

# Module 1: The Basics

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## OUTLINE FOR MODULE 1:

### I. Introduction:

The study of Physical Science encompasses many topics in science: atomic structure, air, radioactivity, the universe, the earth's structure, distant galaxies.

Physical Science is the springboard for science study. It is the pre-cursor for other aspects of science.

### II. Atoms and Molecules:

Facts about Atoms:

- They are the smallest chemical unit of matter.
- They can not be seen.
- There are about 116 basic kinds of atoms
- They link together to form molecules
- They are the building blocks in Creation.
- Elements are substances made up of only one type of atom, however, there are many atoms in the substance.
  - Copper, aluminum, oxygen, hydrogen, etc.

- ▶ Do Experiment 1.1
- ▶ Look at figure 1.1

Facts about molecules:

- Two or more atoms linked together to make a new substance with unique properties
  - A water molecule is 2 hydrogen atoms and 1 oxygen atom
- Molecules, like atoms, are building blocks of the substances we see in Creation ... only bigger.
- Compounds are made of many molecules.
  - Salt, water, sugar, etc.
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The difference between Atoms and Molecules is simple. Atoms are 1 unique substance, while molecules are made up of more than one atom to make a new and different substance.

A mixture is made up of both atoms and molecules.

### III. Measurement and Units

In science it is important to always use the right measurement when relating the information or data which you are studying or collecting. It is very easy to make a mistake when not presenting the facts correctly.

▶ Tips:

- Always use correct units with the numbers you are relating.
- The Metric System is the standard system of measurement in science.
- If you don't give proper measurements/units there will be consequences to your conclusions.

### IV. The Metric System

Because things tend to change over time, ( consider the law of entropy- all things tend to become disorganized over time), we need to learn how to measure accurately. When we study creation, we will often measure the matter in the object to determine more about what we are studying. We are measuring the object's mass when we do this.

- ▶ Mass and weight are not the same thing.
  - Mass measures the amount of matter that is present in an object and is not changed by location of an object in relation to gravitational pull.
  - Weight determines the amount of gravity pulling on an object and can change its measurement in relation to location of an object when measured.
- ▶ Two common measuring systems we use are Metric and English:
  - Mass( the amount of matter in an object) is measured in grams or Slug ( E)
  - Weight can be measured in pounds ( E) or Newtons ( M)
  - Distance ( how big something is) is measured in meters ( M) or feet ( E)
  - Volume ( how much space an object occupies) is measured in liters ( M) or gallons (E)
  - Time is measured in seconds in both systems.

- ▶ Look at Table 1.1
- ▶ Remember that when measuring use the correct units
- ▶ The units above are "base units". There are alternative units for measuring with each base unit.

## V. Manipulating Units

We use alternative units when we need to measure small or large things which don't fit into the 'base unit' descriptions. These units are called 'prefix' units.

- Prefix units always have the same relationship to the base unit.
- In the metric system prefix units always mean the same thing.
  - ie: centi always means '100'
- When a prefix is added to a base unit it then becomes an alternative measurement for the unit.

- ▶ Look at Table 1.2
- ▶ Memorize the Bold terms in the table and their meanings.
  - Milli, centi, and kilo
- ▶ Become familiar with the other terms.
- ▶ The Metric System is easier to use and more logical than the English System.

## VI. Converting Between Units

It is necessary to learn how to convert unit measurements when studying and recording data. Basically it is the same concept as cross-multiplication.

In this course it is referred to as the factor-label method.

**Study the examples on pages 12 and 13 carefully to understand the process of the factor label method clearly.**

We will use the Factor Label Method with all our unit conversions. Here are the steps to follow:

1. Determine the equivalence of the units which are being measured.
  - a. ie: 1 in = 2.54 cm, 1 gal=3.78 L
  - b. kilo = 1000, centi = 100 , deci =10
2. Write a fraction using the measurement on top( numerator) and 1 on the bottom ( denominator)
3. Cross Multiply the equivalent fraction ( from relationship listed above. Inches to centimeters, etc). This cancels out the unit we want to get rid of.
4. Label correctly.

Look at Table 1.3 for the relationship measurements between Metric and English.

## VII. *Converting between Systems*

The Factor Label method is used to convert from metric to English, etc.

To understand this better perform Experiment 1.2 on your own at home and record the results.

- ❖ Side note: Make sure you read the paragraph on temperature well to understand why we use the Celsius scale when measuring temperature versus the Fahrenheit in our scientific calculations. Celsius calculations are measured in a base 10 scale which are easier to compute and remember than Fahrenheit.

## VIII. *Concentration*

Along with the quantity measurements above, we need to also consider the term *Concentration* in our data recovery.

Concentration is the amount of a substance in a certain volume.

Basically, this means the amount of a specific unit w/in a specific volume of material. The concentration of a substance affects how it behaves. Consider the results from the last experiment when you think about concentration.

Complete the On Your Own Questions and the Study Guide and then take the test for Module 1. Don't forget to write all your labs in your lab notebook! 😊