

1. What is Science?

- a **process** used to acquire new knowledge
 - = an ongoing method of learning
- information gathered through observations is **proven** & **tested** by further investigation
- **changing** body of information



Goals of Science?

- improve our **lifestyles** (inventions and resource management)
- increase our **understanding** of the world around us

2. The Scientific Method

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:

Ask a Question

Do Background Research

Construct a Hypothesis

Test Your Hypothesis by Doing an Experiment

Make Observations

Analyze Data

Draw a Conclusion

Steps of the Scientific Method

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 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.