Unit 1: Introduction to Science

- **1.1 The Nature of Science**
- 1.2 The Way Science Works
- 1.3 Organizing Data

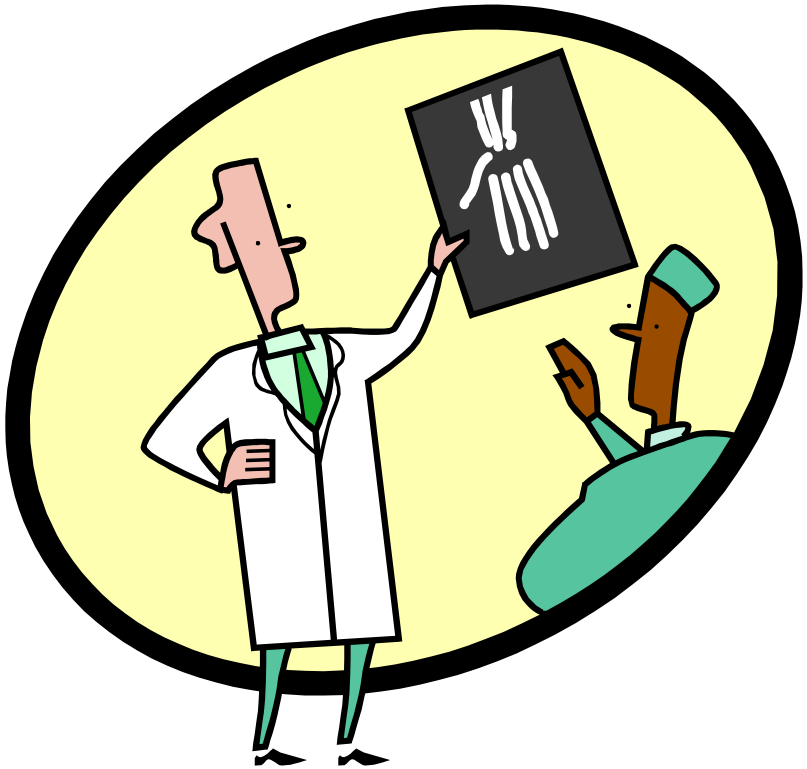
What Scientists Believe:

1. The universe can be described by basic rules.
2. The rules can be DISCOVERED through study and experimentation.

- A scientist may come up with a new hypothesis and experiment or simply check the results of other experiments.

Scientists do many things:

- Scientists:
  - Investigate
  - Plan experiments
  - Observe
    - Wilhelm Roentgen accidentally discovered X-Rays by following the above procedures
    - Alexander Fleming and penicillin
  - Test results



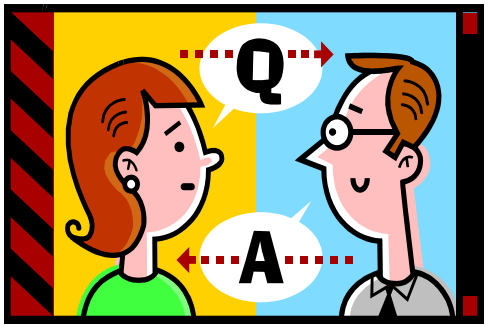
What is Science?

- Science is observing, studying and experimenting to find the nature of things.
- How does science impact your everyday life?

Scientific Inquiry

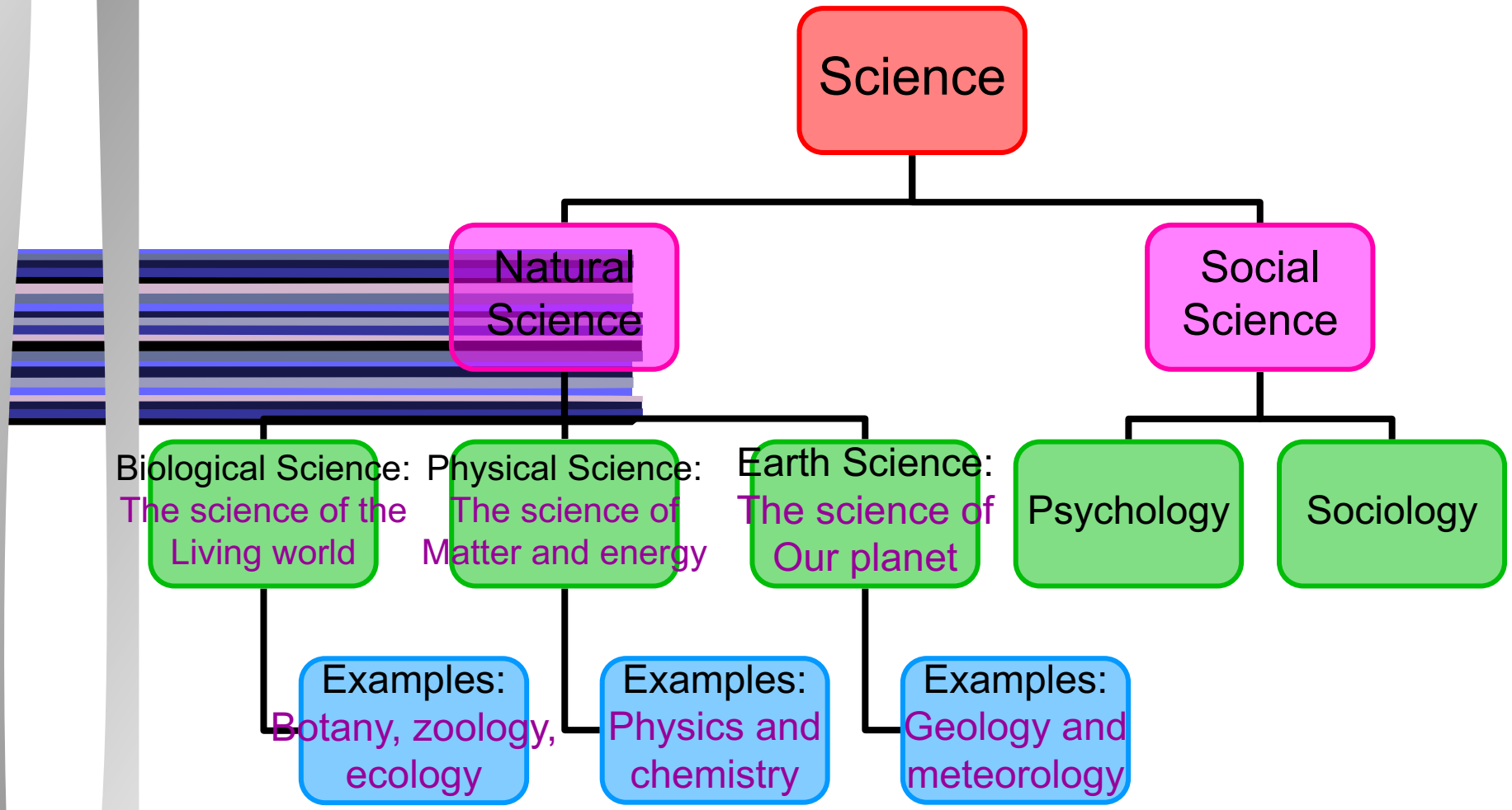
- Inquiry: A way of seeking information through questioning

Why a Scientist Performs Experiments



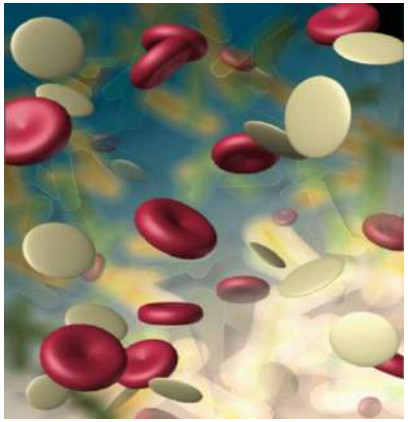
1. To find out something new about the natural world.
2. To explain something that is already known.
3. To check the results of other experiments.
4. To test predictions of current theories.

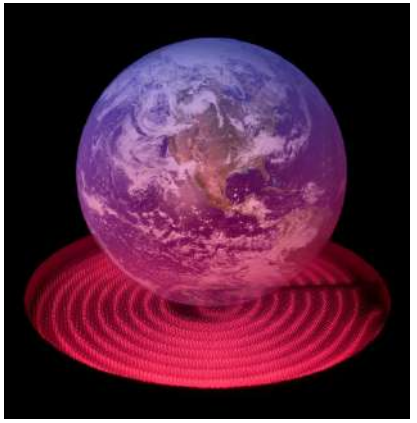
Science Has Many Branches



Branches of Science:

- These branches can intertwine:
  - Biochemistry: study of **matter** of **living** things
  - Geophysics: study of **forces** that affect **Earth**





Branches of Science

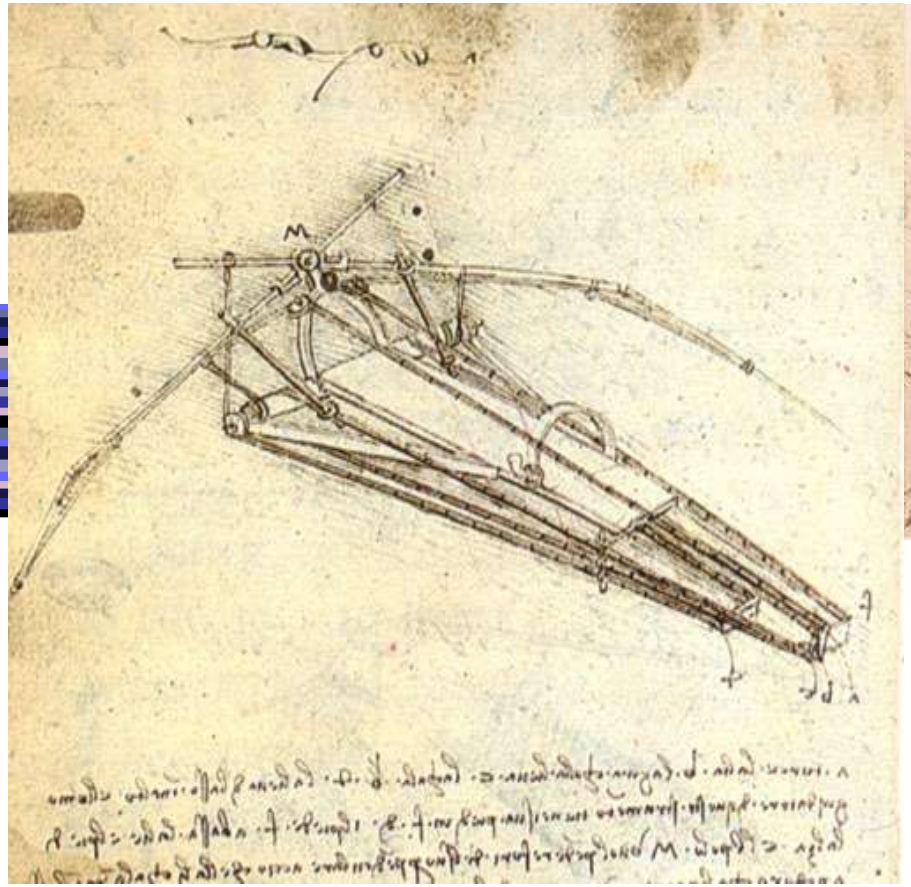
Branch of Science	Area of Study
Social science	Human behavior
Natural science	How the whole universe behaves
Biology	Living things
Botany	Plants
Zoology	Animals
Ecology	Balance in nature

Physical science	Matter and energy
Chemistry	Matter and its changes
Physics	Forces and energy
Geology	Earth's physical nature and history
Meteorology	The atmosphere and weather

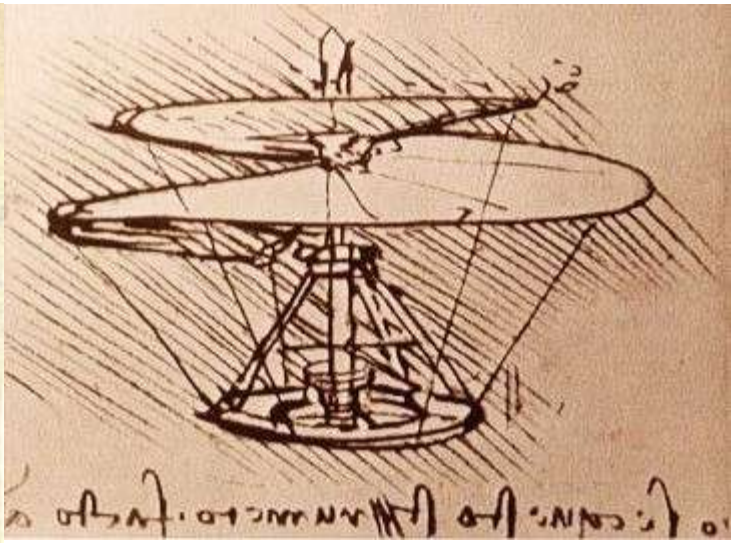
Science and Technology

- They work together and depend on one another.
  - Science: observing, studying, & experimenting to find the nature of things
  - Technology: using science to make human lives easier
    - Computers, cell phones, cars, answering machines
- Leonardo da Vinci: described and sketched ideas for many inventions years ahead of their time.

Leonardo da Vinci



Flying Machine



Aerial Screw
Helicopter

Other inventions: clocks, printing presses, drills, boats, cars, and battle tanks

Scientific Theories and Laws are supported by Observation:

- Scientific Theory: An possible **explanation** of a natural event
  - Example: Kinetic Theory of energy: explains why a saw blade gets hot when used.
  - A theory must pass the following tests:
    1. Explain observations simply and clearly.
    2. Be repeatable.
    3. You must be able to predict from a theory.
- Scientific Law: repeated observation about nature, but does not explain why or how something happens

Theories and Laws

- Theories and laws are NOT ~~ABSOLUTE; they can change as~~ new ~~discoveries are~~ made.
  - Example: People thought the world was flat for thousands of years
- Some scientific theories are impossible to test in the laboratory.
  - For example: how the continents move cannot be tested in a laboratory setting.

Qualitative vs. Quantitative Statements:

- A *qualitative statement* describes an event with words.
  - Examples:
    - The chalkboard is black.
    - There are posters on the wall.
- A *quantitative statement* describes with numbers or mathematical equations.
- Examples:
  - There are 10 posters on the wall.
  - The room has an area of 400 ft^2.

Scientific Models

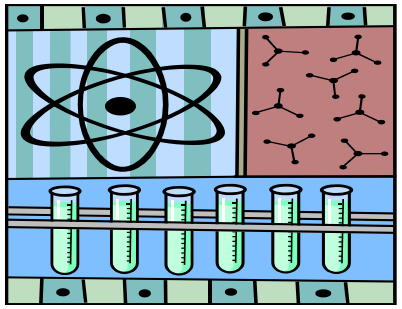
- A representation of an object or event used to understand concepts when the real object is too large, too small, or even too dangerous
  - Examples:
    - Globe
    - Model of an atom
    - Crash tests

Models can be:

•Drawings on paper

•A real object (spring to represent sound wave

•Mental “picture”



Homework Assignment

- Write at least 5 complete sentences describing how science and technology depend on one another. Include how they work together to make your everyday life easier.