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## Chapter 1: About Science

### I. The Basic Science-**Physics** (1.1)

A. **Science** is the present day equivalent of what used to be called **natural philosophy**.



1. Natural Philosophy studied unanswered questions about nature.
2. As answers found-became part of what is now called science.

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Many early cultures use **celestial** objects(stars and planets) to tell the **time of year** and for **navigation**



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B. Science today branches into study of living things and nonliving things.

1. **Life sciences**– biology, zoology, botany, etc.

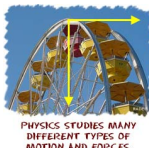
2. **Physical science**– areas such as geology, astronomy, chemistry, and physics.



C. **Physics** is most basic of all sciences

1. Studies motion, forces, energy, matter, heat, sound, light and composition of atoms. (Studies matter and energy and their relationships)

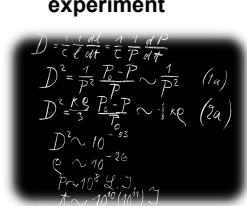
2. Physics is basis for understanding of all other sciences



## II. Mathematics-The Language of Science (1.2)

A. Science transformed in 17th century when nature analyzed and described **mathematically**.

B. When findings in nature expressed mathematically-easy to verify or disprove by **experiment**



### III. The Scientific Method (1.3)

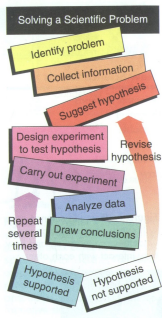


A. Method created by Galileo Galilei (1564-1642) and Francis Bacon (1561-1626)

1. Effective method in gaining , organizing, and applying knowledge.

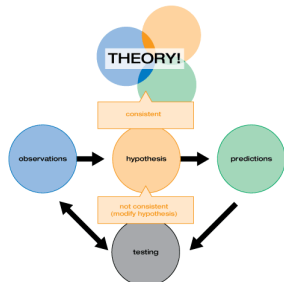


2. Scientific Method involves series of steps:



- Recognize a problem (**observation**)
- Make an educated guess (**hypothesis**) about the answer.
- Predict** the consequences of hypothesis
- Perform **experiments** to test predictions
- Formulate the simplest general rule that organizes the three main ingredients: hypothesis, prediction, and experimental outcome (**analysis and conclusion**)

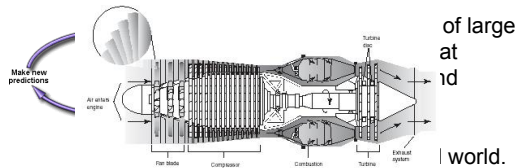
- If original hypothesis is valid, conduct further experiments to verify
- If original hypothesis incorrect, form new hypothesis.



#### IV. The Scientific Attitude (1.4)

A. **Fact**– in science it is a close agreement by competent observers who make a series of observations of the same phenomenon.

B. When hypotheses are tested over and over again and not contradicted they may become **law** or **principle**.



Ancient Greek philosophers (2500 years ago) said Earth made up of 4 elements: **Earth, Water, Air, Fire**.

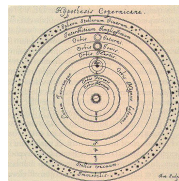


**Copernicus** (16th century) caused great controversy when said Earth revolved around the sun.



Conflicted with popular view and church teachings

Ideas banned by church for 200 years.





## V. Scientific Hypotheses: Must Be Testable (1.5)

A. Before hypothesis classified as scientific, must link to a general understanding of nature and conform to a cardinal rule.

1. **Rule: It must be testable**

a. Must be test for proving it **wrong** as well as **correct**

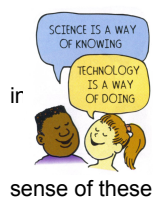
b. If no test for its possible wrongness, then it is not

scientific.

B. **Speculation**— can neither be proven right or wrong

## VI. Science, Technology, and Society (1.6)

A. Science and technology are different

1. **Science**— method of answering theoretical questions

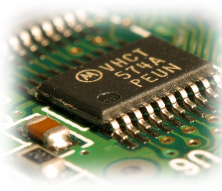
a. Has to do with discovering facts and relationships between observable phenomena

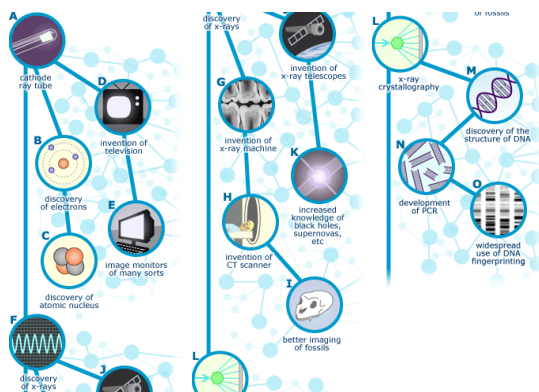
b. Establishing theories that organize and make facts and relationships.

2. **Technology**

a. method of solving practical problems.

b. has to do with tools, techniques, and procedures for putting findings of science to use.






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VII. Science, Art, and Religion- The search for order and meaning in the world takes different forms (1.7)

A. **Science**— mostly concerned with discovering and recording natural phenomena

B. **Arts**— concerned with the value of human interactions as they pertain to the senses.

C. **Religion**— concerned with the source, purpose, and meaning of everything.




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