2. The Scientific Method

Scientists are concerned about **facts** (phenomenon that can be proven true). They organize the facts about "something" learnt so more information about this "thing" can be investigated.

Many of the scientific facts come from data that has been collected as the result of many observations made during **experiments**. In order to gain new knowledge, a scientist follows a specific **method** to obtain the answers to many questions. The steps usually followed are:

1. Define the **Problem (Purpose)** This could be stated in the form of a question.

2. Do **Background Research** to find out what is already known about the topic.

3. State a **Hypothesis** (a prediction or "educated guess" as to the answer to the problem based on reasoning.) This could be stated using an "If ... Then..." statement.

4. Design & carry out **Experiment** to test your hypothesis.
   To create the **procedure** for a controlled experiment, a scientist must be aware of the variables that will be tested.
   - A. **Independent Variable:** variable you change on purpose (the **manipulated** variable)
   - B. **Dependent Variable:** variable that responds to a change in the independent variable (the one you are **testing for**)
   - C. **Constants:** variables in an experiment that are **kept the same** in all trials (they limit the experiment & keep it "fair")
   - D. **Control:** the standard for comparison in an experiment
     : used to judge the measure of **change** in the dependent variable.

Observations are made as the experiment proceeds. This information is gathered through our **senses**. The 2 types of observations are:

A. **Quantitative** : record changes in a **numerically measurable** way
: ie. length, temperature, volume, mass, etc.

B. **Qualitative** : record changes in **characteristics** of an object
: smell, color, etc.

This **data** is recorded the in the form of notes, drawings, tables, graphs, calculations or a combination of these

***NOTE:** Be careful that your observation is **not** an "interpretation" (explaining an observation in terms of your **own experience**)
: ie. "The banana is black." Observation
"The banana must be spoiling." Interpretation

5. **Analyze** your data to determine if the experimental evidence either supports (or disproves) the suggested hypothesis.

6. Formulate a **Conclusion** which **summarizes** your findings. It **must** relate back to the purpose and state whether the hypothesis is correct or not.

A **Theory** is when a major hypothesis has survived countless testing. It is the best explanation for an observed fact thus far & leads to further predictions.