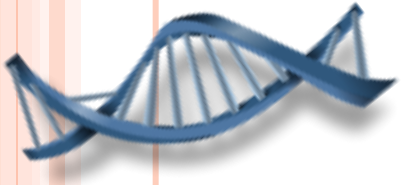


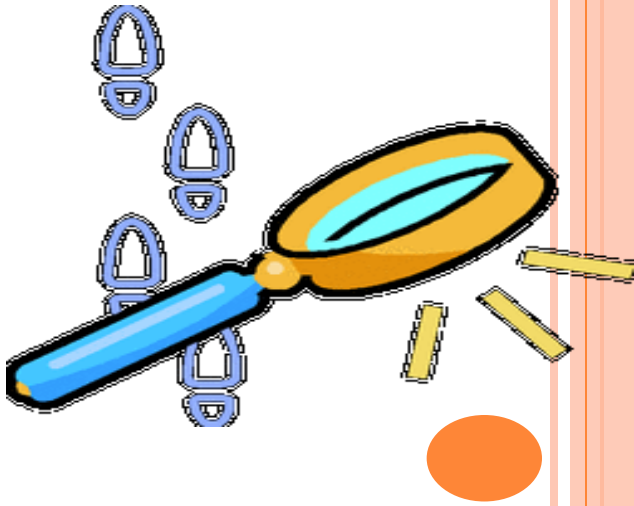
INTRODUCTION TO PHYSICAL SCIENCE & SCIENTIFIC INQUIRY

SCIENTIFIC INQUIRY

- Science: the different ways scientists study the natural world

- *3 Skills Scientists Use*:

1. Observing—gathering information using your senses



2 Types of Observations

a. Qualitative Observation—observations that lack numbers (descriptions)

ex: Rob is wearing a brown shirt

b. Quantitative Observation—observations that deal with numbers (a quantity)

ex: the mass of the substance is 5 grams

2. Inferring—making judgments based on your observations

- It is cloudy—observation

- It must be going to rain—inference

- Observation: the players are jumping
- Inference: Italy just won the World Cup

- Observation: the kitten is yawning
- Inference: the kitten must be tired

3. Prediction—making a forecast of what will happen in the future

PHYSICAL SCIENCE

4. Physical Science: The study of matter, energy, and the changes they undergo.
- Matter: anything that has mass and takes up space.
- Energy: the ability to do work or cause change

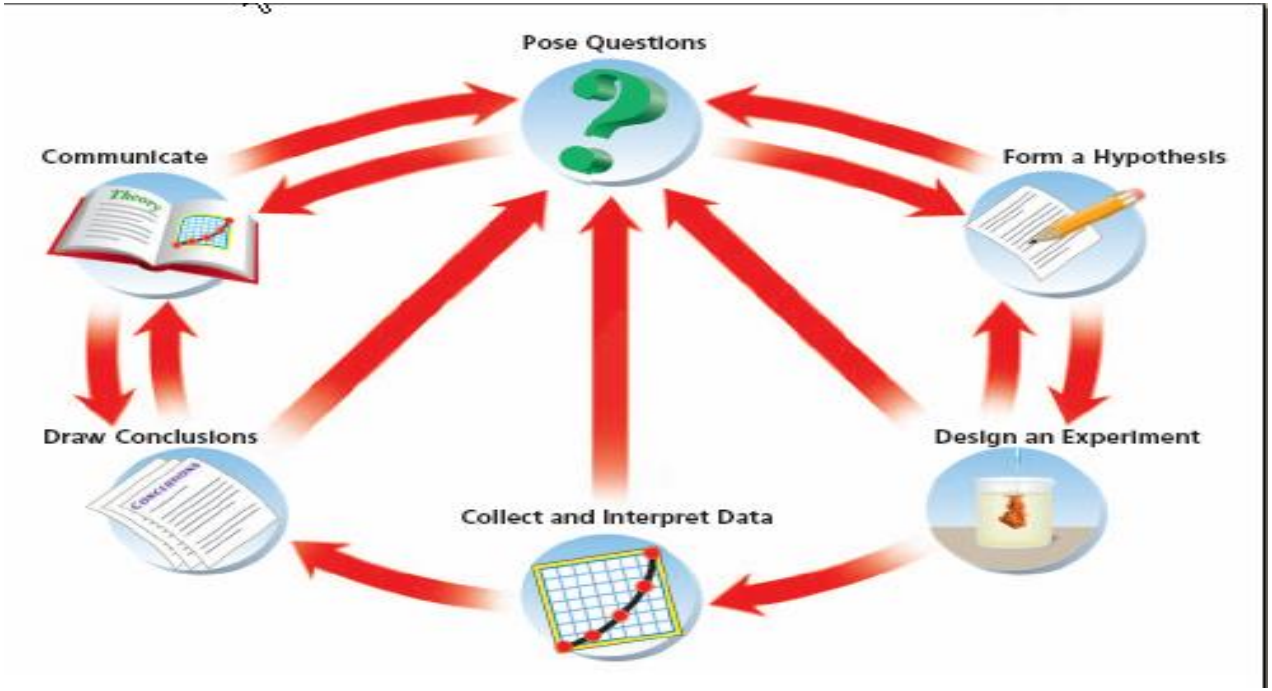
2 Main Areas:

a. Chemistry: the study of the properties of matter and how matter changes.

b. Physics: the study of matter and energy and how they interact.

Scientific inquiry

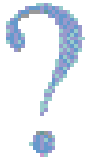
- A process used by scientists to answer questions and solve problems.



- **<u>The 6 Steps of Scientific Inquiry</u>:**
- posing questions
- developing hypotheses
- designing experiments
- collecting and interpreting data
- drawing conclusions
- communicating ideas and results

1. Posing Questions:

- answer by observations



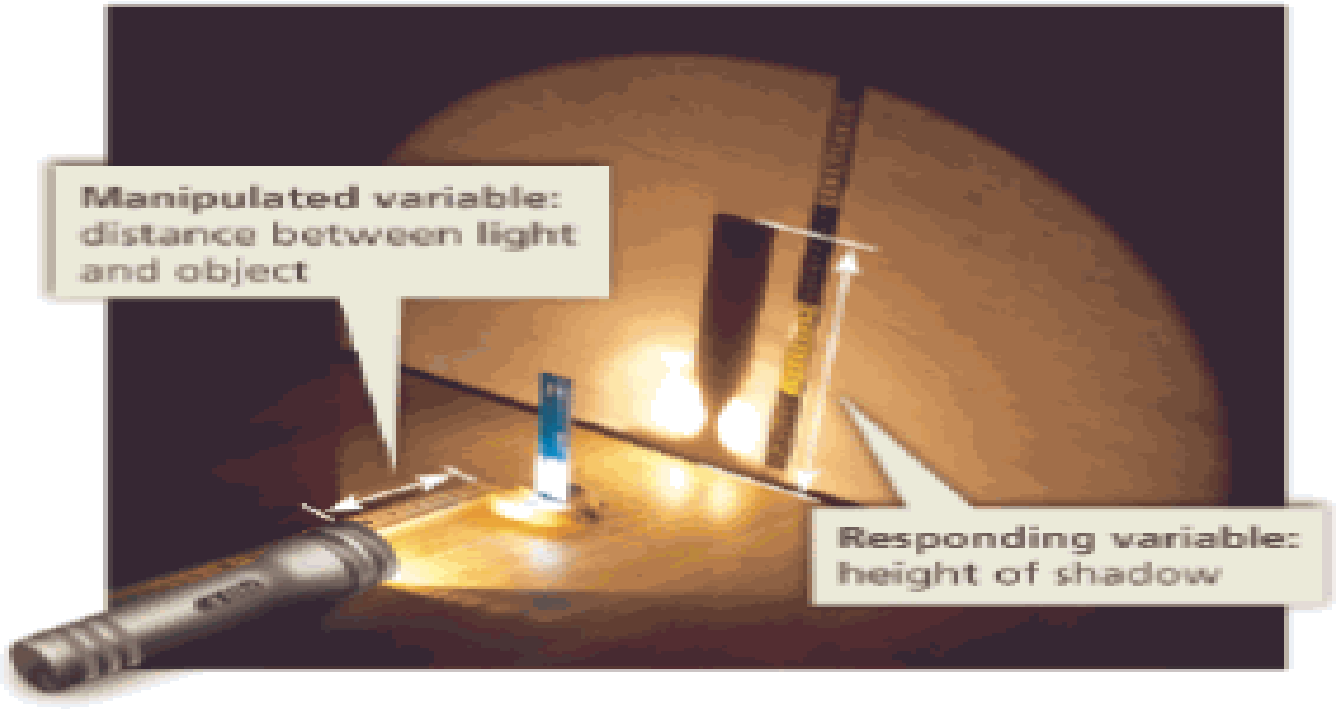
2. Developing Hypothesis:

- possible answer to scientific problem
- Should be written as an “If……then….” statement

3. Designing an Experiment:

- used to test a hypothesis

MANIPULATED VS. RESPONDING VARIABLE



RussLapoa

a. **variables**—factors that can change in the experiment

2 Types of Variables

i. manipulated/independent variable—variable that can be changed or tested

ii. responding/dependent variable—variable expected to change because of the independent variable or what you measure

- manipulated variables should cause changes in the responding variables

b. **Controlled Experiment:** an investigation in which all variables **but one** stays the same.

i. **Control Group:** Compares the results between two (or more) groups. “Normal” group. It does not receive the treatment or a variable. (it’s used as a **comparison** to the experimental group)

ii. **Experimental Group:** Group tested/receiving treatment/contains variable being tested.

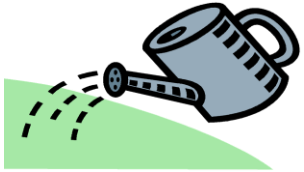
iii. **Constants:** variables that stay the same among both groups

Problem/Question:

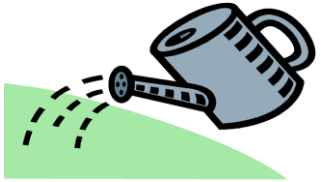
"How does plant food affect the growth of a tulip plant?"

EXPERIMENTAL VS. CONTROL

Experimental Group



Control Group



CONTROL VS. EXPERIMENTAL

- Control Group
- Tulips
- Water
- Sunlight

Manipulated variable = plant food

- Experimental Group
- Tulips
- Water
- Sunlight
- Plant food

Responding variable = plant growth

Try this!

You are the head of the research division of the Leafy Lettuce Company. Your company is experimenting with growing lettuce using hydroponic technology. Hydroponic technology involves growing plants in containers of growth solution in a greenhouse. No soil is used. The growth solution that the company uses contains water, nitrogen, and phosphorus. The company wants to know if adding iron to this formula will improve lettuce growth.

1. Identify the problem/question.
2. Develop a hypothesis.
3. Identify the control group.
4. Identify the experimental group.
5. Identify the manipulated variable.
6. Identify the responding variable.

4. Collecting and Interpreting Data:

- gather info in an organized manner and analyze
- represented by graphs or data tables

5. Drawing Conclusions:

- Written explanation reflecting data to see if it supports your hypothesis

6. Communicating:

- sharing ideas and conclusions
- writing, speaking, Internet, publishing article in scientific journal
- can lead to new questions, hypotheses, and new investigations

- **How Science Develops**:
- Scientists use scientific models, develop theories, and laws

- **model**—a visual aid to help understand an object or process (solar system)

- **law**—a statement that describes what scientists expect to happen every time under certain conditions (gravity)
- **theory**—a well-tested explanation for experimental results or observations (Darwin's Theory)

SAFETY IN THE LAB

We want to avoid this.

- Be prepared

- Read procedure carefully and prior to completing the lab
- Always listen to your teachers directions
- Keep your work area clean and organized
- Keep all lab materials on the lab table and away from the table's edge

AT THE END OF THE LAB…

- Clean up your lab table
- Put all materials, including items and lab equipment where you found them—everything has a home!!!
- **I AM NOT YOUR MAID!!!**
- Please RESPECT all materials that you use—they should be returned in the SAME condition in which you received them!!!