



1.1 What Is Science?

Lesson Objectives

-  State the goals of science.
-  Describe the steps used in scientific methodology.

BUILD Vocabulary

- A. The chart below shows key terms from the lesson with their definitions. Complete the chart by writing a strategy to help you remember the meaning of each term. One has been done for you.

Term	Definition	How I'm Going to Remember the Meaning
Control group	Part of an experiment that is not changed so that it can be compared to the experimental group	<i>A <u>control</u> group is used for <u>comparison</u>.</i>
Controlled experiment	An experiment that tests the effect of one variable	
Data	Detailed records of experimental observations	
Dependent variable	Factor in an experiment that is observed or measured as it responds to the independent variable	
Hypothesis	Possible explanation for observations or for a question that can be tested	
Independent variable	Factor in an experiment that is changed	
Inference	Logical interpretation based on prior knowledge and experience	

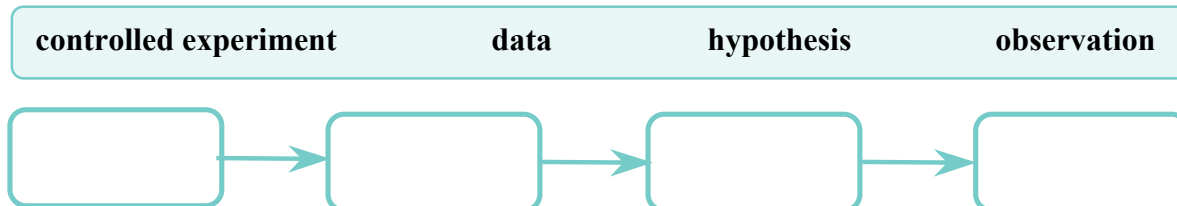
- B. As you work through this lesson, you may find these terms in the activities. When you need to write a key term or a definition, **highlight** the term or the definition.



BUILD Understanding

Flowchart A flowchart to show the steps in a process. Use a flowchart to help you organize information about performing an experiment.

As you read, place the terms into the correct boxes in the flowchart.



Scientific Methodology: The Heart of Science

Collecting and Analyzing Data A scientist's work isn't finished until all the data are collected and analyzed. Quantitative data include numbers. Qualitative data are descriptive.





Complete the table using the phrases below. Write phrases that are qualitative on the left side of the table. Write phrases that are quantitative on the right side. One has been done for you.

The grass is t this week.
Plants grown in the sun are 12 cm taller than those grown in shade.
Salamanders in the wild are disappearing.
Days are shorter in the winter than in the summer.
Frogs that were fed crickets weighed 32 g more than those fed mealworms.
In the experiment, 21 mL of liquid fertilizer were added to the bean plants.

Qualitative	Quantitative
<u>Days are shorter in the winter than in the summer.</u>	

1.2 Science in Context

Lesson Objectives

-  Explain how scientific attitudes generate new ideas.
-  Describe the importance of peer review.
-  Explain what a scientific theory is.
-  Explain the relationship between science and society.

BUILD Vocabulary

- A. The chart below shows key terms from the lesson with their definitions. Complete the chart by writing a strategy to help you remember the meaning of each term. One has been done for you.

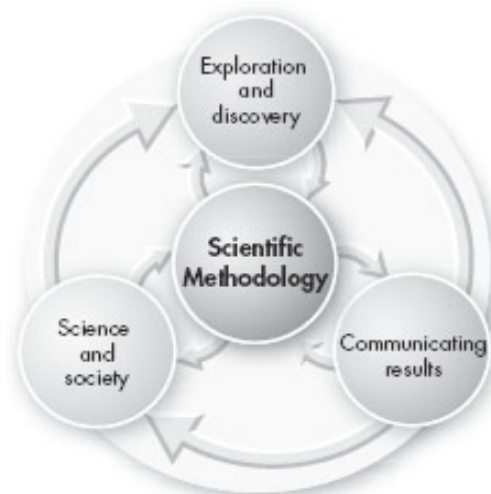
Term	Definition	How I'm Going to Remember the Meaning
Bias	Personal point of view that is not scientific	<i>The "I" in BIAS = I, so it's my point of view.</i>
Theory	Well-tested explanation that explains observations and hypotheses	

- B. As you work through this lesson, you may find these terms in the activities. When you need to write a key term or a definition, **highlight** the term or the definition.

BUILD Understanding

Previewing Visuals Looking at a picture or diagram can help you see what's in the lesson.

Find the diagram below in your textbook. Use it to help you answer the questions.



1. Scientific methodology starts with observations and questions. In which circle do observations and questions belong? _____

2. Why do you think society is part of scientific methodology? _____

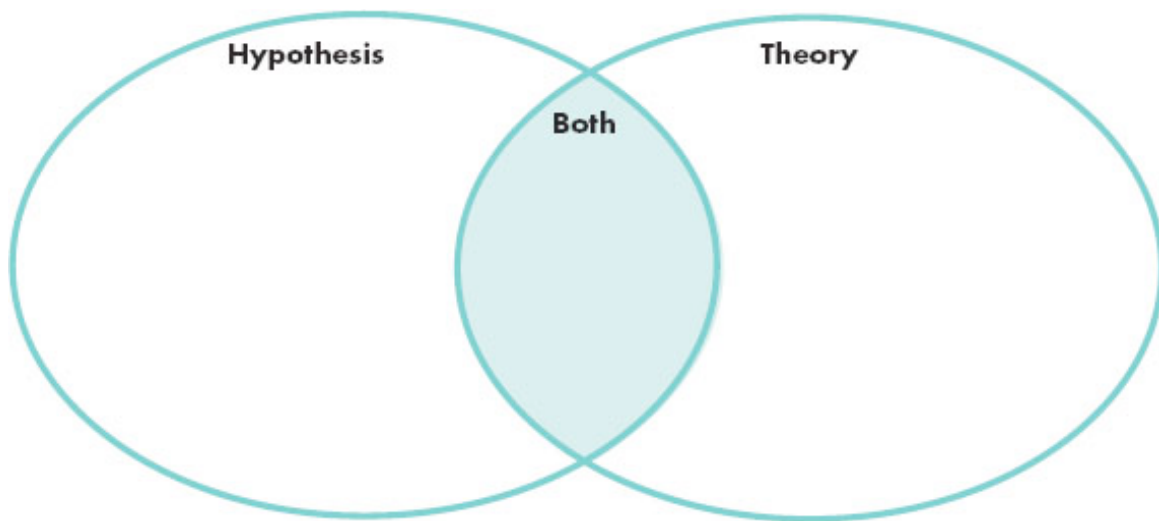
Scientific Theories

A theory is the best explanation of many related observations. Theories allow scientists to make accurate predictions. An hypothesis is an idea that can be tested.

Write phrases from the box that describe a hypothesis on the left side of the Venn diagram. Write phrases that describe a theory on the right side. Write phrases that relate to both in the center.

Used by scientists
Well-tested explanation of observation
Possible explanation that can be tested

Can be revised with new information
Based on observations and inferences
Combines observations and hypotheses







CHAPTER

MYSTERY

Questions About a Medicine Doctors sometimes give patients medicines that are new and have just become available to people. Suppose a doctor gives a patient a new medicine to treat headaches. What are some questions that the patient might ask the doctor about the medicine? Write three questions in the space below.

1.3 Studying Life

Lesson Objectives

-  List the characteristics of living things.
-  Identify the central themes of biology.
-  Explain how life can be studied at different levels.
-  Discuss the importance of a universal system of measurement.

BUILD Vocabulary

- A. The chart below shows key terms from the lesson with their definitions. Complete the chart by writing a strategy to help you remember the meaning of each term. One has been done for you.

Term	Definition	How I'm Going to Remember the Meaning
Asexual reproduction	Single organism produces offspring identical to itself	
Biology	Study of life	<i>Bio- means "living," and biology is the study of living things.</i>
Biosphere	Part of Earth that can sustain life	
Homeostasis	Maintenance of a stable internal environment	
Metabolism	Chemical reactions in which a living thing breaks down or builds up materials	
Sexual reproduction	Cells from two parents combine to form the first cell of a new organism	
Stimulus	Signal to which an organism responds	

- B. As you work through this lesson, you may find these terms in the activities. When you need to write a key terms or a definition, **highlight** the term or the definition.

BUILD Understanding

Concept Map A concept map can help you organize information and show how ideas are connected.

Use the phrases to complete the concept map.

Cellular basis of life

Evolution

Unity and diversity

Growth, development, and reproduction

Information and heredity

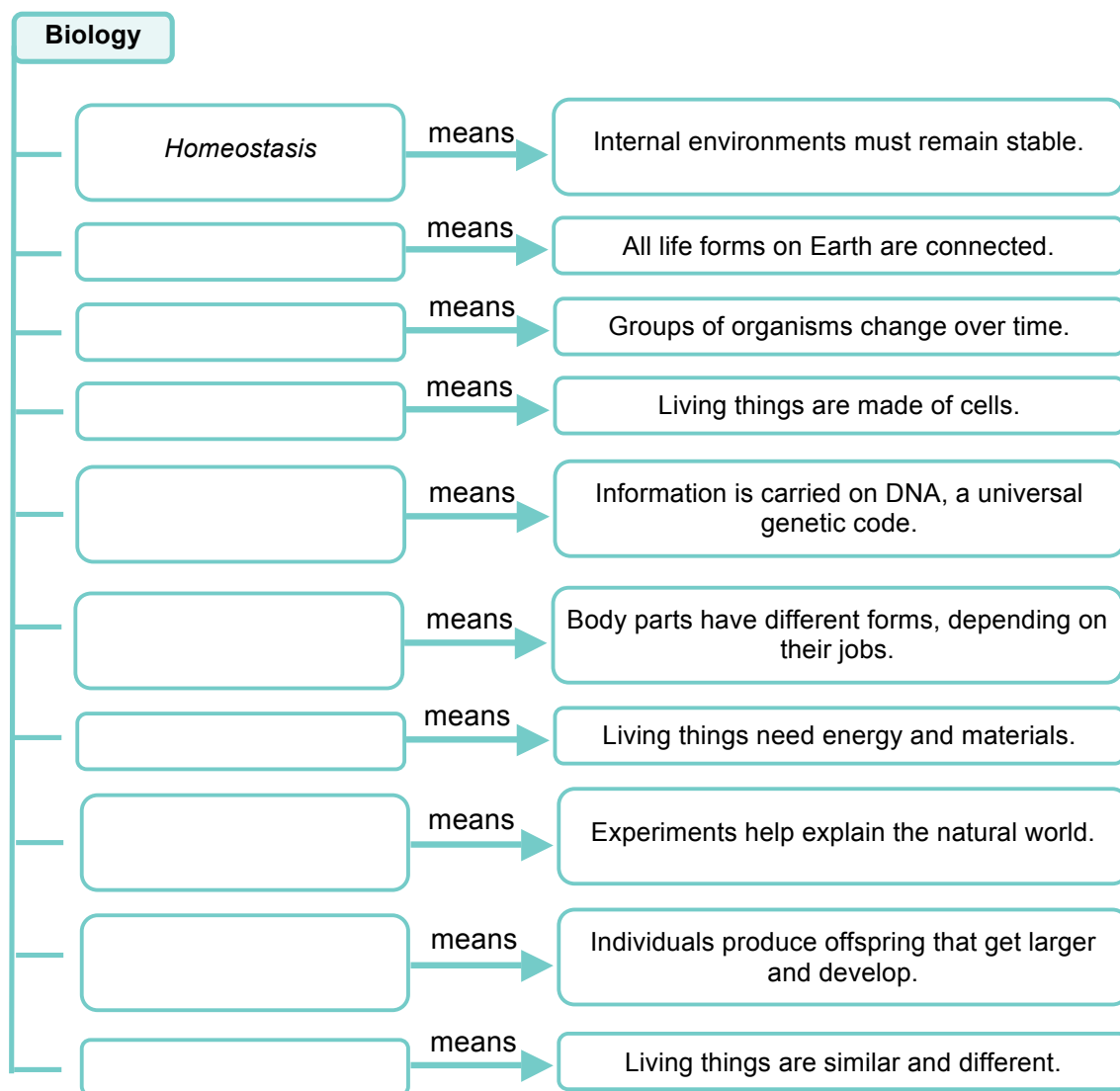
Homeostasis

Matter

Science as a way of knowing

Structure and function

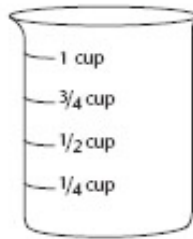
Interdependence of nature

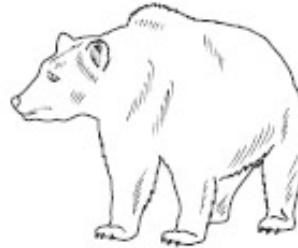


Characteristics of Living Things

Scientists use certain characteristics to classify something as a living thing. Living things must be based on a universal genetic code and must have cells as the basic unit of life. They obtain and use energy. Living things also grow, develop, and reproduce. They maintain a stable internal environment. Over time, living things evolve. Look at the drawings. Label each thing as living or nonliving in the spaces provided.















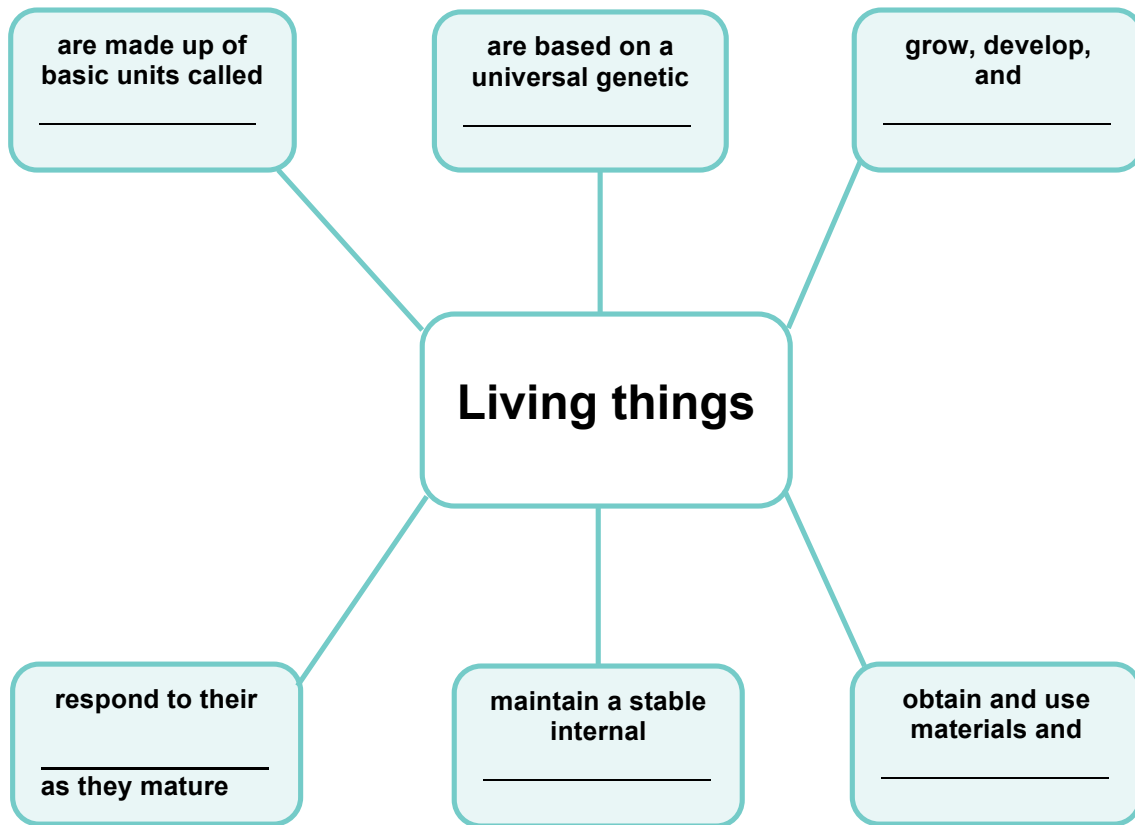


In the chart, write yes or no next to the characteristics that apply to all living things.

Chacteristics	Applies to living things?
Made of one or more cells	
Able to reproduce	
Stay warm	
Based on a genetic code	
Based on the metric system	
Grow and develop	
Obtain and use materials and energy	
Respond to the environment	
Maintain a stable environment	
Change over time	

Characteristics of Living Things

1. Complete the graphic organizer to show the characteristics living things share.



- The genetic molecule common to all living things is _____.
- The internal process of _____ enables living things to survive changing conditions.
- Living things are capable of responding to different types of _____.
- Living things have a long history of _____ change.
- The continuation of life depends of both _____ and _____.
- The combination of chemical reactions that make up an organism's _____ help to organize raw materials into living matter.

Big Ideas in Biology

8. Complete the table of Big Ideas in Biology. The first row is filled in for you.

Big Idea	Description
Cellular basis of life	Living things are made of cells.
Information and heredity	
	Life requires matter that provides raw materials, nutrients, and energy.
Growth, development, and reproduction	
	Living things maintain a relatively stable internal environment.
Evolution	
	Each major group of organisms has evolved structures that make particular functions possible.
	All living things are fundamentally similar at the molecular level.
	All forms of life on Earth are connected into a biosphere—a living planet.
Science as a way of knowing	

9. Pick two of the big ideas from the chart and describe how the ideas interlock.

Taking a Standardized Test

Test Taking Tip: Watch for Clue Words

When you read a test question, watch for the clue words *except*, *always*, and *mostly*. When a question has the word *except*, you are looking for the answer that is not correct. When you see *always* in a question, it means the answer is true in every situation. *Mostly* suggests that the correct answer generally applies, but there are exceptions.

Read the following questions and answer choices.

Living things show all of the characteristics except

- A. growth and development.
- B. ability to respond to the environment.
- C. ability to dissolve.
- D. reproduction.

Step 1 What is the question asking? This question asks you to spot the characteristic that is NOT true of living things.

Step 2 Look for clue words. This question includes the word *except*. You are looking for the answer that is not correct.

Step 3 Read each answer choice carefully. Cross out choices you know are true. You may remember that living things grow and develop and they respond to the environment, so you can cross out A and B.

Step 4 Choose one of the answers left. You know that the correct answer is either C or D. You may remember that living things reproduce. The only characteristic that is NOT true of all living things is C, ability to dissolve.

Self-Test

Practice what you have learned by answering the following questions. Before you choose your answer, underline the clue word. Then circle the correct answer.

1. In research, a scientist must always consider
 - A. plants.
 - B. evidence.
 - C. photographs.
 - D. theories.
2. A bias is mostly due to
 - A. the study of life.
 - B. controlled experiments.
 - C. experimental data.
 - D. a personal point of view.

3. Topics studied in biology include all of the following except
 - A. the biosphere.
 - B. rocks and minerals.
 - C. changes in groups of organisms.
 - D. reproduction and growth.
4. All of the features are true of science except
 - A. deals with the natural world
 - B. collects and organizes information
 - C. explores the supernatural
 - D. proposes explanations based on evidence
5. All of the following are characteristics of all living things except the ability to
 - A. grow and develop.
 - B. maintain a stable internal environment.
 - C. change over time.
 - D. reproduce asexually.
6. All of the following are big ideas in biology except living things are
 - A. unable to adapt to their surroundings.
 - B. based on an universal genetic code.
 - C. made up of cells.
 - D. diverse.
7. When working in a lab you should always
 - A. follow safe practices.
 - B. work with a partner.
 - C. use a microscope.
 - D. design your own experiment.

Short-Response Question

Answer the following question in at least two or three sentences.

8. You wonder whether plants that are exposed to music grow faster than those that are not. Describe a controlled experiment you can do to help you find out.
