Scientific Method

The Scientific Method as an Ongoing Process

Make Observations

What do I see in nature? This can be from one's own experiences, thoughts or reading.

Think of Interesting Questions

Why does that pattern occur?

Formulate Hypotheses

What are the general causes of the phenomenon I am wondering about?

Develop Testable Predictions

If my hypothesis is correct, then I expect a, b, c, …

Gather Data to Test Predictions

Relevant data can come from the literature, new observations or formal experiments. Thorough testing requires replication to verify results.

Refine, Alter, Expand or Reject Hypotheses

Develop General Theories

General theories must be consistent with most or all available data and with other current theories.

Two Types of Observations

* Qualitative: Based on non-numerical observations (colour, state, shape)

Two Types of Observations

* Quantitative: Based on numerical observations (mass, length, volume)

Observations

* Observations should be objective
* Observations should be as accurate as possible.
* Observations should be concise
* An outlier is an irregular result. Anomalies should not be ignored. There must be a logical explanation for an anomalous event. Investigating an anomaly often increases our knowledge and adds to our understanding of nature.