

# *Earth Science*

With

Mr. Thomas






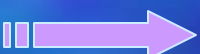
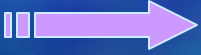
# Units....What are they good for?

- Organization
- Our key to Instrumentation
- Keys to Mathematics Problems & Graphs

# The Units of Earth Science:

- Length: **meters (m)** **Ruler**
- Mass: **Grams (g)** **Triple Beam**
- Time: **Seconds (s)** **Stop Watch**
- Volume: **Liters (L)** **Beaker**

# Unit Conversions

- Kilo\_\_\_\_\_  1,000 of \_\_\_\_\_
  - Ex) Kilometer
- Deca\_\_\_\_\_  10 of \_\_\_\_\_
  - Ex) Decameter
- Deci\_\_\_\_\_  1/10 of \_\_\_\_\_
  - Ex) Decimeter
- Centi\_\_\_\_\_  1/100 of \_\_\_\_\_
  - Ex) Centimeter
- Milli\_\_\_\_\_  1/1,000 of \_\_\_\_\_
  - Ex) Millimeter

# Sample Problems:

- Convert 10 cm into Meters.
- How many kilograms is 1,500 grams?
- How many milliliters is 0.225 Liters?
- How many seconds are in 6 hours?

# Measurement:

- ★ All measurements are to be made to the 10<sup>th</sup>'s place unless you are otherwise directed!  
(only *one* decimal place!)

Examples:

10.84572 g      becomes      10.8 g

2.09 mL      becomes      2.1 mL

# Measurement Error

- Whenever we do experiments errors can and do occur:
  - Human error
  - Instrumentation error
  - Procedure error
- This is identified using “Error Analysis”
- Error is measurable:

**“Percent Deviation”**

# Percent Deviation:

$$\% \text{ Deviation} = \frac{\text{Right} - \text{Wrong}}{\text{Right}} \times 100$$

Given as a percentage (%)!!



# Mass vs. Matter

**Matter:** Anything that has mass & volume. “*Stuff*”

**Mass:** A quantity of matter.  
“How much *stuff*”

**Volume:** The amount of room the *stuff* takes up.

# Density

**Defn: Density is the amount of matter (*stuff*) in a given area.**

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

# Scientific Method

- There are 5 Basic steps:
  - 1) Problem is Identified
    - Make observations.
  - 2) Form a Hypothesis
    - What do you think is going to happen or is happening?
  - 3) Test your Hypothesis & Record Results
  - 4) Based upon outcome of Results, form a Theory.
    - Why do you think the results happened?
  - 5) Test your theories to form Laws.
    - We now know this to be true.

Let's try an example:

# The Dolphin

- First, we need to make observations:
  - Glass container with blue liquid
  - Blue liquid remains still
  - Liquid is in the bottom only
  - Top portion is empty
  - See-through except for middle section
  - Dolphin figure in middle
  - Glass pipe connects top to bottom

- Now we need to come up with a hypothesis:
  - Liquid will move up to upper portion.
  - Or
  - Nothing will happen

- Now we will test our hypothesis and record the results:
  - The liquid rose to the upper section and out of the dolphin's nose.

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- Now, based upon what happened, we need to form a theory for why our results occurred:

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That's it