Homeostasis All living organisms must maintain a stable internal environment in order to function properly. The maintenance of stable internal conditions in spite of changes in the external environment is called **homeostasis.**

Metabolism Living things carry out many chemical reactions in order to obtain energy. **Metabolism** is the sum of all of the chemical reactions carried out in an organism. Almost all of the energy used by living things originally comes from sunlight. Plants, algae, and some bacteria capture this energy and use it to make molecules. These molecules serve as the source of energy, or food, for other organisms.

Responsiveness In addition to maintaining a stable internal environment, living organisms also respond to their external environment. Plants bend toward sunlight. Birds fluff their feathers to insulate their bodies during cold weather. Students, shown in **Figure 9,** also respond to their environment.

Reproduction Most living things can reproduce. **Reproduction** is the process by which organisms make more of their own kind from one generation to the next. Because no organism lives forever, reproduction is an essential part of life.

Heredity When an organism reproduces, it passes on its own traits to its offspring in a process known as **heredity.** Heredity is the reason that children tend to look like their parents. Inherited characteristics change over generations. This process is called **evolution.**

Growth All living organisms grow . Some one-celled organisms only grow briefly, during the time that they are reproducing. Other living things, like the giant sequoia, grow for thousands of years and reach an enormous size. As organisms grow, many change. This process is called *development.* Frogs begin as eggs, develop into tadpoles, and eventually develop into frogs. Development differs from evolution because development refers to change in a single individual during that individual's life.

› **Reading Check** *How is heredity related to evolution?*



Figure 9 These students are responding to the rain by using raincoats. › **Can you think of a way that you have responded to your environment today?**

cell in biology, the smallest unit that can perform all life processes

homeostasis the maintenance of a constant internal state in a changing environment

metabolism the sum of all chemical processes that occur in an organism

reproduction the process of producing offspring

heredity the passing of genetic traits from parent to offspring

evolution the process of change by which new species develop from preexisting species over time

Section 4 Review

› KEY IDEAS

1. **Explain** what biology is.
2. **Describe** nine fields that are part of the science of biology.
3. **Name** the basic unit of life.
4. **Discuss** the seven properties all living organisms share.
5. **Define** homeostasis.

CRITICAL THINKING

6. **Recognizing Verifiable Facts** If you find an object that seems alive, how might you determine if the object is indeed an organism?
7. **Elaborating** Give an example of one way that you are interdependent on another type of organism.
8. **Analyzing Information** Relate five of the characteristics of life to an organism familiar to you.

ALTERNATIVE ASSESSMENT

9. **Interview a Biologist** Choose a field of biology that interests you. Locate a biologist working in that field, and conduct an interview by phone or e-mail. Ask the biologist how he or she became interested in his or her field and what the scientist's work is like. Report your findings to the class.

Teaching Key Ideas

Homeostasis Ask students how humans maintain a constant body temperature. (Sample answers are sweating, shivering, wearing clothing, and physical activity.) To illustrate the maintenance of a human's body temperature, ask a volunteer to have his or her body temperature monitored before and immediately after vigorous exercise. Human body temperature fluctuates based on activity. LS Verbal

Answer to Caption Question

Figure 9: Students' answers will vary based on their daily activities.

› Close

Formative Assessment

Which of the following is not a property of an individual organism?

A. evolution (Correct. Individual organisms do not evolve. Species do.)
B. metabolism (Incorrect. Organisms must convert molecules into energy.)
C. heredity (Incorrect. Organisms express the combination of their parent's genetic composition.)
D. homeostasis (Incorrect. Organisms must maintain a stable internal environment.)

Answers to Section Review

1. Biology is the study of living things.
2. Biology includes biochemistry, ecology, cell biology, genetics, evolutionary theory, microbiology, botany, zoology, and physiology.
3. the cell
4. cellular organization, reproduction and heredity, metabolism, homeostasis, growth, and responsiveness
5. Homeostasis is the ability to maintain a stable internal environment in spite of changes in the external environment.
6. Students might test for the characteristics of living organisms.
7. Students may mention that they depend on other organisms for food.
8. Students may relate the characteristics of life to a pet such as a dog, saying that the dog is composed of cells, is able to reproduce with other dogs, requires food, can pass on its genes to its offspring, and depends on other organisms to survive.
9. Interviews will vary depending on whom students interview.