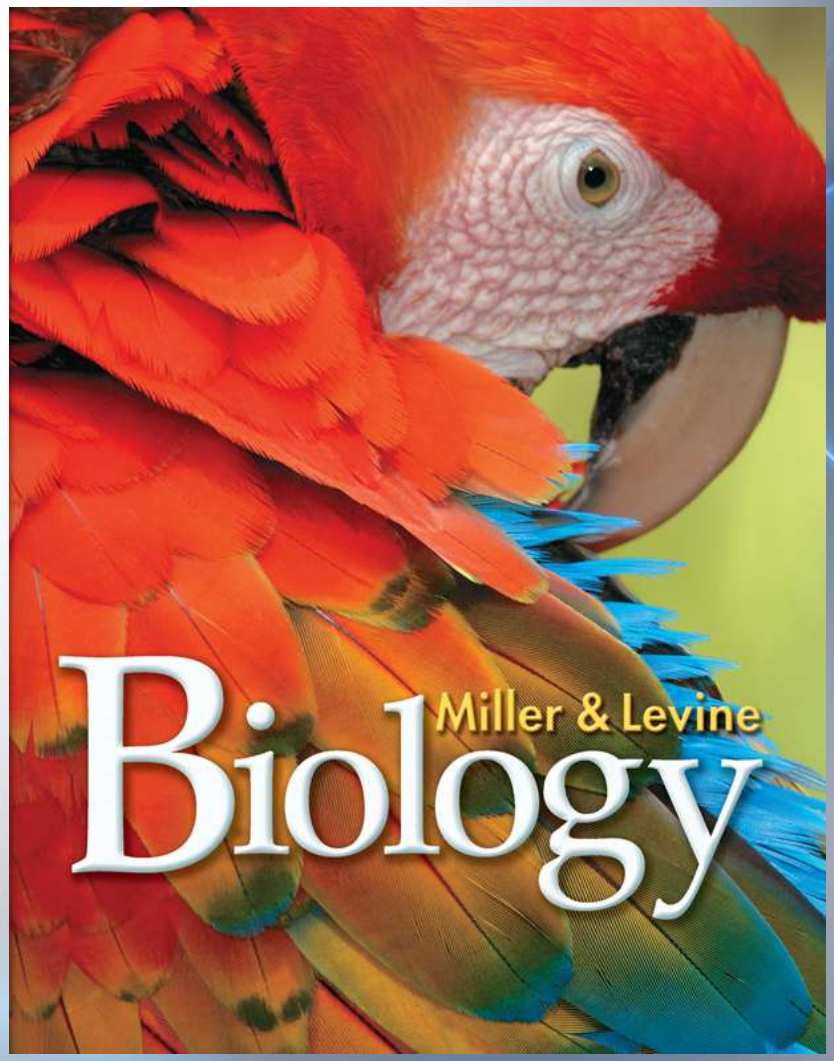
Chapter 1.1 – What is Science?



Daily Objectives

- State and explain the goals of science.
- Describe the steps used in the scientific method.

The Goals of Science are to:

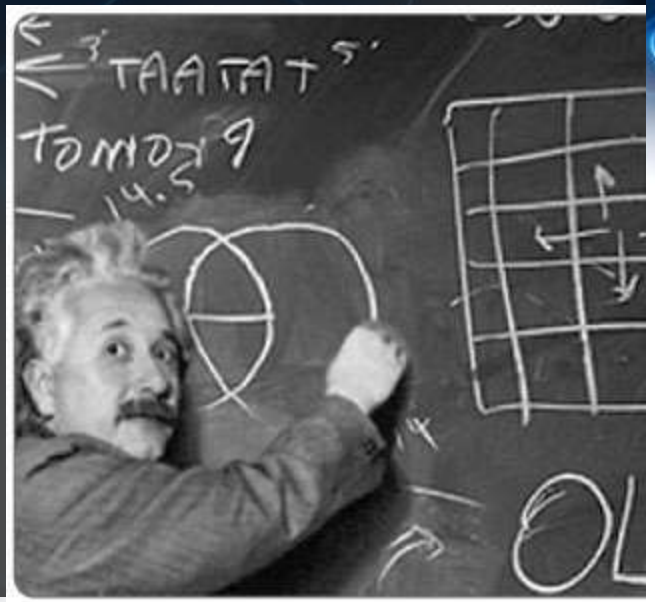
- Investigate and understand the natural world.
- Explain events in the natural world.
- Use those explanations to make useful predictions.

What Makes Science Unique

- Science deals only with the natural world.
- Scientists collect and organize information in a careful, orderly way .
- Scientists propose explanations that can be tested by examining evidence.

What Science Is and Is Not

- Science is an organized way of using evidence to learn about the natural world.



Observing and Asking Questions

- Scientific thinking begins with observation.
- Observation is the process of gathering information about events or processes in a careful, orderly way.
- Observation generally involves using the senses.

Thinking Like a Scientist

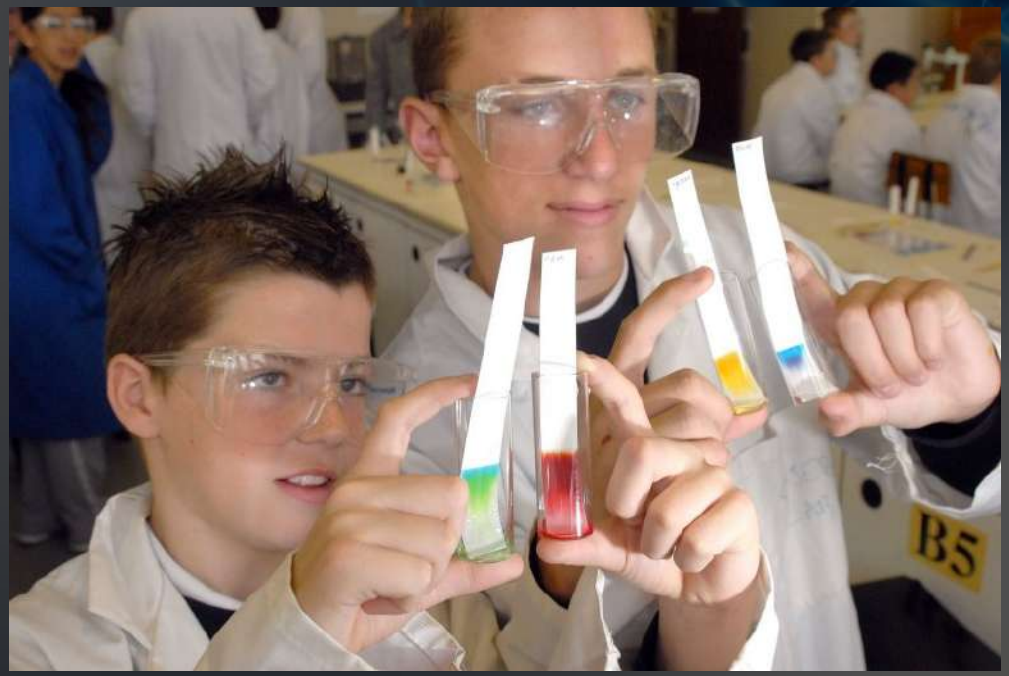
- After making observations scientists can make inferences.
- An inference is a logical interpretation based on prior knowledge or experience.
- Inferences can help to form a hypothesis.

Inferring and Forming a Hypothesis

- A hypothesis is a proposed scientific explanation for a set of observations.
- A hypothesis may be ruled out or confirmed.

Explaining and Interpreting Evidence

- Hypotheses are tested by performing controlled experiments.



Designing Controlled Experiments

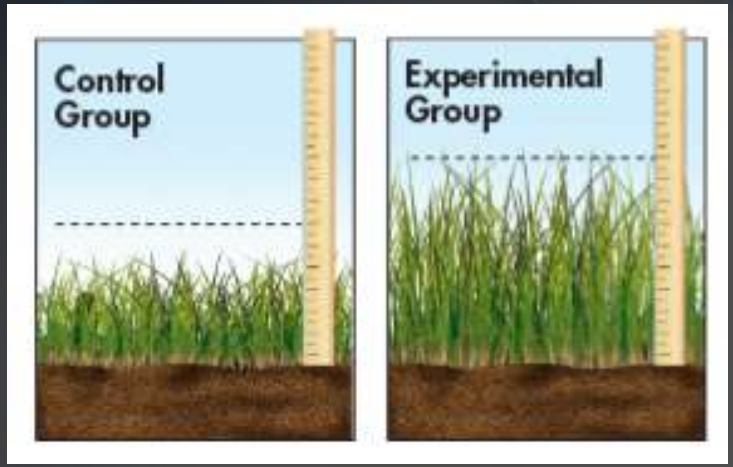
- The factors that change in an experiment are called variables
- Only one variable should be changed during the experiment
- All other variables should be kept unchanged, or controlled.

Designing Controlled Experiments

- If several variables are changed in the experiment, researchers can't tell which variable is responsible for any results they observe.
- The variable that is deliberately changed is called the independent variable
- The variable that is observed and that changes in response to the independent variable is called the dependent variable

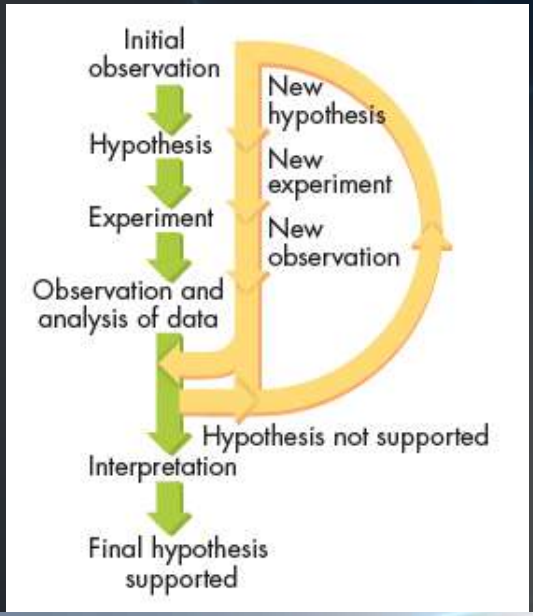
Data

- The information gathered from observations is called data.
  - Quantitative: Numbers (measurements)
  - Qualitative: Descriptive and usually can't be counted



Drawing Conclusions

- Scientists use experimental data as evidence to support, refute, or revise the hypothesis being tested, and to draw a valid conclusion.



Science as a Way of Knowing

- Science is an ongoing process that involves:
  - Asking questions
  - Observing
  - Making inferences
  - Testing hypotheses

Science and Human Values

- Because of new knowledge gained through research, scientists continually revise and reevaluate their ideas
- An understanding of science and the scientific approach is essential to making intelligent decisions about many important topics.