Chapter 1 Cells and More Cells

What You Will Learn

In this chapter, you will learn how to...

- **describe** what all cells have in common, as well as differences between plant and animal cells
- **explain** the importance of mitosis for growth and repair
- **describe** the stages of the cell cycle and **relate** this cycle to the origins of cancer
- **explain** major cell technologies and related issues

Why It Matters

To prevent and treat diseases, doctors and researchers must first understand the normal structures and functions of the cells–and how cells make up the body.

Skills You Will Use

In this chapter, you will learn how to...

- **compare** plant and animal cells using microscopes and labelled biological diagrams
- **identify** the stages of mitosis in plant and animal cells
- **investigate** the rate of cell division in normal and abnormal cells
- **evaluate** the ethical implications of some new medical technologies

Over 4000 Canadians are waiting for an organ transplant–a liver, kidney, or heart–that could save their life. Fewer than half will receive one. In 2002, researchers used genetic engineering to produce the first four piglets that could potentially provide organs for humans. This was a major breakthrough because the human body normally rejects an organ from another species. How scientists achieved this will be discussed in Chapter 1, along with some of the ethical issues that have arisen from research in cell biology.

Activity 1-1

Did You Get the Message?

To be healthy, all organisms must have cells that function normally, sending messages to and from one another. Sometimes, these messages get "scrambled," disrupting normal functioning. In this activity, you will play the game "broken telephone" as a class. How do you think this game will simulate the transfer of messages from cell to cell?

The simple game of "broken telephone" demonstrates how even a small change can completely alter a message.

Procedure

1. Your teacher will begin by whispering a message to a student so that no one else can hear. This student should then whisper the message to the next student, and so on until the message reaches the last person in the class. You are not allowed to repeat the message. The last person should write down what he or she heard.
2. Repeat step 1 with a second message.
3. Compare your teacher's original messages to what the last person wrote down.

Questions

1. How did the original and final messages compare? What might have caused the differences?
2. Was one message less scrambled at the end than the other? What might explain any differences?
3. How do you think this game might reflect what goes on inside your body?

Study Toolkit

These strategies will help you use this textbook to develop your understanding of science concepts and skills.
To find out more about these and other strategies, refer to the Study Toolkit Overview, which begins on page 560.

Preparing For Reading

Previewing Text Features

Before reading non-fiction text, preview the *features* of the text. Major text features include

- headings
- subheadings
- main body text

Other text features include

- definitions of key terms
- activities
- case studies
- sidebars

Some text features give you clues about the most important ideas in the text. For example, on the next page, you will see a box with the heading "Key Terms." These are the important terms you will learn in Section 1.1. Each key term is boldfaced when it first appears in the main body text, and it is defined in the margin on the same page. When studying for a test, use this feature to find important terms and concepts.

Use the Strategy

Turn to Section 1.2 in this chapter. Find the Key Terms box, and choose one term (other than *chromosome*). Find the page where the term is boldfaced, and record its definition.

Reading Effectively

Visualizing

Visualizing means forming an image in your mind based on what you are reading. The table below shows how a reader might visualize the following text, which appears under the subheading "Protein Production" on page 18: "... some proteins help build parts of your body. Others are like couriers .... All of these various proteins get their 'orders' from DNA."

Steps for Visualizing While Reading

Steps	How I Form an Image in My Mind
1. Start with an image in the text that is familiar to you.	The words "get their orders" make me think about a supervisor talking to a group of workers, telling each worker what his or her job will be.
2. Look for details that make the image more accurate.	The examples "some proteins help build" and "others are like couriers" help me visualize the kinds of jobs that proteins do.
3. Once you have created the final image in your mind, make a sketch.	My sketch shows a strand of DNA giving one protein a hard hat and another protein a courier bag.

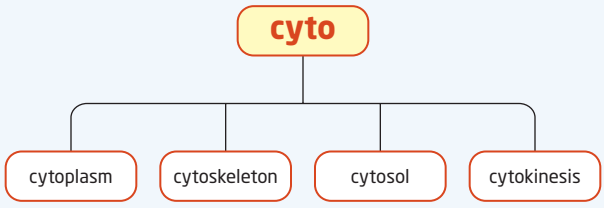
Use the Strategy

When reading the section titled "Mutations" on page 26, follow the steps in the table above.

Word Study

Word Families

Graphic organizers can help you remember the meanings of unfamiliar words. The graphic organizer on the right shows words that contain the word part *cyto*, meaning cell. Any word that contains this word part is related to cells. For example, *cytoskeleton* means a network that controls cell shape.



Use the Strategy

1. Draw a graphic organizer based on the word part *gene*. Find and record the definition of *gene* in Section 1.2.
2. As you read the rest of the section, note any words that contain *gene* or *gen*, and add them to your graphic organizer. Write a definition of each word. relating it to the definition of *gene*.