakes
- Rift Valleys
- Ocean Basins
- Mid-Ocean Ridge

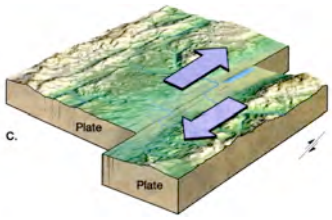


Mid-Atlantic Ridge

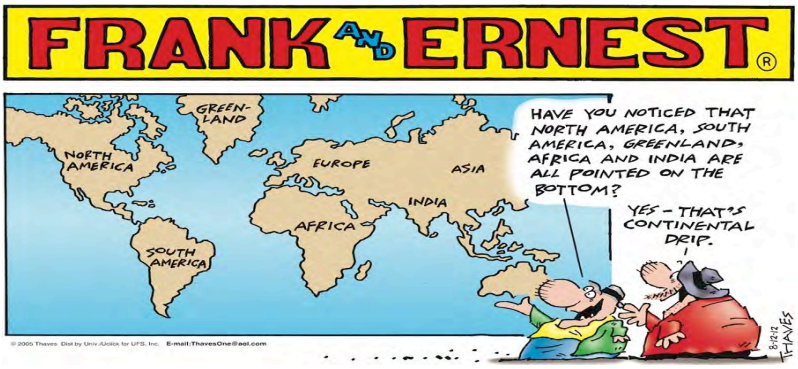


Transform Boundary – location where tectonic plates slide past each other. Can result in:

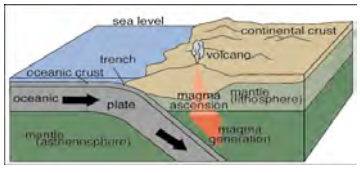
- Shallow earthquakes
- Fault line

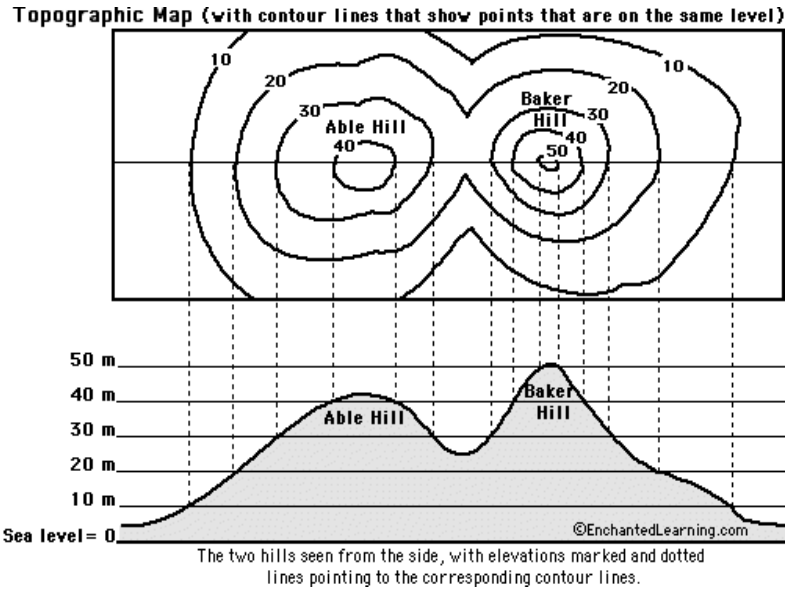


San Andreas Fault

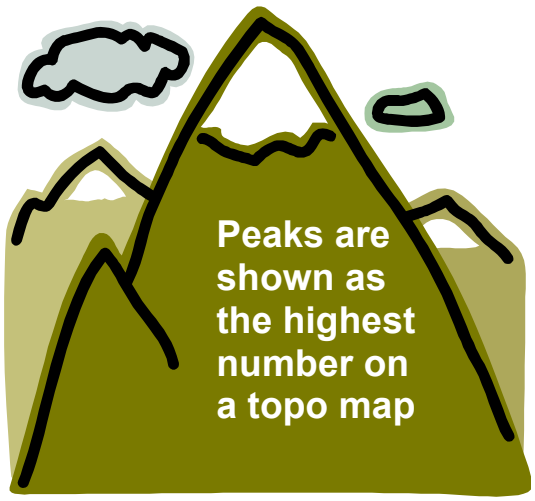


Newton's law of Force and Acceleration can be seen when a subducting plate causes enough force to create a Tsunami (large wave with lots of mass) that will accelerate towards land.



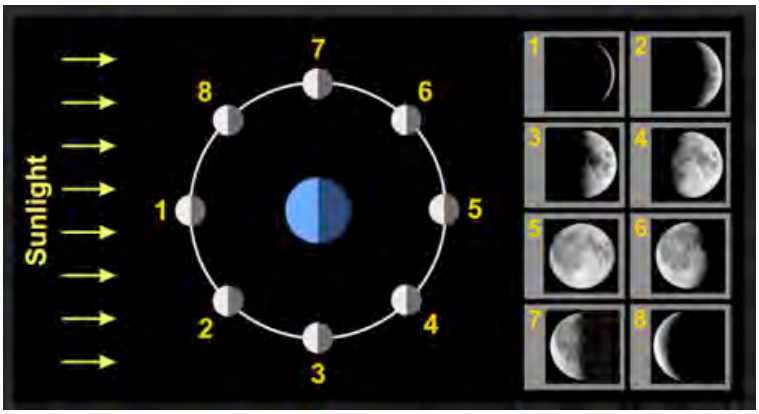


The two hills seen from the side, with elevations marked and dotted lines pointing to the corresponding contour lines.



<u>Topographic Maps</u> are used to identify type and location of land features; contour lines connect points of equal elevation (height above sea level); **closer line** spacing indicates **steeper** changes in elevation.

Lunar Cycle



Answers: 1. New Moon 2. Waxing Crescent 3. 1st Quarter 4. Waxing Gibbous 5. Full Moon 6. Waning Gibbous 7. 3rd Quarter 8. Waning Crescent

Lunar cycle

Phases that the moon (Earth's natural satellite) goes through as it revolves around Earth in a regular orbit taking about 30 days; to an observer on Earth, it takes about 1 month for the moon to go through its cycle of phases; the moon also rotates as it orbits Earth. The moon's rate of rotation and revolution are the same. This is why we only see one side of the moon.

Light on **RIGHT = WAXING**

Light on **LEFT = WANING**

<u>Moon Riddles</u>

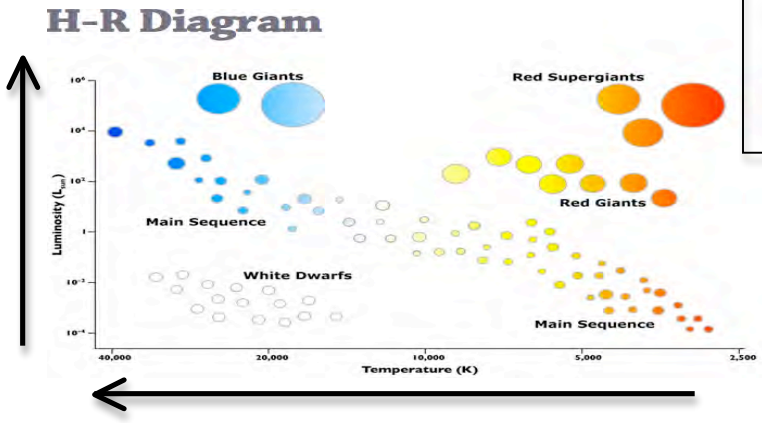
How do you know when the moon is going broke?

"Why does the Moon orbit the Earth?"

Answers: 1. When it is down to its last quarter 2. To get to the other side

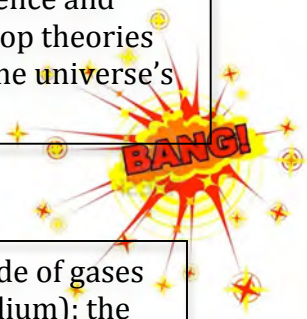
Universe

We use the **Hertzsprung-Russell Diagram** to help us classify stars by their surface **temperature**, **color**, and **luminosity (star's brightness)**.

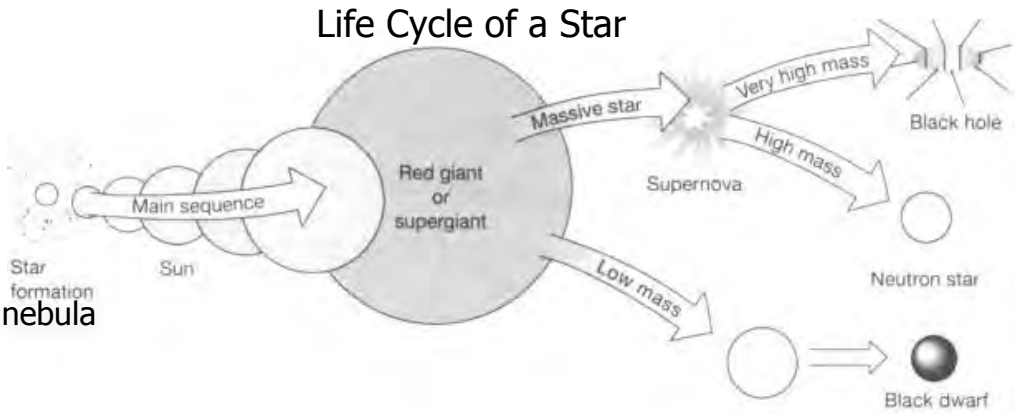


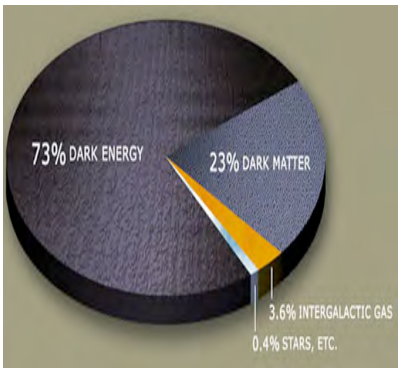
Universe – space and the matter and energy it contains.

Origin of the Universe – evidence and observations are used to develop theories (like Big Bang Theory) about the universe's origin.



Star – huge, hot body made of gases (mostly hydrogen and helium); the star's color indicates its surface temperature.





SPIRAL GALAXY – Milky Way	ELLIPTICAL GALAXY	IRREGULAR GALAXY
		

All the stars, galaxies, and black holes in the universe only compose about 5% of its mass.

The nearest star to Earth is our Sun. It is a fairly "average" star in the Hertzsprung – Russell diagram's "Main Sequence." Our Sun is surprisingly stable, providing Earth with just the right sunlight for life to evolve on our planet. It is approximately 8 light minutes away from earth.

Light Year – is used to measure large distances and sizes in the universe; equal to the distance that light can travel in a vacuum ("empty" space) in one year; 1 light year = 9,461,000,000,000 km

Proxima Centauri is the second closest star to Earth.