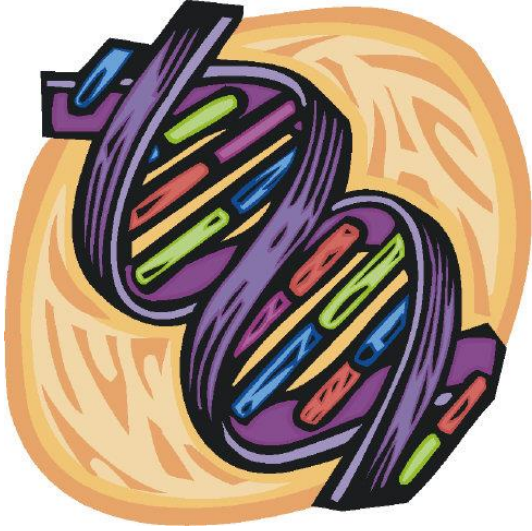
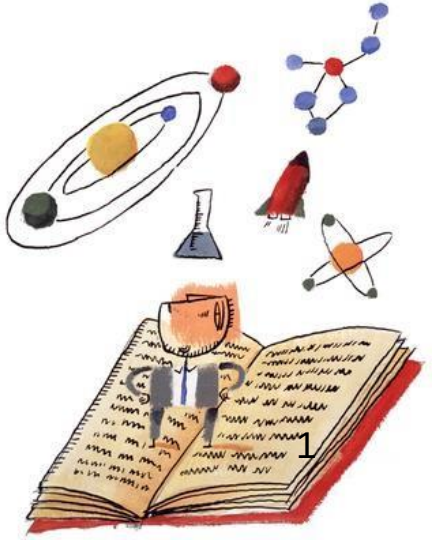


Nature of Science



Objectives

- What is Science
- Why Physics is the Basic Science
- Scientific Method
- Observation, Facts, Hypothesis, Laws, Principles, Models and Theories
- Science and Technology
- Science and Religion

How Old is Science?

- Begin before recorded history
- People observed repeating patterns in their environment which they used to their advantage. For example
  - Star patterns in the night sky (use to navigate)
  - The patterns of the seasons (when to plant and harvest, and animal migration)
  - Patterns in animal migration (food)

  These gave them some control over their environment .

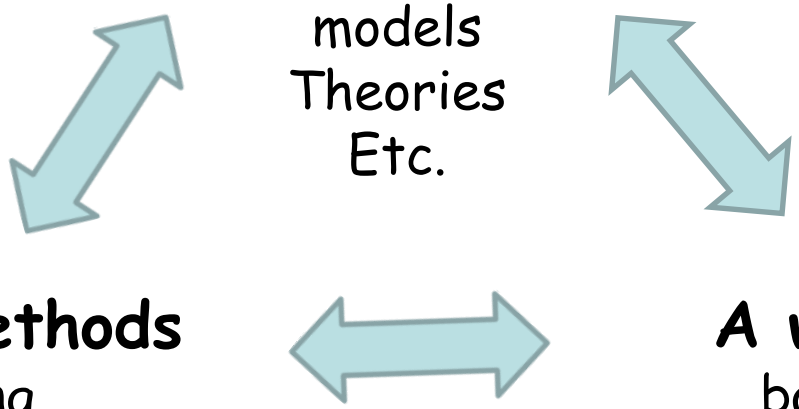
A Brief History of Science

- Ancient civilizations. For example the Egyptian civilization.
- Greeks third and fourth centuries BC. Known figures from that times Aristotle and Pythagoras.
- During the Dark Ages Chinese charted the stars and planets while Arab nations develop mathematics and learned how to make glass and paper.
- Science as we know it today was developed during the sixteenth century and was advanced by the printing press (fifteenth century).

What is Science

Science is: **A body of knowledge**

Facts
laws
models
Theories
Etc.



A set of methods

Observing
Measuring
Predicting
Hypothesing
Experimenting
Etc.

A way of knowing

based on evidence

What is Science?(cont.)

- Science is an organised body of knowledge
- Many different branches
  - Life Sciences - study of living things
    - Botany
    - Zoology
  - Physical Sciences - study of non-living things
    - Geology
    - Chemistry
    - Astronomy
    - **Physics**

What is Science? (cont.)

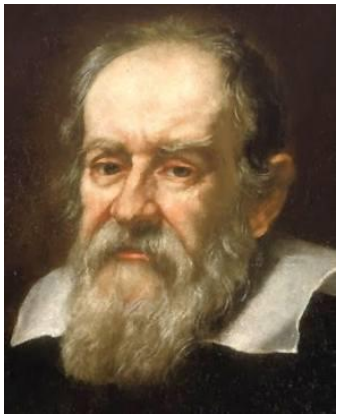
- Science is more that a body of knowledge.
- It is also a method of exploring nature and discovering the order within nature, i.e. the rules that governs it.
- Science is also a tool for solving problems.

The Basic Science – Physics

- Study of how matter and energy interact
- Studies motion, forces, energy, matter, heat, sound, light, and composition of atoms
- Forms the basis for all other sciences
- Once things get small enough, chemistry essentially becomes physics
- Much of biology is nomenclature and organic chemistry
- Thus, biology builds on chemistry, while chemistry builds on ***physics!***

Scientific Method

- A way science gets done



- A method to gain, organise,
- and apply new knowledge

- It's been around for a while…

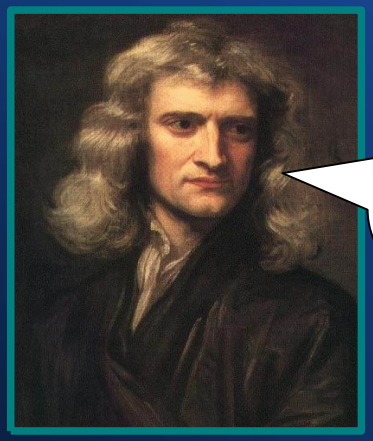
- Principal founders of method
  - Galileo Galilei (1564 - 1642)
  - Francis Bacon (1561 - 1626)

Scientific Method

1. Recognise a problem
1. **Make a guess** (many times a bold guess) about a solution – called a hypothesis
1. **Predict/compute the consequences** of the hypothesis
1. Perform experiments to **test the predictions**
1. Formulate the simplest general rule that organises the problem, the hypothesis, and the experimental results

My Bold Guess

Nuclear collectivity is related to how the elements are created!



No great discovery was ever made without a bold guess.

Sir Isaac Newton

Scientific Method

“If it disagrees with experiment, it’s wrong. In that simple statement is the key to science.” — Richard Feynman

https://www.learnaboutonline.org/science.html#

Scientific Attitude

- Not all of the discoveries are the result of following the scientific method
- Trial and error, experiments without guessing, accidental discovery
- Attitude helps in discovery
  - Inquiry
  - Experimentation
  - Humility