Scientific Explanations
Lesson 1: Understanding Science

Science: the investigation and exploration of natural events and of the new information that results from those investigations

- When you observe the natural world, you form questions what you see. You then explore those questions with reasoning, creativity, and skepticism to find answers.
- Without thinking about it, you use science in almost everything you do

Three branches of Science

- **Life Science:** the study of living things (also called Biology)
- **Earth Science:** the study of Earth, including its landforms, rocks, soils, and forces that shape Earth's surface
- **Physical Science:** the study of chemistry and physics using interaction of matter and energy

Scientific inquiry: process that uses a set of skills to answer questions or to test ideas about the natural world

- Includes possible steps:
    - Ask questions
        - **Observation:** act of using one or more of your senses to gather information and taking note of what occurs
        - **Inference:** a logical explanation of an observation that is drawn from prior knowledge or experience
    - Hypothesize and Predict
        - **Hypothesis:** possible explanation for an observation that can be tested by scientific investigations
        - **Prediction:** a statement of what will happen next in a sequence of events
    - Test Hypothesis
        - Design an experiment
        - Make a model
        - Gather and evaluate evidence or research
        - Collect Data/Record observations
    - Analyze Results:
        - Graph Results
        - Classify Information
        - Make Calculations
    - Draw Conclusions:
        - Conclusion: summary of the information gained from testing a hypothesis
    - Communicate Results
        - Write Science Journal Articles

- Speak at Science Conferences
- Exchange information
- Report it to your TEACHER

Results and conclusions from an investigation can lead to many outcomes:

- Technology: practical use of scientific knowledge, especially for industrial or commercial use
- New Materials
- Possible Explanations: answers questions of who, what, when, where, or how

Scientific Theory	**Scientific Law**
Definition: an explanation of observations or events that is based on knowledge gained from many observations and investigations It is the best explanation of observations unless it is disproved.	Definition: describes a pattern or an event in nature that is always true
Example: The cell theory	Example: Newton's Law of Gravitational Force
Reason: Explains that all living things are made of cells. It will continue to explain the makeup of all organisms until an organism is discovered that is not made of cells	Reason: It will imply that if you drop an object, it will fall towards the Earth not why it will do that.
Explains **how and why** an event occurs	States that an event in nature **will occur under specific conditions**

Critical Thinking: comparing what you already know with the information you are given in order to decide whether you agree with it.

- Reduce bias during scientific investigations.
    - Bias – intentional or unintentional prejudice toward a specific outcome.

Science cannot answer all questions especially if it pertains to personal opinions, values, beliefs, and feelings.

- Some people use scientific evidence to strengthen their claims about these topics.

Safety in science: be aware of the safety symbols, wear appropriate safety equipment, and listen to all instructions.

Ethics: rules of conduct or moral principles

- Animals should be treated properly
- Scientists should tell research participants about potential risk and benefits of the research.
    - Anyone can refuse to participate.