A sloth is hanging from a tree branch in a forest. The sloth is the central focus, with its body and limbs visible as it grips the branch. The background is filled with green leaves and tree trunks, creating a dense, natural setting. The overall image has a soft, slightly faded appearance, which makes the overlaid text stand out.

Unit 1

Nature of Science

Scientific Inquiry

- **Objective 1:**

- **Goals:**

- Manipulate variables, collect, organize, and analyze data accurately, interpret results and draw conclusions.
 - Identify and clarify biological questions and design experiments.
 - Safely use laboratory equipment and techniques when conducting scientific investigations.

Science?

The goal of science is to help us understand the natural world and improve people's lives.

Thinking like a scientist can help you solve problems and think critically about your world.



Scientific Thought

Scientific thought involves making observations, using evidence to draw conclusions, being skeptical about ideas, and being open to change when new discoveries are made.



“Walking Tree”

Scientific Investigation

Science is a universal language. Scientists all over the world follow the same steps when conducting a scientific investigation.

These steps are called the Scientific Method.



The Scientific Method

- Make an observation
- Ask questions
- Develop a hypothesis
- Test the hypothesis with an experiment
- Analyze and interpret results
- Make a conclusion

The Scientific Method Broken Down

Observation: Using your senses to gain information

Hypothesis: a possible explanation of the observations that can be tested. (An educated guess)

Experiment: procedure that is carried out under controlled conditions to test a hypothesis.

Conclusion: explanation of results that accept or reject the hypothesis.

Variables

A carefully planned experiment should isolate one variable the is being changed.

Independent Variable: the only thing in the experiment that is purposefully changed.

Dependent Variable: factors that change in response to the independent variable. (what is measured)

Control Group: this group serves as a comparison because it receives NO experimental treatment.

Constants: aspects of the experiment that are kept exactly the same throughout all of the trials.

Graphing

One way to analyze data is through graphing. A proper graph always includes the following:

1. Title
2. Labeled Axes (DRY MIX: dependent responds on the Y, manipulated independent is on the X)
3. Accurate X and Y ranges
4. Plot the correct points



Experimental Design

When designing an experiment you must include the following:

1. Hypothesis
2. Experiment
 - a. Procedure
 - b. Independent and Dependent Variables
 - c. Data analysis plan
3. Conclusion

Lab Safety

1. Listen carefully to your teacher and follow all instructions.
2. Read Lab procedure carefully
3. Tie back loose clothing and long hair.
4. Measure precisely
5. Never taste or smell any materials unless told to do so.
6. Keep lab area clean

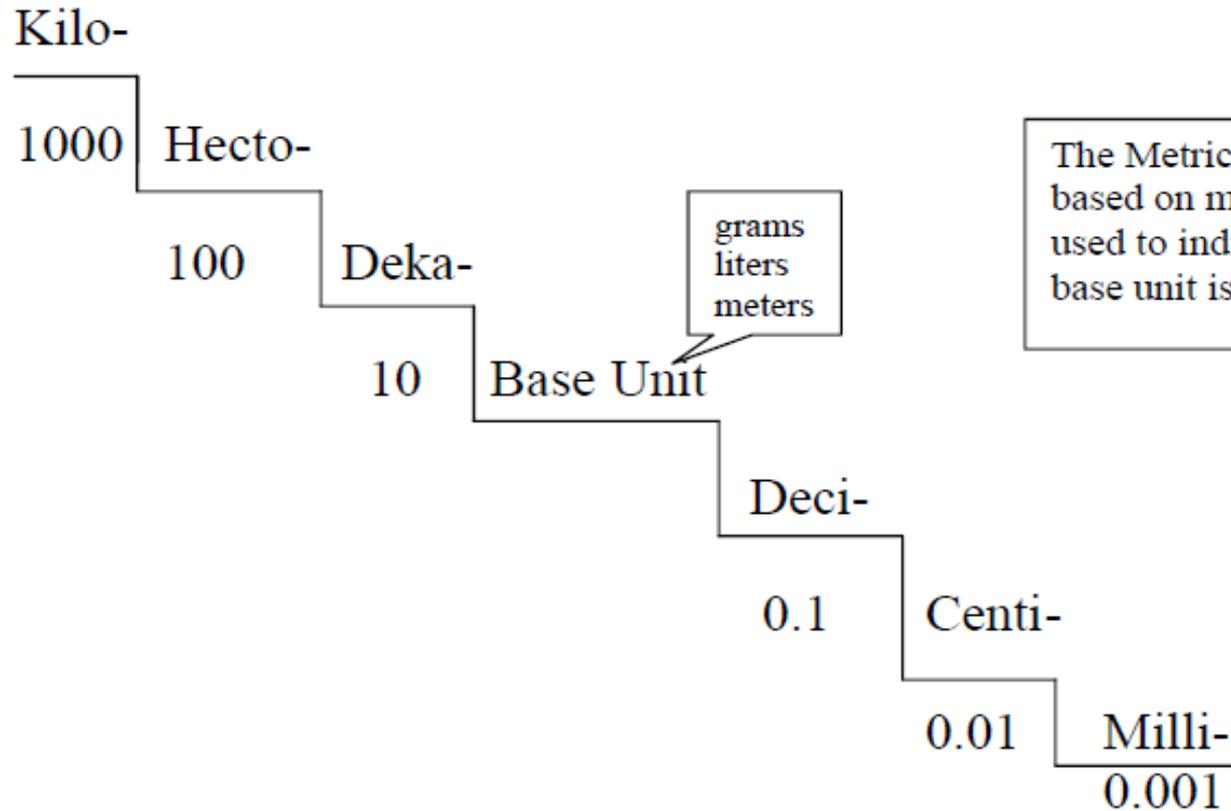
If an accident occurs, stay calm, and tell your teacher immediately.

Math and Measurements

Goals:

- Use appropriate SI units for length, mass, time, temperature, quantity, area, volume, and density, and describe the relationships among SI unit prefixes and how SI units are related to analogous English units.
- Use graphical models, mathematical models, and simple statistical models to express patterns, and relationship determined from sets of scientific data.

Metric System



The Metric System of measurement is based on multiples of 10. Prefixes are used to indicate what multiple of 10 the base unit is being multiplied by.

Measurements

Length= meters

Volume = Liters

Mass= grams

What is Science

The goal of science is to help us understand the natural world and improve people's lives.

Tries to answer 3 basic questions:

- What's there?
- How does it work?
- How did it come to be this way?

Hypothesis/Theory/Law

Hypothesis: a possible explanation for observations

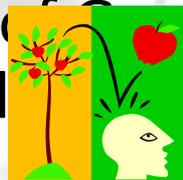
Theory: Well tested explanation that unifies a broad range of observations

- Allows scientists to make accurate predictions about new situations
- Not considered absolute truth



Law: A natural occurrence that has been proven to happen whenever certain conditions exist.

- They do not describe why, just that something will happen
- Newton's Law of Gravity: when something is dropped on Earth it will fall



What is Biology?

The study of living things and their relationships to each other.

Biological research allows us to understand these relationships.

Characteristics of Life

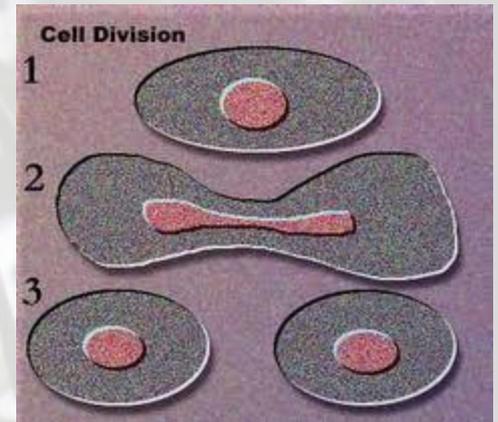
There are seven characteristics that all living things exhibit.

All Living things:

1. Reproduce: Sexual- two parents, Asexual- a single cell divides in half.
2. Are based on a genetic code- flies produce flies, dogs produce dogs
3. Grow and develop- distinctive life cycles
4. Obtain and use materials and energy
5. Respond to environment- Adaptation: organisms become like their surroundings.
6. Maintain a stable internal environment- homeostasis
7. Are organized (Hierarchy of life)

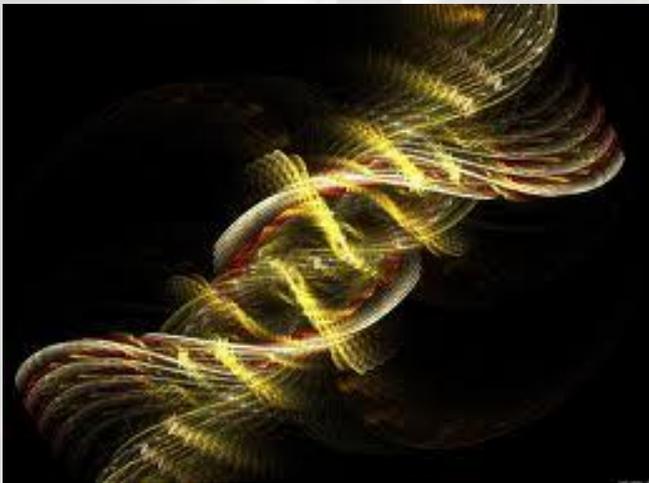
Living things reproduce

- All living organisms produce new organisms through reproduction.
 - Sexual: two cells from different parents unite to produce the first cell of the new organisms
 - Asexual: a single cell divides in half to form two new organisms.



Living things are based on a universal genetic code

- Organisms inherit traits from their parents.
 - Flies produce flies, dogs produce dogs, and seeds from maple trees produce maple trees.



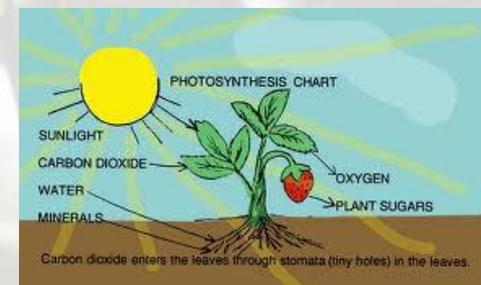
Living things grow and develop

- Each type of organism has a distinctive life cycle- a pattern of growth and change that occurs over the organism's lifetime.
 - Some organisms simply grow or change in size
 - Some organisms develop- cells increase in number but also differentiate.



Living things obtain and use materials and energy

- All organisms take in selected materials that they need from their surroundings or environment. But the way they obtain energy varies.
 - Plants, some bacteria, and most algae obtain their energy directly from sunlight through photosynthesis.
 - Most other organisms consumer another organism to obtain energy.



Living things respond to their environment

- Organisms live in constantly changing environments
 - Organisms must change or ADAPT to survive in certain environments.
 - Ex: A seed can only germinate when there is sufficient water and the ground is warm enough.



Living things maintain a stable internal environment

- The process by which organisms keep their internal conditions constant is called **homeostasis**.
 - Humans keep a relatively constant internal temperature of 98.6 °F.



Living things are Organized

- Hierarchy of life:
 - Cell -> Tissue -> Organ -> Organ System -> Organism -> Population -> Community -> Ecosystem -> Biome -> Biosphere -> Earth

