# The Nature of Science

# How to practice good science….

- Science is a process…not a just a set of facts.

- Science is dynamic and involves:
  - Investigation
  - Experimentation
  - Observation
  - Replication

# Investigation

- Definition:  carry out a systematic inquiry to discover and examine the facts of so as to establish a truth.
  - **It all starts with a question and a hypothesis.**
  - **Example:  Why do objects fall to the ground?**
    - **Hypothesis…**

# Experimentation

- How do we test this educated guess?
  - Experimentation often:
    - Rules out other factors
    - Confirms a factor

- Experimentation must be:
  - Observable
  - Able to be duplicated

# Your turn…

- With a partner
- Come up with question
  - Something your curious about...
- Then
  - Design an experiment to test this question…

# Results: Theories vs. Laws

- <u>Law</u>: An observation about nature, a summary of a natural event.
  - Many laws are mathematically proven.
  - A scientific law does not explain how or why something happens, but a scientific theory does.

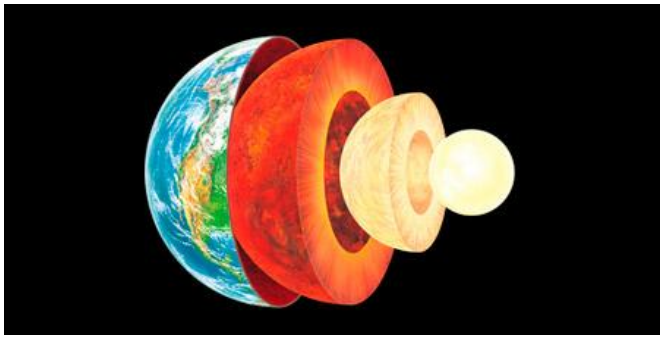
- <u>Theory</u>: Wide ranging idea that explains many different laws.
  - Theories (and science in general) are always open to challenges and testing. They are accepted until disproven.

# Examples of Laws and Theories

- Laws: Gas laws, Conservation of energy, law of gravitation

- Theories: Evolution, Atomic theory, plate tectonics, relativity

# Branches of Science



- Physical Sciences

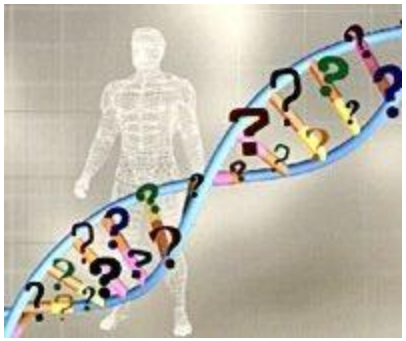
  Physics and chemistry

- Life Sciences

  Botany

  Zoology

  Ecology



- Earth Science

  Geology

  Meteorology

# Science and Technology

- Technology:  Application of science
  - Computers
  - Microscopes
  - Building construction
  - Weapons
  - Space exploration
  - Etc.

- Dark Ages

# Why does science work?

- Its consistent- Scientific method, Sig. Figs
- Its subject to change- Dynamic
- It can be tested over and over and over and over and over and over again ☺
  - Cure for cancer