

# Characteristics of Living Things

## BEFORE YOU READ

After you read this section, you should be able to answer these questions:

- What are all living things made of?
- What do all living things have in common?

**National Science Education Standards**  
**LS 1b, 1c, 1d, 2a, 2b, 2c, 3a, 3b, 3c**

## What Are All Living Things Made Of?

If you saw a bright yellow, slimy blob in the grass, would you think it was alive? How could you tell? All living things, or *organisms*, share several characteristics. What does a dog have in common with a bacterium? What do *you* have in common with a bright yellow slime mold?

All living things are made of one or more cells. A **cell** is the smallest unit that can carry out all the activities of life. Every cell is surrounded by a cell membrane. The *cell membrane* separates the cell from the outside environment.

Some organisms are made of trillions of cells. In these organisms, different kinds of cells do different jobs. For example, muscle cells are used for movement. Other organisms are made of only one cell. In these organisms, different parts of the cell have different jobs.



Some organisms, such as the monkeys on the left, are made up of trillions of cells. The protists on the right are made up of one or a few cells. They are so small they can only be seen with a microscope.

## How Do Living Things Respond to Change?

All organisms can sense changes in their environments. Each organism reacts differently to these changes. A change that affects how an organism acts is called a **stimulus** (plural, *stimuli*). Stimuli can be chemicals, light, sounds, hunger, or anything that causes an organism to react. ✓



**Organize** As you read this section, make a list of the six characteristics of living things.

### STANDARDS CHECK

**LS 1b** All organisms are composed of cells—the fundamental unit of life. Most organisms are single cells; other organisms, including humans, are multicellular.

**1. Identify** What are all living things made of?

---



---



**2. List** Give three examples of stimuli.

---



---



---

**SECTION 1** Characteristics of Living Things *continued*



The touch of an insect is a stimulus for a Venus' flytrap. The stimulus causes the plant to close its leaves quickly.

**TAKE A LOOK**

**3. Complete** For a Venus' flytrap, the touch of an insect is a \_\_\_\_\_.

Even when things outside the body change, an organism must keep the conditions inside its body the same. The act of keeping a constant environment inside an organism is called **homeostasis**. When an organism maintains homeostasis, all the chemical reactions inside its body can work correctly.

*Critical Thinking*

**4. Predict** What would happen if your body couldn't maintain homeostasis?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**RESPONDING TO EXTERNAL CHANGES**

If it is hot outside, your body starts to sweat to cool down. If it is cold outside, your body starts to shiver to warm up. In each situation, your body reacts to the changes in the environment. It tries to return itself to normal.

Different kinds of organisms react to changes in the environment in different ways. For example, crocodiles lie in the sun to get warm. When they get too warm, they open their mouths wide to release heat.

**How Do Organisms Have Offspring?**

Every type of organism has *offspring*. The two ways organisms can produce offspring are by sexual or asexual reproduction. Generally, in **sexual reproduction**, two parents make offspring. The offspring get traits from both parents. In **asexual reproduction**, one parent makes offspring. The offspring are identical to the parent. ✓

Most plants and animals make offspring by sexual reproduction. However, most single-celled organisms and some multicellular organisms make offspring by asexual reproduction. For example, hydra make offspring by forming buds that break off and grow into new hydra.

**READING CHECK**

**5. Identify** How many parents are generally needed to produce offspring by sexual reproduction?

\_\_\_\_\_

**SECTION 1** Characteristics of Living Things *continued*



Like most animals, bears produce offspring by sexual reproduction. However, some animals, such as hydra, can reproduce asexually.

**TAKE A LOOK**

**6. Identify** How do most animals reproduce?

---



---

**Why Do Offspring Look Like Their Parents?**

All organisms are made of cells. Inside each cell, there is information about all of the organism’s traits. This information is found in DNA (**d**eoxyribo**n**ucleic acid). *DNA* carries instructions for the organism’s traits. Offspring look like their parents because they get copies of parts of their parent’s DNA. Passing traits from parent to offspring is called **heredity**. ✓

✓ **READING CHECK**

**7. Define** What is the function of DNA?

---



---



---



---

**Why Do Organisms Need Energy?**

All organisms need energy to live. Most organisms get their energy from the food they eat. Organisms use this energy to carry out all the activities that happen inside their bodies. For example, organisms need energy to break down food, to move materials in and out of cells, and to build cells.

An organism uses energy to keep up its metabolism. An organism’s **metabolism** is all of the chemical reactions that take place in its body. Breaking down food for energy is one of these chemical reactions.

✓ **READING CHECK**

**8. Compare** How does growth differ in single-celled organisms and those made of many cells?

---



---



---



---



---

**How Do Organisms Grow?**

All organisms grow during some part of their lives. In a single-celled organism, the cell gets bigger and divides. This makes new organisms. An organism made of many cells gets bigger by making more cells. As these organisms grow, they get new traits. These traits often change how the organism looks. For example, as a tadpole grows into a frog, it develops legs and loses its tail. ✓

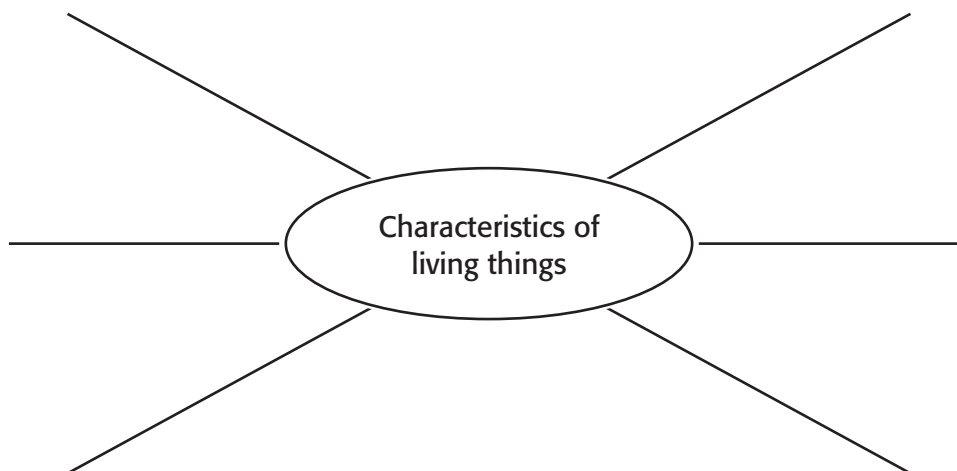
# Section 1 Review

NSES LS 1b 1c, 1d, 2a, 2b, 2c, 3a, 3b, 3c

## SECTION VOCABULARY

<p><b>asexual reproduction</b> reproduction that does not involve the union of sex cells and in which one parent produces offspring that are genetically identical to the parent.</p> <p><b>cell</b> in biology, the smallest unit that can perform all life processes; cells are covered by a membrane and contain DNA and cytoplasm</p> <p><b>heredity</b> the passing of genetic traits from parent to offspring</p>	<p><b>homeostasis</b> the maintenance of a constant internal state in a changing environment</p> <p><b>metabolism</b> the sum of all chemical processes that occur in an organism</p> <p><b>sexual reproduction</b> reproduction in which the sex cells from two parents unite to produce offspring that share traits from both parents</p> <p><b>stimulus</b> anything that causes a reaction or change in an organism or any part of an organism</p>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

**1. Summarize** Complete the Spider Map to show the six characteristics of living things. Add lines to give details on each characteristic.



**2. Compare** How does sexual reproduction differ from asexual reproduction?

---



---



---

**3. Explain** How do the buds of an organism such as hydra compare to the parent?

---



---

**4. Identify Relationships** How is a bear's fur related to homeostasis?

---



---

6. scientific theory, scientific law

**Review**

1. Scientific theories are based on observations and evidence. Theories explain all observations and evidence about a certain topic.
2. Scientists use models to help them study things in detail. Models can help scientists to study things that are too large, too small, too fast, too slow, or too dangerous for them to study in reality.
3. Many tests and pieces of evidence support it.
4. New observations can support a scientific theory. They can also indicate that the theory is incorrect.
5. Physical model: globe, map  
Mathematical model: equation, graph  
Conceptual model: drawing, flowchart
6. A scientific law describes observations and makes predictions about what will happen in certain conditions. A scientific theory explains how observations are connected. Scientific theories can be supported by scientific laws.

**SECTION 4 TOOLS, MEASUREMENT, AND SAFETY**

1. stage, light, tube with lenses
2. The scientist should use a light microscope because it can be used to study living organisms.
3. It would be much harder for scientists to compare and share their data.
4. the meter
5. Multiply its width by its length.
6. the amount of space an object takes up
7. It pushed 10 mL of liquid out of the way when it was put into the graduated cylinder.
8.  $1,000 \text{ mg} = 1 \text{ g}$
9. a measure of how hot or cold something is
10. It is easier to convert  $^{\circ}\text{C}$  into K than to convert  $^{\circ}\text{F}$  into K or  $^{\circ}\text{C}$ .
11. Answers include: eye protection in the lab area, heating safety near hot plates

**Review**

1. Place the object in a known volume of liquid. Then, measure the volume of the object and the liquid together. The volume of the object is the difference between the volume of the liquid and the object and the volume of the liquid alone.

2. Looking at something that is very small: microscope, magnifying glass

Measuring how tall your friend is: ruler, meterstick

Measuring how much water is in a glass: graduated cylinder, beaker

3.  $^{\circ}\text{C}$  and K
4. Follow teacher's directions; follow written directions; do not take shortcuts.

**Chapter 2 It's Alive!! Or Is It?****SECTION 1 CHARACTERISTICS OF LIVING THINGS**

1. cells
2. Possible answer: chemicals, light, sounds
3. stimulus
4. The conditions inside your body would change. Chemical reactions in your body might not work correctly.
5. two
6. by sexual reproduction
7. DNA carries instructions for the organism's traits.
8. A single-celled organism makes its cell larger. Organisms with many cells grow by making more cells.

**Review**

1. made of cells, respond to changes, reproduce, have DNA, use energy, grow
2. In asexual reproduction, only one parent produces offspring. In sexual reproduction, two parents are needed to produce offspring.
3. The offspring from asexual reproduction are identical to the parent.
4. A bear's fur helps it to stay warm, even when the temperature of the environment changes. The bear can keep a stable body temperature.

**SECTION 2 THE NECESSITIES OF LIFE**

1. About 70% to 85% of a cell is made of water. Most of the reactions that happen in a cell need water.
2. so it can have air to breathe
3. It gives them energy and nutrients to live and grow.
4. We are all consumers. We have to eat other organisms to get energy.