

## Scientific Method Review

### Science

- Science: A way of learning about the natural world
  - Includes all of the knowledge gained by exploring the natural world
  - This knowledge is always growing and changing as scientists ask new questions and explore new ideas

### Scientific Inquiry

- Scientific: Of or relating to the practice of science
- Inquiry: A close examination of a matter in a search for information or truth
- Scientific Inquiry: The ways in which scientists explore the natural world

### How Does Scientific Inquiry Work?

- Scientific Method:
  - Ask questions
  - Make observations and/or inferences
  - Develop hypotheses
  - Design experiments
  - Make measurements
  - Collect data
  - Interpret data
  - Draw conclusions
  - Communicate

### Ask Questions

- Scientific inquiry begins with a question or a problem

### Make Observations and Inferences

- Observation: Using one or more of your senses to collect data
- Inference: An interpretation of an observation that is based on evidence or prior knowledge
- Data: Facts, figures and other evidence gathered through observation

## Making Inferences

- An inference is only one of many possible **interpretations** of the observation

## Developing Hypotheses

- **Hypothesis**: A possible **explanation** for a set of observations or answer to a scientific question
- A hypothesis must be something that can be tested
- Worded as an **If . . . Then** statement
- Hypotheses can either be **supported** or **disproved**

## Designing an experiment to test a hypothesis

- After you state your **hypothesis**, you must design an **experiment** to test it.

## Experiment Variables

- **Variable**: Factors that can change in an **experiment**
- **Manipulated (Independent) Variable**: The variable that is changed during the experiment
- **Responding (Dependent) Variable**: The factor that changes because of the manipulated variable

## Controlled Experiments

- **Controlled Experiment**: An experiment in which all of the variables except for one are remain the same.
- Scientific experiments **MUST** be **controlled**!

## Making Measurements and Collecting Data

- Scientists have developed a standard system of **measurement** called The International System of Units (SI)
- Why do scientists need a standard system of measurement?

## Interpreting Data

- After the data are collected, they must be **organized** and **interpreted**
- How can data be organized so that is easy to understand?

## Drawing Conclusions

- After you have **organized** and **interpreted** your data, you must draw a **conclusion**.
- You need to decide if the data support your original hypothesis.

## Communicating

- Scientists must **communicate** their findings to other scientists. This contributes to the **growth** of the body of **scientific** knowledge.

## Scientific Theories

- Scientific Theory: A well-tested **concept** that explains a wide range of observations.
- A theory is based on **thousands** of **experiments** done by different scientists.
- Future testing may prove a theory to be **incorrect**.