

A large yellow pencil with a red eraser and a red band, tilted diagonally across the top left of the slide. A red squiggly line extends from the eraser end.

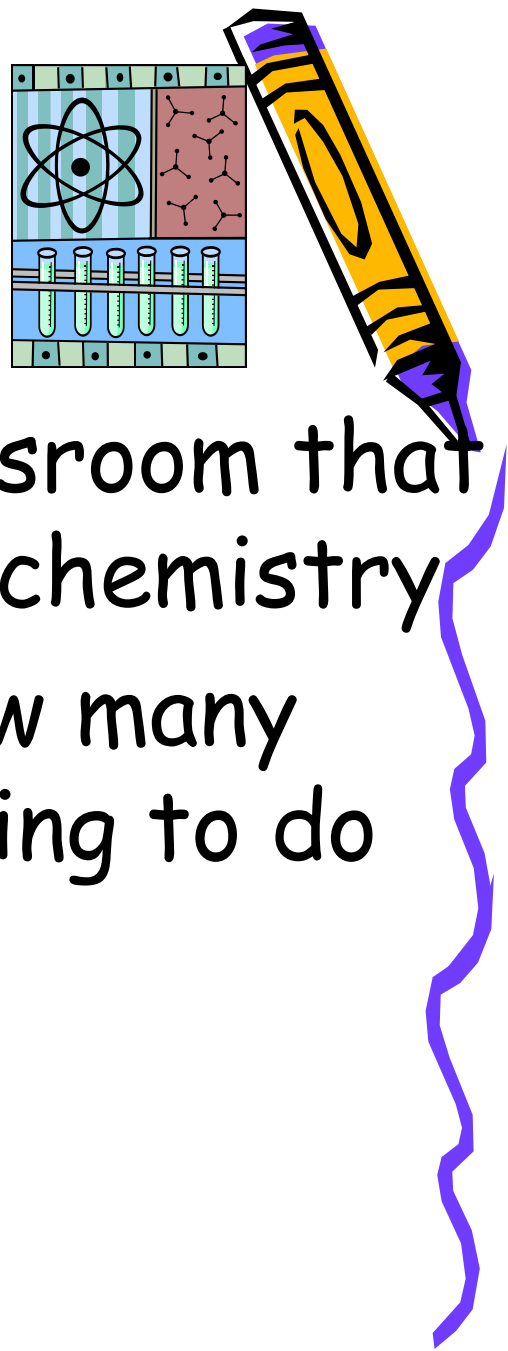
Welcome to
Physical Science 1



Miss Licata
Room 215

A thick purple squiggly line that starts from the bottom of the text and extends towards the right.A small yellow pencil with a purple eraser and a purple band, positioned at the end of the purple squiggly line.

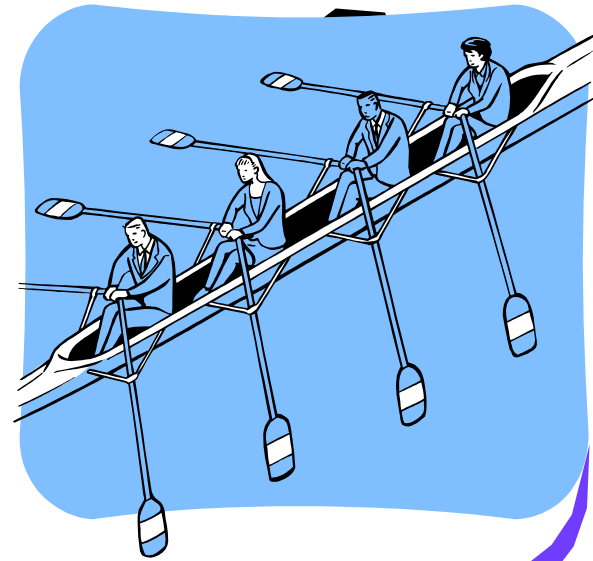
What Does Chemistry Have To Do With YOUR Life?



- Consider objects in the classroom that are related to the study of chemistry
- Consider daily activities, how many daily activities have something to do with chemistry?



Welcome to our **CHEMISTRY TEAM**

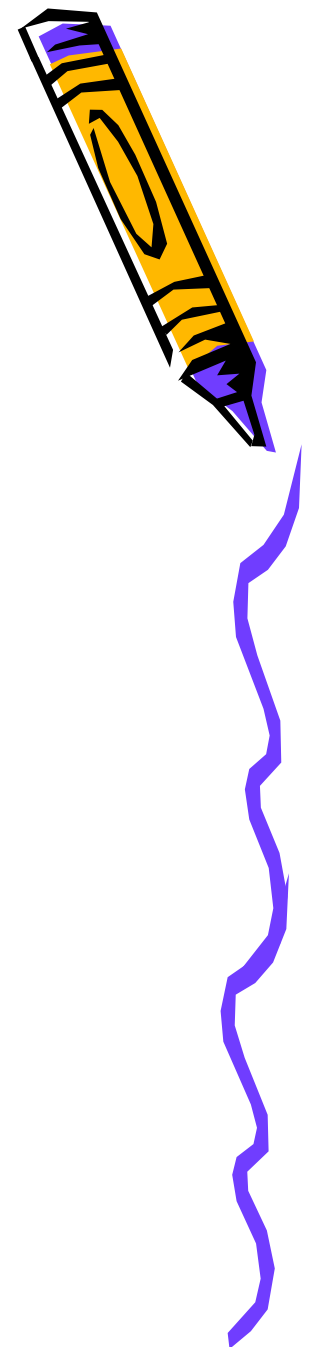
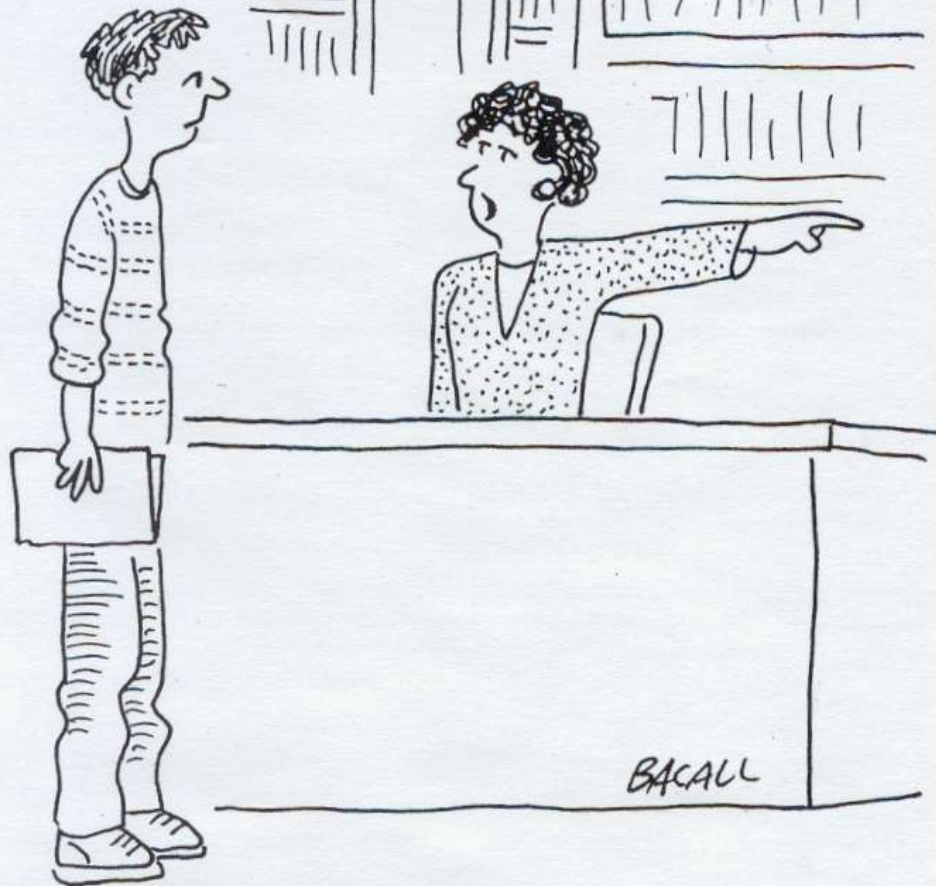


- How is a “team” different from a “group” ?
- Coordinated effort
 - Linked by a common purpose
 - supportive, trusting, helpful, work together...
- We'll have different smaller teams during the year

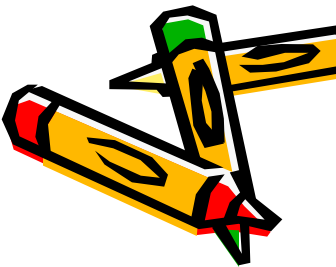


Beaker Partners!!



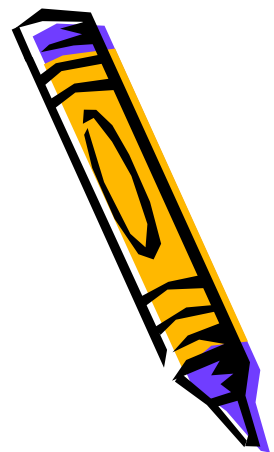


How To Do Well in Chemistry Without Studying is over there in the fiction section.





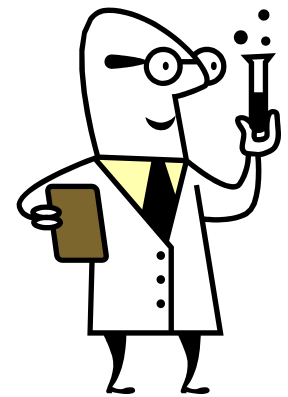
Classroom Expectations



- Be in your seat when the bell rings
 - Non-chem items away
 - Text, notebook, pencil/pen, calculator out
- Take care of lav needs BEFORE class
- Have your HW open & ready to be checked while you work on today's beaker breaker



- Missed work carries a "zero" until made-up
- You have 3 days to make-up a missed test
- If your absent the day before the test (review) you will be expected to take the test on test day
- No credit for late homework
- All homework missed due to excused absence must be shown to me BEFORE the chapter test to get credit
- Sharpen pencils before class begins
- Remain in your seat until the bell rings
- RESPECT EACH OF US !





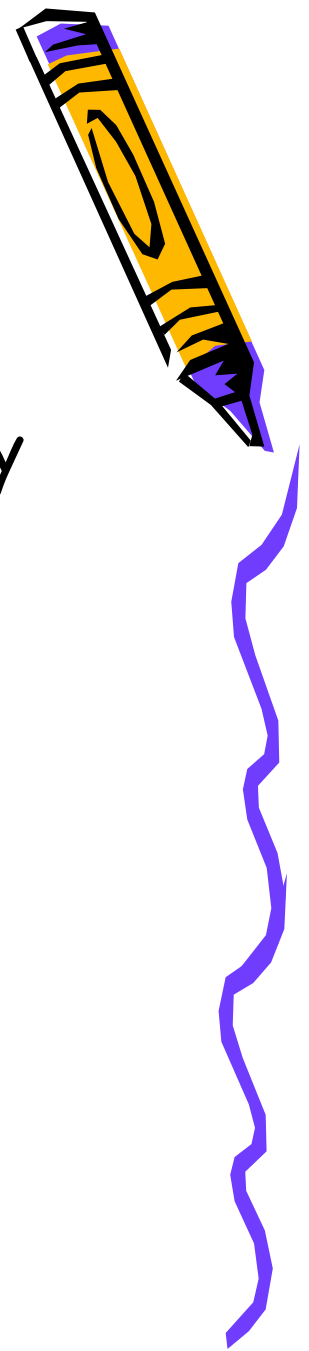
Physical Science I

- Chapter 1: Science Skills





Beaker Breaker!!

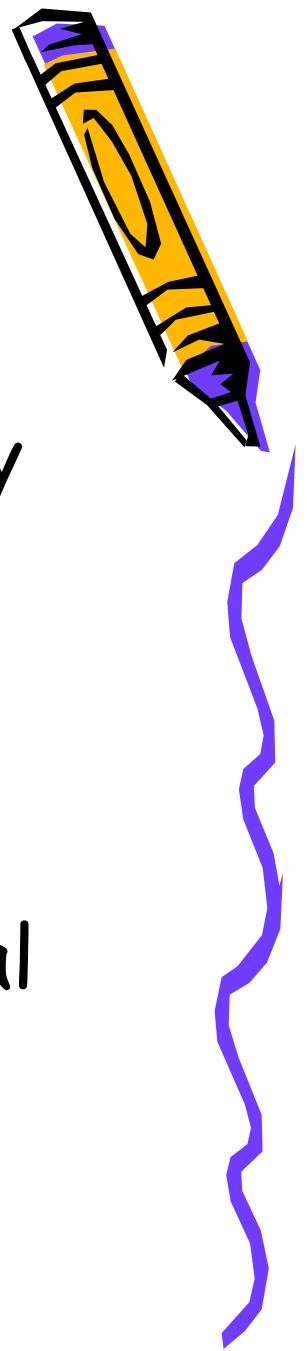


- True or False: Science and Technology are not related
- Which of the following are areas of science?
 - a. biology and chemistry
 - b. astronomy and geology
 - c. zoology and botany
 - d. All of the above



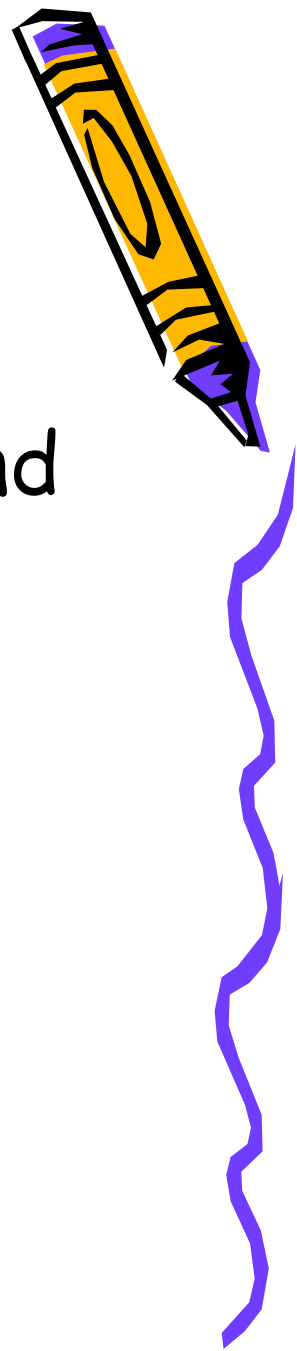
Objectives

- Explain how science and technology are related
- List the major branches of natural science and describe how they overlap
- Describe the main ideas of physical science



1.1: What is science?

- **Science:** a system of knowledge and the methods you use to find that knowledge.
- Science begins with curiosity and often ends with discovery.



What is technology?



- **Technology:** the use of knowledge to solve practical problems
- Science and technology are interdependent. Advances in one lead to advances in the other.
- Example -Figure 2 page 3



Science Improves Our Quality of Life

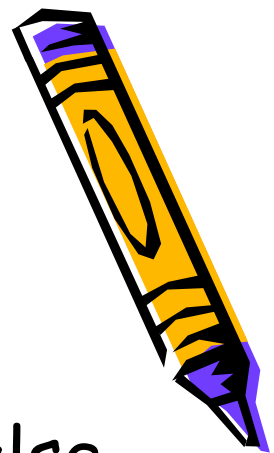
(Beaker Partners Activity)



- Advances in science have led to devices that make our lives easier and more pleasant. For example a microwave
 - Name five household devices that make your life easier or more pleasant
 - Go through the list and describe how each device's function was accomplished before its invention



Beaker Breaker



- Is the following statement True or False
(If false correct it)

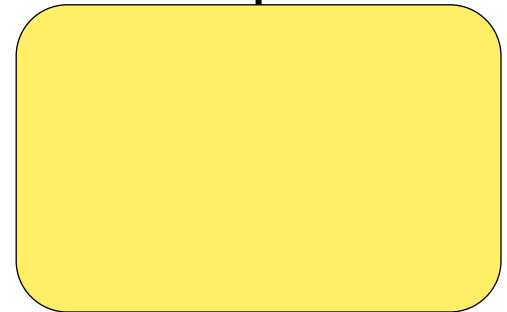
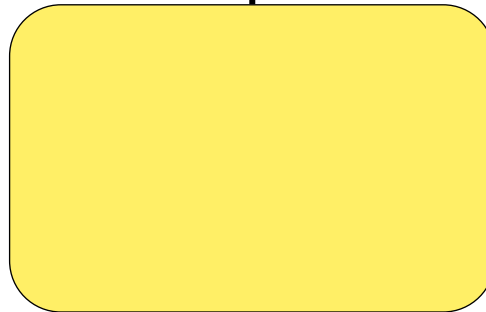
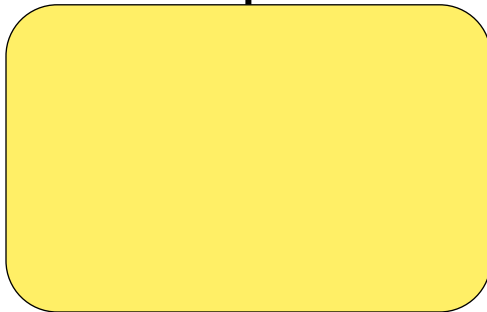
Science begins with discovery and often ends with curiosity.

2. _____ is the use of knowledge to solve practical problems



Fill in the blanks

Natural Science



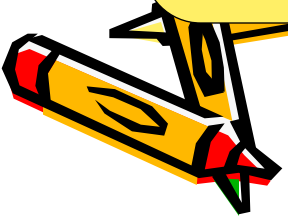
Branches of science:

Natural Science

Physical Science

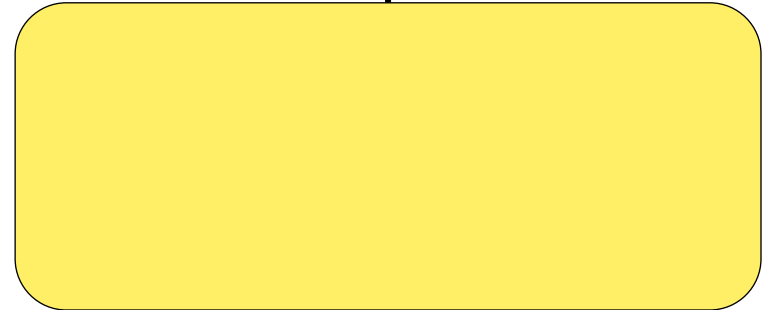
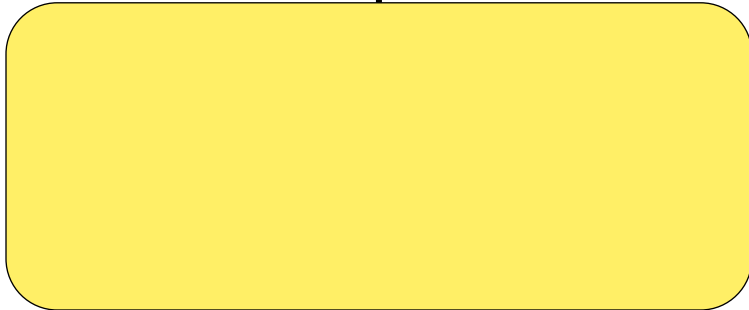
Earth and Space
Science

Life Science



Fill In the Blanks

Physical Science





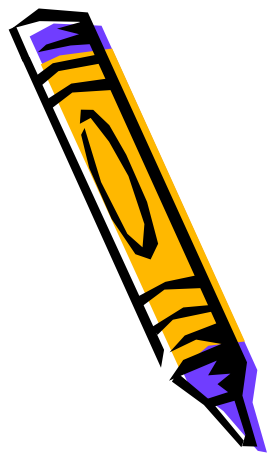
Physical Science



Physics



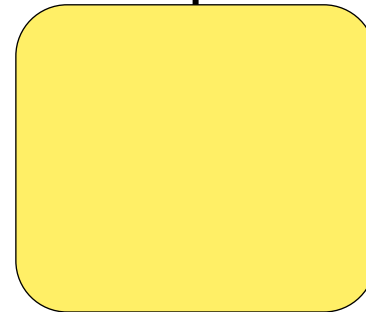
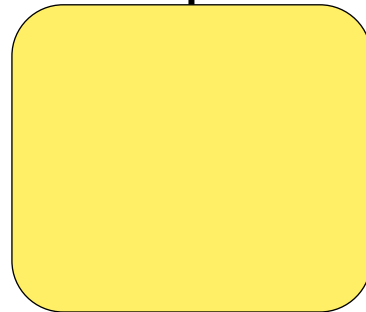
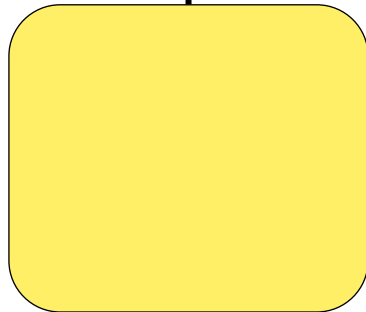
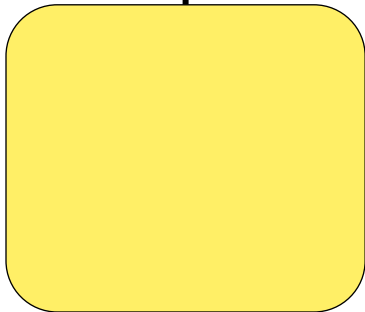
Chemistry



Fill in the Blanks



Earth and Space
Science



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graph TD; A[Earth and Space Science] --- B[Geology]; A --- C[Meteorology]; A --- D[Astronomy]; A --- E[Oceanography];
```

Earth and Space
Science

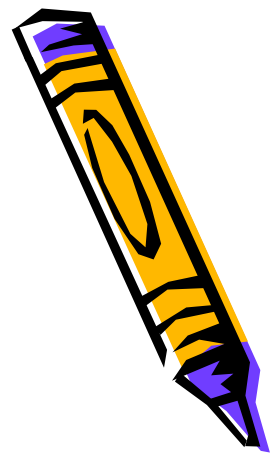
Geology

Meteorology

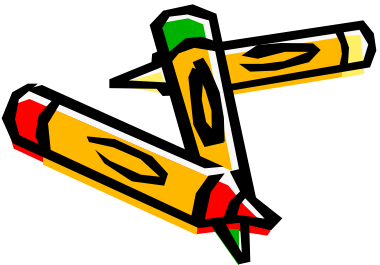
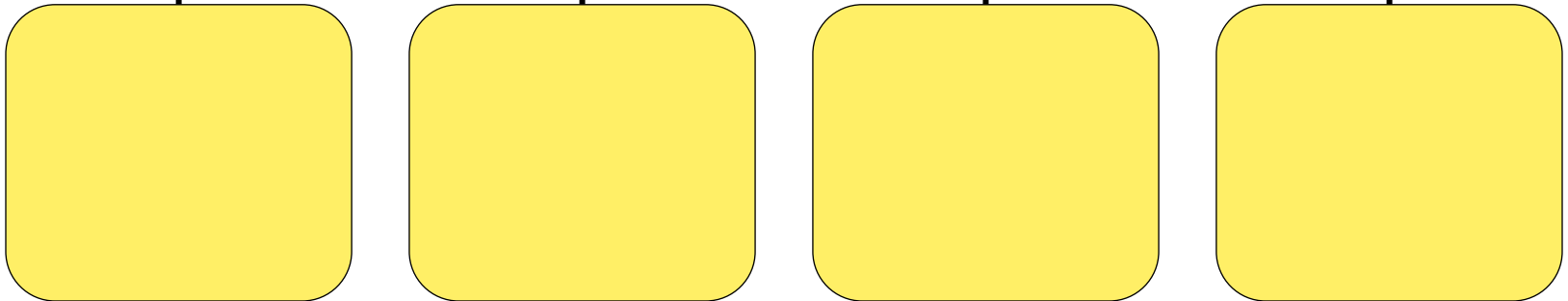
Astronomy

Oceanography

Fill in the Blanks



Life Science



Life Science

botany

ecology

zoology

genetics



The big ideas of Physical Science

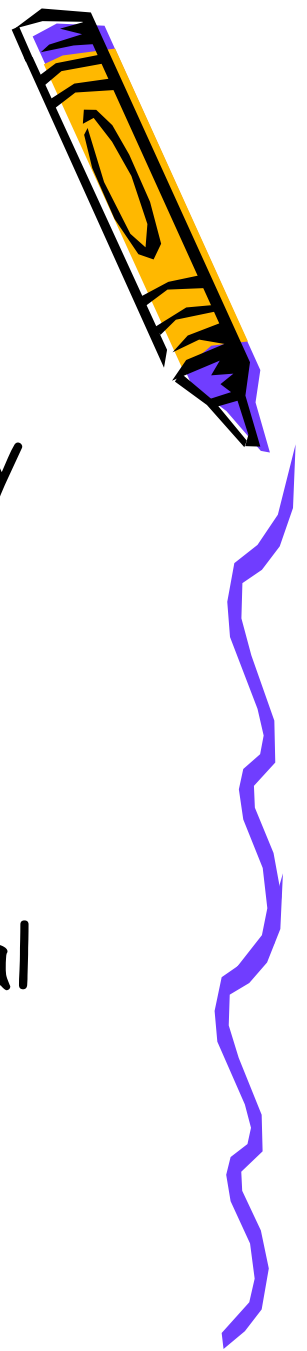


- Space and time
 - Ex: the universe
- Matter and change
 - Matter -anything that has mass and takes up space
 - Matter is made up of building blocks called **ATOMS**
 - Atoms-made of smaller building blocks called **protons, neutrons and electrons**
- Forces and motion
 - Forces cause change in motion
- Energy
 - Different forms of energy
 - Matter changes from one form to another, energy is either absorbed or released.



Objectives

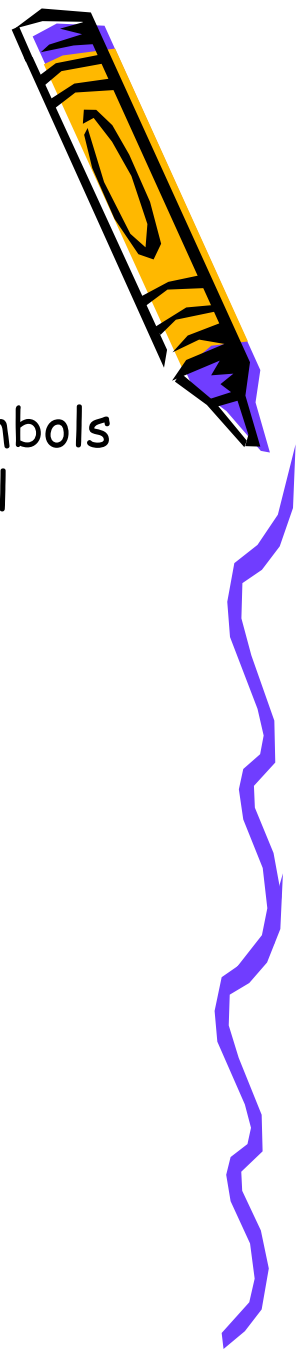
- Explain how science and technology are related
- List the major branches of natural science and describe how they overlap
- Describe the main ideas of physical science



Noble Gas Elements

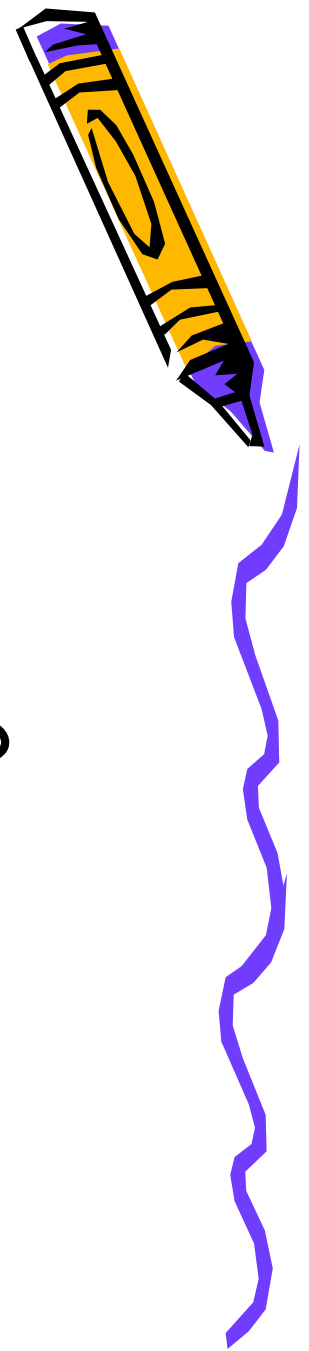
Activity Make Flashcards of the elements with their symbols
One side the Name of element, other side the symbol
Beaker Partner Activity

- Helium - He
- Neon - Ne
- Argon - Ar
- Krypton - Kr
- Xenon - Xe
- Radon - Rn





Beaker Breaker!!



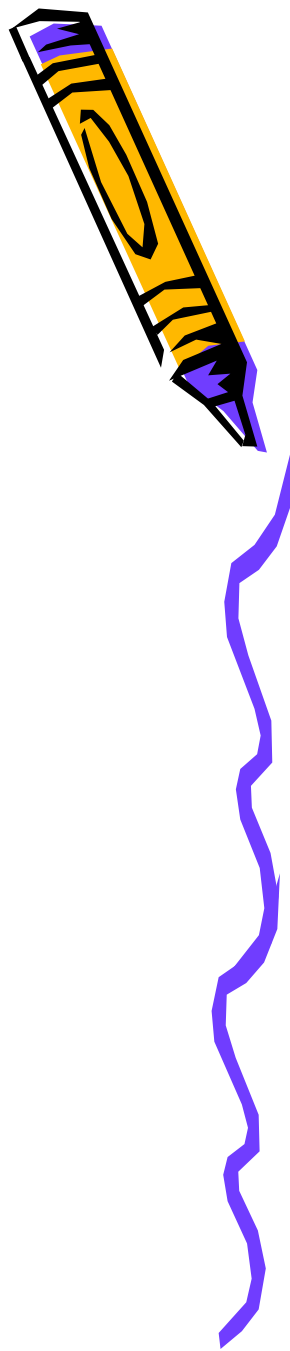
- True or False: Science and Technology are related
- True or False: Chemistry and Biology make up physical science?
- What is the symbol for Xenon?
- What does the symbol Kr represent?



New Symbols!!

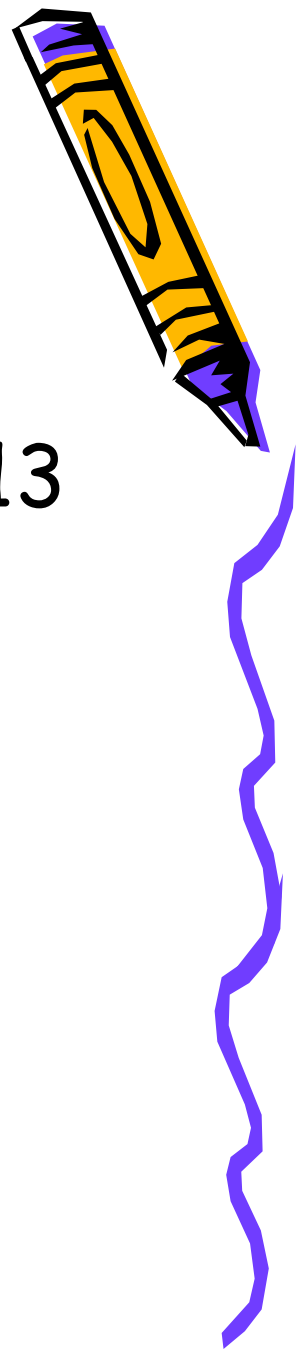
(name them and make flash cards)

- P
- F
- CI
- N
- O
- S
- B

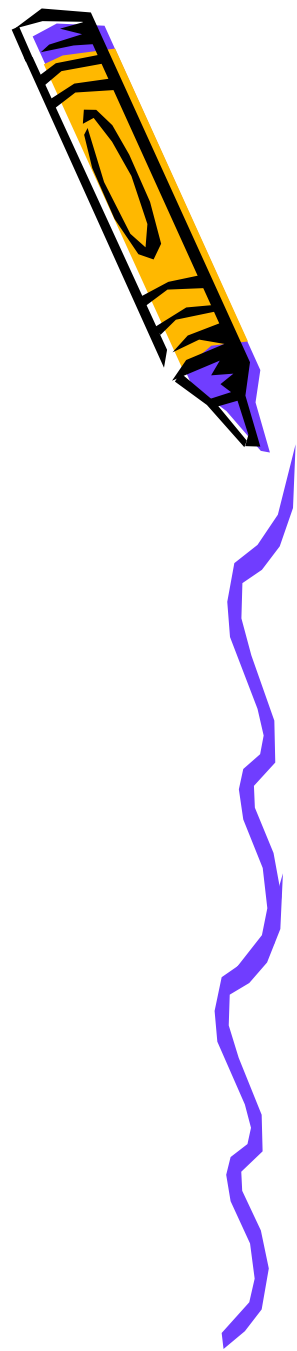


Beaker Breaker

- You have 3 minutes to review the 13 elements that are on the quiz



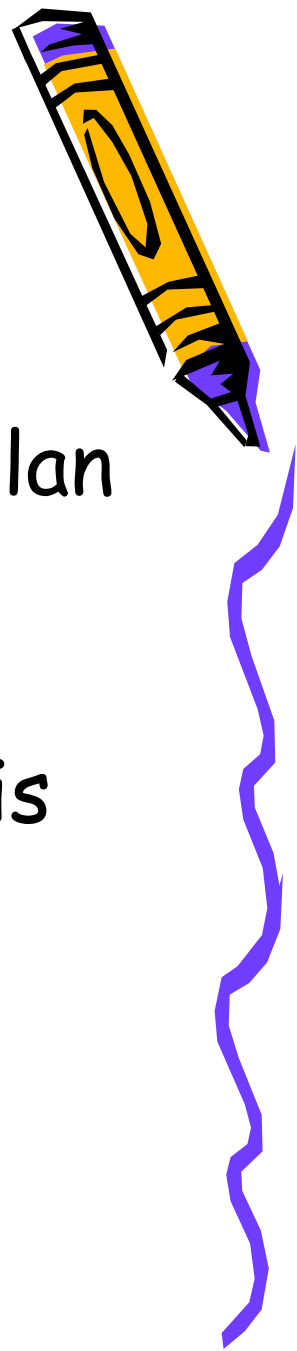
Elements Quiz



- What does the symbol "Ne" represent?
- What does the symbol "S" represent?
- What does the symbol "Kr" represent?
- What does the symbol "Xe" represent?
- What does the symbol "P" represent?
- What is the symbol for Radon?
- What is the symbol for Argon?
- What is the symbol for Chlorine?
- What is the symbol for Oxygen?
- What is the symbol for Nitrogen?



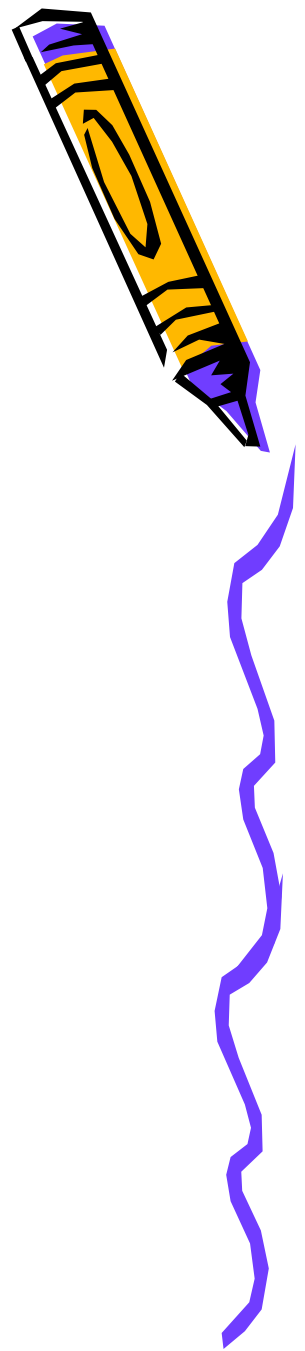
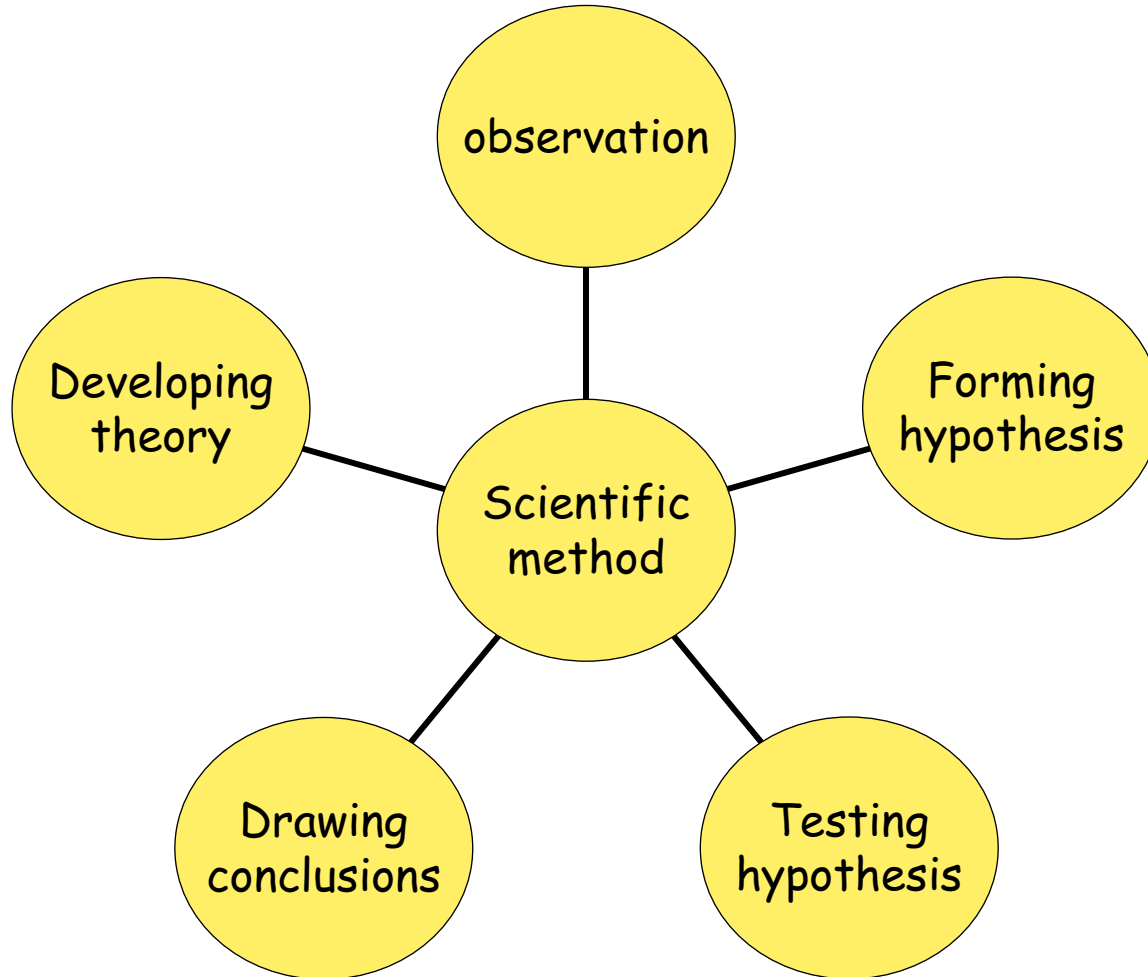
1.2: Using a scientific approach



- **Scientific method:** an organized plan for gathering, organizing, and communicating information
- The goal of any scientific method is to solve a problem or to better understand an observed event.



A basic scientific method:



Scientific Method



- See figure 7 on page 8
- Make an observation.
 - Observation is information that you obtain through your senses.
- 2. Forming a Hypothesis
 - A hypothesis is a proposed answer to a question
- 3. Testing a Hypothesis
- 4. Draw Conclusions
- 5. Developing a Theory



Scientific Laws:

- A statement that summarizes a pattern found in nature
- A scientific law describes an observed pattern in nature without attempting to explain it. The explanation of such a pattern is provided by a scientific theory.



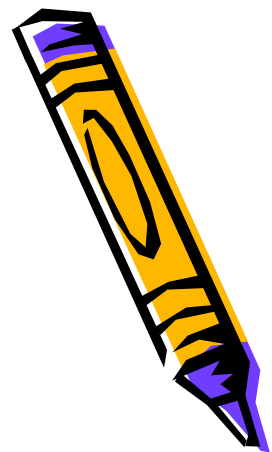
Scientific models:

- a representation of an object or an event
- Scientific models make it easier to understand things that might be too difficult to observe directly.





Beaker Breaker!!



Based on the 5 steps of the scientific method:

- What is a proposed solution to problem called?
- What is the information that you obtain through your senses called?
- What is a well-tested explanation for a set of observations called?



Standards of Measurement

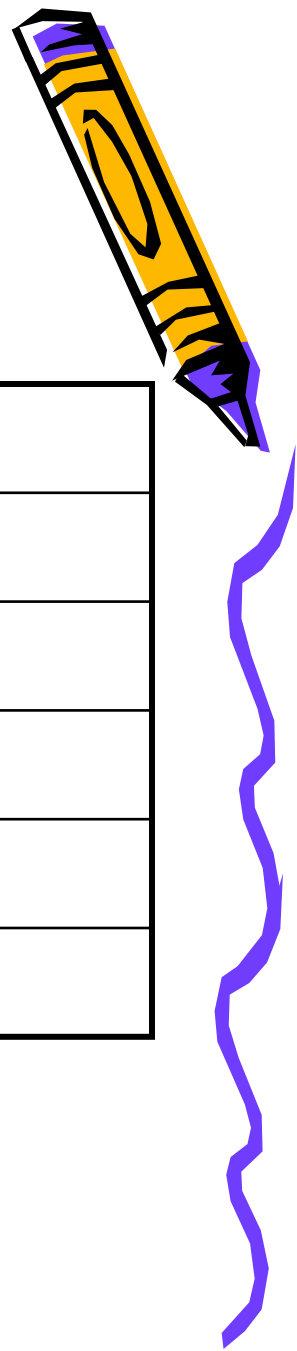
Section 1-3



- A standard is an exact quantity that people agree to use for comparison or measurement.
- The first such system of measurement called the Metric System was devised by a group of scientists in the late 1700's.
- In 1960 an improved version of the Metric System was devised and is now called the International System of Units. (SI)



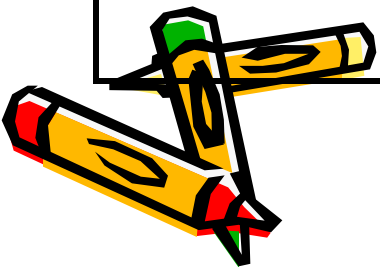
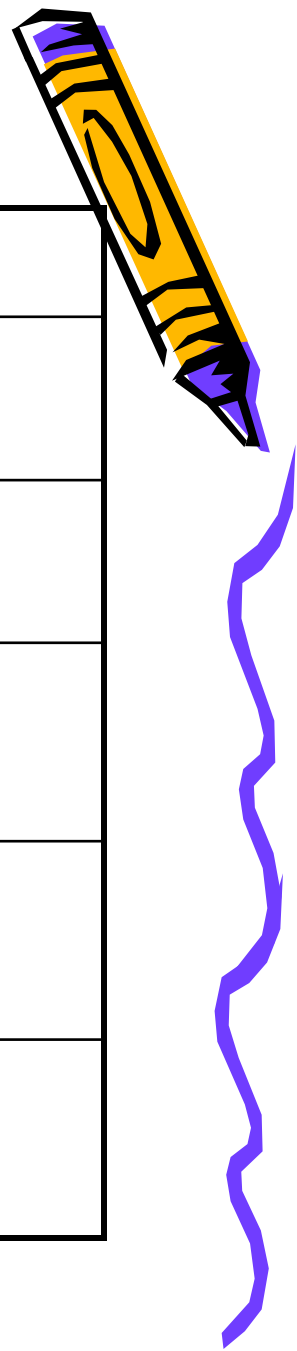
SI units of Measurements:



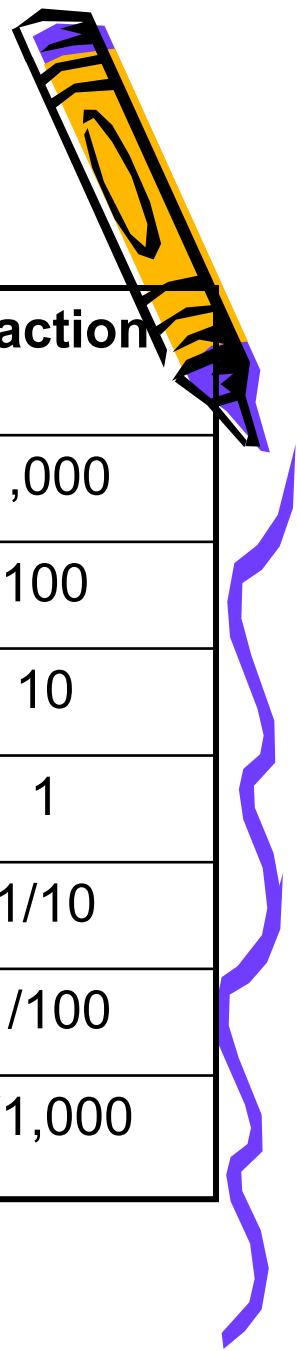
Quantity	Unit	Symbol
Length	meter	m
Mass	Kilogram	kg
Temperature	Kelvin	k
Time	Second	s
Amt of substance	Mole	mol



Quantity	Unit	Symbol
Area	Square meter	m^2
Volume	Cubic meter	m^3
Density	Kilograms per cubic meter	Kg/m^3
Pressure	Pascal ($kg/m \cdot s^2$)	Pa
energy	Joule ($kg \cdot m^2/s^2$)	J



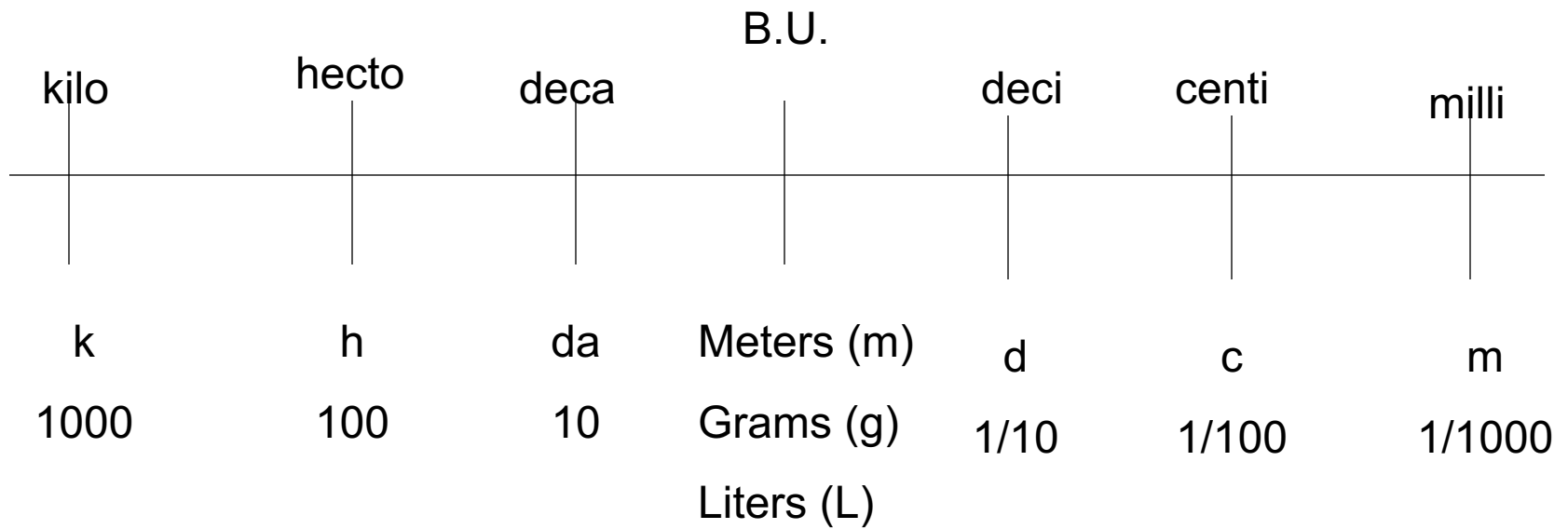
Commonly Used Prefixes



Prefix	Symbol	Meaning	Numeric Form	Fraction
Kilo -	k	Thousand	1,000	1,000
Hecto -	h	Hundred	100	100
Deca -	da	Ten	10	10
(base unit)	m, L, g	One	1	1
Deci -	d	Tenth	0.1	1/10
Centi -	c	Hundredth	0.01	1/100
Milli -	m	Thousandth	0.001	1/1,000



Metric conversion line:



Try these: 1. Convert 34.2 mL to L

2. Convert 15.6 kg to mg

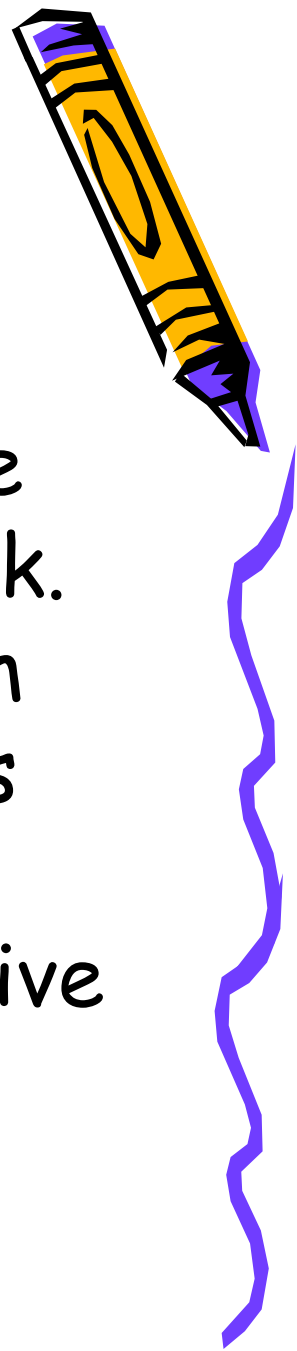


Measuring Length

When measuring length, we will be using a metric ruler or meterstick.

The numbered divisions are 1 cm divisions. The smallest divisions marked are 1 mm divisions.

Estimating to the next digit will give $1/10^{\text{th}}$ of a millimeter.



Measuring Mass

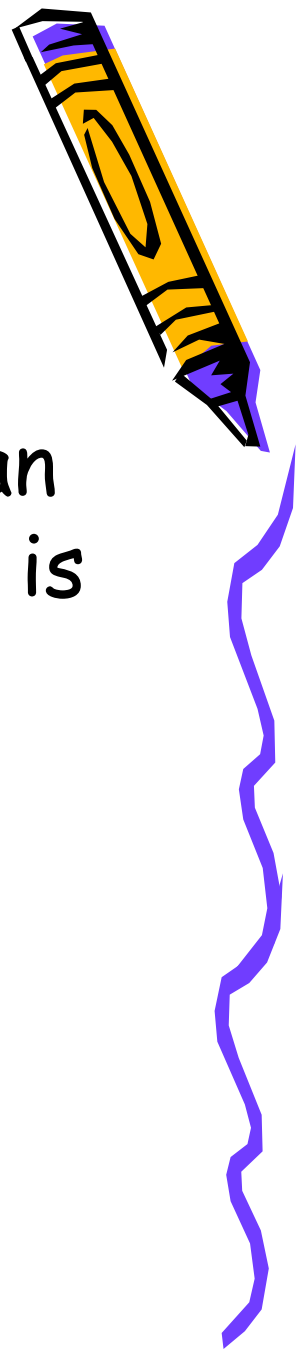


When using an electronic balance, write down all numbers printed on the screen. When using a triple beam balance, the mass can be measured accurately to 0.01 grams.



Measuring Volume

The amount of space occupied by an object is called its volume. There is no specific way to measure the object's volume.



Measuring the Volume of a Solid

When measuring the volume of a solid object, multiply its length x width x height. Typically the volume of a solid is measured in either cubic centimeters (cm^3) or cubic meters (m^3).



Measuring the Volume of a Liquid

When measuring a liquid volume, one must choose the appropriate device based upon the amount of liquid to be measured. For smaller amounts of liquid, a graduated cylinder is used.

For larger amounts of liquids, a beaker would be used. The most

common units used for these types of volumes are liters (L) and milliliters (mL).



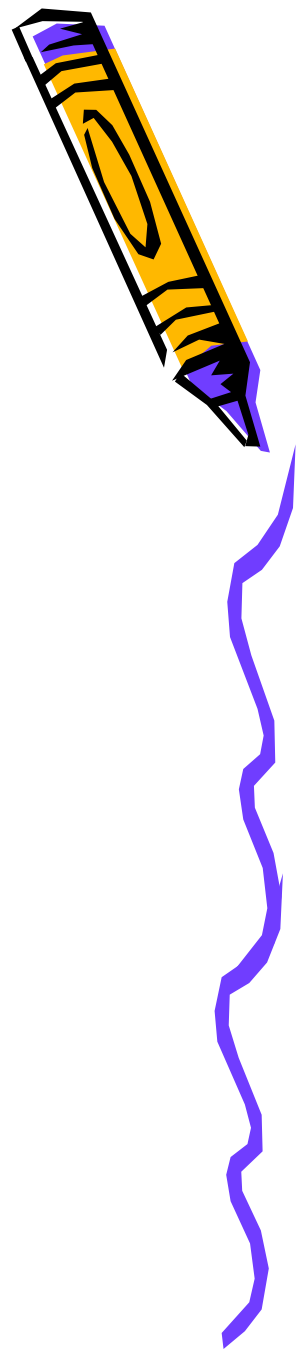
Measuring Time

Many times, we will be using a digital stopwatch which are accurate to $1/100$ th of a second. If a stopwatch with a second hand is being used, it will measure to nearest second. In this case, an estimated measurement to the nearest $1/2$ second is possible.



Derived Units

- Derived units are made from mathematical combinations of SI base units
- Ex: area, volume, density



Density

Density is an important characteristic property of matter. When one speaks of lead as being "heavy" or aluminum as "light," one is actually referring to the density of these metals.

Density is defined as mass per unit volume.

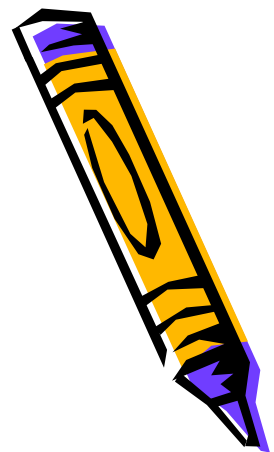


Calculating Density

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

$$D = \frac{m}{V}$$

An object with a mass of 10 grams and a volume of 5 cm³ has a density of 2 g/cm³.



Limits of measurement:

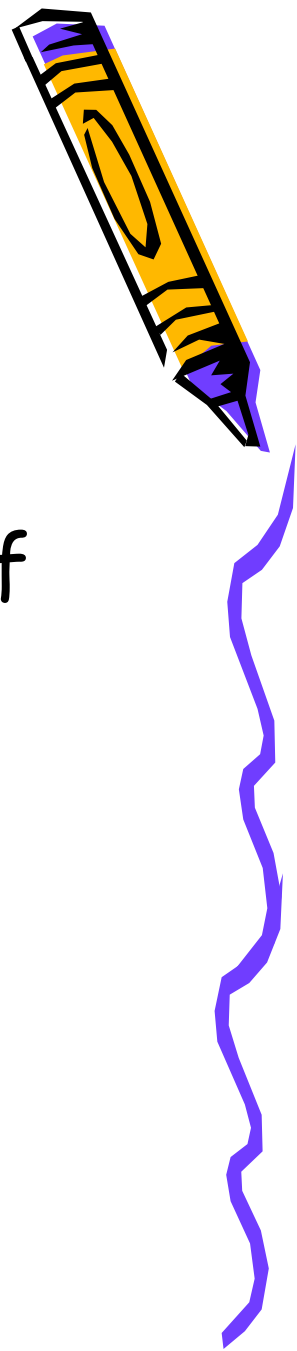


- Precision: how exact a measurement is
- Significant figures: all the digits that are known in a measurement, plus the last digit that is estimated. (the fewer the sig figs, the less precise)
- The precision of a calculated answer is limited by the least precise measurement used in the calculation



Accuracy

- Accuracy: is the closeness of a measurement to the actual value of what is being measured





Beaker Breaker!!

Convert

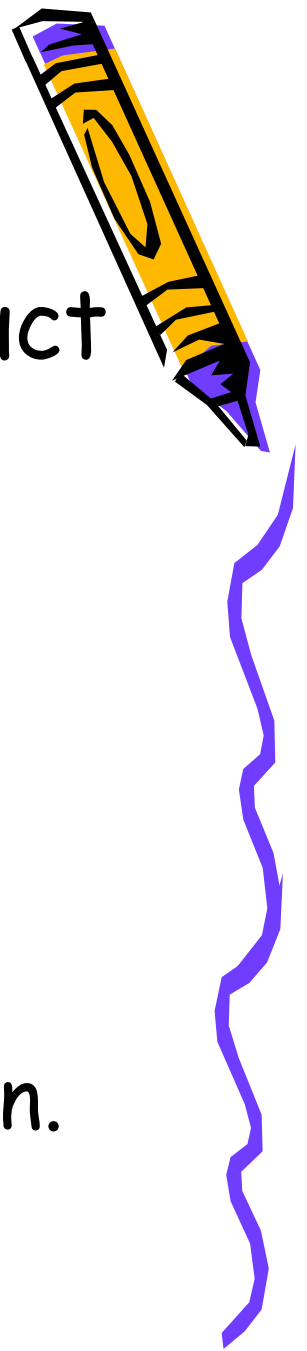


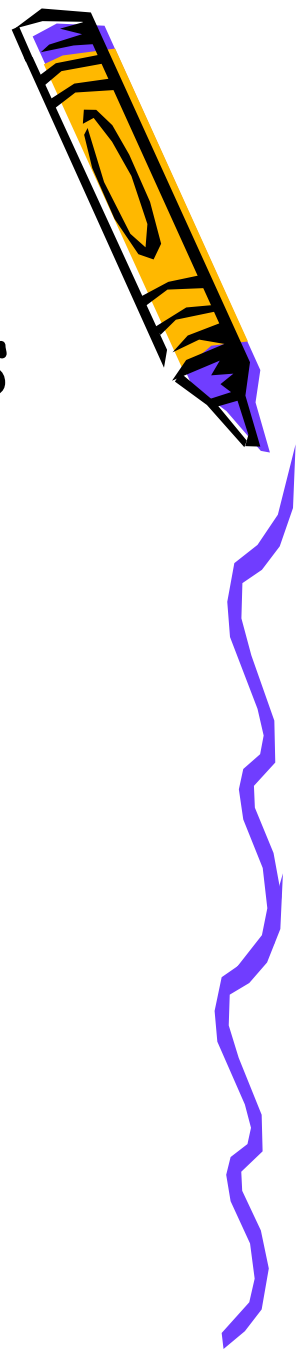
- $2500\text{m} = \underline{\hspace{2cm}}\text{km?}$
- $65\text{g} = \underline{\hspace{2cm}}\text{mg?}$
- $120\text{mg} = \underline{\hspace{2cm}}\text{g?}$



Scientific Notation

- Number is expressed as a product of 2 factors.
- The first factor is a number between 1 and 10.
- The second number is a power of ten.

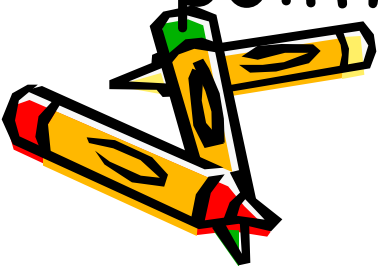




- In scientific notation, numbers are written in the form:
- $M \times 10^n$



- Determine M by moving the decimal point in the original decimal number to the left or right so that only one nonzero digit remains to the left of the decimal point.
- Determine n by counting the number of places that the decimal point was moved.



If the decimal point was moved to the left, then n is positive

- 602 213 774.
- Move decimal point
- Count number of places decimal point moved
- 6.02 213 774
- Therefore 602 213 774 in scientific notation
- is $6.02\ 213\ 774 \times 10^8$



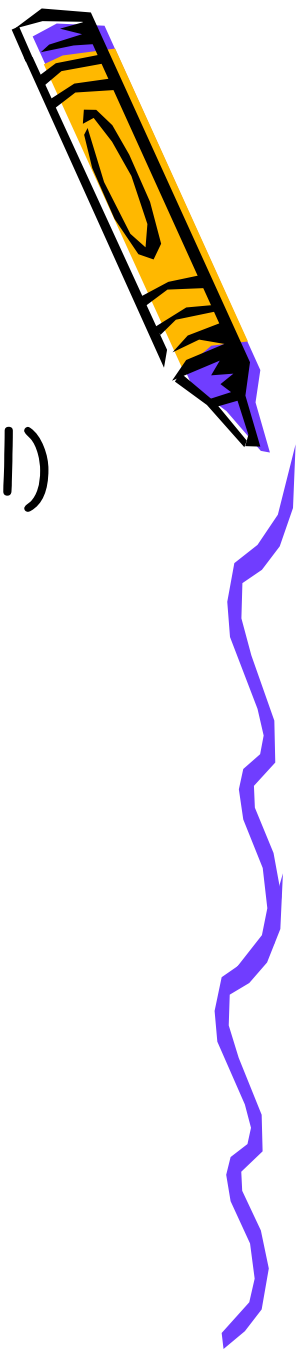
If decimal point was moved to the right then n is negative.

- 0.006 325
- Move the decimal to the right
- 0.006 352
- In scientific notation, 0.006 325 is
- 6.325×10^{-3}

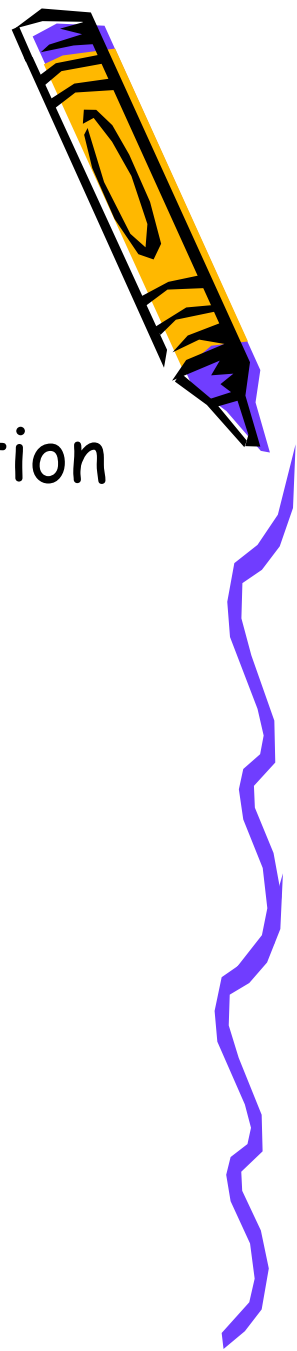


Practice Problems

- 0.00000000000372g (11 zeros total)
- 45,000,000,000 km



Beaker Breaker



- Write the following in scientific notation

7569080

0.0008976

2. Convert the following

987cm to m

74.5g to kg





Dimensional analysis method

- FACTOR LABEL METHOD
 - "FLM"



Conversions and Dimensional Analysis or Factor Label Method



Not all objects that are measured are in the units that are needed. The factor label method is a mathematical way to convert from the units you have to the units you need. In order to eliminate the unwanted units, you design a ladder-type set up of equalities that cancel out the units you no longer want.

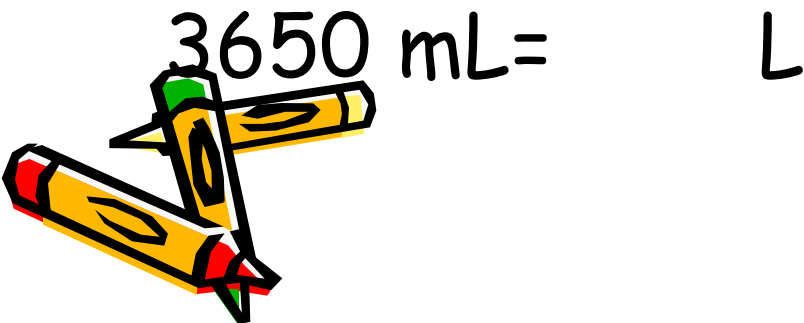
Example: How many liters are there in 3650 mL?



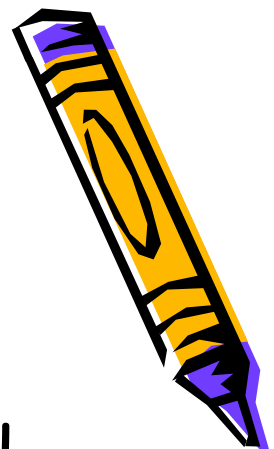
Steps of Factor Label



1. Write down the number (with units) given in the problem on the left side of the paper.
2. Write the units you are solving for after an equals sign on the right side of the paper.



Steps of Factor Label



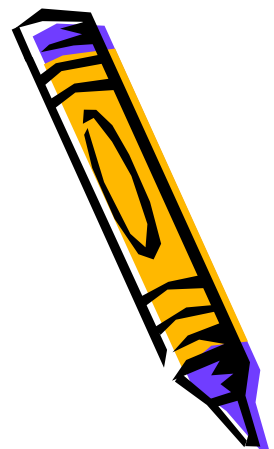
3. Find an equality relating to the original units and write it down in the ladder set up. Make sure to put the units that you DO NOT want in the denominator. Cross out the units that match.

$$3650 \cancel{\text{mL}} 1 \text{ L} = \quad \text{L}$$

$$\frac{1000 \text{ mL}}{1 \text{ L}}$$



Steps of Factor Label



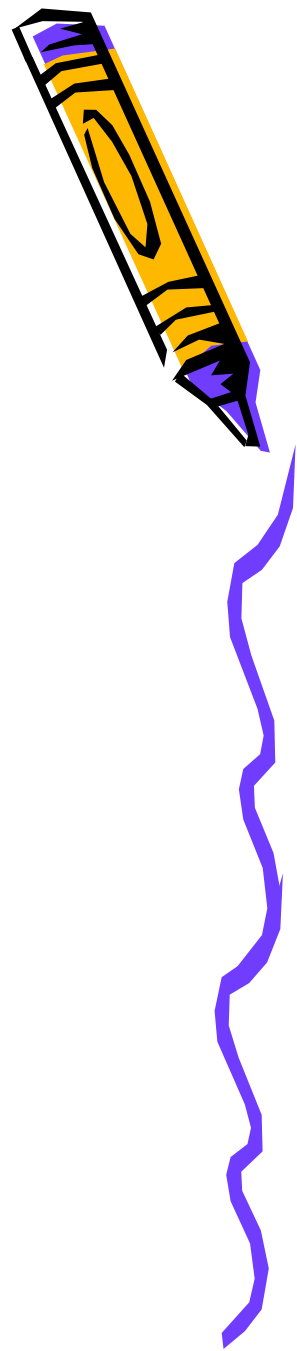
4. Ask yourself if you want the units in the numerator. If you don't, repeat steps 3 and 4 until you get the correct units in the numerator.
5. Solve the problem by multiplying the numbers in the numerator, then dividing by the numbers in the denominator.

$$3650 \text{ mL} \cdot \frac{1 \text{ L}}{1000 \text{ mL}} = 3.65 \text{ L}$$

1000 mL



More Examples of Factor Label Method



- Convert 480.cm to mm
- Convert 5.6kg to g
- Convert 50cm to m
- Convert 5L to mL
- Convert 65g to mg





Beaker Breaker!!

Using Factor Label Method



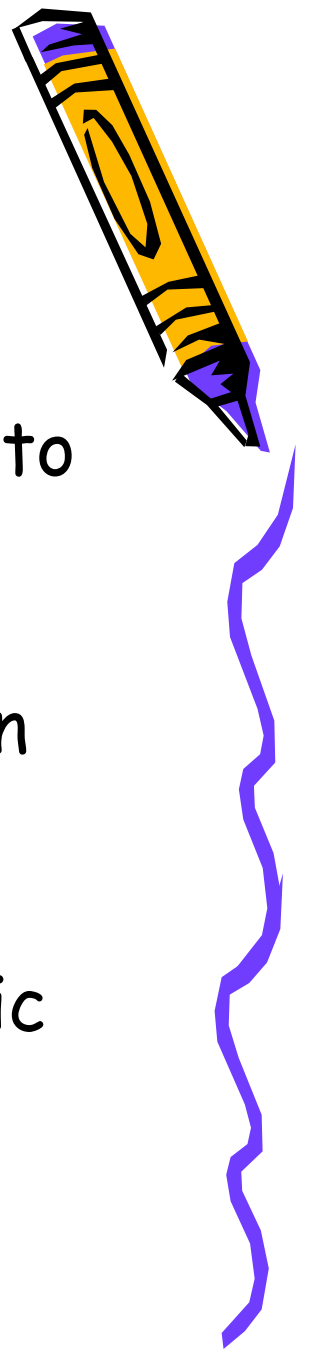
- $2500\text{m} = \underline{\hspace{2cm}}\text{km?}$

- $65\text{g} = \underline{\hspace{2cm}}\text{mg?}$

- $120\text{mg} = \underline{\hspace{2cm}}\text{g?}$



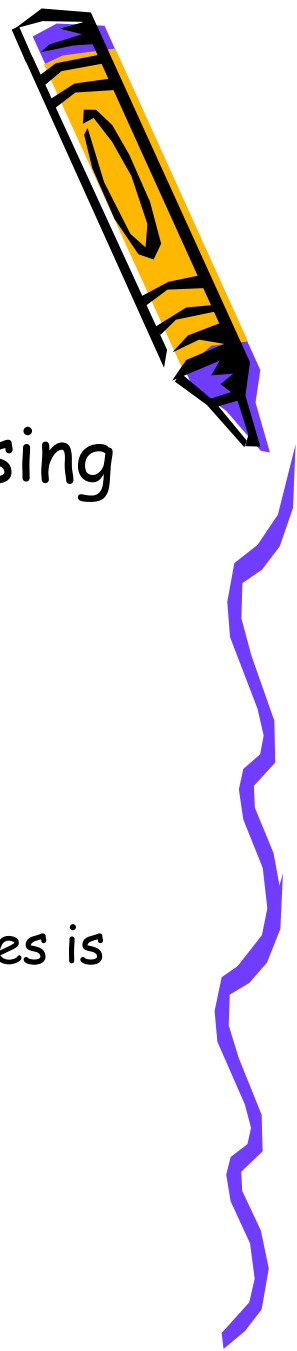
Beaker Breaker



- Use the short method to convert 870g to kg
- Put the following into scientific notation
0.00589
- Write down the 5 steps of the scientific method



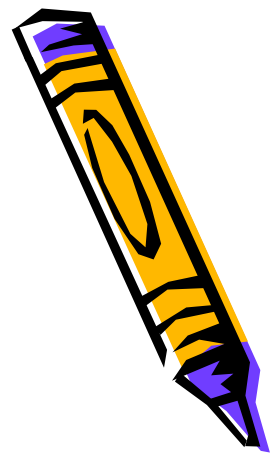
1.4: Presenting Scientific Data



- Scientists can organize their data by using data tables and graphs
 - Line graphs:
 - Slope: rise / run
 - Directly proportional if ratio of two variables is constant (forms a straight line)
 - Inverse proportion if product of the two variables is constant (forms a curved line)
 - Bar graphs and circle graphs

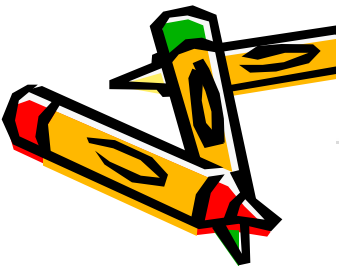


Data tables



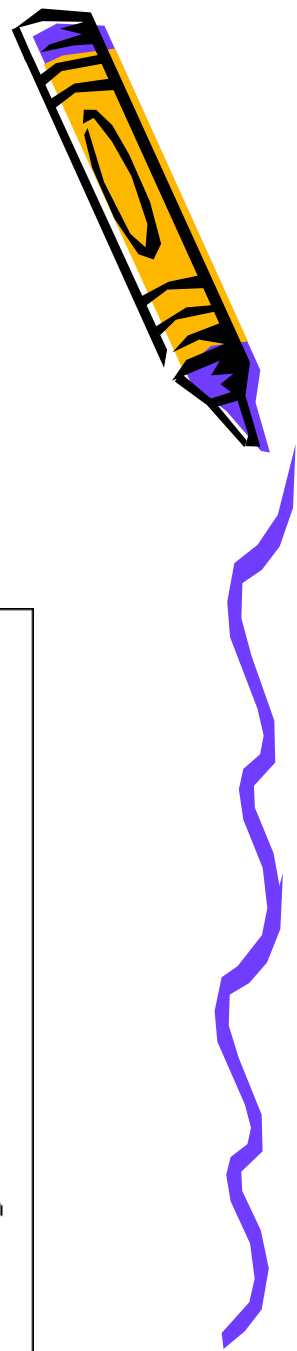
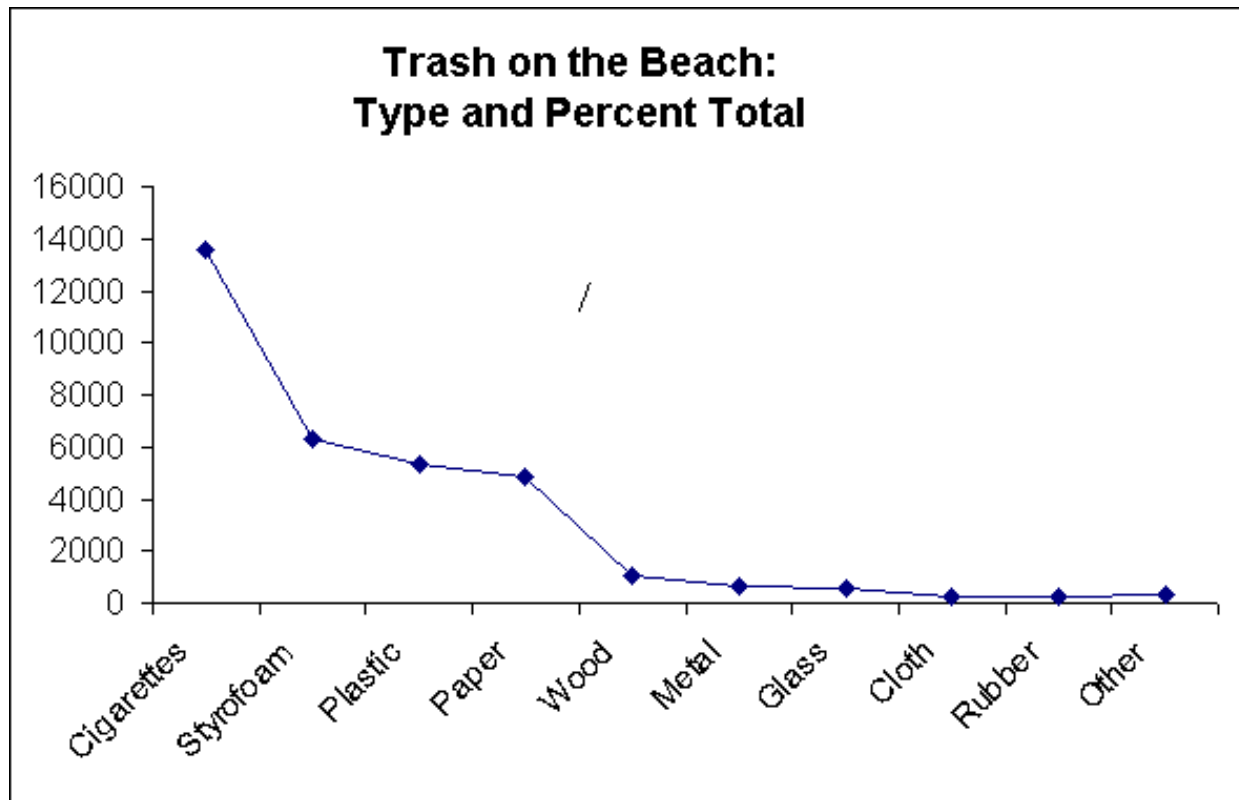
- Contains both the manipulated variable and the responding variable

Test Tube	Type of Water Sample	After 10 minutes	After 20 minutes	After 30 minutes	After 40 minutes	After 50 minutes	after 60 minutes
1							
2							
3							



Line Graph

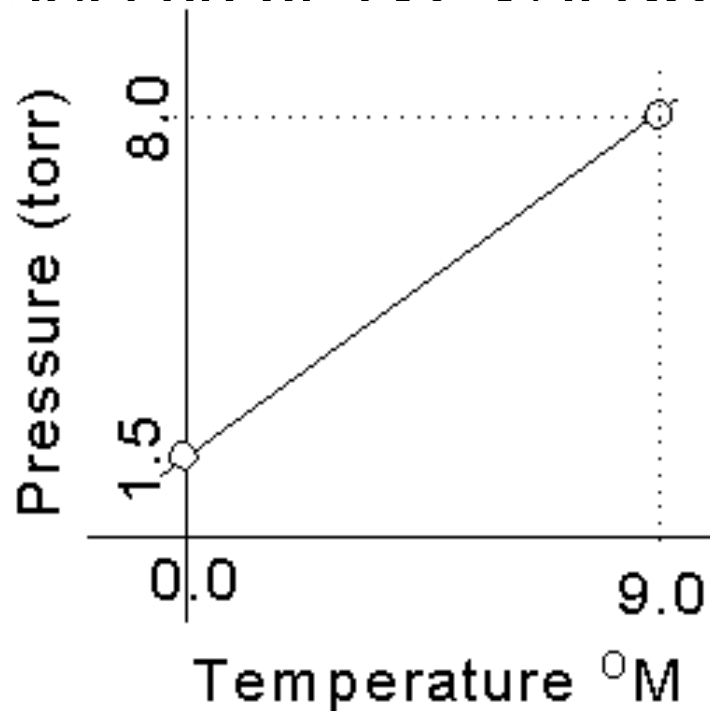
- Manipulated variable on the x-axis
- Responding variable on the y-axis



Line Graphs

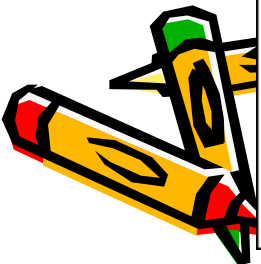
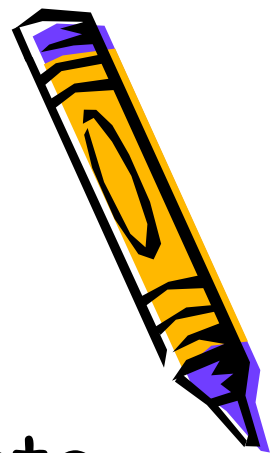
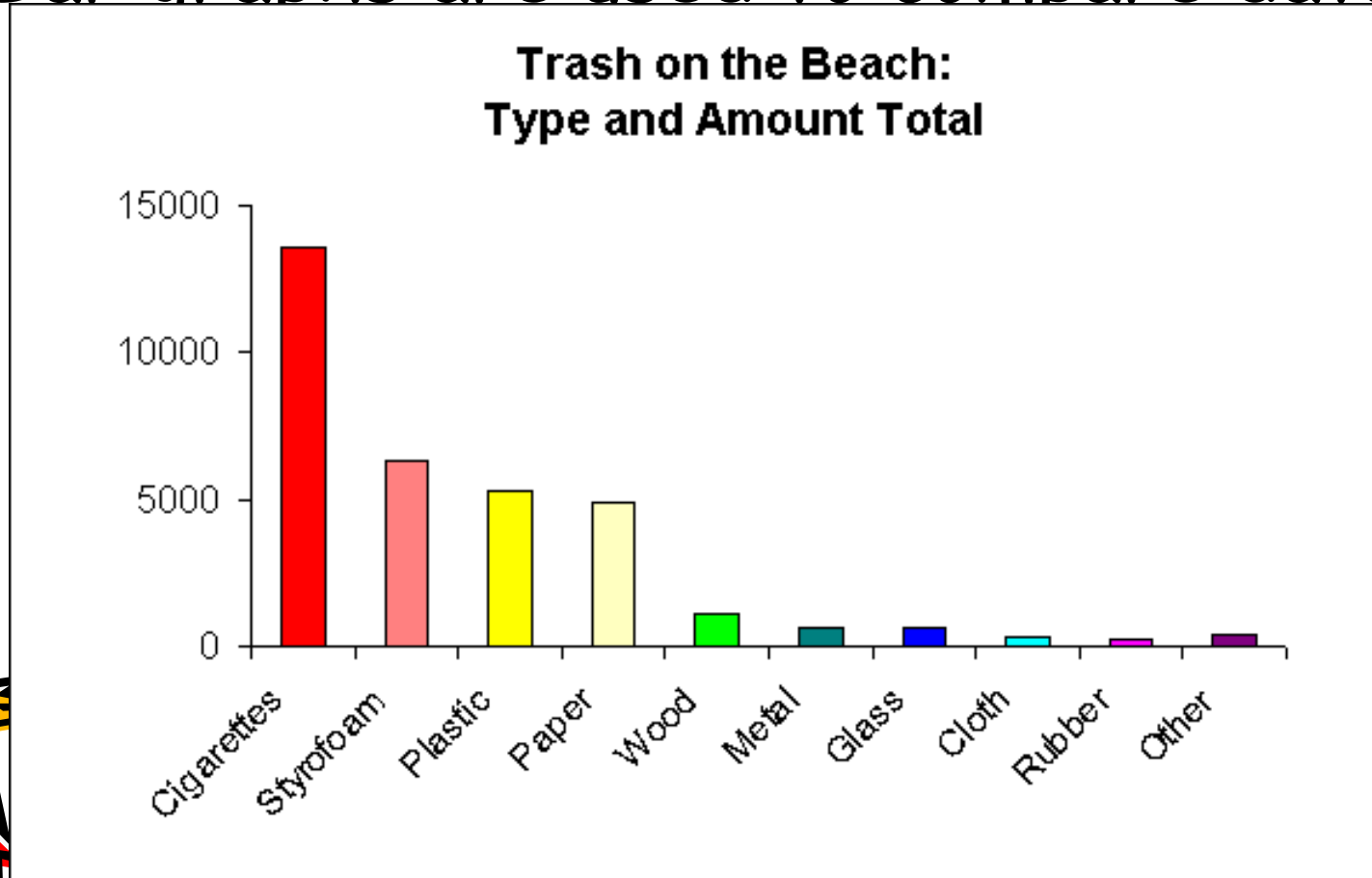


- Slope shows relationship between the two variables
 - Slope = rise/run or $(y_2 - y_1) / (x_2 - x_1)$



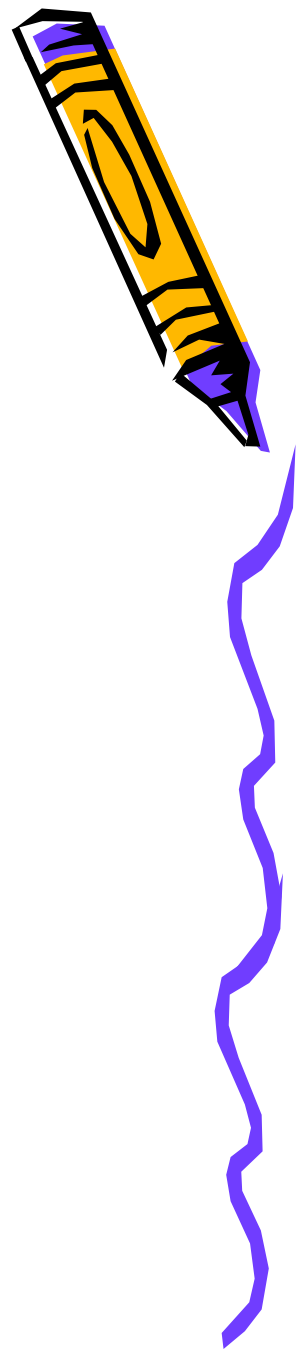
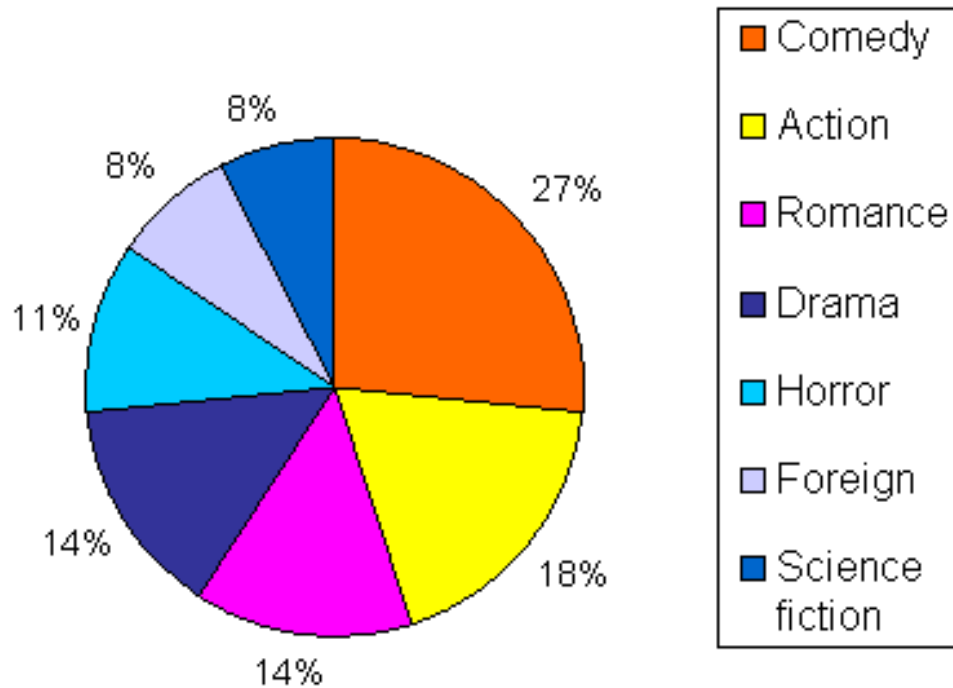
Bar graph

- Bar graphs are used to compare data



Pie Charts

- Shows how a part relates to the whole





Beaker Breaker!!

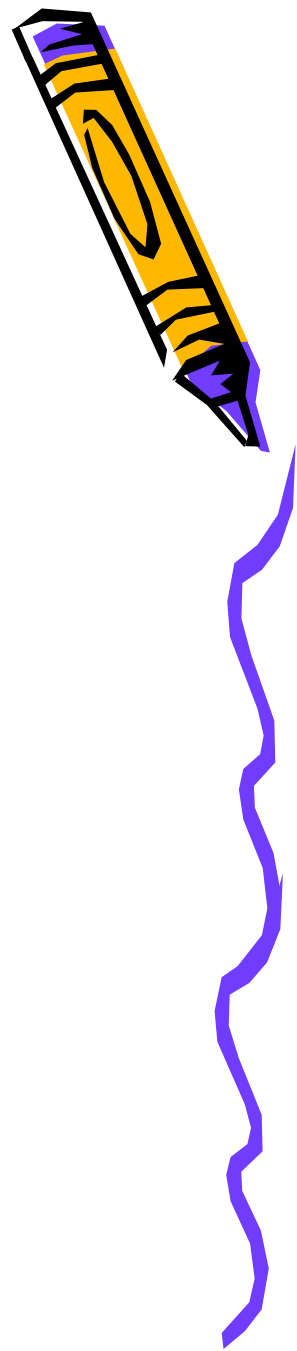
Using Factor Label Method



- $198\text{g} = \underline{\hspace{2cm}}\text{kg}$
- $104\text{km} = \underline{\hspace{2cm}}\text{m}$
- $5.6\text{m} = \underline{\hspace{2cm}}\text{cm}$



Steps in Graphing Scientific Data



- 1. Determine the independent variable.
- 2. Scale the axes.
- 3. Plot the data.
- 4. Title your graph.
- 5. Interpret your graph.



1. Determine the Independent Variable



- **A.** The independent variable is chosen by the experimenter. It is the condition that he/she chooses to vary (change).
- **B.** The independent variable is graphed on the x-axis (**horizontal**).



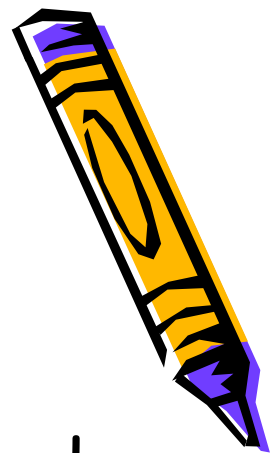
Dependent Variable



- A. The dependent variable depends upon the independent variable.
- B. The dependent variable is graphed on the y-axis(**vertical**).



2. Scale the Axes

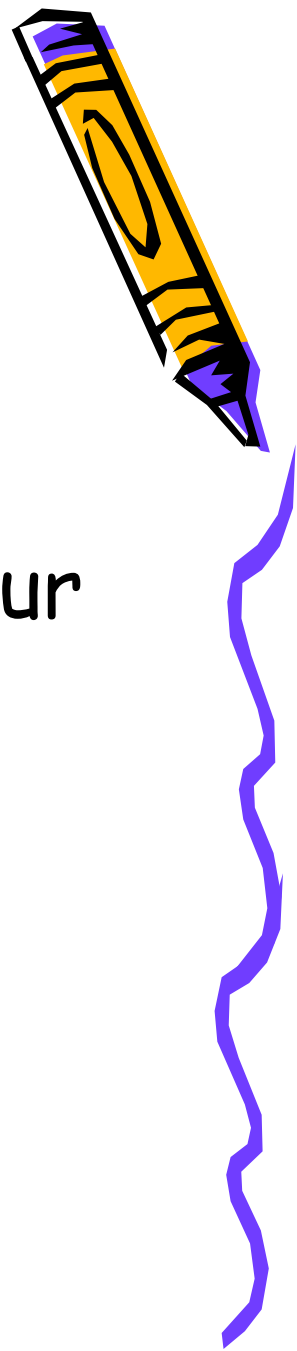


- **A.** Each axes must have a scale with equal divisions.
- **B.** Each division must represent a whole number of divisions.
- **C.** To decide which multiple to use, divide the maximum value of the variable by the number of major divisions on your graph paper.



2. Scale the axes (cont)

- **D.** Label your axes.
- **E.** Be sure to include units with your label.
- Ex: Temperature ($^{\circ}\text{C}$)



Plot Your Data



- **A.** Plot each data point by locating the proper coordinates for the ordered pair on the graph grid.
- **B.** Draw the best fit straight line through your data points.
- **C.** If your data points do not fit along a line, sketch you "best fit" line to connect your points.



Title Your Graph



- A. Your title is written as:

independent variable vs. dependent variable

- Ex: Time (seconds) vs. Temperature ($^{\circ}\text{C}$)

- B. Be sure to include units in your title



Interpret Your Graph



- A. Directly proportional = as one variable increases the other variable increases
- B. Inversely proportional = as one variable increases the other variable decreases





Beaker Breaker!!



- Complete using Factor Label

$$56.m = \underline{\hspace{2cm}} km$$

(hint 1,000m =1km)

2. When one variable increases and the other variable decreases, this is known as _____proportional
3. When one variable increases and the to other variable increases too, this is known as _____proportional

