

What is Science?



- Organized **inquiry** into the natural world and its phenomena.
- **GOAL** of science....develop a deeper understanding of the natural universe without human bias.
- Science is **not** exact or perfect. From time to time, scientific explanations may **change** as new data is presented. The process of testing and fine-tuning theories **never ends** as scientists try to gain new insights into old problems. Scientists use the scientific method to test these explanations.

SCIENTIFIC METHOD

1. **OBSERVATION** - Make observations to gather information and form a question.
2. **HYPOTHESIS** - A hypothesis is a possible explanation or prediction that must be **TESTABLE!!**
3. **EXPERIMENT** - Test the hypothesis by conducting an experiment. If unable to test using an experimental design then the statement remains a hypothesis. Hypotheses can be proven wrong, but can never be confirmed with absolute certainty. There are **RULES** in an experiment.

- Experiments need a control group to use as a standard for comparison. Scientist must contrast an "experimental group" with a "control group". The two groups are **EXACTLY** alike except for the **ONE** variable being tested.
- Experiments contain variables which are factors in the experimental design. There are 3 types of variables:
 - Constants are variables that remain the same in each group. They **do not** change.
 - The independent variable (IV) is the **factor that changes** or is being tested in the experiment.
 - The dependent variable (DV) is the **result** from the change made in the experiment.

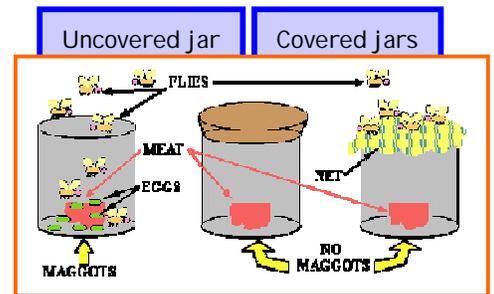
4. **DATA** - Gather data and analyze results. (displayed in graphs or tables)

- Quantitative data is represented by measurements and qualitative data is represented by descriptions.

5. **CONCLUSIONS** - Data from the experiment can **SUPPORT** or **REJECT** the hypothesis.

Redi's Experiment on Spontaneous Generation

OBSERVATIONS/PROBLEM: Flies land on meat that is left uncovered. Later, maggots appear on the meat.
HYPOTHESIS: If meat is covered, then no maggots will appear.



Only test **ONE** variable during an experiment, so you know what caused the change!

Independent Variable:

Dependent Variable:

CONCLUSION: Maggots form only when flies come in contact with meat. Spontaneous generation did not occur.

How are THEORIES formed?

Scientific Theories are based on knowledge gained from **MANY** experiments.

- **Scientific Theories join together well supported and related hypotheses.**
- **Theories must explain a wide range of observations.**
- **Theories can be changed if new evidence presents itself.**

