Chapter 3

Lesson 10 Cells

Focus on the Pennsylvania Academic Standards

Assessment Anchors/Eligible Content: S8.B.1.1.1 Describe the structures of living things that help them function effectively in specific ways (e.g., adaptations, characteristics).

S8.B.1.1.2 Compare similarities and differences in internal structures of organisms (e.g., invertebrate/vertebrate, vascular/nonvascular, single-celled/multi-celled) and external structures (e.g., appendages, body segments, type of covering, size, shape).

S8.B.1.1.4 Identify the levels of organization from cell to organism and describe how specific structures (parts), which underlie larger systems, enable the system to function as a whole.

Academic Standards: 3.3.7B

You can identify the major parts of a cell and their functions.

The **nucleus** is the control center of a cell. It contains a cell's genetic material.

Cytoplasm is the watery substance inside a cell that contains various cell parts.

The **cell membrane** controls the movement of substances into and out of a cell.

Chloroplasts are organelles in plant cells and are where food-making processes take place.

The **cell wall** gives a plant cell its shape and provides support and protection.

Guided Instruction

DIRECTIONS Read the following information and answer the questions.

Cells are the building blocks of life. All living things are made up of one or more cells. Most cells are too small to be seen without a microscope. Cells function in similar ways in all living things. They grow and reproduce. Cells obtain energy from the nutrients they take in. They also use these nutrients to make materials that they need.

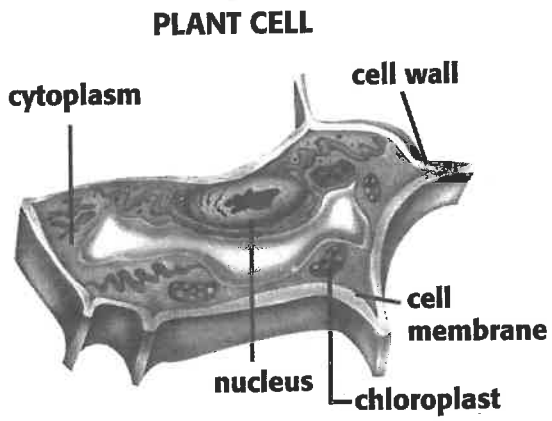
There are different parts to a cell. Many cells, including all plant and animal cells, have a central **nucleus** that contains genetic material. The nucleus and other cell parts are surrounded by a watery substance called **cytoplasm**. The **cell membrane** encloses the cytoplasm and cell parts.

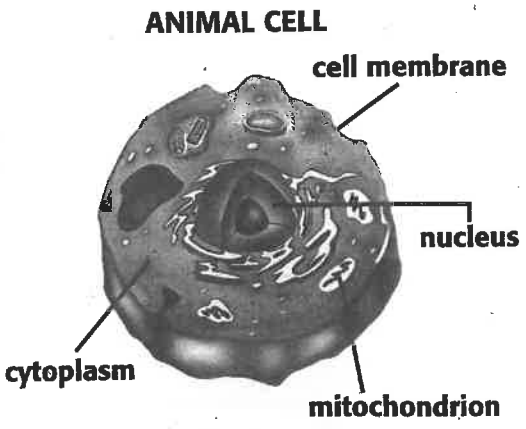
Guided Questions

What does the **nucleus** of a cell contain?

Where is the **cytoplasm**?

What does the **cell membrane** do?





Some plant cells contain parts not found in animal cells. Plants and plantlike protists have **chloroplasts**, which is where food is made by using the green pigment, *chlorophyll*. Plants also have a rigid **cell wall** outside the cell membrane. The cell wall is a nonliving structure that gives the cell its shape. The strength of billions of cell walls makes it possible for trees to be hundreds of feet tall.

Bacteria are organisms that are composed of a single cell. A single bacteria, called a bacterium, has a cell wall, but no nucleus. This means that the genetic material of a bacterium is found in the cytoplasm. Most bacteria cannot make their own food.

Guided Questions

What do **chloroplasts** contain?

Where is the **cell wall** in relation to the cell membrane?

DIRECTIONS Answer the following questions.

1. What are four functions of cells that are the same in all organisms?

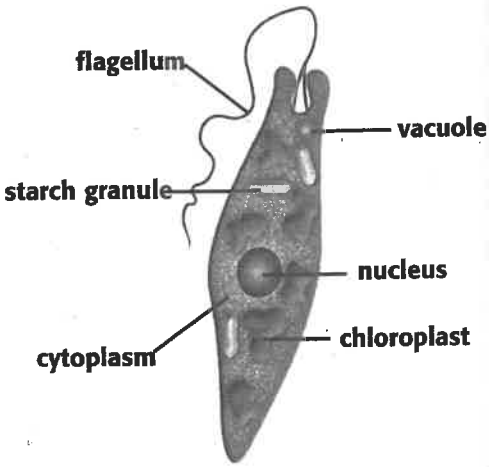
2. Compare the function of a cell membrane with a cell wall for a plant cell.

3. Why do plants need chloroplasts?

Apply the Pennsylvania Academic Standards

DIRECTIONS Read the paragraph, study the picture, and answer the questions.

Euglena are microscopic single-celled organisms that live in fresh water ponds. They grow and reproduce. Euglena are green and can use the energy in sunlight to make their own food. However, euglena are not plants. They sometimes obtain nutrients by taking in other microorganisms. Euglena can move from place to place by whipping their tail-like flagella back and forth. The diagram shows the structure of a typical euglena.



1. Explain why a euglena is a living thing.

2. In what ways is a euglena like all other cells?

3. How is a euglena like a plant cell? How is it like an animal cell?

   Like a plant cell:

   Like an animal cell:

PSSA Practice

Directions: Read each question. Then circle the letter for the best answer.

What is the building block of all living things?

A the cell
B the chloroplast
C the nucleus
D the cytoplasm

Which of the following statements is true?

A Cells don't need nutrients.
B Chloroplasts contain a cell's genetic material.
C Cells grow and reproduce.
D All nonliving things are made of cells.

Which of the following is found in a plant cell but **not** in an animal cell?

A cell membrane
B cell wall
C cytoplasm
D nucleus

4. Which of the following is true about all cells?

A The genetic material is found in the cytoplasm.
B They grow and reproduce.
C They obtain and use nutrients.
D They are found in multicellular organisms.

5. Which part of a euglena is also found in an animal cell?

A cell wall
B chloroplasts
C nucleus
D chlorophyll

6. Which organism could this cell be from?

A a human
B a maple leaf
C an alga
D a euglena

Focus on the Pennsylvania Academic Standards

Lesson 11 Structures of Living Things

Assessment Anchors/Eligible Content: S8.B.1.1.1 Describe the structures of living things that help them function effectively in specific ways (e.g., adaptations, characteristics).

S8.B.1.1.2 Compare similarities and differences in internal structures of organisms (e.g., invertebrate/vertebrate, vascular/nonvascular, single-celled/multi-celled) and external structures (e.g., appendages, body segments, type of covering, size, shape).

S8.B.1.1.4 Identify the levels of organization from cell to organism and describe how specific structures (parts), which underlie larger systems, enable the system to function as a whole.

Academic Standards: 3.3.7.A

You can distinguish among tissues, organs, and organ systems in plants and animals.

A **tissue** is a group of cells that work together.

An **organ** is a group of tissues that work together.

An **organ system** is a group of organs that work together.

Vascular tissue transports water and sugar in plants.

Guided Instruction

DIRECTIONS Read the following information and answer the questions.

Multicellular organisms have cells that look and act in different ways. The human body consists of about 200 different kinds of cells. A group of cells that work together to perform a specific task in an organism comprise **tissue**. Two or more tissues that work together to get a job done comprise an **organ**. A group of organs that work together to perform a certain job comprise an **organ system**. Organ systems found in plants, animals, and other multicellular organisms allow these organisms to function more efficiently.

Many green plants have a root system, a shoot system, and a reproductive system. A root system is an organ system made up of roots. A shoot system is made up of stems and leaves. Roots and stems are organs containing two kinds of **vascular tissue**. One, xylem, carries water and minerals upward through the roots and stems. The other, phloem, transports sugar downward. The leaves function in food production. A plant's reproductive system is made up of flowers and fruits.

Many kinds of animals have organ systems that carry out similar functions. A circulatory system is a transport system, in which blood carries nutrients, wastes, and other substances throughout the body.

Guided Questions

What is the difference between a **tissue** and an **organ**?

What is an **organ system**?

Which plant organs contain **vascular tissue**?

The digestive system functions in the breakdown of nutrients. The respiratory system is involved in exchanging gases, such as oxygen and carbon dioxide, between the air and the organism's body. The nervous system is an organism's control and communication system.

Each organ system in an animal is made up of cells, tissues, and organs. For example, in the human skeletal system, individual bone cells are grouped together to form bone tissue. Bone tissues are grouped together to make up a bone. Each bone is one organ of the skeletal system.

Guided Questions

Which organ system carries blood throughout the body?

DIRECTIONS Answer the following questions.

1. How are cells, tissues, organs, and organ systems related?

2. What are three organ systems that are found in many green plants?

3. Give two examples of organ systems in animals and describe the function of each.

4. The stomach and the intestines are part of the human digestive system. What level of organization do they represent?

5. In fish, water enters and leaves through gills. Oxygen from the water passes through a thin membrane and into the blood stream. Carbon dioxide passes from the blood into the water in the gills. What organ systems are interacting in the fish? Explain.

Apply the Pennsylvania Academic Standards

DIRECTIONS Read the paragraph, study the chart, and answer the questions.

Starfish have an organ system that most other animals do not have. It is called the *water vascular system.* This system helps starfish eat, move, and breathe. The chart below lists the organs in the water vascular system and describes the function of each organ.

ORGANS OF THE WATER VASCULAR SYSTEM

Organ	Function
Sieve plate	allows water to enter the starfish; keeps out pieces of debris
Ring canal	pumps water from the sieve plate to the radial canals
Radial canals	allow water to flow to the tube feet
Tube feet	help the starfish move, catch food, take in oxygen, and remove wastes
Ampullae	bulb-like structures that connect to the tube feet and regulate water pressure

1. What are three functions of a starfish's water vascular system?

2. What do the tube feet do?

3. Identify two separate human body systems whose functions are similar to those performed in a starfish by the water vascular system.

4. What are the five organs that make up the water vascular system of a starfish and how do they function as an organ system?

5. What is another kind of organ system that you could expect to find in a starfish? Explain.

PSSA Practice

Directions: Read each question. Then circle the letter for the best answer.

Which of the following lists an organism's levels of organization in order from smallest to largest?

A tissues, cells, organ systems, organs
B cells, organs, tissues, organ systems
C tissues, cells, organs, organ systems
D cells, tissues, organs, organ systems

What is the function of a plant's vascular tissue?

A transportation
B reproduction
C food production
D waste removal

Organ systems similar to a human's systems are **most likely** to be found in a

A maple tree.
B horse.
C bacterium.
D mushroom.

The advantage of having different levels of organization is that they increase an organism's

A efficiency.
B size.
C intelligence.
D habitat.

5. Bones are part of the human skeletal system. Which level of organization do they represent?

A cells
B tissues
C organs
D organ systems

6. Which of the following systems produces the flowers and fruits on a plant?

A root system
B vascular system
C shoot system
D reproductive system

7. Which is **not** a function of the water vascular system of a starfish?

A movement
B to catch food
C control center
D to breathe