

A spiral-bound notebook with a light-colored, textured cover. The spiral binding is on the left side. The text is centered on the cover.

# Life Science

## Chapter 1

### **Exploring and Classifying Life**

# What is Science?

- Science - an organized way of studying things and finding answers to questions
- Science is about Critical thinking?
  - a process that uses certain skills to solve problems

# Scientific methods

- -an organized way to solve a problem using a series of procedures



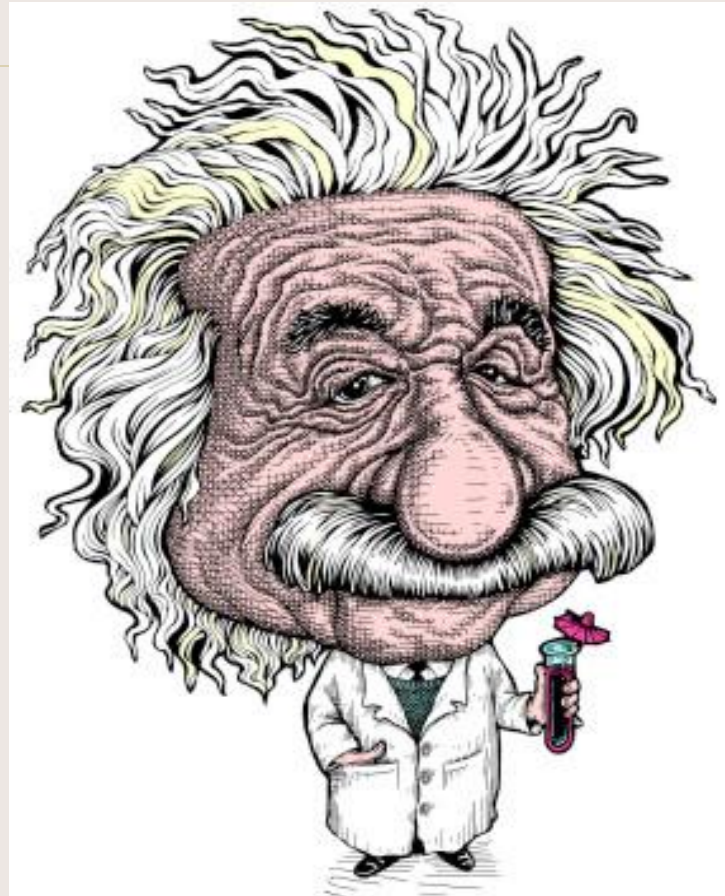
# Steps to the Scientific Method

- 1. State the problem.
- 2. Gather information.
- 3. Form a hypothesis, or a prediction that can be tested.
- 4. Test the hypothesis with an experiment.
  - a. Variable is something in an experiment that can change.
  - b. Control is the standard of comparison in an experiment; cannot change
- 5. Analyze data.
- 6. Draw conclusions.
- 7. Report results.

# Five Main Steps ?

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- Problem
- Hypothesis – Possible Solution
- Experiment- Test hypothesis
- Conclusion – Analyze data and draw conclusion
- Report



**Discussion Question:**  
**Why is it important to form a hypothesis?**

# Theories and laws

- Scientific theory- an explanation of things or events based on scientific knowledge; the result of many observations and experiments
- Scientific law a statement about how things work in nature

# Measurement


- Measurement is required in science
- In Science we use the SI System of measurement which is based on the Metric system.





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Measurement  
&  
SI System

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- I. The SI System is based mainly on the metric system.**
  - II. Reasons to use the metric system**
    - A. Based on 10 and multiples of 10**
    - B. The Old English system is not based on any certain number or pattern**



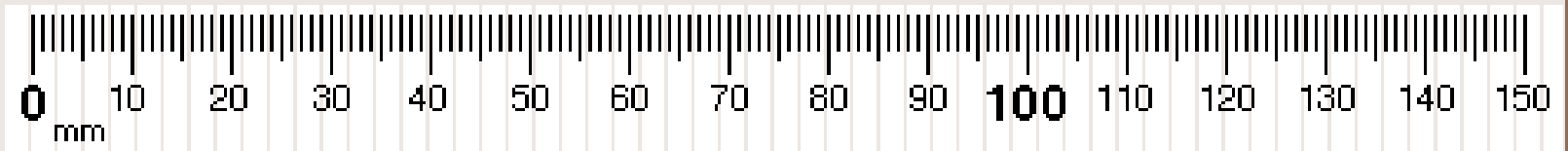
**C. The metric system has basic terms that are used each measurement**

- 1. All length use the meter**
- 2. All masses use the gram**
- 3. Volume uses the Liter, or cubed length**

**D. The metric system has six prefixes to these units that describe how much of or how many of the unit there is.**

- 1. milli –  $1/1000$  or 0.001**
- 2. centi –  $1/100$  or 0.01**
- 3. deci –  $1/10$  or 0.1**
- 4. deka – 10**
- 5. hecto – 100**
- 6. kilo – 1000**

**E. To do metric conversions all you do is multiply or divide by 10, or move the decimal point.**



## Metric Conversion Table

<b>kilo</b>	<b>hecto</b>	<b>deka</b>	<b>unit</b>	<b>deci</b>	<b>centi</b>	<b>milli</b>
<b>1000</b>	<b>100</b>	<b>10</b>	<b>1</b>	<b>0.1</b>	<b>0.01</b>	<b>0.001</b>

*Move the decimal point the same direction as you count across the line. The unit is the gram, meter, or liter.*

## Abbreviations

*Meter – m, Liter – L, Gram – g, Kilo – k, Hecto – h, Dekka – da, Deci – d, Centi – c, Milli – m*

# Living Things

- **How are living things, or organisms, alike?**
  - **Living things are organized.**
    - Cell-the smallest unit of an organism that carries on the functions of life
    - Each cell has an orderly structure and contains hereditary material.
  - **Living things respond.**
    - Stimulus-anything that causes some change in an organism
    - Response-the way an organism reacts to a stimulus, often results in move-ment
    - Homeostasis-maintaining the proper conditions inside an organism
  - **Living things use energy.**
  - **Living things grow and develop.**
    - Growth of many-celled organisms is due to an increase in the number of cells.
    - Growth of one-celled organisms is due to an increase in the size of the cell.
    - Development-changes that take place during the life of an organism
  - **Living things reproduce.**

# All living things have levels of organization

1. **Cells together make tissues**
2. **Tissues together make organs**
3. **Organs together make systems**
4. **Systems together make complex organisms**  
(There can be organisms at any level)





# What do living things need?

- A place to live that provides for all of the organism's needs
- Raw materials, like water, proteins, fats, and sugars
- **Discussion Question-**
  - What do you have in common with a flower?

# Exploring and Classifying Life

- **Where does life come from?**
- Spontaneous generation-early theory that living things could come from non-living things; disproved by Louis Pasteur in the mid-1800s

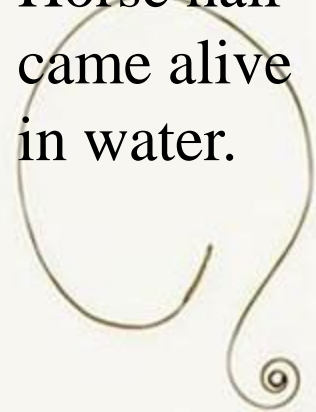
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# Where life comes from

- Spontaneous Generation - People once believed that living could come from nonliving.



Horse hair  
came alive  
in water.



# Pasteur's Experiment



(a)

A flask is filled with broth, and its neck is drawn out into an S shape. The broth is boiled to kill any preexisting microorganisms.

(b)

As the broth cools, a puddle of condensing water forms in the bottom of the S, effectively sealing the mouth of the flask. No microorganisms grow in the broth.

(c)

If the neck is later broken off the flask, outside air can enter, carrying microorganisms to the broth. Soon, the broth swarms with microorganisms.

## Figure 19-1 Spontaneous generation refuted

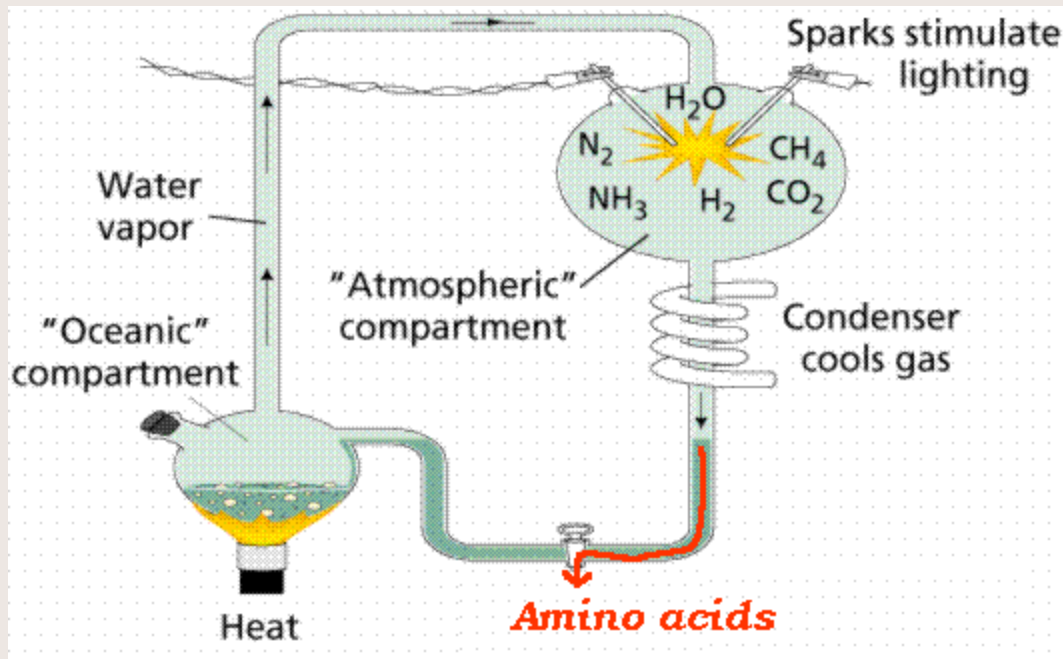
Pasteur's experiment disproving the spontaneous generation of microorganisms in broth.

# Biogenesis-theory

- The result of Pasteur's work is the theory of Biogenesis –
  - “At this present time all living things come only from other living things.”

# Where did life originate?

- Oparin's Hypothesis
- Miller's experiment



# Where did life originate

- Alexander I. Oparin's hypothesis on the origins of life-gases in Earth's early atmosphere combined to form more complex compounds found in living things.
  - gases:
    - ammonia
    - Hydrogen
    - Methane
    - water vapor

Stanley Miller and Harold Urey tested Oparin's hypothesis and showed that chemicals found in living things could be produced.

# Discussion Question

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- **Why didn't Miller and Urey's experiment prove Oparin's hypothesis?**



# Classification systems

- Aristotle classified organisms more than 2,000 years ago.
- Carolus Linnaeus introduced a system based on similar structures of organisms.
- Modern systems based on phylogeny-the evolutionary history of an organism

# Today's classification system

- separates organisms into 6 kingdoms.
  - Kingdoms are the first and largest category.
  - The smallest classification category is a species.
  - Organisms that belong to the same species can mate and produce fertile offspring.

# Binomial nomenclature

- -two-word system used by Linnaeus to name species
  - 1. First word identifies the genus or group of similar species.
    - It is the noun
  - 2. Second word tells something about the species-what it looks like, where it is found, or who discovered it.
    - Adjective
    - 3. Why use scientific names?
      - a. To avoid mistakes
      - b. To show that organisms in the same genus are related
      - c. To give descriptive information
      - d. To allow information to be. organized easily
- \*know why we use scientific names.

# C. Tools for identifying organisms

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- 1. Field guides-descriptions and illustrations of organisms
- 2. Dichotomous keys-detailed lists of identifying characteristics that include scientific names

# Discussion Question

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- **How do scientific names show you that organisms are related?**