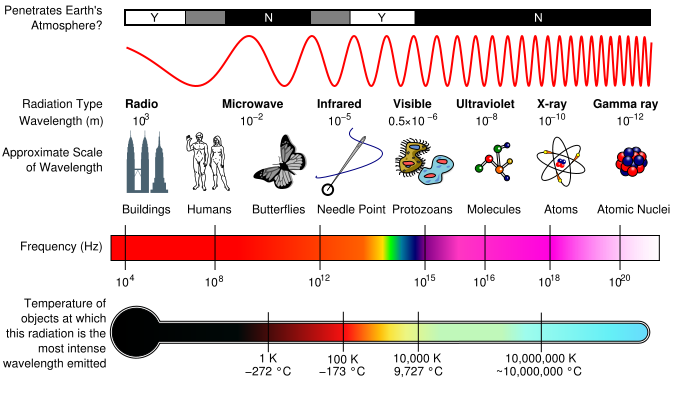
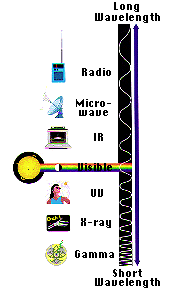
TOPIC 1  
Electromagnetic Spectrum

* 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

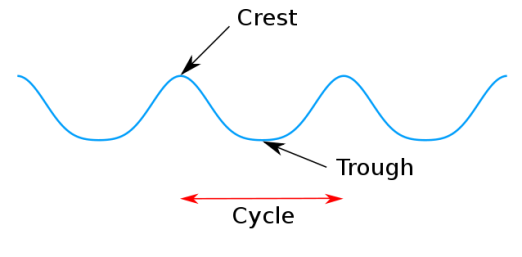
The dependent variable is the during the experiment. This data is collected as a the independent variable.

* + - * 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