

# 4.1

## The Characteristics of Living Things

Life is everywhere. You know that plants and animals are living things, but so are mushrooms, seaweed, and tiny, invisible creatures like bacteria. Living things come in all shapes, colours, and sizes.

Now consider some non-living things that you see in daily life, such as rocks, mountains, and oceans. What makes these things different from the living creatures? How do you know that something is alive?

Look at the two photos shown in Figure 1. One of the hippos is an animatronic machine, while the other is a living hippo. Can you tell one from the other? What characteristics do living things have that make them “alive”?



**Figure 1** What makes an animatronic hippo (a) different from a real one (b)?



### TRY THIS: Living or Non-living?

**SKILLS MENU:** predicting, performing, observing, evaluating, communicating



What characteristics do we use to define something as “alive”?

**Equipment and Materials:** pencil; paper; graduated cylinder (100 mL); 2 beakers (250 mL); yeast; sand; apple juice

1. Examine equal amounts of yeast and sand using your senses. In your notebook, record the similarities and differences between them (look at physical characteristics such as size, colour, texture, and shape).
  2. Pour 100 mL of apple juice into each of two 250 mL beakers. In your notebook, predict what will happen if you
    - (a) add yeast to one of the beakers
    - (b) add sand to one of the beakers
  3. Add 25 mL of yeast to one of the beakers. Now add 25 mL of sand to the other beaker. Record your observations.
- A. What similarities and differences did you notice between the yeast and the sand in Step 1?
  - B. In Step 3, what did you observe in each of the beakers? Was your prediction accurate?
  - C. What do you think happened in each beaker?
  - D. Why was it important to use equal amounts of yeast and sand, and an equal amount of apple juice?
  - E. How has this activity helped you understand the differences between living and non-living things? What new questions about living and non-living things do you have after performing this activity?

Animatronics is the technology of recreating living things using machines. Animatronics uses electronics and mechanical systems to animate motorized puppets. Animatronic puppets move and sound just like the living things they are imitating. The designer of the animatronic hippo in Figure 1(a) has taken great care to make the face look like that of a real hippo, but still, we know that it is not alive. In nature too, looks can be deceiving. The diatom in Figure 2 looks like a button or a cookie, but is actually a living thing. How can you identify living things from non-living things? Table 1 describes some of the key characteristics of life. 🌍



**Figure 2** Diatoms are among the smallest life forms on Earth. They can be found in freshwater and marine environments.

**Table 1** Characteristics of All Living Things

|  |  |
|--|--|
| <p><b>Living things grow in size, reproduce, and are able to repair themselves.</b></p> <ul style="list-style-type: none"> <li>Plants and animals increase in size as they grow older.</li> <li>Living things produce offspring.</li> <li>Living things repair worn or injured parts.</li> </ul> |  |
| <p><b>Living things require energy.</b></p> <ul style="list-style-type: none"> <li>Plants obtain energy from sunlight.</li> <li>Animals eat plants, other animals, or both to obtain energy.</li> </ul>  |  |
| <p><b>Living things respond to changes in their environment.</b></p> <ul style="list-style-type: none"> <li>Animals try to escape from predators.</li> <li>Plants grow roots in the direction of moist soil.</li> </ul>  |  |
| <p><b>Living things have a lifespan.</b></p> <ul style="list-style-type: none"> <li>Living things have a life cycle. Humans, for example, grow old and eventually die.</li> </ul>  |  |
| <p><b>Living things produce waste.</b></p> <ul style="list-style-type: none"> <li>Living things produce unusable or unwanted materials that they release to the external environment as waste.</li> </ul>  |  |

To learn more about animatronics,

**Go to Nelson Science**



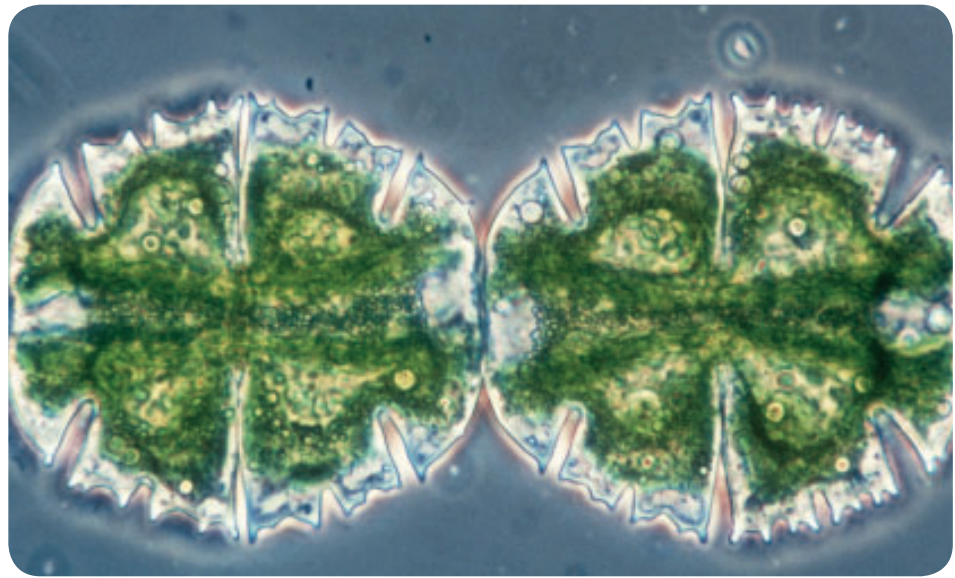
#### LINKING TO LITERACY

##### Monitoring Understanding

Effective readers determine if the text is making sense to them by stopping, thinking about, and discussing what they have read. With a partner, check your understanding. Explain how a non-living thing can display some of the characteristics of living things.

**cell:** the basic structural and functional unit of life

All living things possess the characteristics described in Table 1. However, non-living things may appear to have some of these characteristics, too. For example, the animatronic hippo uses energy (batteries); it responds to changes in its environment (signals from a remote control); and it ages over time and eventually dies (stops working). However, living things have another unique characteristic that non-living things do not have. All living things are made up of at least one cell (Figure 3). The **cell** is the basic structural and functional unit of all living things. Some organisms, such as bacteria, consist of a single cell, while others (like humans) are made up of trillions of cells! Most cells are too small to be seen with the unaided eye.



**Figure 3** The green algae shown here started as one cell, but has divided to form two cells.

**Unit Task** How will your knowledge of the characteristics of living things help you identify living things when completing the Unit Task?

**CHECK YOUR LEARNING**

- Copy Table 2 into your notebook. In the first column, list the characteristics of living things. In the second column, suggest a non-living thing that displays a similar characteristic. The first one is done as an example.

**Table 2**

| Characteristics of living things | Non-living thing with a similar characteristic                 |
|----------------------------------|--|
| • living things produce wastes   | • a car produces wastes in the form of fumes, but is not alive |
|                                  |  |
|                                  |  |

- Identify the characteristic(s) of living things illustrated by each of the following statements. Explain your choice for each.
  - Flowers eventually die.
  - Plants obtain energy from the Sun.
  - A zebra runs away from a lioness.
  - A broken bone heals over time.
  - Plant roots grow toward moist soil.
- Consider all of the characteristics of living things. Are green algae (like the one in Figure 3) alive? Explain your answer.
- What two characteristics of life are described in the following statement? "A human begins life as a single cell, whereas an adult is made up of trillions of cells."