Chapter 1
The Nature of Science

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Section 1.1 - What is science?
Vocabulary – Chapter 1 (section 1)

- **Science**: is a way of learning about the natural world
- **Scientific Theory**: an attempt to explain a pattern observed in the natural world
- **Scientific Law**: a rule that describes a pattern in nature
- **System**: is a collection of structures, cycles, and processes that relate to and interact with each other
Vocabulary – Chapter 1 (section 1)

• Life Science: the study of living systems and the ways in which they interact
• Earth Science: the study of Earth systems and the systems in space
• Physical Science: the study of matter and energy
• Technology: is the practical use of science, or applied science
Section 1: What is science?

A. Science is a way of learning more about the natural world.

1. Scientists ask questions about the natural world, but questions about art, politics, personal preferences, or mortality can’t be answered by science.

2. Answers are uncertain because new knowledge and discoveries are continually being made.

3. Scientific theory – an attempted explanation for repeatedly observed patterns in the natural world.

4. A rule that describes a pattern in nature is a scientific law.
Section 1: continued

B. Scientists study systems – collections of structures, cycles, and processes that relate to and interact with each other.

C. Science is divided into three main branches that study different systems.
   1. Life science studies living things and how they interact.
   2. Earth and space systems are studied in Earth science.
   3. Physical science studies matter and energy.
   4. The practical use of science is called technology.
Section 1.2 – Science in action
Vocabulary – Chapter 1 (section 2)

• Hypothesis: reasonable guess that can be tested and is based on what is known and what is observed
• Infer: to draw a conclusion based on observation
• Controlled Experiment: involves changing one factor and observing its effect on one thing while keeping all other things constant
Vocabulary – Chapter 1 (section 2)

• Variable: factor that can be changed in an experiment

• Independent Variable: variable that is changed in an experiment

• Dependent Variable: variable that changes as a result of a change in the independent variable

• Constant: variable that is not changed in an experiment
A. The **scientific method** includes observing, questioning, and researching; forming a hypothesis; predicting an outcome; investigating; analyzing; forming conclusions; communicating findings; and repeating the process.

B. Scientists **draw** (or come up with) conclusions based on observations.
Section 2: continued

C. An experiment is one type of scientific investigation.

1. Factors that can be changed in an experiment are variables.

2. Constants are variables that remain unchanged.

D. Safety is important for both laboratory and field scientists.
Section 1.3 – Models in science
Vocabulary – Chapter 1 (section 3)

• Model: any representation of an object or an event that is used as a tool for understanding the natural world; can communicate observations and ideas, test predictions, and save time, money, and lives
Section 3: Models in Science

A. Models – representation of an object or event used as a tool for understanding the natural world.

B. Models come in three basic types.
   1. Physical models can be seen and touched.
   2. Computer models can be seen on a computer screen but not touched.
   3. Idea models are concepts that describe how someone thinks about something in the natural world.
Section 3 - Continued

C. Models have several **uses**. (ex. Maps, recipes, globes.)

1. Models **communicate** observations and ideas.
2. Models can **test** predictions.
3. Models can **save** time, money, and lives.

D. Models **change** over time as new observations and discoveries are made.
Section 1.4 – Evaluating scientific explanation
Vocabulary – Chapter 1 (section 4)

- Critical Thinking: involves using knowledge and thinking skills to evaluate evidence and explanations
- Data: information gathered during an investigation; recorded in the form of descriptions, tables, graphs, or drawings
Section 4: Evaluating Scientific Explanation

A. Critical Thinking – using what is known to decide if new facts should be agreed with or believed.

B. Data should be evaluated.
   1. The data should be **specific** and exact.
   2. Observations should be carefully, accurately, and completely **recorded**.
   3. Data must be **repeatable** and reliable.
Section 4: Continued

C. Conclusions should be evaluated.
   1. Conclusions should be explainable.
   2. Possible explanations should be considered before a single conclusion is reached.

D. Promotional claims should be carefully analyzed, since they are designed to sell products rather than to promote scientific evidence impartially.