

Cell Structure and Function • Section Summary

Looking Inside Cells

Key Concepts

- What role do the cell wall and cell membrane play in the cell?
- What are the functions of cell organelles?
- How are cells organized in many-celled organisms?
- How do bacterial cells differ from plant and animal cells?

The **cell wall** is a rigid layer of nonliving material that surrounds the cells of plants and some other organisms. **A plant's cell wall helps to protect and support the cell.** The cell wall is made of a strong, flexible material called cellulose, and many materials can pass through it.

In cells that do not have cell walls, the **cell membrane** is the outside boundary that separates the cell from its environment. All cells have cell membranes. In cells with cell walls, the cell membrane is located just inside the cell wall. **The cell membrane controls what substances come into and out of a cell.**

Inside a cell are tiny structures called **organelles**, which carry out specific functions within the cell. The **nucleus** is a large, oval structure that acts as the "brain" of the cell. **You can think of the nucleus as the cell's control center, directing all of the cell's activities.** The nucleus is surrounded by a protective membrane called the nuclear envelope. Materials pass in and out of the nucleus through small openings, or pores, in the nuclear envelope.

The **cytoplasm** is the region between the cell membrane and the nucleus. Many cell organelles are found in the cytoplasm. The **mitochondria are known as the "powerhouses" of the cell because they convert energy in food molecules to energy the cell can use to carry out its functions.** Passageways called the **endoplasmic reticulum carry proteins and other materials from one part of the cell to another.** Small, grainlike bodies called **ribosomes function as factories to produce proteins.** Collections of sacs and tubes called **Golgi bodies receive proteins and other newly formed materials from the endoplasmic reticulum, package them, and distribute them to other parts of the cell.** The Golgi bodies release materials outside the cell. In plants and some other organisms, large, green structures called **chloroplasts capture energy from sunlight and use it to produce food for the cell.** Large water-filled sacs called **vacuoles are the storage areas of cells.** A vacuole stores food and other materials needed by the cell. Small, round structures called **lysosomes contain chemicals that break down certain materials in the cell.**

Plants and animals contain many cells. In a many-celled organism, the cells are often quite different from each other and are specialized to perform specific functions. **In many-celled organisms, cells are often organized into tissues, organs, and organ systems.** Bacterial cells are smaller and different from plant and animal cells. **While a bacterial cell does have a cell wall and a cell membrane, it does not contain a nucleus. The bacterial cell's genetic material, which looks like a thick, tangled string, is found in the cytoplasm.** Bacterial cells contain ribosomes, but none of the other organelles found in plant or animal cells.

Cell Structure and Function ▪ *Guided Reading and Study*

Looking Inside Cells (pp. 16–24)

This section describes cell structure and function in plant cells, animal cells, and bacteria.

Use Target Reading Skills

Before you read, preview the figure Plant and Animal Cells in your textbook. Then write two questions that you have about the illustrations in a graphic organizer like the one below. As you read, answer your questions.

Plant and Animal Cells

| |
|---|
| Q. How are animal cells different from plant cells? |
| A. |
| Q. |
| A. |

Introduction (p. 16)

1. What are organelles?

Enter the Cell (p. 17)

2. The rigid layer of nonliving material that surrounds plant cells is the

Cell Structure and Function ▪ *Guided Reading and Study*

3. Circle the letter of each sentence that is true about the cell wall.
- a. Cell walls are made of cellulose.
 - b. Plant cells have cell walls.
 - c. Animal cells have cell walls.
 - d. Water and oxygen cannot pass through the cell wall.

4. What does the cell wall do?

5. Where is the cell membrane located in cells that have cell walls?

6. Where is the cell membrane located in cells that do NOT have cell walls?

7. Is the following sentence true or false? The main function of the cell membrane is to control what comes into and out of a cell.

Sail On to the Nucleus (p. 18)

8. Circle the letter of each sentence that is true about the nucleus.
- a. Materials pass in and out of the nucleus through pores in the nuclear envelope.
 - b. Chromatin contains the instructions that direct the functions of a cell.
 - c. The nucleolus is part of the nuclear envelope.
 - d. Ribosomes are made in the nucleolus.

Organelles in the Cytoplasm (pp. 19–22)

9. Circle the letter of the part of the cell that is the region between the cell membrane and the nucleus.
- a. organelle
 - b. nucleus
 - c. cytoplasm
 - d. chromatin

Cell Structure and Function ▪ *Guided Reading and Study*

Looking Inside Cells *(continued)*

10. In the table below, describe the function of each organelle in the cytoplasm.

| Organelles in Cytoplasm | |
|-------------------------|----------|
| Organelle | Function |
| Mitochondria | |
| Endoplasmic reticulum | |
| Ribosomes | |
| Golgi bodies | |
| Chloroplasts | |
| Vacuoles | |
| Lysosomes | |

Specialized Cells (p. 23)

11. The structure of each kind of body cell is suited to its _____.

Bacterial Cells (p. 24)

12. Circle the letter of each sentence that is true about bacterial cells.
- a. Bacterial cells are larger than plant or animal cells.
 - b. Bacterial cells have a cell wall and a cell membrane.
 - c. Bacterial cells do not have a nucleus.
 - d. Bacterial cells do not have genetic material.

Cell Structure and Function ▪ *Review and Reinforce*

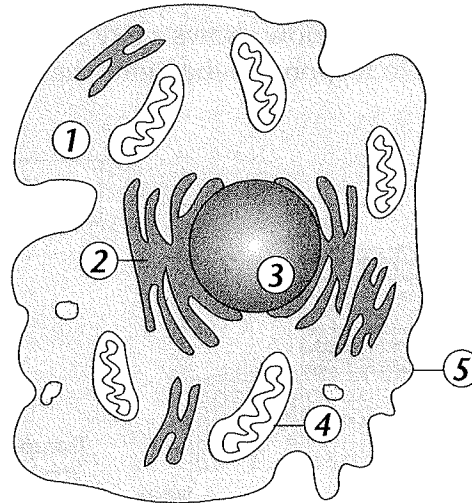
Looking Inside Cells

Understanding Main Ideas

Identify each of the cell structures in the figure.

1. _____
2. _____
3. _____
4. _____
5. _____

Simplified Animal Cell



Cell Structure and Function

Building Vocabulary

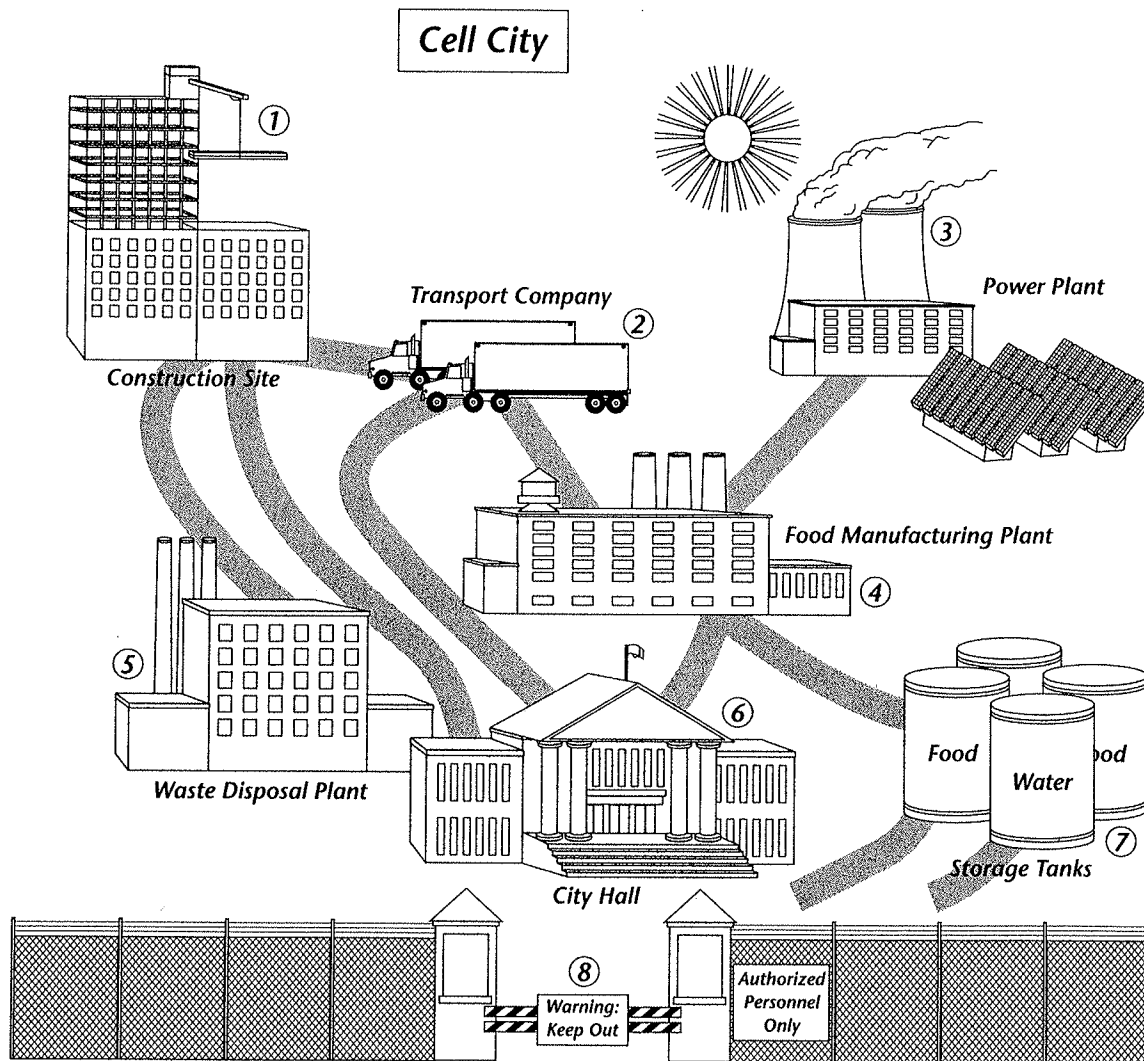
Fill in the blank to complete each statement.

6. _____ are tiny cell structures that carry out specific functions within the cell.
7. The rigid layer of nonliving material that surrounds the cells of plants and other organisms is called the _____.
8. In cells without cell walls, the _____ forms the outside boundary that separates the cell from its environment.
9. The _____ is a large, oval structure that directs all of the cell's activities.
10. The region between the cell membrane and the nucleus is called the _____.
11. _____ produce most of the energy the cell needs to carry out its functions.
12. A maze of passageways called the _____ carries proteins and other materials from one part of the cell to another.
13. _____ function as factories to produce proteins.
14. _____ receive proteins and other newly formed materials and distribute them to other parts of the cell.
15. Organelles called _____ capture energy from sunlight and use it to produce food for the cell.
16. The storage area of a cell is called a(n) _____.
17. _____ are small, round structures in cells that break down large food particles into smaller ones.

Cell Structure and Function ▪ Enrich

Modeling Cell Structures

The figure below shows a city that is a model for a cell. Study the figure, and use it to respond to the items that follow.



Answer the following questions on a separate sheet of paper.

1. State the function performed by each numbered structure in the figure.
2. Now name a cell structure that performs each of these same functions.
3. Does "Cell City" represent a plant cell or an animal cell? Explain your answer.