

Chapter 2 Section 1 Notes

The Experimental Method

- Step 1 – Observation
- Step 2 – Hypothesizing
- Step 3 – Predicting
- Step 4 – Experimenting
- Step 5 – Organizing and Analyzing Data
- Step 6 – Drawing Conclusions
- Step 7 – Repeating Experiments
- Step 8 – Communicating Results

Observation - information obtained by using the senses (sight, hearing, smell, and touch).

A hypothesis is a testable explanation for an observation.

- not a guess.
- makes logical sense.

Predictions - made before experimentation.

- logical statements about what will happen if a hypothesis is correct.

Experiments are procedures for testing a hypothesis; carried out under controlled conditions

- Two essential characteristics:
 - a single variable (*or factor of interest*) is tested
 - a control is used.
- To test for one variable, scientists usually study two groups or situations at one time, with the variable being the only difference between the two groups.
 - experimental group - receives the experimental treatment.
 - control group - does not receive the experimental treatment.

Data - information gathered through experimentation.

Drawing Conclusions

- After experimenting, scientists analyze their data and compare the results with their prediction often using mathematical tools.

Repeating Experiments

- Scientists often repeat their experiments.
- The more often an experiment can be repeated with the same results, in different places and by different people, the more sure scientists become about the reliability of their conclusions.
- Scientists look for a large amount of supporting evidence before they accept a hypothesis.

Communicating Results

- Scientists publish their results in scientific journals, to share what they have learned with other scientists.

The Correlation Method

- Correlations or associations are used when the use of experiments to answer questions is impossible or unethical
 - Example: using known information about tree ring width (wide = rainy season; narrow = dry season) to look at why the settlers at Roanake Island all died and why many died at the Jamestown Colony.

Scientific Habits of Mind

- Good scientists tend to have several key habits of mind, or ways of approaching and thinking about things.
 - 1) Curiosity (*scientists want to know why and how things work*)
 - 2) Skepticism (*scientists don't believe everything they read or hear*)
 - 3) Openness to new ideas (*whether the ideas are others or their own*)
 - 4) Intellectual honesty (*scientists don't change the results of an experiment if it doesn't match their prediction*)
 - 5) Imagination and creativity (*allows the boundaries of what we know to be expanded*)