

Scientific Method

What is Science & Why Should We Care?

- Method for studying the natural world.
- Nature works on rules – simple ones and complex ones.
- If we study patterns, science can be applied to everything.

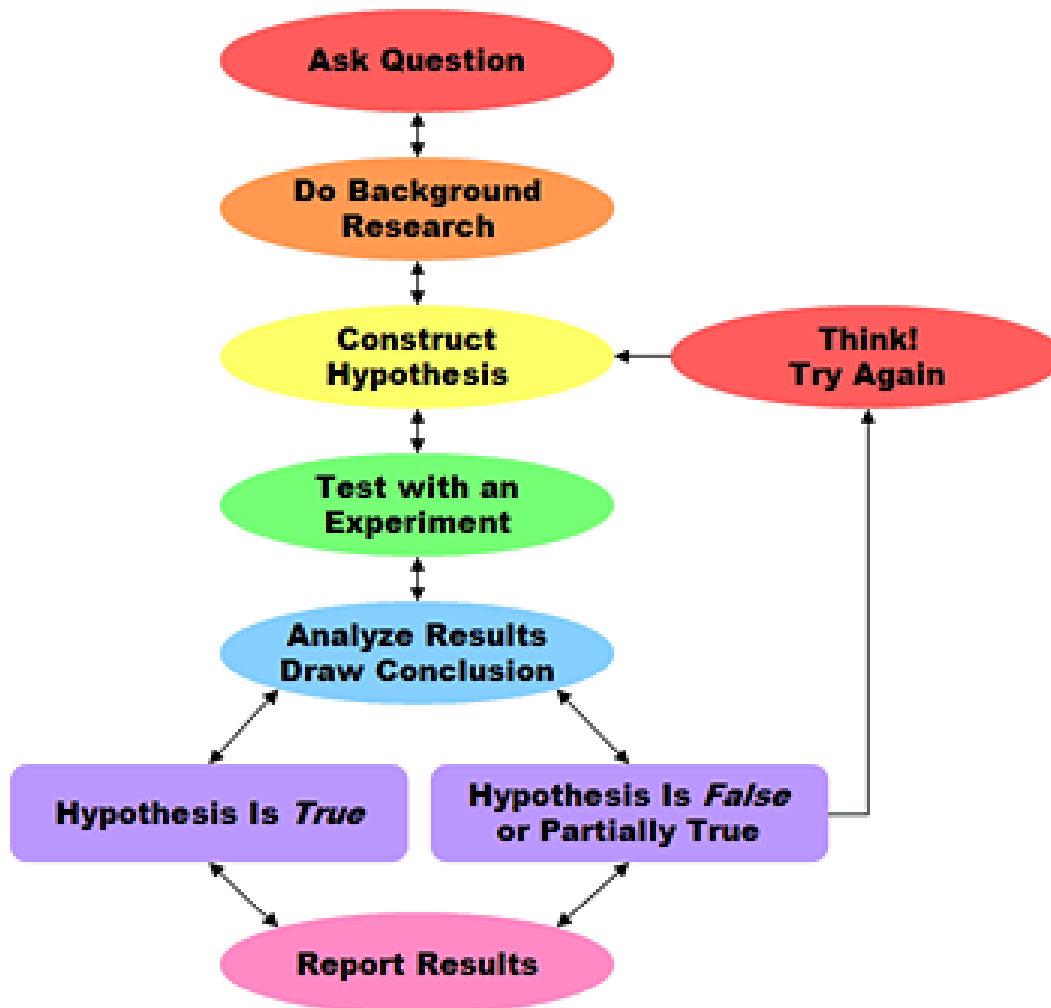
Scientific Method

- The scientific method is the **process** by which scientists, collectively and over time, endeavor to construct an accurate representation of the world.
- Attempts to minimize the influence of bias or prejudice in the experimenter when testing a hypothesis or a theory.

6 Steps

- State the problem
- Do research
- Form a hypothesis
- Experiment
- Analyze
- Form a conclusion and express it to others

Scientific Method Flow Chart

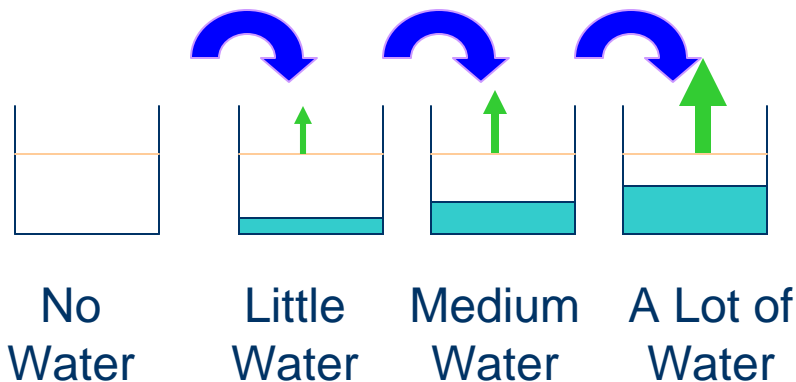


Variables in an Experiment

- These are quantities that can have more than a single value:
 - **Independent Variable:** is the factor that you will change on purpose in your experiment.
 - **Dependant Variable:** is the factor that you predict will change as a result of your independent variable.
 - **Constant:** are the factors that don't change when other variables do.
 - **Control:** is the standard by which the test results can be compared to.

Example #1

- Hypothesis- I predict that the amount of water I give to plants will affect their growth.



Independent Variable: Amount of Water

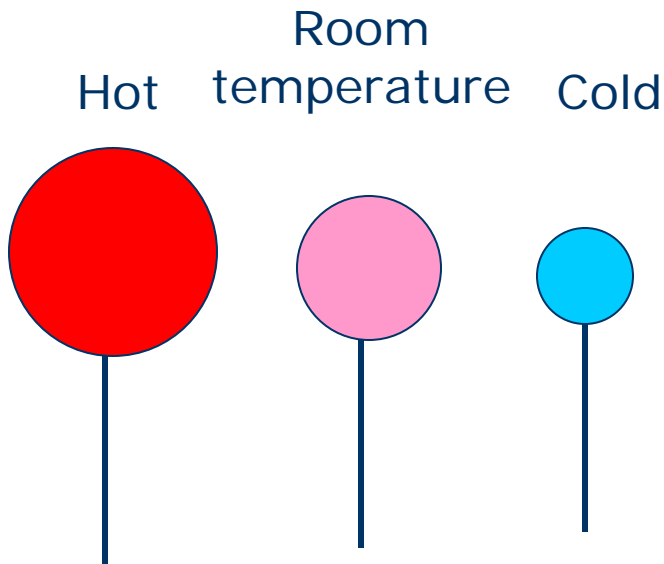
Dependent Variable: Growth of the Plant

Constant: Sunlight, Soil, Container

Control: No Water Plant

Example #2

- Hypothesis- I predict the hotter the air temperature, the larger the balloon size will be.



Independent variable: Temperature

Dependant Variable: Size of Balloon

Control: Room Temperature Balloon

Constant: Amount of Air in the Balloon

Scientific Theories and Laws

- Theories: **Explanation** of things or events based on knowledge gained from repeated observations all over the world. Theories are changeable based on evidence gathered by new technology.
- Law: **Statement** about what happens in nature and that it seems to be true all the time. Laws don't change.

Pangaea: The supercontinent 200 million years ago



The land masses after 65 million years of drift



The continents today and 50 million years from now



Strength of Scientific Method

- The greatest advantage of the scientific method is that it is unprejudiced.
- The results obtained using the scientific method are repeatable.
- A Scientific Theory or a Hypothesis differentiates from an act of faith: they must be “proven”.