PRE-GED LESSON PLAN – SCIENCE (Level 6.0 – 8.9)

COMPETENCY: 3.01 Recognize methods, standards and ethics of scientific inquiry (including careful observation, accurate record keeping and the ability to replicate results), and describe these steps in systematic experimentation

CONNECTIONS: SC.H.1.3.1, SC.H.1.3.2, SC.H.1.3.3, SC.H.1.3.4, SC.H.1.3.5, SC.H.1.3.6, SC.H.1.3.7

CLASSROOM PROCEDURE:

1. Ask students how does the forensic team on CSI, medical examiners, doctors, scientists or law enforcement solve problems or crimes? Write responses on the board.
2. Ask students how their responses are similar to the use of the scientific method. Read the definition of the Scientific Method on the Teacher Discussion Guide.
3. Relate the scientific process to student responses.
4. Pass out the Student Vocabulary Sheet (find research or background and procedures at the bottom and Soda can buoyancy lab sheet. Ask students to define the terms on worksheet in their own words. Set a time limit.
5. Next, direct students to read the Pre-Lab and Lab along with you. In General, explain how they will be conducting the experiment using the scientific method to determine which type of soda is more buoyant (will float), regular or diet.
6. Display a can of diet soda and a can of regular soda next to a clear tub of water.
7. Direct students to the LAB section of the worksheet.
8. Read: Background Information (instructor reads, a student reads or in groups read).
9. Ask students to write down the problem and develop a hypothesis.
10. Discuss Procedures and clarify lab and set time limit and expectations for lab worksheet.
11. Closure: After completion of the lab, discuss and review lab all components of the lab to increase understanding of scientific process and lab experimentation.

VOCABULARY:

problem
research
hypothesis
testing
result
conclusion

TEACHER-MADE OR ALTERNATIVE MATERIALS:

MATERIALS NEEDED:

Copy of Teacher Discussion Guide
Copy of Teacher Key
2 sided student copies of Vocabulary and Lab
Per Group: 1 can regular soda 1 can diet soda
A deep (12 ") Clear container (tub or tank) full of water
Paper towels (for clean-up of water)
Pack of nutra-sweet and pack of sugar

SUPPLEMENTARY MATERIALS:

[website for similar experiment http://www.middleschoolscience.com/dietsoda.htm and http://camillasenior.homestead.com/files/density_demonstration.pdf]

EVALUATION:

[Assessment of Vocabulary Comprehension and conduction of lab experiment following the scientific method process]

Student Vocabulary & Soda Can Buoyancy Lab Sheet

Student Name(s) _____ Date _____ Class _____

_____ _____

_____ _____

In your own words, what is the Scientific Method?

In your own words, briefly define the following terms:

1. Problem
2. Research
3. Hypothesis
4. Testing
5. Results
6. Conclusion

LAB RESEARCH/BACKGROUND

Buoyancy is the upward push of a liquid or gas on an object. For example, water pushes up on a boat. When you float in water, you are experiencing buoyancy. **Density** is how much "stuff or mass" is crammed into an object. Density is about the relationship of mass to volume. For example: If you take a marble and put into a test tube filled with water, the water will spill over. However, a ball the same size as the marble would cause much less water to spill out because the mass of the marble is more than the foil ball.

Imagine how many people could be crammed into a Volkswagen Beetle. The empty car had air in it. Where did the air go? The air goes outside the car, just like the water spills over. The mass of an object affects the volume of air or water (displacement). Air takes up space just as the object in the air take up space. The density of water is $1 g/cm^3$. An object will float if it has a density of less than 1. An object will sink if it has a density of more than 1.

Interesting Facts and Inquires regarding the ***Buoyancy of Regular & Diet Soda Lab***

- There are 39, 000 mg (milligrams) of sugar in **regular soda**. **Diet soda** has 100 mg of nutra-sweet to obtain sweetness
- Regular and Diet cans of soda both contain 12 fl. ounces.
- How will the type of sweetener affect the density of soda?
- How will the density affect the buoyancy of regular and diet soda?

LAB PROCEDURES **Student Lab Sheet (Page 2 of 2)**

1. Read LAB Sheet then complete questions 1 and 2. As you conduct the lab, record answers for the remaining questions as you do each step of the lab.
2. Lay a paper towel on a table next to the tub or tank of water to sit wet cans on
3. Take the full regular soda can and carefully insert it bottom first and slowly release the can into the container of water, record the level of buoyancy (see chart A) as a percent on chart B.
4. Repeat step 3 with for a total of 3 times. (Record buoyancy percent & then average on chart B)
5. Repeat steps 3 and 4 with the diet soda (Record buoyancy percent & then average on chart B)
6. Dry both cans and return to instructor
7. Finish Lab questions.
8. Closure

Read all sections Student Lab Sheet (both pages) prior to beginning.

1. What is the **problem** in this experiment? _____

_____

2. Develop a **hypothesis** for this experiment: _____

_____

3. Testing and Results: To determine results, follow the procedures and refer to **Chart A** and **Chart B**.

Chart A **How to measure the estimated % of buoyancy**

100 % buoyancy (floating) very near top
75% buoyancy (floating) between top and middle
50% buoyancy (floating) at the middle
25% buoyancy (floating) between middle and bottom
0% buoyancy (floating) sitting on bottom

Chart B **Percent of Buoyancy of Regular and Diet Soda**

Type	Trial 1 %	Trial 2 %	Trial 3 %	Average % Buoyancy
Regular Soda				
Diet Soda				
Example X soda	75%	50%	75%	67%

See example data

4. Brainstorm 2 **reasons** why you think one type of soda is more buoyant than the other

_____

_____

5. Write a **conclusion** statement based on your hypothesis: _____

_____

Closure: After completing all information, discuss findings with the instructor.

Teacher Discussion Guide and Key

Soda Can Buoyancy Lab (Page 1 of 3)

Objectives:

- To practice application of the scientific method process
- To develop repeatable and accurate experimental designs.
- To analyze data and draw conclusions
- To conduct an experiment utilizing the concept of buoyancy and density.

Discussion and Vocabulary Key

What is the Scientific Method?
The Scientific Method is a process of gathering information in a systematic way to gain knowledge to solve a problem.

Steps in the Scientific Method

a. Problem - Identify a problem which is a question that needs to be solved.
b. Research - Find information about the problem by interviews, investigation, articles and etc.
c. Hypothesis - Develop a hypothesis by guessing or predicting what you think will happen and the reason you think it will happen.
d. Testing - Test the hypothesis with an experiment or investigation.
e. Results - Results are the collection of observations and/or data commonly displayed in charts and/or graphs.
f. Conclusion - is a statement that briefly summarizes the results and includes exactly how much the data supports or rejects the hypothesis.

Materials per group:
1 can of regular soda
1 can of diet soda
1 clear container filled with water about 12" deep
(clear tank or Rubbermaid tub, etc.)
Paper towels
1 pack Nutra-sweet
1 pack Sugar

Research or Background:

Buoyancy is the upward push of a liquid or gas on an object. For example, water pushes up on a boat. When you float in water, you are experiencing buoyancy. **Density** is how much "stuff or mass" is crammed into an object. Density is about the relationship of mass to volume. For example: If you take a marble and put into a test tube filled with water, the water will spill over. However, a ball the same size as the marble would cause much less water to spill out because the mass of the marble is more than the foil ball. Imagine how many people could be crammed into a Volkswagen Beetle. The empty car had air in it. Where did the air go? The air goes outside the car, just like the water spills over. The mass of an object affects the volume of air or water (displacement). Air takes up space just as the object in the air take up space. The density of water is $1 g/cm^3$. An object will float if it has a density of less than 1. An object will sink if it has a density of more than 1. Note for the Percent of Buoyancy of Regular & Diet Soda Lab: There are 39, 000 mg (milligrams) of sugar in **regular soda**. **Diet soda** has 100 mg of nutra-sweet to obtain sweetness. Think: How will the type of sweetener affect the density of soda? How will the density of regular and diet soda affect the buoyancy of the regular and diet soda?

Teacher Discussion Guide and Key

LAB PROCEDURES

1. Read LAB Sheet then complete questions 1 and 2. As you conduct the lab, record answers for the remaining questions as you do each step of the lab.
2. Lay a paper towel on a table next to the tub or tank of water to sit wet cans on
3. Take the full regular soda can and carefully insert it bottom first and slowly release the can into the container of water, record the level of buoyancy (see chart A) as a percent on chart B.
4. Repeat step 3 with for a total of 3 times. (Record buoyancy percent & then average on chart B)
5. Repeat steps 3 and 4 with the diet soda (Record buoyancy percent & then average on chart B)
6. Dry both cans and return to instructor
7. Finish Lab questions.

Closure: After completing all information, discuss findings with the instructor

Soda Can Buoyancy Lab

LAB QUESTIONS

1. What is the **problem** in this experiment? Example: How will the density of regular and diet soda that have the same amount of soda in each can affect buoyancy (floats in water)?
2. Develop a **hypothesis** for this experiment: Example: We think the regular can of soda will be more buoyant since both cans have the same amount of soda.. Answers will vary
3. **Testing and Results:** To determine results, follow the procedures and refer to Chart A and **Chart B**.

Chart A **How to measure the estimated % of buoyancy**

100 % buoyancy (floating) very near top
75% buoyancy (floating) between top and middle
50% buoyancy (floating) at the middle
25% buoyancy (floating) between middle and bottom
0% buoyancy (floating) sitting on bottom

Chart B **Percent of Buoyancy of Regular and Diet Soda**

Type	Trial 1 %	Trial 2 %	Trial 3 %	Average % Buoyancy
Regular Soda	?	?	?	?
Diet Soda	?	?	?	?
Example X soda	75%	50%	75%	67%

See example data

4. In your group, discuss **reasons** why you think one soda can is more buoyant than the other. Brainstorm and record a minimum of 2 reasons your group decide on. (Answers will vary) Examples:
   a. type of sugar in b. amount of sugar in c. amount of paint on can

5. Write a **conclusion** statement: For example: My hypothesis stated that regular soda would be more buoyant however, the results reject my hypothesis since regular soda has an average of 8% buoyancy compared to diet soda that has an average buoyancy of 83%. (answers will vary).

Teacher Closer Discussion

- Discuss and relate how the scientific method helped us to solve our problem.

- Teacher note: pass around an open package of regular sugar and an open pack of Nutra-sweet so that students can get an idea of how they are different.

- Discuss the major reason regular cans sink more than diet cans of: 100 mg of Nutra-sweet is 0.003527 ounces however 100 mg of sugar is 1.375684 ounces. If possible, hold up a transparent cup of 100 mg of nutra-sweet and one with 100 mg of sugar. You can pass these around to help students visualize the comparison of each type of sweetener used in soda. The Nutra-sweet is a highly concentrated sweetener.

- Discuss and relate reasons about how 5 different cans of the same type of regular soda may vary in buoyancy. An example of a potential answer might be: Each soda might be a different percentage of buoyancy due to automated filling of cans at the factory.

PRE-GED LESSON PLAN – SCIENCE (Level 6.0 – 8.9)

COMPETENCY: 3.02 Describe properties of matter and understand basic principles of atomic theory.

CONNECTIONS: SC.A.1.3.1, SC.A.1.3.2, SC.A.1.3.3, SC.A.1.3.4, SC.A.1.3.5, SC.A.1.3.6, SC.A.2.3.1, SC.A.2.3.2, SC.A.2.3.3

CLASSROOM PROCEDURE:

1. Ask students to describe the parts of their desk or table.
2. Ask students what is the smallest part of matter called. The atom
3. Pass out the background sheets to students.
4. Read the information together
5. Direct students to look at the diagram of the atom and point out that the protons and neutrons are inside the nucleus.
6. Also point out that the electrons are in a cloud outside the nucleus and are considered to have little to no weight.
7. Ask students to count the number of protons in Atom B diagram. (8 protons)
8. Ask students to add the number of protons and number of neutrons in atom B. (16)
9. The atomic weight is equal to the number of neutrons and protons in an atom. Atom B has an atomic weight of 16.
10. Ask students to complete the activity chart and questions.
11. Review questions at completion of worksheet to increase understanding..

VOCABULARY:

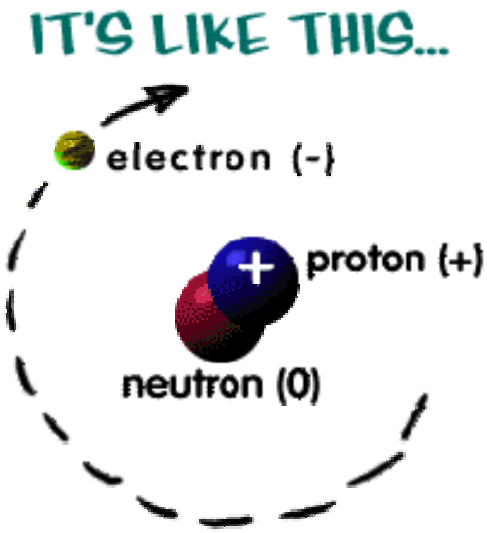
atom
proton
neutron
electron
positive charge
negative charge
neutral charge
atomic weight (mass)

TEACHER-MADE OR ALTERNATIVE MATERIALS:

MATERIALS NEEDED:	**SUPPLEMENTARY MATERIALS:**	**EVALUATION:**
Copy Activity Sheet for Students Copy Background Information Sheet Teacher Key	Great Periodic Table that illustrates the subatomic parts of the atom of any element. http://www.chemicalelements.com/	[Complete Chart, Comprehension Questions

Background Information

Atoms



An **atom** is the smallest part of an element (matter) such as Iron, Silver or Gold. Each atom has a **nucleus** in the middle. Inside the nucleus of an atom there are **protons** and **neutrons** which together equal the **atomic mass** of an atom. Protons and neutrons are made up of **quarks**. Outside of the nucleus is a cloud of empty space in which **electrons** orbit the nucleus. Substances are made up of molecules. **Molecules** are 2 or more atoms that are held together by a chemical bond or force. The smallest part of a substance is a molecule.

Graphic used with permission from: www.Chem4Kids.com

Change in matter occurs as a result of the rearrangement of the atom, molecule or subatomic parts. For example: If an atom of Sodium (Na) and an atom of Chlorine (Cl) are combined, the atom of each element changes. The rearrangement of the electrons forms a molecule of (NaCl) Sodium Chloride which is table salt. When the electrons in an atom moves from one atom to another, the subatomic arrangement results in a chemical bond between the atoms of these elements. The atoms are chemically changed and therefore different from the original atom.

Parts of an Atom

On the periodic table, you will find a chart that shows 109 + elements. **Elements** are substances that are made up of only one kind of atom. Most everyone can name many different elements such as iron, silver, gold, oxygen, hydrogen, nitrogen, carbon, chlorine, and etc. An **atom** is the smallest part of an element that can be broken down and still have the characteristics of that element. All atoms are alike in that they all have a nucleus with neutrons and protons and a cloud of electrons around the nucleus; however each element is made up of different atoms. Since each element is made from a different substance, the atoms are different. For example: Nitrogen (N) is made up of a nucleus that contains 7 protons and 7 neutrons and the electron cloud surrounding the nucleus has 7 electrons. If a nitrogen atom is compared to another nitrogen atom, they would both be alike. Compare an atom of nitrogen to the following elements on the chart below.

Chart A **Atoms of Different Elements**

Atom of the Element	Nucleus		Electron Cloud
	Protons (+)	Neutrons	Electrons (-)
(N) Nitrogen	7	7	7
(O) Oxygen	8	8	8
(Cl) Chlorine	17	18	17
(As) Arsenic	33	42	33

Chart B Parts of an Atom and the Charge of the Particles
Protons are positively charged (+) particles inside the nucleus of an atom
Neutrons are neutral (no charge) particles inside the nucleus of an atom with the protons
Electrons are negatively charged (-) particles outside the nucleus in an electron cloud of an atom

FACTS ABOUT ATOMS

(See Chart; Parts of an Atom and the Charge of the Particles)

- The number of protons equals the number of electrons.

- The number of protons and electrons are always equal in a single atom therefore an atom is considered **neutral**. A neutral atom is not positively or negatively charged.

- Protons and Neutrons are located inside the nucleus of an atom.

- The **atomic weight or atomic mass** of an atom from any element is determined by adding the number of protons and number of neutrons together. The protons and neutrons inside the nucleus are considered to be the heaviest part of the atom.

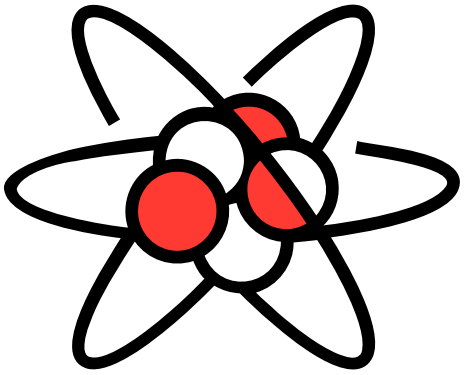
- Electrons that are located in the electron cloud surrounding the outside of the nucleus and are so light that they are considered not to have weight or mass. The electron cloud is said to consist of mostly empty space in which the electrons orbit the nucleus.

- The **atomic number** of an atom equals the number of protons. Atoms of each element are arranged on the periodic chart by the atomic number.

Student Activity Sheet

Name _____

Date _____ **Class** _____



To increase your understanding of the material, please read background information and then calculate the atomic number and atomic mass for each atom of an element in the chart below. Write your answer on the chart.

Atom of the Element	# of Protons	# of Neutrons	# of Electrons	Atomic Number	Atomic Mass
1. (N) Neon	10	10	10		
2. (Kr) Krypton	36	48	36		
3. (Ca) Calcium	20	20	20		
4. (O) Oxygen	8	16	8		

Answer the following questions.

5. Circle one: Inside Nucleus Outside Nucleus Where are protons located?

4. The Carbon atom has 6 protons; how many electrons does it have?

5. Where are the neutrons in an atom located?

6. Carbon has 6 protons and 6 neutrons, when these two particles are added, what information do they provide about the atom?

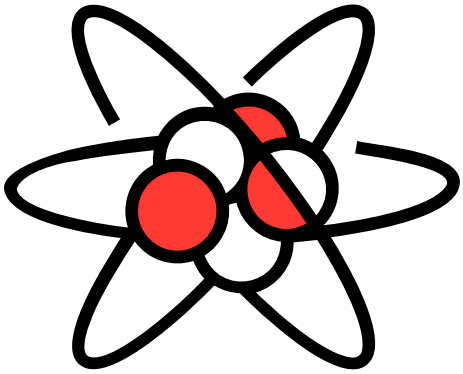
7. What is the charge of protons?

8. In order for an atom to be neutral, what two subatomic particles must be equal?

Teacher Key

Name _____

Date _____ **Class** _____



To increase your understanding of the material please read background information and then calculate the atomic number and atomic mass for each atom of an element in the chart below. Write your answer on the chart.

Atom of the Element	# of Protons	# of Neutrons	# of Electrons	Atomic Number	Atomic Mass
1. (N) Neon	10	10	10	**10**	**20**
2. (Kr) Krypton	36	48	36	**36**	**84**
3. (Ca) Calcium	20	20	20	**20**	**40**
4. (O) Oxygen	8	16	8	**8**	**24**

Answer the following questions.

5. **Circle one: Inside Nucleus Outside Nucleus Where are protons located?**

6. **The Carbon atom has 6 protons; how many electrons does it have? 6 electrons**

1. **Where are the neutrons in an atom located? Neutrons are inside the nucleus**

2. **Carbon has 6 protons and 6 neutrons, when these two particles are added, what information do they provide about the atom? The atomic weight or atomic mass**

3. **What is the charge of protons? Protons have a positive charge**

4. **In order for an atom to be neutral, what two subatomic particles must be equal? Electrons and Protons**

PRE-GED LESSON PLAN – SCIENCE (Level 6.0 – 8.9)

COMPETENCY: 3.03 Interpret scientific concepts through the application of comprehension skills and visual processing skills to physical science selections

CONNECTIONS: LA.A.1.4.2, LA.1.4.3

CLASSROOM PROCEDURE:

1. Borrow a tuning fork from any school
2. Set a shallow container filled with water on paper towels or newspaper.
3. Read lab procedures aloud to class and demonstrate.
4. Safety Note: strike the tuning fork with a glancing blow on the edge of the bottom of your shoe: the tuning fork should vibrate. Please do not strike on other surfaces.
5. Next, strike the shoe again and put the vibrating tip of the tines in the shallow water.
6. Practice to get the "Shamu" affects. Waves travel as vibrations! Let students try the demo.
7. Let students strike their shoe and then touch a few selected items in the room. Have students hold the fork after it begins to vibrate to absorb the energy.
8. Sound is vibrations.
9. Tell students that sound travels as vibrations through longitudinal waves that move back and forth like a slinky.
10. Tell them that sound waves are mechanical in that they need a medium (like air, metal or water) to travel through.
11. Sound waves transfer energy through vibrations.
12. Direct students to read the background information and complete the student activity questions.
13. Share some of the interesting facts about the speed of sound and Mach number with students.

VOCABULARY:

Longitudinal waves
Wavelength
Compression
Rarefaction
Medium
Mach number

TEACHER-MADE OR ALTERNATIVE MATERIALS:

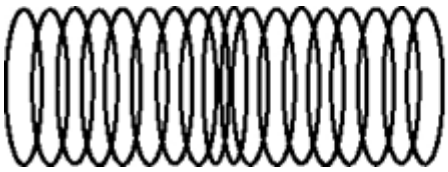
MATERIALS NEEDED:	**SUPPLEMENTARY MATERIALS:**	**EVALUATION:**
Copy of Student Activity Computer w/Internet Copy of Background Sheet Teacher Key Interesting Facts about the Speed of Sound and Mach Tuning Fork (borrow from a school) Shallow container full of water Paper towels or Newspaper	Interesting facts about the speed of sound and mach number Extension: Lab on Pitch	Activity Questions that increases comprehension of scientific concepts. Hands-on- Inquiry that increases processing of physical science.

What is a Sound Wave?

Background Sheet

Sounds are vibrations that travel as a wave. A wave is a disturbance that transfers energy from place to another. Waves are classified according to how they move. Waves can move in a repeating up-and-down or back-and-forth movement. Sound moves in longitudinal waves (back and forth like a slinky). Longitudinal waves move the particles of the medium parallel to the direction that the waves are traveling. This can be seen by stretching out a slinky and watching the (back-and-forth) movement. Places where the coils are close are called compressions and places where they stretch out are called rarefactions. A wavelength can be measured by the distance between compression to compression or rarefaction to rarefaction.

Animation courtesy of Dr. Dan Russell, Kettering University.
http://www.kettering.edu/~drussell/Demos/waves-intro/waves-intro.html



Longitudinal Waves

Longitudinal waves are mechanical in that they require a medium to travel through. A medium is the matter that the energy travels through such as air, metal, wood, water and most objects. Sound travels as vibrations through matter in longitudinal waves. When someone speaks into your ear, the speech (sound) travels as vibrations to your eardrum and is then passed along nerves to the brain.

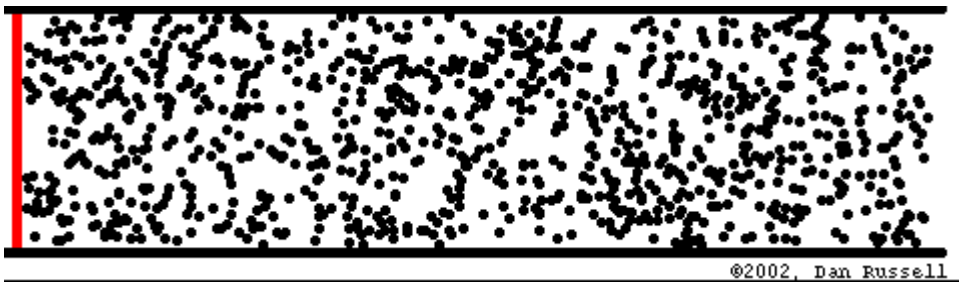
You can feel the vibrations of sound when you strike a tuning fork and it begins to hum in a specific pitch; it is vibrating. The energy of the sound waves travel through the metal into the air as vibrations in longitudinal waves.

Sound can travel through air at sea level (at sea level) at approximately 761 miles per hour. Sound travels in different mediums at different speeds. Sound can not travel through places where there is no matter such as in the vacuum of space. Sound is the transfer of energy through vibrations that require a medium and travels as longitudinal waves.

Visit this site to see the animations of waves.

Animation courtesy of Dr. Dan Russell, Kettering University.

http://www.kettering.edu/~drussell/Demos/waves-intro/waves-intro.html



Student Activity

Procedures:

1. Lay a shallow container filled with water on some newspaper to absorb the water.
2. Bend your leg so that you can see the bottom of your shoe.
3. Strike the edge of your shoe with a glancing blow from the tuning fork. Safety note: do not strike any other object with the tuning fork.
4. Feel the fork and then hold the tongs in your hand. Observe
5. Next, repeat step 3 except put the tip of the vibrating fork into the shallow water.
6. Try step 5 several times to get the best "Shamu Affect".
7. Try touching the tuning fork to other objects like metal, your ear, and jewelry.
8. Clean up the water and return supplies to your teacher.

Analyze and Conclude

1. What happened to the tuning fork after you hit your shoe?
2. What happened to the vibrations when you held the tuning fork?

3. What mediums did the vibrations go through when you touched the tuning fork to the water?
4. How did the sound travel?
5. How did you transfer the sound to other objects in the room?

Reading Comprehension Questions

1. Explain what a medium is.
2. Describe a longitudinal wave.
3. Describe how sound waves travel.

4. What is the speed of sound at sea level or standard atmosphere?
5. Explain how a longitudinal wave moves.
6. Sounds are _____ that travel as a wave.
7. Explain why sound can not travel in space?

8. What is a [illegible]?

Teacher Key

Analyze and Conclude

1. What happened to the tuning fork after you hit your shoe? **It started to vibrate**
2. What happened to the vibrations when you held the tuning fork? **Hand absorbed the vibrations (stopped)**
3. What mediums did the vibrations go through when you touched the tuning fork to the water? **Metal, air and water.**
4. How did the sound travel? **The sound traveled through the metal and air as vibrations.**
5. How did you transfer the sound to other objects in the room? The **metal vibrated against other objects such as the metal of the door or top of the desk.**

Reading Comprehension Questions

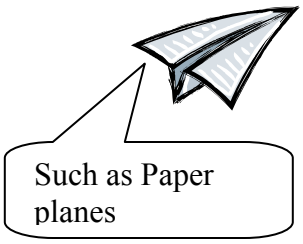
1. Explain what a medium is. **A medium is matter such as air, water or metal.**
2. Describe a longitudinal wave. **A longitudinal is a mechanical wave that acts like a slinky and requires a medium to transfer sound.**
3. Describe how sound waves travel. **Sound travels as vibrations in longitudinal waves.**
4. What is the speed of sound at standard atmosphere? **762 miles per hour**
5. Explain how a longitudinal wave moves. **A longitudinal wave moves in a parallel movement (back and forth).**
6. Sounds are **vibrations** that travel as a wave.
7. Explain why sound can not travel in space? **Sound requires a medium (matter) to travel through and space is a vacuum with no matter in that there is no atmosphere except around space objects.**
8. What is a wave? **A wave is a disturbance that transfers energy from place to another**

Interesting Facts about the Speed of Sound and Mach Number

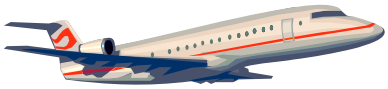
To calculate the mach number: speed of object / Speed of Sound

When someone is referring to Mach 1 or Mach 5, they are comparing the speed of an object to the sound barrier. For example: (Mach 1) is 720 miles per hour, the speed of sound. NASA and the Military are now working on vehicles that will travel up to 20 times the speed of sound. Check out the Internet to research this subject.

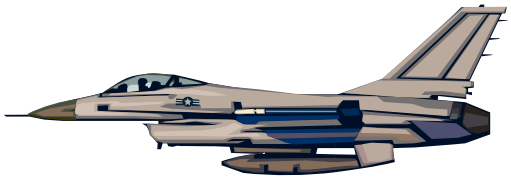
- **Subsonic refers to any object that is less than Mach 1 from a paper plane to a large airline jet that travels around the world with or without passengers.**



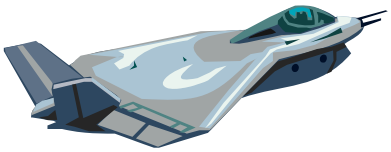
- **Transonic refers to objects that travel at Mach 1 (720 mph)**



- **Supersonic refers to objects that travel more than Mach 1**



- **Hypersonic refers to objects that travel at Mach 5 or more**



For more information: http://www.lerc.nasa.gov/WWW/K-12/airplane/mach.html

Extension Lab/Student Sheet

Name _____Date _____ Class _____

Materials per Group

3 glass soda bottles (other materials if no soda bottles; 3 plain glasses that are alike, or 3 test tubes or 3 sturdy wine glasses)

3 containers you can pour water from; fill each container with water and add red food coloring to 1st container of water, blue to 2nd and green to third container of water.

Metal spoon

Procedures

1. Fill glass 1 container ¼ full of colored water
2. Fill glass 2 container ½ full of a second color of water
3. Fill glass 3 container ¾ full of a third color of water
4. Set glasses approximately 5 cm apart or about 2 inches
5. Tap on the filled portion of the glass of each container with the metal spoon

Analyze and Conclude:

1. Compare the sound of tapping the glass ¾ fill level of water with tapping the glass with ¼ fill water level?

2. How can the pitch be varied in this experiment?

3. Sound is a mechanical wave that travels in a _____ motion wave.

Extension Teacher Key

LAB Analyze and Conclude:

1. Compare the sound of tapping the glass ¾ fill level of water with tapping the glass with ¼ fill water level? **The higher the water level the lower the pitch or sound and the lower the water level the higher the pitch or sound.**

2. How can the pitch be varied in this experiment? **The more water added the lower the sound of the pitch or the less water the higher the pitch.**

3. Sound is a mechanical wave that travels in a **longitudinal** motion wave.

PRE-GED LESSON PLAN – SCIENCE (Level 6.0 – 8.9)

COMPETENCY: 03.04 Understand the competitive, interdependent and cyclical nature of living things in the environment and the consequences of altering the equilibrium in ecosystems.

CONNECTIONS: SC.G.1.3.1, SC.G.1.3.2, SC.G.1.3.3, SC.G.1.3.4, SC.G.1.3.5, SC.G.2.3.1, SC.G.2.3.2, SC.G.2.3.3, SC.G.2.3.4, SS.B.2.3.6, AT.2.1.3.1, AT.7.1.3.1, AT.8.1.3.2

CLASSROOM PROCEDURE:

1. "How many of you have watched any of the Lion King series?"

Play the "Circle of Life" theme song and ask students what they think the song is about.
Words to the "Circle of Life" Theme Song can be found at:
http://www.lionking.org/lyrics/OMPS/Circle-EJ.html

2. Relate the song to the lesson on Food Chains and Webs found at:
   http://www.vtaide.com/png/foodchains.htm
   http://www.bigelow.org/bacteria/
3. The Lion King movies are fiction animations that closely illustrate the reality of how we obtain our energy through food chains and webs. In life, we wrestle with the delicate balance of our ecosystems just as the song suggest.
4. Have students read the online lesson, taking turns reading aloud.
5. Ask students to explain the diagrams as they appear on the webpage.
6. Have students complete the student activity page questions.
7. Ask students to share and explain some of the food chains they created.

VOCABULARY:

Food chain
Food web
Herbivores
Omnivores
Carnivores
Producers
Energy Pyramid

TEACHER-MADE OR ALTERNATIVE MATERIALS:

MATERIALS NEEDED:	**SUPPLEMENTARY MATERIALS:**	**EVALUATION:**
Lion King Movie Soundtrack Copy of Student Activity & Background Teacher Key Plain white sheet of paper for drawing Color pencils, crayons, or markers etc. Teacher Access to a computer	Extension: Internet Food Web Game http://www.ecokids.ca/pub/eco_info/topics/frogs/chain_reaction/index.cfm#	Illustration of a Food Chain Comprehension Questions

Student Activity

1. Describe how a food chain works?

2. Develop and illustrate a food chain based on the information in the article. Also use the Background Reference hard copy. Use no more than 4 links and begin the food chain with the appropriate link. Use arrows to indicate where energy is flowing.

(Do not use examples shown in this lesson, think of your own.)

3. Draw an example of an **herbivore and what it eats.**

4. Draw an example of a **carnivore and what they eat.**

5. Draw an example of an **omnivore and what they eat.**

6. Why are producers so important?

7. Explain what is meant by interdependence?

8. Why are there more herbivores than carnivores?

9. Explain how food chains are a part of the cycle of life?

10. Draw one animal and illustrate all the other life forms it eats that you can think of.

Teacher Key

1. Describe how a food chain works? **A food chain involves 3 to 4 links of organisms in which the first organism depends on the food (plants) and the predator that eats that organism and may progress to a 2nd predator that eats the first predator. Link 1 would be the plant, link 2 the organism that eats the plant, link 3 the organism that eats the organism that eats the plant, etc.**

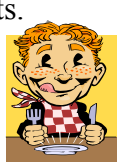
2. Develop and draw a food chain based on the information in the article. Also refer to the Background Reference hardcopy. Use no more than 4 links and begin the food chain with the appropriate link. Use arrows to indicate where energy is flowing.

   Food chain should start with a plant and end with an animal.

3. Draw an example of an **herbivore and what it eats.** Herbivores eat vegetation like grass or shrubs. A cow is an herbivore.

4. Draw an example of a **carnivore and what they eat. A lion is a carnivore, it eats other animals.**

5. Draw an example of an **omnivore and what they eat.** An omnivore eats other animals and plants. Bears, raccoons, and people are omnivores.



6. Why are producers so important? **Plants are producers and there are far more of them than animals. All food chains or webs transfer energy beginning with producers (plants). The most energy is at the bottom of the food pyramid (producers/plants) and the energy decreases as you go up the food chain.**

7. Explain what is meant by interdependence? This is where the cycle of life comes in. **We all, plants and animals, depend on each other in order that all critters and plants have shelter, food, and air to breathe to survive. Interdependence refers to a food chain or web that maintains the balance of plant and animal populations within a community.**

8. Why are there more herbivores than carnivores? **There are more producers/plants so that herbivores have more food/ more energy to transfer than do carnivores that eat only meat.**

9. Explain how food chains are a part of the cycle of life? **Each part of the cycle is a continuous transfer of energy from one organism to another and then decomposed and recycled as nutrients to begin the process again.**

10. Draw one animal and draw all the other life forms it eats that you can think of. **Lions eat animals such as: zebras, hyenas, leopards, rodents, reptiles and many other animals.**

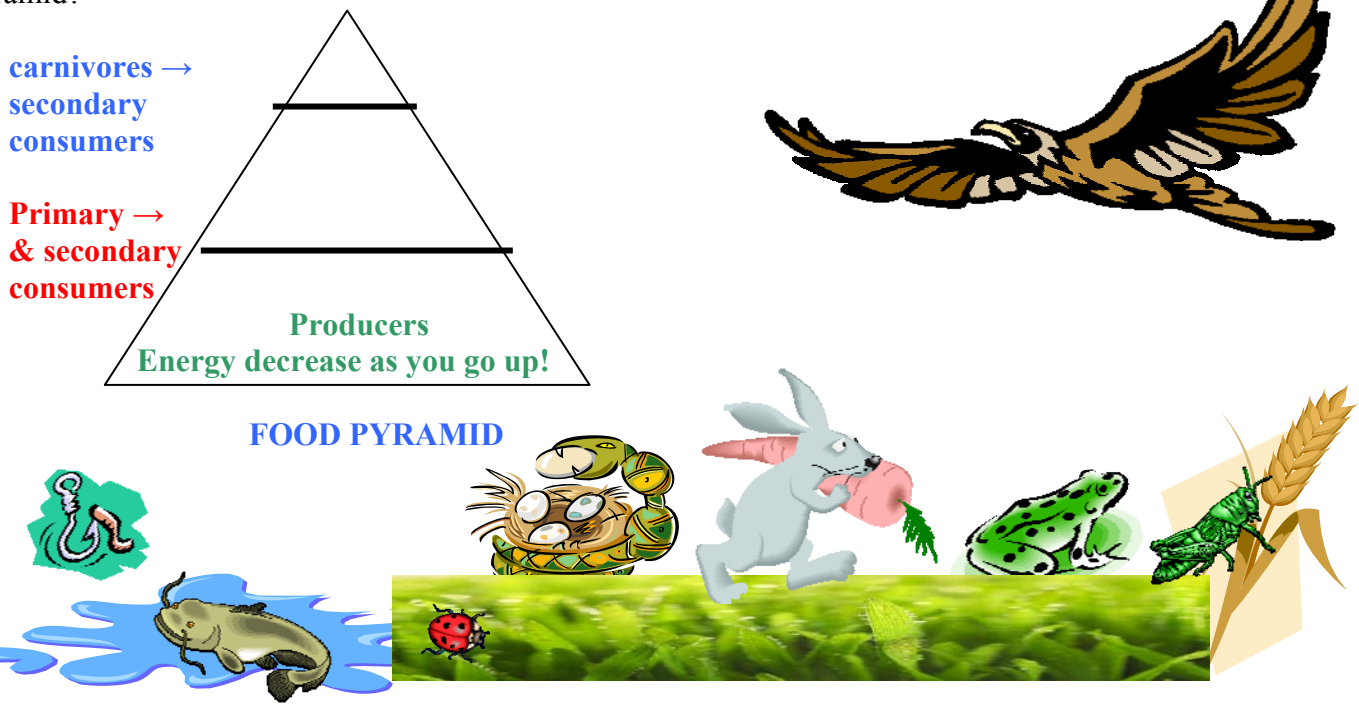
Background

Why do we need a huge abundance of plants and not so many animals to keep the balance of nature, the cycle of life going? And even more important, besides warmth and light, why do we need the sun?

The answer to both questions is basically that we need energy. Without the sun, photosynthesis would not take place in plants which happens to be our largest source of food energy. Plants are called producers because they make their own food (the process of photosynthesis) in which the sun to begins the process. All other organisms depend upon producers. Animal organisms are considered consumers; they do not make their own food from the sun. Yes, they may can go out and pick fruit, but if not for the sun and the process of photosynthesis there would be no fruit. Yes, we can eat beef. Would there be cows if the grass they eat did not grow because there was no photosynthesis? Would the lion have enough to eat if the zebra that depends on plants for energy, had no plants to eat? No matter what the lion is eating: a herbivore eats only plants; carnivores eat only animals; and omnivores eat both plants and animals, each is dependent upon one another for energy (food). The reliance on other organisms is called interdependence which is based on the concept that plant and animal populations in a food chain or food web are kept in balance within a community. All consumers are dependent on the abundance of plants (producers) for the cycle of life.

The transfer of energy starts in a food chain and is further dispersed in a larger group of organisms called a food web. A food web consists of an entire community of organisms and helps to keep balance of energy within the populations. An energy pyramid illustrates how the energy is transferred. The 1st level on the bottom, consist of producers, an abundant supply of plants. The 2nd level, consists of two types of consumers: herbivores and omnivores and lastly the 3rd level contain the carnivores. As you go from producers to consumers up the pyramid, energy is decreased. In other words, the level with the highest amount of energy is level 1, producers.

Lions like to eat large animals especially giraffes and zebras to obtain their energy (food). Giraffes and zebras eat shrub and tree foliage for energy (food). Food is chemical energy that when consumed can be transformed into electricity to keep a heart beating, energy can be transformed into motion that allows organisms to move, into heat which is why you have a normal temperature of 98.6 degrees. Where would the lion, zebra, giraffe and shrubs go on the food pyramid? Where do the organisms below fit on the food pyramid?



PRE-GED LESSON PLAN – SCIENCE (Level 6.0 – 8.9)

COMPETENCY: 3.05 Analyze scientific data and make predictions related to the information.

CONNECTIONS: SC.H.1.3.7, SC.H.2.3.1, LA.A.2.3.1, LA.A.2.3.8

CLASSROOM PROCEDURE:

1. Copy the Vocabulary Word Sheet and cut along the lines. Put words in a sack. Divide the class into groups to accommodate the vocabulary words and have each group draw out their vocabulary word(s).
2. Ask students to review the background information and teach the class the definition and application of their vocabulary word(s).
3. Ask students to look at the three pH scales at the on the background sheet and assign each scale to a group to discuss and then share their information with the class.
4. Highlight the major content of the background information with students.
5. Read the lab information and procedures. Ask class if they have any questions as to how to conduct the lab.
6. Direct students through the lab sheet prior to their investigation.
7. Once students have conducted the lab and answered the questions, inform them that they may taste the orange soda they created. Give them a packet of sugar if they want to sweeten the orange soda. The orange soda is carbonated similar to soda. (In soda, they also use pressure to add the carbon dioxide).
8. Relate the lab terminology (vocabulary) to the background information sheet content.
9. Ask students to complete the questions

VOCABULARY:

Ion
Acid
Base
Ph Scale
Indicator
Compound

TEACHER-MADE OR ALTERNATIVE

MATERIALS NEEDED:	**SUPPLEMENTARY MATERIALS:**	**EVALUATION:**
Copies of Background Sheet and Vocabulary Words Copies of Student Lab w/ pH scale Teacher Voc & Act. Key Per Group: Clear Plastic Cups Plastic Spoon 1 orange 1 level teaspoon of baking soda Water (possibly a packet of sugar per group)	Extension Lab use cabbage juice as indicator to check pH of orange solution and baking soda. See: Teacher Key More info on pH scales: http://www.epa.gov/castnet/images/ph_scale.gif	Vocabulary Application Hands-on-Inquiry Analysis using scientific method and pH scale. Scientific Method Lab

Background:

What is an ion? An ion is atom that has gained or lost electrons and therefore has a positive or negative charge.

What is an acid? An acid is any compound that produces hydrogen ions (H^+) in water, and reduces the pH to below 7.

Some facts about acids:

- The greater the concentration of hydrogen ions produced the stronger the acid
- Acids taste sour
- Change blue litmus paper to red
- React with metals to produce hydrogen gas
- Acidic solutions also conduct electricity

What is a base? A base is any compound that produces hydroxide ions (OH^-) in water and raises its pH above 7.

Some facts about bases:

- The greater the concentration of hydroxide ions (OH-) produced the stronger the base
- Bases taste bitter
- Bases change red litmus paper to blue
- Bases feel slippery and help dissolve oils and fats
- Bases also conduct electricity

What is a compound? A compound is matter of two or more elements that are chemically bonded and cannot be separated by physical means. The properties of a compound are different from the elements that it up.

What is an indicator? Indicators are substances that change color when it comes in contact with an acid or base. Indicators are used to identify acidic or basic substances. Cabbage juice is a universal indicator.

What is a pH scale? A pH scale ranges from 0 to 14 and is used to describe how acidic (<7) or basic (>7) a substance is. The pH of a substance is a measure of the hydrogen ion (H+) concentration. A pH less than 7 is acidic and a pH greater than 7 is basic. A pH of 7 is considered neutral, neither acidic nor basic.

CHECK IT OUT! ACID OR BASE PH SCALE

Acids

(H+) increases as pH decreases

Increasing Acid

Concentration of Hydrogen ions compared to distilled water	pH	Common Examples
10, 000, 000	0	Battery Acid
1, 000, 000	1	Hydrochloric acid produced in the human stomach
100, 000	2	Lemon, Vinegar, Gastric Acid
10. 000	3	Grapefruit, Orange, Soda
1, 000	4	Acid Rain, Tomato
100	5	Soft Drinking Water, Coffee
10	6	Urine, Salvia
1 (Neutral)	7	Water, Distilled Water, Blood
1/1 0	8	Sea Water
1/1 00	9	Baking Soda, Antacid
1/1, 000	10	Great Salt Lakes, Milk of Magnesia
1/10, 000	11	Ammonia
1/100, 000	12	Soapy Water
1/1,000, 000	13	Bleach
1/10,000, 000	14	Liquid Drain Cleaner (Lye)

Increasing Base (alkalinity)

Student Activity

Experiment Information: When a base is added to an acid, a chemical reaction takes place. You can observe a chemical reaction by change of: color, heat change, smell, combustion (fire) or formation of gas like carbon dioxide (CO_2). Baking soda is a base and the juice of an orange is an acid. How would I know if a chemical reaction took place when if I put baking soda and the juice of an orange together?

1. **State the problem:**

2. **Develop a hypothesis (prediction):**

Procedures:

1. Squeeze the juice of one orange into a cup.
2. Add an equal amount of water to the juice.
3. Add 1 level teaspoon of baking soda to the orange mixture and record observation(s).

4. **Observation(s) of chemical reaction:**

5. **Conclusion:** Support or reject the hypothesis and state what took place.

Analyze and Conclude:

6. The baking soda produced _____ ions in the water.

7. The juice of an orange produced _____ ions in the water.

8. Determine the pH of the orange juice from the charts provided. _____

9. Determine the pH of the baking soda from the charts provided. _____

10. Determine if the pH of orange juice is: (circle one)

a. strong acid b. weak acid c. strong base d. weak base

Bonus: Taste your solution, add a little sugar to sweeten if needed. Describe the taste.

Vocabulary Key

Ion is an atom that has gained or lost an electron and has a charge.	**Acid is a compound that produces hydrogen ions and has a pH below 7**
Base is a compound that produces hydroxide ions and has a pH above 7.	**pH scale is a scale that ranges from 0 to 14 and is used to describe how acidic (<7) or basic (>7) a substance is.**
Indicators are substances that change color when it comes in contact with an acid or base. Indicators are used to identify acidic or basic substances.	**Compounds are matter of two or more elements that are chemically bonded and cannot be separated by physical means.**

FYI: Extension Lab on pH using cabbage juice as indicator, add equal amounts of substance with cabbage juice and record color.

pH	2	4	6	8	10	12
Color	Red	Purple	Violet	Blue	Blue-Green	Greenish-Yellow

An experiment using cabbage juice as the indicator can be found at:
http://chemistry.about.com/library/weekly/aa012803a.htm

Teacher Note:

Cabbage Juice Indicator

To prepare cabbage juice, cut and use only half of a purple cabbage. Cut the half you are going to use into small chunks and put them in a pot with 3 quarts of water. Bring to boil and let simmer until the juice is purple about 5 minutes. Pour the juice into a storage container through a colander. Throw away solids. Let the juice cool and take it to school the next day. It will spoil and smell if made too many days ahead.

Teacher Activity Key

Experiment Information: When a base is added to an acid, a chemical reaction takes place. You can observe a chemical reaction by change of: color, heat change, smell, combustion (fire) or formation of gas like carbon dioxide (CO_2). Baking soda is a base and the juice of an orange is an acid. How would I know if a chemical reaction took place when if I put baking soda and the juice of an orange together?

Teacher Note: Wash and cut oranges in half prior to class and you can uses a sports water bottle to add water . Make sure that students only use 1 level teaspoon of baking soda for best taste per orange.

1. State the problem: ***What will happen when I put baking soda in an orange juice solution? Answers many vary…***

2. **Develop a hypothesis (prediction):** ***I think the orange juice solution will bubble and fizz.*** Or I think the orange juice will change color. Or I think the orange juice will get warm. All of these are correct hypothesis but some will be supported and some rejected. The first one, bubble and fizz is the one that will be supported.

	Procedures
1.	Squeeze all the juice out of 1 orange into a clean plastic cup
2.	Add an equal amount of water to the juice in the cup
3.	Add 1 level teaspoon of baking soda to the orange solution (record observations)

1. **Observation(s) of chemical reaction:** ***bubbles, fizz***

2. **Conclusion:** Support or reject the hypothesis and state what took place. ***My hypothesis stated that the mixture would bubble and my hypothesis is accepted. Or My hypothesis stated that the orange mixture would turn colors, but my observation was rejected.***

Analyze and Conclude:

3. The baking soda produced ___**hydroxide or (OH^-)**____ ions in the water.

4. The juice of an orange produced ___**hydrogen or (H^+)**____ ions in the water.

5. Determine the pH of the orange juice from the charts provided. ____**pH of 2-3**_____

6. Determine the pH of the baking soda from the charts provided. ____**pH of 9**_____

7. Determine if the pH of orange juice is: (circle one)

a. ***strong acid*** *b. weak acid* *c. strong base* *d. weak base*

Bonus: Taste your solution, add a little sugar to sweeten if needed. Describe the taste. Taste like orange soda close to what you buy in the store. ***They use Carbon Dioxide (CO_2) to make sodas fizzy. The baking soda produced the CO_2 gas. Chemical Reaction!***

PRE-GED LESSON PLAN – SCIENCE (Level 6.0 – 8.9)

COMPETENCY: 03.06 Understand, interpret and explain graphic models and stimuli such as diagrams, photographs, drawings, maps, graphs, charts and tables.

CONNECTIONS: SC.H.1.3.7 SC.H.2.3.1, SC.H.3.3.7, LA.B.2.3.1, MA.E.3.3.1

CLASSROOM PROCEDURE:

To prepare for class, Read over the background and if possible pull up the web site to show the animation after students discuss #2.

1. Ask students how football fans in a stadium make a wave. When students say that a person stands and then sits and then another stands and then sits, ask if the people moved with the wave or remained in their seats? Particles in waves move up and down but do not move with the wave they transfer energy. A fun thing to do is to have student talk together for 3 minutes and decide on a wave they can demonstrate and then do it.
2. Ask students what are some other characteristics of waves. (wavelength, amplitude and frequency). Write the 3 vocabulary words on the board as they talk about them.
3. Once students have identified the major 3 characteristics of a wave, discuss each one briefly.
4. Have students paraphrase a definition for each word.
5. Have students work through the student activity sheet individually, as a group or with direct teacher assistance.
6. Wrap-Up may be going over the three major characteristics of a wave and discussing the answers to the student activity.

VOCABULARY:

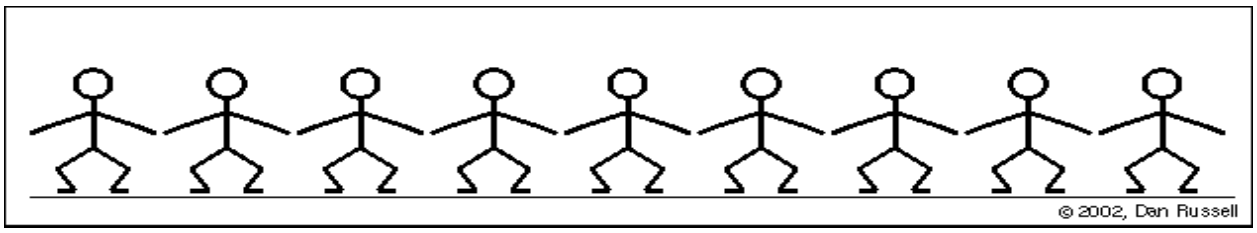
1. wavelength
2. amplitude
3. frequency

TEACHER-MADE OR ALTERNATIVE MATERIALS:

MATERIALS NEEDED:	**SUPPLEMENTARY MATERIALS:**	**EVALUATION:**
[Make copy of background sheets for each group of students. Make a copy of the student activity sheet. Try to pull up the website in the background material to illustrate the animation of the wave.]	[**http://www.kettering.edu/~drussell/Demos/waves-intro/waves-intro.html**]	[Oral discussion and completion of student activity in an individual, group or teacher directed setting. Teacher key provided.]

Characteristics of Waves

Background Information Sheet



Animation courtesy of Dr. Dan Russell, Kettering University.
http://www.kettering.edu/~drussell/Demos/waves-intro/waves-intro.html

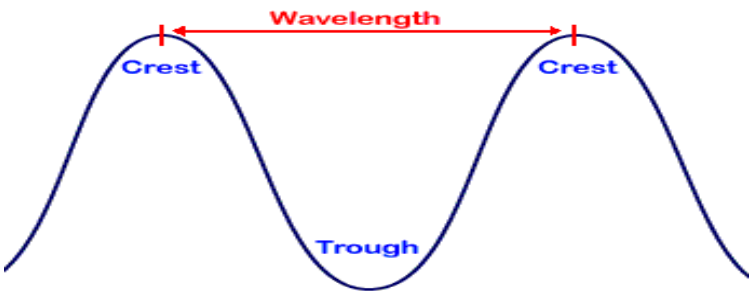
Have you ever "done the wave" as part of a large crowd at a football or baseball game? A group of people jumps up and sits back down, some nearby people see they and they jump up, some people further away follow suit and pretty soon you have a wave traveling around the stadium. The wave is the disturbance (people jumping up and sitting back down), and it travels around the stadium. However, none of the individual people the stadium are carried around with the wave as it travels - they all remain at their seats.

To see transverse wave animation from Dr. Dan Russell:
http://www.kettering.edu/~drussell/Demos/waves-intro/waves-intro.html
(copyright and fair use information at http://www.kettering.edu/~drussell/Demos/copyright.html)

Light travels as particles of energy called photons that have electric and magnetic properties. Light travels as a transverse wave in which the photons move up and down along the wave much as the wave of the crowd. Sound on the other hand travels back and forth on a longitudinal wave and requires a medium (matter) for the transfer of energy. Both types of waves have characteristics that can be measured. We are going to explore three basic characteristics of waves: wavelength, amplitude and frequency.

The first characteristic of wavelength can be easily measured. The wavelength can be determined by measuring the distance between the top of one crest to the top of the next crest or from the bottom of the trough to the bottom of the next trough.

Wavelength Diagram



Animation courtesy of Dr. Dan Russell, Kettering University.
http://www.kettering.edu/~drussell/Demos/waves-intro/waves-intro.html

PRE-GED LESSON PLAN – SCIENCE (Level 6.0 – 8.9)

COMPETENCY: 3.07 Recognize that energy interacts with matter; that energy may be changed in form; and that force and motion can be described and predicted.

CONNECTIONS: SC.B.1.3.1, SC.B.1.3.2, SC.B.1.3.3, SC.B.1.3.4, SC.B.1.3.5, SC.B.1.3.6, SC.B.2.3.1, SC.B.2.3.2, SC.C.1.3.1, SC.C.1.3.2, SC.C.2.3.1, SC.C.2.3.2, SC.C.2.3.3, SC.C.2.3.4, SC.C.2.3.5, SC.C.2.3.6, SC.C.2.3.7

CLASSROOM PROCEDURE:

1. Prior to class, get a package of cookies and a tennis ball or other like ball.
2. Distribute background information to be shared as a pair.
3. Ask students to explain what energy is. Assign a student to write down brief bullets of student responses on the board.
4. Explain the definition of energy and relate it to student responses. Energy is the ability to do work or cause change.
5. Ask students to explain what potential and kinetic energy are. Potential is stored energy of position and kinetic is the energy of motion.
6. Ask each group of students to choose **one** of the selections of kinetic energy: electrical, radiant, thermal, motion or sound. Instruct them to read and be able to briefly explain the concept to the class. Give student 5 minutes to read their selection and decide on what they are going to say.
7. Ask students to briefly explain and describe the type of kinetic energy they chose.
8. Toss the tennis ball to a student and ask the student to explain when the ball has potential energy and when it has kinetic energy. About to toss = potential, ball in motion = kinetic.
9. Explain what an energy transformation is by giving students a couple of cookies and asking them to look over the potential energy list and choose which one of the selections applies to the cookies. Cookies are potential chemical energy. Ask students when they eat the cookies how are they transformed into another type of energy. The chemical energy is transformed into kinetic energy of motion.
10. Review the background transformation of energy examples. (pictures).
11. Ask students to answer the student activity questions and assist students if needed.

VOCABULARY:

Energy Transformations
Potential Energy
Kinetic Energy
Electrical Energy
Radiant Energy
Thermal Energy
Motion Energy
Sound Energy
Chemical Energy
Stored Mechanical Energy
Nuclear Energy
Gravitational Energy
Fission
Fusion

TEACHER-MADE OR ALTERNATIVE

MATERIALS NEEDED:

Copies of Background
Copies of Student Activity
Teacher Key
2 cookies per student
Ball (any type) Tennis ball is best

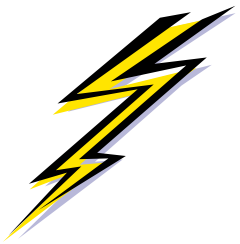
SUPPLEMENTARY MATERIALS:

More information and energy curriculum is available at: http://www.need.org/

EVALUATION:

Guided Inquiry
Comprehension questions
Labeled Diagrams

Energy



Background

What is energy? Energy is the ability to do work or cause change. Energy makes our cars move, our bodies grow, and our lights turn on. Energy is found in different forms, such as light, heat, sound and motion. All forms of energy can be put into two categories, kinetic and potential.

Kinetic energy is the energy of motion, such as waves, electrons, atoms, molecules, substances, and objects.

- **Electrical Energy** is the movement of electrons. Everything is made of tiny particles called atoms. Atoms are made up of smaller particles called electrons, protons and neutrons. When a force is applied, electrons move through a wire and is called electricity. Lightning is an electrical energy.
- **Radiant energy** is electromagnetic energy that travels in transverse waves. Radiant energy includes visible light, x-rays, gamma rays, radio and microwaves. The sun is radiant energy as is light.
- **Thermal** energy is heat or the internal energy in substances. Thermal energy is the vibration and movement of the atoms and molecules within a substance. Geothermal energy which is a natural heating process within the earth such as hot springs and magma are thermal energy.
- **Motion** energy is the movement of objects and substances from one place to another. Objects move when a force is applied according to Newton's Laws of Motion. Wind is an example of motion energy.
- **Sound** is the movement of energy through substances in longitudinal waves. Sound is produced when a force causes an object or substance to vibrate. The energy is then transferred through the object by waves.

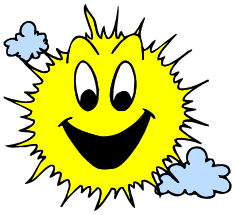
Potential energy is stored energy and the energy of position (gravitational energy). There are several forms of potential energy.

- **Chemical** energy is energy that is stored in the bonds of atoms and molecules. It is the energy that holds these particles together. Food, biomass, petroleum, natural gas and propane are examples of stored chemical energy.
- **Stored Mechanical** Energy is energy stored in objects by the application of a force. Compressed springs and stretched rubber bands are examples of stored mechanical energy.
- **Nuclear energy** is stored in the nucleus of an atom. The energy holds the nucleus together. The energy can be released when the nuclei are combined or split apart. Nuclear power plants split the nucleus of uranium atoms in a process called fission. The sun combines the nuclei of hydrogen atoms in a process called fusion.
- **Gravitational** energy of position or place is like a rock resting at the top of a hill (in a position to roll down the hill). Hydropower, such as water in a damn is also an example of gravitational energy.

Energy Transformations

Chemical → 

Motion

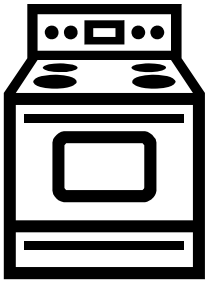


Radiant → 

Chemical

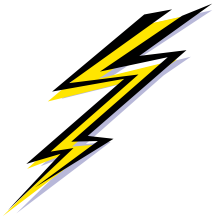
Chemical → 

Motion/Mechanical

Electrical → 

Thermal

Student Activity



Name _____Date _____ Class _____

1. If a ball is placed on the edge of a shelf, explain how the potential energy could be increased. (Hint: energy of position)

2. Explain what energy transformation takes place when you eat some cookies.

3. What is energy?

4. List two of the four forms of energy.

5. Explain how kinetic and potential energy are different.

6. Give an example of kinetic energy.

7. Give an example of potential energy.

8. Explain how electrical energy is made.

9. Draw and label an illustration of an energy transformation not used in the background information between electrical and motion.

10. Draw and label an illustration of an energy transformation not used in the background information between chemical and motion.

Teacher Key

1. If a ball is placed on the edge of a shelf, explain how the potential energy could be increased. (Hint: energy of position) **Potential energy could be increased by putting the ball on the edge of a higher shelf.**

2. Explain what energy transformation takes place when you eat some cookies. **When you eat food (potential chemical energy) it is transformed to motion (a form of kinetic energy).**

3. What is energy? **The ability to do work or cause change.**

4. List two of the four forms of energy. **Student should list any two of the following: light, heat, sound or motion.**

5. Explain how kinetic and potential energy are different. **Kinetic is the energy of motion and potential energy is the stored energy of position (gravitational energy).**

6. Give an example of kinetic energy. **Any of the examples given in the background or students may say electrical, radiant, thermal, motion or sound.**

7. Give an example of potential energy. **Any of the examples given in the background or chemical, stored mechanical, nuclear, or gravitational.**

8. Explain how electrical energy is made. **Electrical energy is made by the movement of electrons.**

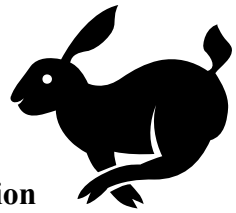
9. Draw and label an illustration of an energy transformation not used in the background information between electrical and motion.



Electrical **Motion**

10. Draw and label an illustration of an energy transformation not used in the background information between chemical and motion.





Chemical **Motion**

PRE-GED LESSON PLAN – SCIENCE (Level 6.0 – 8.9)

COMPETENCY: 03.08 Interpret scientific concepts through the application of comprehension skills and visual processing skills to life science selections.

CONNECTIONS: SC.F.1.3.1, SC.F.1.3.2, SC.F.1.3.3, SC.F.1.3.4, SC.F.1.3.5, SC.F.1.3.6, SC.F.1.3.7, SC.F.

CLASSROOM PROCEDURE:

1. Read objective
2. Ask the questions at the top of the Teacher Information Sheet
3. Discuss the recorded responses
4. Tell the joke and Ask what Laughter is.
5. Pass out the Student Activity Sheets, website hardcopies or provide access to the Internet for students.
6. Divide students into groups or have them work in pairs.
7. Students will answer the questions by searching the websites indicated or hardcopies of the website information.
8. Students will draw and label a model of the brain.
9. When students have completed their work, review the questions and brain parts.

VOCABULARY:

Limbic System
Cerebellum
Cerebrum
Brain Stem
Frontal lobe
Parietal Lobe
Temporal Lobe

TEACHER-MADE OR ALTERNATIVE MATERIALS:

MATERIALS NEEDED:	SUPPLEMENTARY MATERIALS:	EVALUATION:
Copy of Teacher Information Sheet Copies of Student Activity Sheet Hardcopies of Internet Information if students can not access the Internet in class or provide bookmarks for each website listed. Pencil and Colored Pencils (optional)	Websites used in this assignment: http://people.howstuffworks.com/laughter4.htm http://people.howstuffworks.com/laughter.htm/printable	Student Activity Sheet Q! & A Draw and label Brain model

Teacher Information

"BRAIN ON LAUGHTER"

Objective 1: Students will become familiar with the science of laughter and the brain.

Ask students these questions to provoke their thinking about laughter. Select or designate a volunteer to record responses on the board for each question.

- Why do some jokes seem funny?
- What is one way someone can make you laugh?
- Who do you think laughs more, the young or old?
- Can you tickle yourself?

Ask students: What is Laughter?
Write response on board. You all have lots of views about what laughter is. In order to better understand the science of laughter, we need to know more about the brain.

Next: Break students into groups or allow them to work in pairs. Provide copies of background information, student activity sheet and Internet access or hard copies of the Internet Material. Have students read over the Internet material or hardcopy and answer the question as well as illustrating and labeling the brain model diagram.

Limbic System http://people.howstuffworks.com/laughter4.htm

How Laughter Works http://people.howstuffworks.com/laughter.htm/printable

THE BRAIN
http://www.enchantedlearning.com/subjects/anatomy/brain/Structure.shtml

CLOSURE: Discuss the student activity questions and answers.

Read Joke:

"Room Service"
"Can you send up a towel?"
"Please wait, someone else is using it."

If you are interested in finding some jokes, try:
http://faculty.washington.edu/chudler/jokes.html

BRAIN ON LAUGHTER Teacher Key

As directed by instructor, use the hardcopy on the limbic system and the Parts of the Brain or access the websites for information to answer the following questions. Write responses as directed by your instructor.

LIMBIC SYSTEM
Use website: http://people.howstuffworks.com/laughter4.htm

The limbic system in the brain is responsible for motivation and emotional behavior. Read over the first paragraph under limbic system and the paragraph under the diagram model of the brain.

1. Name and describe the two structures that are highly involved in emotional behavior.
Amygdale – small almond shaped structure deep inside the brain
Hippocampus – a tiny seahorse shaped structure

2. The amygdale connects to the hippocampus and the thalamus. The connections play an important role in controlling activities like: **friendship, love, affection and the expression of moods**

3. What structure is the major contributor to the production of loud and uncontrollable anger?
Hypothalamus

How Laughter Works use website: http://people.howstuffworks.com/laughter.htm/printable

4. Explain one of the effects of laughing. Answers may vary
Laughing feels good, Laughing is good for your health, or Laughter helps fight disease.
Scroll down to How Laughter Works
5. List the two parts of laughter. **Gesters and production of Sound**

Scroll down to Why Do We Laugh?

6. Explain two reasons people laugh. **Answers may vary: shared relief of passing of danger, bonding between people, dominant individual may us laughter to control or exercise power, if a person is threatened he/she may join in the laughter to deflect anger and lastly to be more social.**

The 3 Major Parts of the Brain and their Functions
http://www.enchantedlearning.com/subjects/anatomy/brain/Structure.shtml

7. List the 3 major parts of the brain. **Cerebrum, Cerebellum, and the Brain Stem**

8. On the back of this sheet, list the functions of the Frontal Lobe.
Behavior, Abstract thought processes, Problem Solving, Attention, Creative Thought, Some emotion, Intellect, Reflection, Judgment, Initiative, Inhibition, Coordination of movements, Generalized and mass movements, Some eye movements, Sense of Smell, Muscle movements, Skilled movements, Some Motor Skills, Physical Reaction, Libido.

BRAIN ON LAUGHTER Teacher Key Page 2 of 2

9. On the back of this sheet, list the functions of the Temporal Lobe.
Auditory memories, Some hearing, Visual Memories, Some Vision Pathways, Other Memory, Music, Fear, Some language, Some Speech, Some Behavior and Emotions, and Sense of Identity

10. On the back of this sheet, draw and label the model of the brain identifying all 7 areas.

See website: http://www.enchantedlearning.com/subjects/anatomy/brain/Structure.shtml

Parts to be labeled are: Cerebellum, Cerebrum, Brain Stem, Frontal Lobe, Parietal Lobe, Temporal Lobe, and the Occipital Lobe

BRAIN ON LAUGHTER STUDENT ACTIVITY SHEET

As directed by instructor, use the hardcopy on the limbic system and the Parts of the Brain or access the websites for information to answer the following questions. Write responses as directed by your instructor.

LIMBIC SYSTEM
Use website: http://people.howstuffworks.com/laughter4.htm

The limbic system in the brain is responsible for motivation and emotional behavior. Read over the first paragraph under limbic system and the paragraph under the diagram model of the brain.

1. Name and describe the two structures that are highly involved in emotional behavior.

2. The amygdale connects to the hippocampus and the thalamus. The connections play an important role in controlling activities like:

3. What structure is the major contributor to the production of loud and uncontrollable anger?

How Laughter Works use website: http://people.howstuffworks.com/laughter.htm/printable

4. Explain one of the effects of laughing.

5. List the two parts of laughter.

Scroll down to Why Do We Laugh?

6. Explain two reasons people laugh.

The 3 Major Parts of the Brain and their Functions
http://www.enchantedlearning.com/subjects/anatomy/brain/Structure.shtml

7. List the 3 major parts of the brain.

8. On the back of this sheet, list the functions of the Frontal Lobe.

9. On the back of this sheet, list the functions of the Temporal Lobe.

10. On the back of this sheet, draw and label the model of the brain identifying all 7 areas.

PRE-GED LESSON PLAN – SCIENCE (Level 6.0 – 8.9)

COMPETENCY: 03.09 Interpret scientific concepts through the application of comprehension skills and visual processing skills to environmental science selections.

CONNECTIONS: SC.D.1.3.1, SC.D.1.3.2, SC.D.1.3.3, SC.D.1.3.4, SC.D.2.3.1

CLASSROOM PROCEDURE:

1. Ask students what causes global warming
2. Tell students that they will be developing and designing an information brochure for middle school students to teach them about the effects of global warming.
3. Pass out the class set of background sheets.
4. Ask students each of the major questions on the background sheet and have them find a brief answer for each question.
5. Pass out the rubric, go over the directions and review what students will be graded upon.
6. Pass out the colored pencils and copy paper.
7. Instruct students on how to fold the (landscaped format) into a hamburger style brochure.
8. Identify the front, center and back page.
9. Go over the Rubric.
10. Direct students to brainstorm for 5 minutes to come up with some ideas for a theme picture on the front.
11. Tell them to jot down some brief bullets for each concept to be developed and come up with an illustration before they start their brochure.
12. Review the major concepts at the end of class

VOCABULARY:

Global Warming
Greenhouse Gases
Ozone
Carbon Dioxide (CO_2)
Stratosphere
Chlorofluorocarbons (CFC's)

TEACHER-MADE OR ALTERNATIVE MATERIALS:

MATERIALS NEEDED:	**SUPPLEMENTARY MATERIALS:**	**EVALUATION:**
Class Set of Background Information Rubric Sheet for each student A piece of copy paper per student Colored pencils per pair of students	http://www.ucsusa.org/global_warming/science/global-warming-faq.html	Rubric for a Brochure Produce a product That reflects comprehension of information .

Background Information

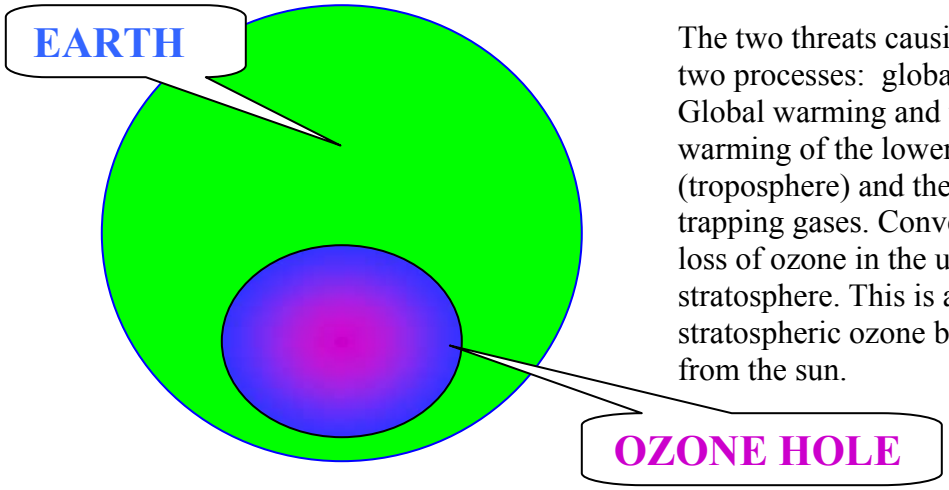
Would a temperature rise of a couple degrees really change the global climate?

A small increase in the average global temperature of about 2°- 3°F can have dramatic affect on the Earth's climate. In the last 10,000 years, the Earth's average temperature hasn't varied by more than 1.8°F. In our last Ice Age, temperatures of only 5°-9°F cooler than those today covered the Northeast United States by more than 3,000 feet of ice.

Scientists predict that continual global warming is continuing to rise and the average global temperature may rise 2.5°- 10.4°F over the next 100 years.

- Sea Level may rise between 3.5 inches and 34.6 inches. Flooding will result as will the loss of coastal areas. Much of our fresh water will be polluted by salt water.
- All ecosystems will suffer great losses of plants and animals. The wetlands with become too salty.
- The increased temperature will threaten human, animal and plant life. Humans will be vulnerable to disease-carrying insects, rodents and mosquitoes and these diseases will spread over large geographical areas.
- The agriculture in many parts of the world would be dramatically affected causing more starvation.

Are global warming and the hole in the ozone layer connected?



Antarctic in 2000

The two threats causing the thinning and holes concern two processes: global warming and ozone depletion. Global warming and the greenhouse effect refer to the warming of the lower part of the atmosphere (troposphere) and the increasing concentrations of heat-trapping gases. Conversely, the ozone hole refers to the loss of ozone in the upper part of the atmosphere, the stratosphere. This is a major problem because stratospheric ozone blocks incoming ultraviolet radiation from the sun.

Look at some of the websites with views of ozone depletion (holes or thinning):
http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img_id=4131

Global Warming and Ozone Depletion are related in the following ways:

- Some human-made gases, CFC's or chlorofluorocarbons, trap heat *and* destroy the ozone layer. Currently, these gases are responsible for less than 10 percent of total atmospheric warming, far less than the contribution from one of the main greenhouse gases, carbon dioxide.
- The ozone layer traps heat, so if it gets destroyed, the upper atmosphere actually cools, thereby offsetting part of the warming effect of other heat-trapping gases. However, the cooling of the upper layers of the atmosphere can produce changes in the climate that affect weather patterns in the higher latitudes (the most north or most south areas).
- Trapping heat in the lower part of the atmosphere allows less heat to escape into space and results in the cooling of the upper part of the atmosphere. The colder it gets, the greater the destruction of the protective ozone layer.

Reducing ozone-depleting gases is crucial to preventing more destruction of the ozone layer. If we just eliminate these gases, the problem will not be solved. However, efforts to reduce all types of emissions to reduce global warming will be good for the recovery of the ozone layer.

What can we do about global warming?

The most important thing we can do to slow down global warming is to reduce emissions of heat-trapping gases. Governments, individuals, and businesses can all help.

Governments need mandate several options to reduce greenhouse gas emissions, like:

- Raise energy efficiency standards
- Research and Problem Solve the use of renewable energy sources and work out the kinks so do the job!
- Do not pay subsidies that encourage the use of coal and oil by making them artificially cheap
- Protect and restore forests, which serve as important storehouses of carbon.

Individuals can reduce the use fossil fuels

- Drive less and drive fuel-efficient and less-polluting cars
- Use energy-efficient appliances
- Insulate homes
- Conserve on the use of electricity

Businesses and Industry must become more efficient, invest in research to solve problems and develop and enforce energy saving polices. They also need to take an active role in sharing solutions and educating the general populations with television ads. We can all make a difference.

Student Rubric

Name _____, _____

_____, _____

Date _____ Class _____

Design, develop and complete a brochure to a middle school classroom to educate them about the concerns of Global Warming. Students will illustrate the following concepts and facts. Use mostly illustrations (draw and label) with few words. Your brochure should be folded in half (hamburger style in landscape format). Use the concepts to be addressed in your brochure.

Concepts to be Addressed:

Front Page
- ❑ Eye Catching Theme on Global Warming (Hook your audience)

Center Pages
- ❑ Explain and Illustrate how a temperature rise will make a difference
- ❑ Explain and Illustrate scientists predictions of how an increase in global warming over the next 100 years.
- ❑ Explain and Illustrate how global warming is connected to the ozone layer
- ❑ Explain and Illustrate how reduction of use of greenhouse gases affect the ozone layer.

Back Page
- ❑ Explain and Illustrate what can be done to help reduce global warming.

0 - 5 = F	6 - 10 = D	11 - 15 = C	16 – 20 = B	21 – 25 = A

Grading Criteria	Comments	Points
Content: Significant content for each concept addressed.		
Creativity: Color/Symbols/Illustrations		
Collaboration of Group: Appropriate participation, focus and contribution.		
Vocabulary Use: correctly utilizes vocabulary words demonstrating mastery, application, and understanding.		
Organization: Labels/Order/Complete		
Total Points/Grade		/

PRE-GED LESSON PLAN – SCIENCE (Level 6.0 – 8.9)

COMPETENCY: 3.10 Recognize the organization and interaction within the vast universe and solar system and how life on earth is affected.

CONNECTIONS: SC.E.1.3.1, SC.E.1.3.2, SC.E.1.3.3, SC.E.1.3.4, SC.E.2.3.1

CLASSROOM PROCEDURE:

1. Ask students what a magnetic field is. (see background)
2. Relate students' answers to the correct response.
3. Ask students what is meant by dipole when speaking of magnets. (see background)
4. Explain that magnets have two poles, north and south and that each pole attracts the opposite.
5. Direct students to read the background and what the website animations linked.
6. Review the animations on the website and relate to question on Student Activity.
7. Work through the magnetism lab procedures and have students conduct lab, then answer the analyze and conclude questions.
8. Relate lab results to background information.
9. Ask students how a compass and magnetism are related?
10. If time, direct students to follow the procedures (illustrate) compass lab.
11. Tell students to complete the questions at the bottom of the lab.
12. Discuss how the two labs are connected. (both labs are about alignment of domains in a material that has magnetic properties)

VOCABULARY:

Magnetism
Poles
Domains
Alignment
Dipole
Ferromagnetic
Compass

TEACHER-MADE OR ALTERNATIVE MATERIALS:

MATERIALS NEEDED:

Copies of Background Computer with Internet Access
Copies of Magnetism and Compass Lab
Teacher Keys
Per Group:
Steel nail
1 magnet
10 Staples (see teacher key hints)
1 steel needle & shallow bowl of water
1 inch square piece of Styrofoam cup

SUPPLEMENTARY MATERIALS:

Use website links to view helpful animations
http://www.ndt-ed.org/EducationResources/CommunityCollege/MagParticle/Physics/MagneticDomains.htm

EVALUATION:

Hands-On Inquiry resulting in a product
Questions and Answers

Magnetism

BACKGROUND

Magnets are everywhere, on the refrigerator, on a white board, and in the solenoid of a car assisting the electric motor. **See animation:**

http://www.ndt-ed.org/EducationResources/HighSchool/Magnetism/magnetismintro.htm

Most of us are familiar with the general properties of magnets but do not always understand the source of magnetism. A **magnetic field** describes how the space around the magnetic material has a different level of energy than the space outside the magnetic pull. The change in energy can be detected and measured. The location where a magnetic field can be detected entering or exiting a material is called a magnetic pole. Magnetic materials have two poles, one north and one south. A **dipole** is an object that has a magnetic pole on one end and a second, equal but opposite magnetic pole on the other end. Sometimes magnets have blue on the north pole and are painted red on the south pole. **See animation:**

http://www.ndt-ed.org/EducationResources/HighSchool/Magnetism/electronpairing.htm

http://www.ndt-ed.org/EducationResources/HighSchool/Magnetism/magneticbehavior.htm

http://www.ndt-ed.org/EducationResources/HighSchool/Magnetism/fieldcreation.htm

http://www.ndt-ed.org/EducationResources/HighSchool/Magnetism/magneticproperties.htm

A magnetic field can be measured leaving the dipole at the north end and returning the magnetic field at the south end. The Earth has a north pole and a south pole. It generates a magnetic field. If a magnet is cut in two, two magnets or dipoles are created out of one. This sectioning and creation of dipoles can continue to the atomic level. Therefore, the source of magnetism lays in the basic building block of all matter...the atom.

All matter is composed of atoms, and atoms are composed of protons, neutrons and electrons. The protons and neutrons are located in the atom's nucleus. The electrons are in constant motion around the nucleus. Electrons carry a negative electrical charge and produce a magnetic field as they move through space. A magnetic field is produced whenever an electrical charge is in motion. Just as electrons orbit around the nucleus, planets orbit around the sun because of the same type of attraction or force. Our planets spin (rotate) as they revolve around the sun. Each planet has a gravitation pull between the planet and the sun. This rotation is just like how electrons rotate as they revolve around the nucleus. As matter has more atomic mass so does matter have more energy. **See the National Science Foundation, NDT animation to more clearly understand this concept.**

http://www.ndt-ed.org/EducationResources/HighSchool/Magnetism/reviewatom.htm

A magnetic field can be detected using a compass. The magnetic field will place a force on the **compass** needle. Not all matter has the property of magnetism. Iron, nickel and cobalt have

the property of magnetism. Use this website to see how electrons create a magnetic force. **See the National Science Foundation NDT animation to more clearly understand this concept.**

Magnetic Domains

Ferromagnetic materials have strong magnetic properties because they contain a high concentration of iron and are made up of small regions called magnetic **domains.** The **alignment** of the atomic dipole domains (particles that have a north and south poles) favor the north or the south. The domains in ferromagnetic materials are strong. However when ferromagnetic materials are forming and solidifying, the strong domains are randomly aligned. As the ferromagnetic material comes in contact with a magnetic field, it spontaneously aligns the domains in one direction and from that point on demonstrates strong magnetic properties.

http://www.ndt-ed.org/EducationResources/HighSchool/Magnetism/magneticdomain.htm

http://www.ndt-ed.org/EducationResources/HighSchool/Magnetism/ferromagmaterials.htm

Ferromagnetic materials become magnetized when the magnetic domains within the material are aligned. This can be done by placing the material in a strong external magnetic field or by passing electrical current through the material. Some or all of the domains can become aligned. When more domains are aligned, the stronger the magnetic field in the material. When all of the domains are aligned, the material is said to be magnetically saturated. When a material is magnetically saturated, no additional amount of external magnetization force will cause an increase in its internal level of magnetization. When domains are aligned, all domains are headed north or headed south, see the arrows in the animation. **Please view all animations**.

Courtesy of National Science Foundation NDT project:

http://www.ndt-ed.org/EducationResources/CommunityCollege/MagParticle/Physics/Magnetism.htm

http://www.ndt-ed.org/EducationResources/CommunityCollege/MagParticle/Physics/MagneticDomains.htm

http://www.ndt-ed.org/EducationResources/HighSchool/Magnetism/twoends.htm

http://www.ndt-ed.org/EducationResources/HighSchool/Magnetism/linesofforce.htm

http://www.ndt-ed.org/EducationResources/HighSchool/Magnetism/magneticfields.htm

Student Activity

What makes a metal object (made of iron, cobalt or nickel) magnetic?
Students will explore and investigate the alignment of magnetic domains.
Hint: An inexpensive package of round magnets can be found in the craft section of Wal-Mart or Craft Stores. Small bar magnets work best. View all animations to complete the student activity sheet.

Procedures:

1. Hold the tip (slanted area) of a nail over the staples and **[Circle Yes if attracted] or [Circle No if not attracted]** to the staples.

2. Stroke the slanted area of the tip of the nail across the magnet **back and forth** (two directions) 20 times and immediately hold the tip over the staples and record number of staples attracted to the tip of the nail. _____ **# of staples.**

3. Stroke the slanted area of the tip of the nail across the magnet in **one direction** for 20 strokes and immediately hold the tip over the staples and record the number of staples attracted to the tip of the nail _____**# of staples.**

Analyze and Conclude

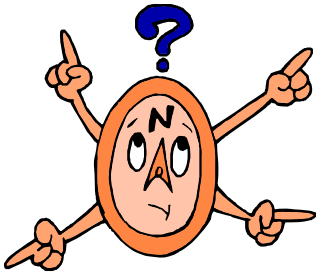
1. Draw and label a diagram of how the domains may be aligned in a nail that has not been magnetized.

2. Draw and label a diagram of how the domains may be aligned in a nail that has been stroked in two directions on a magnet.

3. Draw and label a diagram of how the domains may be aligned in a nail that has been stroked in one direction.

Student Activity

Make a compass!



Students will construct a magnetic compass with a needle and magnet...

A **compass** is an instrument that determines directions.
A compass will point to the magnetic north or magnetic south depending on whether it was magnetized with the north end or south end of a magnet. Opposites attract so if you use the south end of a magnet to stroke the needle, the magnetized end should point north!

Procedures:

1. Take a 1 inch square piece of a Styrofoam cup.

2. Take a needle and poke it through the top, under and back up through the top. (thread it through the Styrofoam)

3. Take the pointed end and stroke it 20 times in one direction

4. Put the Styrofoam with the newly magnetized needle in the shallow water and determine which direction it is pointing in.

Conclude and Analyze:

1. What direction does the needle point to?

2. What pole of the magnet was used to magnetize the needle?

3. Describe how the magnetic domain changed in the needle when stroked on a magnet.

Teacher Key

What makes a metal object (made of iron, cobalt or nickel) magnetic?
Students will explore and investigate the alignment of magnetic domains.

Hint: To separate staples, hold the stapler over a sheet of paper and staple; let folded staples collect on the paper. It is easier than separating staples. Students will not need more than 10 staples per group.

Procedures:

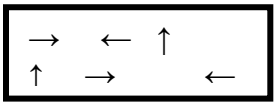
1. Hold the tip (slanted area) of a nail over the staples and [**Circle Yes if attracted] or [Circle *No* if not attracted]** to the staples.

2. Stroke the slanted area of the tip of the nail across the magnet **back and forth** (two staples attracted to the tip of the nail. **0** **# of staples** attracted to the nail.

3. Stroke the slanted area of the tip of the nail across the magnet in **one direction** for 20 strokes and immediately hold the tip over the staples and record the number of staples attracted to the tip of the nail**. answers vary, 3 or 4 # of staples** attracted to the nail.

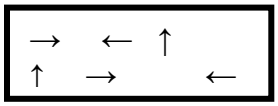
Analyze and Conclude

1. Draw and label a diagram of how the domains may be aligned in a nail that has not been magnetized.



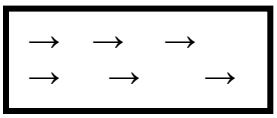
un-magnetized domains that are not aligned.

2. Draw and label a diagram of how the domains may be aligned in a nail that has been stroked in two directions on a magnet.



un-magnetized domains that are not aligned.

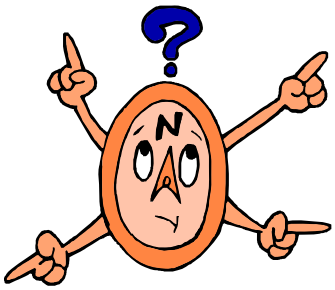
3. Draw and label a diagram of how the domains may be aligned in a nail that has been stroked in one direction.



the domains are aligned and the nail is temporarily magnetized.

Teacher Key

Make a compass!



Hint: Cut 1 inch squares out of a Styrofoam cup prior to class And insert a regular needle through the Styrofoam to illustrate how to make the compass. Wal-Mart has packages of needles.

Students will construct a magnetic compass with a magnet and a needle.

A **compass** is an instrument that determines directions. A compass will point to the magnetic north or magnetic south depending on whether it was magnetized with the north end or south end of a magnet. Opposites attract so if you use the south end of a magnet to stroke the needle, the magnetized end should point north!

Procedures:

1. Take a 1 inch square piece of a Styrofoam cup.
2. Take a needle and poke it through the top, under and back up through the top. (thread it through the Styrofoam.
3. Take the pointed end and stroke it 20 times in one direction
4. Put the Styrofoam with magnetized needle in the shallow water and determine which direction it is pointing in.

Conclude and Analyze:

1. What direction does the needle point to? **The opposite end of the magnet you stroked. If pointing north, you used the south end of a magnet.**

2. What pole of the magnet was used to magnetize the needle? **If the needle points south, you used the north end to magnetize your needle.**

3. Describe how the magnetic domain changed in the needle when stroked on a magnet. **The domains were not aligned before the needle was stroked on the magnet and became aligned after it was stroked on the magnet, magnetizing the needle.**

PRE-GED LESSON PLAN – [SCIENCE] (Level 6.0 – 8.9)

COMPETENCY: [03.11 Use appropriate tools to conduct investigations, analyze evidence, and communicate scientific arguments]

CONNECTIONS: [SC.H.1.3.1, SC.H.1.3.4, SC.H.1.3.5, SC.H.1.3.6, SC.H.2.3.1, SC.H.3.3.1, SC.H.3.3.2, SC.H.3.3.4, SC.H.3.3.5, SC.H.3.3.7]

CLASSROOM PROCEDURE:

1. Pass out Background
2. Review the Background information with students.
3. Assist students in understanding the topics to be debated.
4. Divide the class into 2 groups. Group 1 will support topic 1 and group 2 will support topic 2.
5. Set time limit on students and remind them when their last 5 minutes arrives.
6. Advise students to use the pre-selected websites to help the project move along more smoothly.
7. Help students organized who will search for what issue and how to bullet the key facts on the index cards.
8. Ask students to sit in their group and stand to make the statement and support it with evidence. Ask them to make a concluding statement to encourage the audience to be persuaded to support their position.
9. Grade Speech as you think best.

VOCABULARY:

CEV
ISS
Collaboration
Multinational

TEACHER-MADE OR ALTERNATIVE MATERIALS:

MATERIALS NEEDED:	**SUPPLEMENTARY MATERIALS:**	**EVALUATION:**
Copies of Background Review websites and bookmark them for easy access 3 index cards for each person Divide class into 2 groups Have them draw the debate topic our of a container Read the background Assist students in accessing websites	Computer with Internet Access 2004 to current News magazines Newspaper Articles that relate to topic	Students will debate and provide evidence to support their position

Background

President Bush proposed a new space policy in 2004 in which he directed that NASA undertake a new goal: return the astronauts to the Moon between 2015 and 2020. In order to accomplish this goal, NASA would terminate the shuttle program in 2010 and build a new Crew Exploration Vehicle (CEV). The CEV would transport astronauts to Earth orbit by 2014 and later to the moon. Another requirement that would have to be made is restructuring the International Space Station (ISS) to support only life sciences and research that helps achieve the exploration goal rather than the broader research base that included robotic probes. Originally the ISS was considered an exciting project that demonstrated what a multinational collaboration could achieve. Between 2010 when the shuttle program will terminate and the 2014 proposed date for the CEV is ready, U.S. astronauts would have to rely on Russia to travel to and from the space station.

DEBATE TOPIC

The U.S. should support continuing the Space Shuttle program until the CEV is ready

VS

The U.S should support terminating the Space Shuttle program in 2010 and rely on the Russians to transport U.S. astronauts.

In order to find evidence to support your position, you will need to consider the following list of **issues** surrounding the space program.

Cost

Impact on NASA Activities

Issues that may affect Collaboration

History of Program Changes

Status of ISS

Historical problems with the Sky Lab and MIR

As a part of the background, some websites are included that may assist you in gathering bulleted facts that provide evidence for your position.

http://history.nasa.gov/smith.htm
Space Station program

http://www.space.gs/iss/02-apr-2006-iss.html
Up to date Space Astronautics News

http://www.space.com/news/spacehistory/dangerous_reentries_000602.html
Dangerous Debris Falling From the Sky

http://history.nasa.gov/Bush%20SEP.htm
President Bush Announces New Vision for Space Program

http://www.whitehouse.gov/news/releases/2004/01/20040114-1.html
Fact Sheet

http://72.14.203.104/search?q=cache:C4zazt1NZLsJ:www.house.gov/science/hot/columbia/rs21411.pdf+NASA%27s+Space+Shuttle+Program&hl=en&gl=us&ct=clnk&cd=7
The National Aeronautics and Administration: Overview, FY2005 Budget in Brief, and Key Issues for Congress

http://history.nasa.gov/smith.htm
NASA's Space Station Program: Evolution and Current Status

http://www.spaceref.com/news/viewsr.html
NASA 2005 Key Issues for Congress

Your group will divide the up and gather evidence to address each issue to support your position. You will have 30 minutes to gather evidence and bullet the evidence on index cards. At the end of 30 minutes, you will sit with your group and any other group that supports your position. You will be given 10 minutes to state your position and support it with your team members. Organize how you will present. The other team with who is support the opposite side will also have 10 minutes to state their position and present evidence. Each team will need a concluding statement. At the end of the presentations, your instructor will judge which team gave the best presentation of the evidence and most likely to persuade the audience to support his agenda.

Interesting Note:

The MIR was an antiquated Russian Space Station that de-orbited safely 5 years ago. On the other hand, the U.S. Skylab de-orbited mostly into the Indian Ocean off the Australian Coast and multiple pieces were found in sparsely populated areas in the town of Esperance, Australia. The town authorities sent the U.S. a fine of $400 for littering.