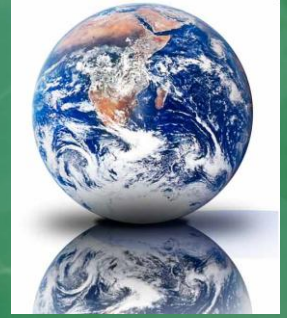


## The Nature of Science?

Biology II  
Chetek High School  
Mrs. Michaelsen

## What is Science?

- From Latin word *Scientia* = Knowledge
- The effort to discover and increase human understanding of how the natural and physical world works.
- Knowledge is gained through research.



## Why Study Science?

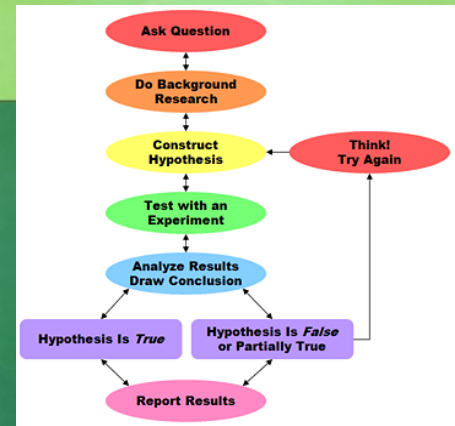
- Produces more responsible citizens
- Helps build a strong economy
- Contributes to global health
- Contributes to informed decisions that impact the world
- Ensures future support of scientific research and advancements
- This leads to Scientific Literacy

## Scientific Literacy

- It's NOT just about memorizing science facts.
- It answers the question: How do you look at the world? What is your understanding?
- Knowing how the natural world works empowers you to function well in society.
- You can make educated decisions regarding political issues, technology, the environment, your health and much more...
- [Video on the importance of Science Literacy](#)

## Science is a Process

- The Scientific Method: Seeks to explain the events of nature in a reproducible way, and to use these reproductions to make useful predictions.
  - Identifying a Problem/Question
  - Forming a Hypothesis (If/then statement)
  - Designing and Performing Experiments
  - Collecting and Analyzing Data
  - Formulating Conclusions about the Hypothesis



## Science is a Process (cont.)

- Problem must include two variables:
  - Dependent: The thing that is measured or affected.
  - Independent: The thing that you change.
- Experiment must be under controlled circumstances.
  - Experimental Group: Modified to observe the effects of the independent variable.
  - Control Group: Remains unchanged throughout the experiment - serves as a comparison.

## Examples...

- Hypothesis tested repeatedly with little modification:
  - Cell Theory
  - Gene Theory
  - Theory of Plate Tectonics
  - Law of Gravity
  - Theory of Evolution by Natural Selection
  - Kinetic Theory of Gases
  - Big Bang Theory

## Bias in Science

- Eliminated by strict following of the scientific method.
- Multiple tests for reliability
- Peer-review process
- Scientific Method - Grail Style

## Macroinvertebrate Research

- Hypothesis: If the Chetek River has poorer water quality than the Red Cedar River, then the Chetek River will have less diversity (a higher biotic index) than the Red Cedar River.
- Collection procedure must be followed accurately.
  - Field collection with nets and sorting into jars to bring back to lab.
- Identification in the lab must be done accurately using available key.