





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.

Lesson Summary

Characteristics of Living Things **Biology** is the study of life. Living things share these characteristics: They are made of cells and have a universal genetic code; they obtain and use materials and energy to grow and develop; they reproduce; they respond to signals in their environment (**stimuli**) and maintain a stable internal environment; they change over time.

Big Ideas in Biology The study of biology revolves around several interlocking big ideas:

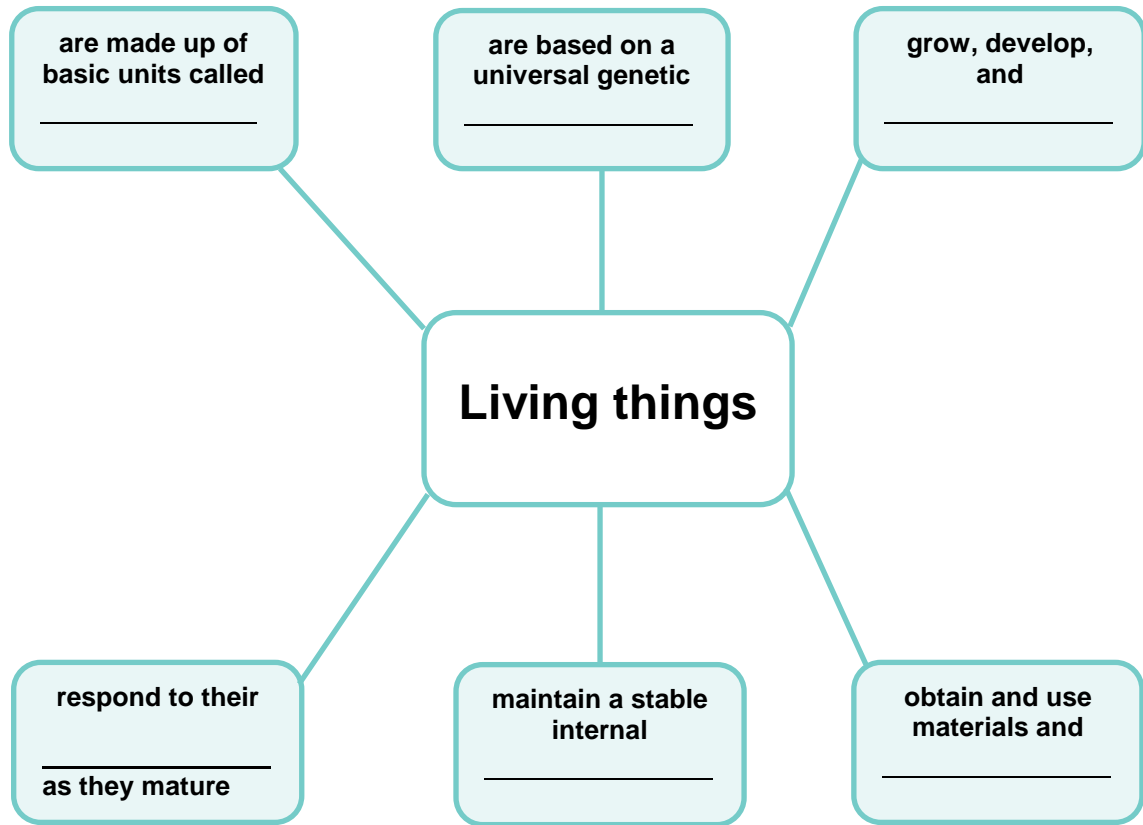
- ▶ **Cellular basis of life.** Living things are made of cells.
- ▶ **Information and heredity.** Living things are based on a universal genetic code written in a molecule called **DNA**.
- ▶ **Matter and energy.** Life requires matter that provides raw material, nutrients, and energy. The combination of chemical reactions through which an organism builds up or breaks down materials is called **metabolism**.
- ▶ **Growth, development, and reproduction.** All living things reproduce. In **sexual reproduction**, cells from two parents unite to form the first cell of a new organism. In **asexual reproduction**, a single organism produces offspring identical to itself. Organisms grow and develop as they mature.
- ▶ **Homeostasis.** Living things maintain a relatively stable internal environment.
- ▶ **Evolution.** Taken as a group, living things evolve, linked to a common origin.
- ▶ **Structure and function.** Each major group of organisms has evolved structures that make particular functions possible.
- ▶ **Unity and diversity of life.** All living things are fundamentally similar at the molecular level.
- ▶ **Interdependence in nature.** All forms of life on Earth are connected into a **biosphere**—a living planet.
- ▶ **Science as a way of knowing.** Science is not a list of facts but “a way of knowing.”

Fields of Biology Biology includes many overlapping fields that use different tools to study life. These include biotechnology, global ecology, and molecular biology.

Performing Biological Investigations Most scientists use the metric system as a way to share quantitative data. They are trained in safe laboratory procedures. To remain safe when you are doing investigations, the most important rule is to follow your teacher’s instructions.

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.

Fields of Biology

10. Biology is made up of many overlapping fields, each of which uses different tools to gather information about living things. Fill out the table below with information about two fields of biology—one that appeals to you, and one that does not. Include a description of each field and the tools scientists in the field use, as well as your impressions of each.

Field of Biology	Description of Field	Why It Does or Does Not Appeal to Me

Performing Biological Investigations

11. Describe the system of measurement most scientists use when collecting data and doing experiments.

12. Why do scientists need a common system of measurement?

13. What is the most important safety rule for you to follow in the laboratory?

Apply the Big idea

14. Your teacher is doing a long-term experiment by having you and your classmates grow plants at home. You are testing the hypothesis that plant growth is affected by the amount of water a plant receives. All the data will be compiled in three weeks. Why isn't it a good idea to use the 8-ounce measuring cup from your kitchen or the 12-inch ruler you have on your desk?
