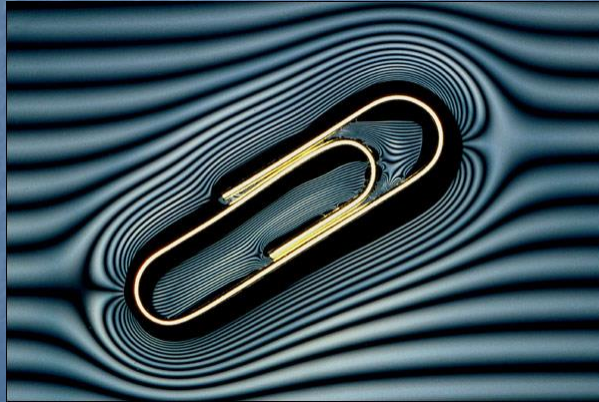


Physical Science

Chapter 1



What we will learn

- What is Science and different types
- Identify steps of the scientific method
- Describe why scientists use variables

What is Science?

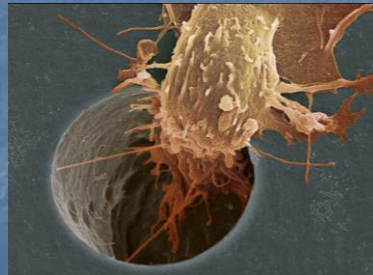
- **Science** – can be defined many ways
 - Is the effort to discover, and increase human understanding of how the world works
 - A method for studying the natural world
 - A process that uses observations and experimenting to gain knowledge about things in nature
- **What is the purpose of Science?**
 - The purpose of science is to explain the world around us
 - Science enables us to improve our quality of life, in many cases quite dramatically



Types of Science

■ 2 Types of science

- **Pure science** (fundamental science)
 - doing research just to learn. It describes the most basic objects, forces, relations between them and laws governing them
- **Applied science** (Practical science)
 - The application of research (pure science) to human needs



This cancer cell is moving down a pore in a filter. They are studying this cell in hopes of finding a cure.

3 Categories of Science

1. **Life Science** – studies living things
2. **Earth Science** – studies Earth and space
3. **Physical Science** – studies matter and energy



Physical Science - Terms

- **Physical Science** – Study of matter and energy
 - Looks at the composition and properties of matter
 - Matter? – anything that takes up space
- **Properties** – What matter is like and how it behaves
- **Observations** – Information gathered from using one of your 5 senses
 - Sight, smell, taste, touch, hearing
- **Inferences (conclusion)** – Solution based on observations made

When performing scientific investigations we must eliminate bias by making correct observations, not **inferences**

Ex: It is cloudy outside, its going to rain

Science terms

- **Scientific Exercise**
 - Steps are given
 - Example: Labs in physical science
- **Scientific Problem**
 - Steps of solving problem are not known
 - Example going to Mars
- **Scientific Law**
 - Rules of nature
 - Predict what will happen
- **Theory**
 - Explanation based on many observations
- **Can Theories or laws change??**
 - Yes
 - Examples:
 - World is flat
 - Sun rotates around Earth
 - Earth is center of Universe

Science terms

Qualitative vs. Quantitative

Qualitative measurements

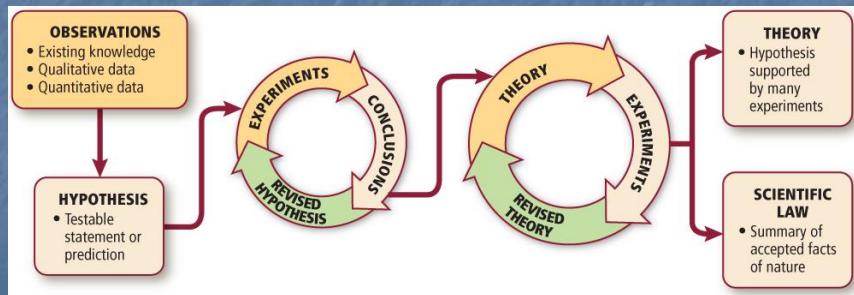
- General, vague, descriptive measurements without units
 - Hot outside
 - He is tall
 - That table is heavy

Quantitative Measurements

- Give numbers in a definite form, usually as numbers and units
 - The temperature is 98°F
 - He is 6' 6" tall
 - The table weighs 56 Kg

Scientific Inquiry/Scientific Method – an organized way of questioning and investigation procedures

- The steps in a **scientific method** are repeated until a hypothesis is supported or discarded.



Scientific Method (scientific inquiry)

Observations → Hypothesis → Experiments → Theory

1. Observations

- What do you want to find out?
- Any information gathered by using 5 senses

2. Form Hypothesis

- Educated guess – develop a theory or a solution to the problem

3. Experiments

- What experiment can you use to prove your theory?
- Data is facts, figures, and other evidence gathered during observations
- Test of hypothesis

4. Theory

- Look at results
- Did your test prove or disprove your theory?
- Make a conclusion based on observations and experiments

4 Parts of an Experiment

1. Control

- Standard for comparison
- The situation that you compare to the other variables too

3. Manipulated Variable (Independent variable)

- Variable that varies
- Factor adjusted by experimenter

2. Constant

- Factor or factors that doesn't vary in an experiment

4. Responding Variable (Dependent Variable)

- Depends on the independent variable
- Variable that is expected to change

Independent Variable VS Dependent

- **Independent variable:** What the scientist changes or what changes on its own.
 - **Two examples of common independent variables are age and time.** There's nothing you or anything else can do to speed up or slow down time or increase or decrease age. They're *independent* of everything else
- **Dependent variable:** What is being studied/measured.
 - The dependent variable (sometimes known as the responding variable) is what is being studied and measured in the experiment.

9 steps to thinking like a Scientist

1. Posing a question
2. Observing
3. Inferring
4. Develop a hypothesis
5. Design a controlled experiment
6. Collect data
7. Interpreting data
8. Drawing conclusions
9. Communicating information

Scientific Theories and laws

- **Theory** – an **explanation** of things based upon many observations and investigations
 - A theory can be used to explain why or how something happens
- **Scientific law** – a statement about what happens in nature that seems to be true all the time
- Scientific laws will **predict** what will happen in certain situations, but will never explain why
- A theory can be used to **explain** a scientific law

Using Science - Technology

- **Technology** – the application of science to help people
- Science can lead to technology or vice versa
- Not all technology is good!
ex: Nuclear energy? Genetic engineering?

