SI Units
- o Fundamental Units (for *mks* system which used for "everyday" sized objects)

    - o ** Length – _____
    - o ** Mass – _____
    - o ** Time – _____
    - o Temperature – _____

    - o Counting Amount – _____
    - o Electric Current – _____
    - o Amount of Light – _____

- o Derived Units (units based on _____ units)

    - o Speed (Velocity) – _____
    - o Force (Weight) – _____

    - o Electrical Power – _____

Significant Figures (**Generally, homework should be 3 sig. fig.)

When a scientist makes a _____, he must use a _____ within a particular physical context. Both that tool and the _____ _____ impose a limit to how precisely the measurement can be made. When the digits are read from the tool, only those that are _____ describe actual reality and are said to be _____.

- o Thus, sig. fig. exists to tell a reader how much a measurement can be _____.

- o It matters for real life applications (_____)

- o Sig. fig. is often NOT relevant to "math problems," because "math" is not _____. If, a person wishes to describe _____, though, sig. fig. _____ be used.

- o Mr. Carr's rule – Keep digits that carry useful information (aka eliminate 50% of options).

    23.27g ± 0.01g __4__ sig. fig.   23.27g ± 0.07g _____ sig. fig.

    23.27g ± 0.02g _____ sig. fig.   23.27g ± 0.2g _____ sig. fig.

    23.27g ± 0.04g _____ sig. fig.   23.27g ± 0.4g _____ sig. fig.

- o Scientists _____ use sig. fig. notation. Instead, they calculate the ± to avoid _____.

- o In calculations, the final results precision is always limited by the "worst" input *measurement*.

    - o For multiplication/division the "worst" measurement is the one with the fewest digits.

    - o For addition/subtraction it is the one with the largest absolute ± value.

    Velocity = displacement/time = 10.000m / 6.0s = 1.6666666666 m/s = _____ m/s

Bill Gates wealth + Mr. Carr's wealth = _____ = _____

Vectors and Vector Addition
- o Vectors are mathematical objects that possess both

    _____ and _____. As a result of the

    _____, adding them is trickier than adding

    _____.

- o For graphical addition, always shift/_____ the

    vectors so they line up head to tail. The sum goes

    from the 1st ____ to the last _____.

- o Trigonometric vector addition requires using, _____, _____, or _____ to find the x-y-components. Then, use integer addition (w/direction) on the x's and y's separately. Then, the _____ Theorem to get magnitude and _____ to get direction. (AP topic)

Accuracy and Precision (_____, _____, _____, etc. are NOT scientific errors)
- o _____ is how close you are to the _____ value (or "god" value)
- o _____ errors are created by systematic (_____) issues.
  - o Faulty _____ or uncalibrated _____
  - o Consistent _____ error
- o _____ errors are what gives data a _____ of values even when you are being _____
  - o limits of the _____ device
  - o irregularity of the _____ being _____
  - o inconsistent _____ error
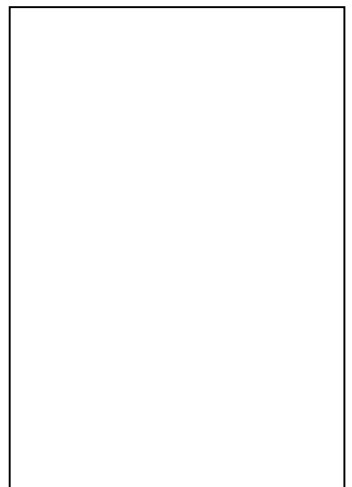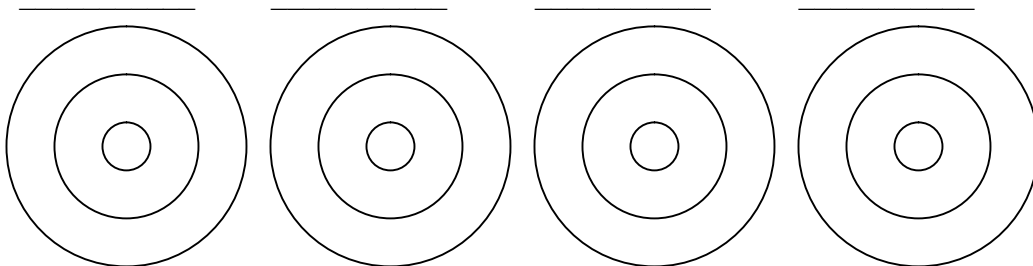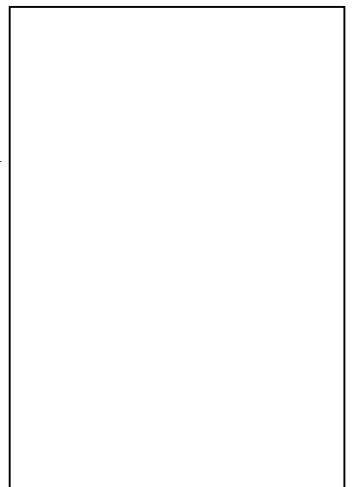
Variables

- o _____ : Chosen not to change
- o _____ : Changed on purpose by experimenter to cause an effect
- o _____ : Are effected because of the change to the independent variable.

Experiment: Completely Melting 1kg of Ice in an Oven

_____ type of pan holding ice   _____ Oven temperature

_____ Time   _____ starting amount of ice

Variable Relationships

Shape	Slope	Formula	Name
		y =	
		y =	
		y =	
		y =	
		y =	

Scientific Method

1. _____
   a. Provides a _____ for the experiment.
   b. Forces you to be _____ about what you are interested in learning.
2. _____
   a. You should have a _____ to believe it is _____.
   b. It must be specific enough to possibly be _____.
   c. Guides you in how to _____ your investigation.
3. _____(_____/_____)
   a. It tests your _____.
   b. It must be _____ or other scientists _____.
4. _____
   a. It must be based solely on _____ from the _____.
   b. It must answer your _____. (No one cares about your _____.)
5. _____
   a. It determines to what degree you can _____ your results.

- o Scientific Laws are usually written as _____ connecting _____ variables to _____ variables. They give no _____ for why the equation is true.
- o Theories _____ why something is true. To be a scientific theory, the explanation must be "well-tested", meaning…
  - o Based on _____ experiments that are _____ from each other and have been _____ by many other scientists.
  - • As a result, scientific theories are _____ completely wrong.
  - • However, new technology sometimes forces theories to be _____.

Dimensional Analysis (a.k.a. tracking units)

$$v = \underline{\hspace{2cm}} \qquad F = m\,a$$

- o Dimensional analysis is a tool that can be used a variety of
  ways. At its simplest it can be used to find the _____
  units that a _____ units is made from or to check for
  _____ errors in a calculation.

- o More powerfully, _____ _____ can allow you to rebuild partially forgotten
  _____ or even discover new _____ (a.k.a. relationships between physical quantities)
  that *could* be _____.

$$F = m\,(v/r^2) \qquad\qquad \text{versus} \qquad\qquad F = m\,(v^2/r)$$

Data Handling and Display

Data Table - _____   Spreadsheet - _____

_____   _____

Pro - _____   Pro - _____

Con - _____   Con - _____

_____ Chart/_____ – Shows how the   _____ Graph – Shows the relationship between
size of different _____ compare to each   two _____. Looking in between two
other. Looking in between two measured points   measured points tells you _____ info.
tells you _____ info.

_____ Chart – Used only when all the measured
categories total to _____%.