

The Nature of Science  
Notes 1.2 Scientific Inquiry

Scientific inquiry, or the scientific method, is the process scientists use to study the natural world and develop explanations based on the evidence they collect.

The steps in scientific inquiry include:

1) Observation

Scientists use their five senses to make observations.

Example: A plant shaded by a tree or bush grows slower than one in direct sunlight

2) Problem

Scientists will ask a question based on their observations.

Example: Does light help a plant grow?

3) Hypothesis

Scientists will propose a possible answer to the problem.

Example: A plant that gets more light will grow more quickly than a plant that get less light.

Scientists will research a problem to collect information that may help them answer the question.

4) Experiment

Scientists will conduct one or more experiments to answer the question.

Example: Several plants will be exposed to different amounts of light each day for several weeks.

Experimental variables

An experiment is made up of two variables, or things that may change during the experiment.

1) Independent variable

This is the one and only variable that will change during the experiment.

For our experiment it is the amount of light the plants gets.

2) Dependent variable

This is the factor that may change because of the independent variable.

For our experiment, it is a measurement of how much the plants grow.

An experiment in which only one variable is changed at a time is called a controlled experiment.

For our plant experiment the controls include using the same type of soil, plant container, fertilizer, plant, light source, and the amount of water we give it. The only difference will be the amount of light the plants gets.

### Experimental data

During the experiment, we will need to collect data, then interpret it.

Data tables are a good way to organize data as you collect it.

Graphs help to visualize and interpret the data you have collected.

### 5) Conclusion

After you have interpreted your data, you are ready to draw a conclusion. The conclusion should...

- 1) be a summary of what you learned from the experiment.
- 2) answer the hypothesis, does it support the hypothesis or not.
- 3) be based on sufficient data.

Inquiry leads to inquiry, meaning that the process used to answer one question usually raises more questions that need to be investigated.

For our experiment that might include questions like. Is there a difference in how a plant grows with natural light opposed to artificial light?

### Communicating

Scientists communicate or share their findings with other scientists through writing and lectures, so that others can repeat their experiments.

### Scientific Theories and Laws

#### Scientific Theories

Theories connect a large set of related observations by a single explanation. They are well tested, meaning many experiments and observations have been made to support the explanation. Although most scientists will accept a theory, it does not mean it can't be incorrect. The theory might be modified or discarded all together.

Example; The Theory of Evolution

### Scientific Laws

A scientific law is a law of nature. Under the same circumstances, you will get the same results every time.

Example: The Law of Gravity