TOPIC 1
Electromagnetic Spectrum

 

* Radio waves
	+ have the in the electromagnetic spectrum.
	+ These waves carry the you listen to on the radio.
	+ They also carry signals to and phones.
* Microwaves
	+ Have wavelengths than waves, which heat the food we eat.
	+ They are also used for , like the radar used in weather forecasts.
* Infrared waves
	+ with wavelengths and wavelengths.
	+ Infrared waves with long wavelengths can be .
	+ Heat Lamps give off these infrared waves.
	+ We call these infrared or infrared waves.
	+ The gives off infrared waves with wavelengths.
* Visible light waves
	+ are the only electromagnetic waves .
	+ We see these waves as the of the rainbow.
	+ Each color has a wavelength.
	+ Red has wavelength and violet has the wavelength.
	+ These waves combine to make .
* Ultraviolet waves
	+ have wavelengths than visible light waves.
	+ These waves are to the human eye, but some can see them.
	+ Of the sun's light, the ultraviolet waves are responsible for causing .
* X-Rays
	+ As wavelengths get , the waves have more .
	+ X-Rays have smaller wavelengths and therefore more energy than the waves.
	+ X-Rays are so that they pass easily allowing doctors to look at our .
* Cosmic Rays/Gamma Rays
	+ are high energy , originating in , that travel at nearly and strike the Earth from all .
	+ Aurora Borealis: are associated with the , a flow of ions flowing outward from the Sun.
	+ have the wavelength and energy of the waves in the electromagnetic spectrum.
	+ These waves are generated by atoms and in explosions.
	+ Gamma rays cells, but doctors can use gamma rays to kill cells.

TOPIC 2

SCIENCE AND THE SCIENTIFIC METHOD

* What is Science?
	+ The goal of science is to investigate and understand the natural world, to explain events in the natural world, and to use those explanations to make useful predictions.
	+ Science: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Science deals only with the natural world.
		- Scientists: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Scientists propose \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that can be \_\_\_\_\_\_\_\_\_\_\_\_\_\_ by examining evidence.
		- Science is an organized way of using evidence to learn about the natural world.
	+ How is science done?
		- Science begins with an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
			* This is the process of about events or processes in a careful, orderly way.
		- \_\_\_\_\_\_\_\_\_\_\_ is the information gathered from .
			* There are two types of data:
				+ Quantitative data are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
				+ Qualitative data are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
		- Hypothesis
			* A hypothesis is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
			* A hypothesis must be stated in a way that makes it “ ”. The hypothesis is just a to a question, and it must be thoroughly .
* Scientific Methods
	+ The scientific method is: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_
		- * B. The Steps to the Scientific Method
			* Step 1: / Asking a Question
				+ A problem or a question must .

Examples:

How much water can a root hair absorb?

Why does a plant stem bend toward the light?

What effect does temperature have on heart rate?

* + - * Step 2: Form a
				+ Hypothesis: A possible \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ explanation to the or problem.
				+ It is simply a and has not yet been \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
				+ It must be stated in a way that is . A statement is considered “testable” if can be that either does or does not support it.
			* Step 3: Designing a Controlled Experiment
				+ The factors in an experiment that can be changed are called \_\_\_\_\_\_\_\_\_\_\_\_. Some example of variables would be: temperature, of light present, , of solutions used.
				+ A controlled experiment works with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. If several variables were at the same time; the scientist would know which variable was for the observed results.
				+ In a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ only one variable is at a time. All other variables should be or “controlled”.
				+ An experiment is based on the comparison between a \_\_\_\_\_\_\_\_\_\_\_\_ with an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

These two groups except for one factor.

The group serves as the . It is the same as the group, except that the one that is being tested is .

The experimental group shows the that is being tested.

* + - * + There are two variables in an experiment:

The independent variable is the variable that is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The dependent variable is the one

The dependent variable is the during the experiment. This data is collected as a the independent variable.

* + - * Step 4: Recording and Analyzing Results
				+ The data that has been collected must be and to determine whether the data are .
			* Step 5: Drawing Conclusions
				+ The evidence from the experiment is used to determine if the hypothesis is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_.
				+ Experiments must be over and . When repeated, the results the same before a valid can be reached.
* Forming a Theory
	+ A theory may be formed has been tested and is supported by .
	+ Theory: A broad and comprehensive of what is to be true.
		- It is by considerable .

TOPIC 3

WAVES AND WAVE PROPERTIES

* Why are we able to see?
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* And…what is light?
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* So…what is a wave?
	+ A wave is a disturbance that carries from to .
	+ A wave \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ carry matter with it! It just \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the matter as it goes through it.
		- Some waves do not need \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (called a “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_”) to be able to (for example, through space).
			* These are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (or EM waves).
		- Some waves \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ have a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in order to move. These are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ waves.
* Wave Types
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ waves: Waves in which the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ moves at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ angles to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the wave
		- Parts of transverse waves:
			* Crest: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of the wave
			* Trough: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of the wave



* + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) waves: Waves in which the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_back and forth in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_direction as the wave
		- Parts of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ waves:
			* Compression: where the are together.
			* Rarefaction: where the are
* Wave Properties
	+ Wave \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ depend on what (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) is making the waves.
		- Wavelength: The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_between \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_on a wave and the exact \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_wave.
		- Frequency: How many \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ go past a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in one \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; unit of measurement is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
			* The higher the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_in the wave.
				+ 10 waves going past in 1 second = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
				+ 1,000 waves go past in 1 second = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
				+ 1 million waves going past = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Amplitude: How far \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_moves from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ position (where it is when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ moving).
			* Remember that for transverse waves, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ point is the crest, and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ point is the trough.
			* Remember that for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_waves, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ where the medium is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ together are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_where the medium is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ apart are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
		- The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ together and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ apart the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_the amplitude.
	+ The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a wave is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of its amplitude.
		- Mathematically speaking
			* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* Where:
				+ E = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (the capacity to do work)
				+ C = a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (depends on the medium)
				+ A = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* For example:
				+ If \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is equal to 3 units (and we assume C = 1 for this case)
			* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* Note that when the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is one
	+ Wave speed: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in which the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is traveling. It varies in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and gases.
		- A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ way to calculate speed:
			* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ x \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
				+ *OR*
			* v = f x ג
* Changing Wave Direction
	+ Reflection: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
		- If the surface is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at which the wave hits \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_as the angle at which it \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (angle in = angle out).
		- This is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ Refraction: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
		- This happens when a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_a new \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ CHANGES.
		- The amount of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ depends on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ it is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ Diffraction: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
		- The amount of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ depends on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of the obstacle and the size of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
			* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_obstacle, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_wavelength = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_diffraction
			* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_obstacle, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ wavelength =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_diffraction