

Chapter 7 PAP Guided Reading

7.1 Life Is Cellular

Lesson Objectives:

1. State the cell theory.
2. Describe how the different types of microscopes work.
3. Distinguish between prokaryotes and eukaryotes.

Lesson Summary

The Discovery of the Cell The invention of the microscope in the 1600s enabled researchers to see cells for the first time. Robert Hooke named the empty chambers he observed in cork "cells."

Cells are the basic units of life.

Cell theory, states: All living things are made of cells. Cells are the basic units of structure and function in living things. New cells are produced from existing cells.

Prokaryotes and Eukaryotes Cells come in an amazing variety of shapes and sizes, but all cells contain DNA. Also, all cells are surrounded by a thin flexible barrier called a **cell membrane**. There are two basic categories of cells based on whether they contain a nucleus. The **nucleus** (plural: nuclei) is a large membrane-enclosed structure that contains DNA.

Eukaryotes are cells that enclose their DNA in nuclei. **Prokaryotes** are cells that do not enclose their DNA in nuclei.

The Discovery of the Cell

For Questions 1–2, complete each statement by writing the correct word or words.

1. The invention of the _____ made the discovery of cells possible.
2. Robert Hooke used the name _____ to refer to the tiny empty chambers he saw when he observed magnified cork.

Exploring the Cell

For Questions 3–5, write True if the statement is true. or change the underlined word(s) make the statement true.

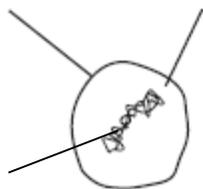
- _____ 3. The size of the image formed by a light microscope is unlimited because light that passes through matter is diffracted.
- _____ 4. Fluorescent dyes help scientists see the movement of compounds and structures in living cells.
- _____ 5. Transmission electron microscopes form a 3-D image of the surface of a specimen.

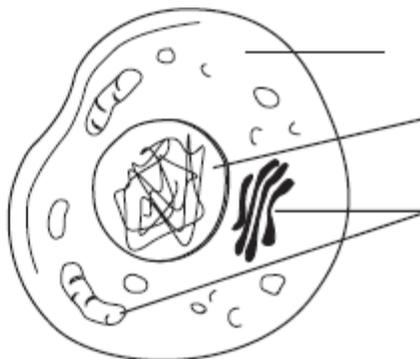
Prokaryotes and Eukaryotes

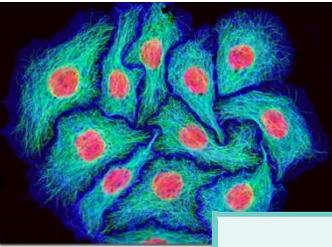
Prokaryotes are simple cells. They lack a nucleus. Your body is made up of eukaryotic cells. Eukaryotes have a nucleus that holds DNA. They also have organelles.

Look at the diagrams below. Follow the directions.

6. Label the prokaryotic cell and its parts.
7. Label the eukaryotic cell and its parts.







Cell Theory, Structure and Transport

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8. Compare and contrast the two types of cells by completing the table.

	Prokaryotic Cell	Eukaryotic Cell
Cell membrane		
Nucleus		
Cell size		
Complexity		

9. Complete the table about the two categories of cells.

Two Categories of Cells			
Category	Definition	Size range	Examples
Prokaryotic cells			
Eukaryotic cells			

10. Which category of cells—prokaryotic or eukaryotic—is your body composed of? _____

11. Circle the correct answer. Bacteria are _____ cells.

- a. prokaryotic b. eukaryotic

12. Give two other examples of living things that are eukaryotic.

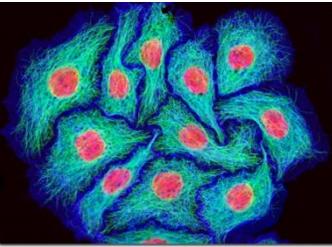
- a. _____ b. _____

13. Recall that in science, a theory is a well-tested explanation that unifies a broad range of observations and hypotheses and enables scientists to make accurate predictions about new situations. How does the cell theory demonstrate this definition of theory?

14. (circle all true statements) Prokaryotes

- a. grow and reproduce. c. are more complex than cells of eukaryotes.
 b. include many large, multicellular organisms. d. have cell membranes and cytoplasm.

15. Are all eukaryotes large, multicellular organisms? _____



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Chapter 7.2 Guided Reading

7.1 Review

7.2 Cell Structure

Lesson Objectives

1: Describe the structure and function of the cell nucleus. 2: Describe the role of vacuoles, lysosomes, and the cytoskeleton. 3: Identify the role of ribosomes, endoplasmic reticulum, and Golgi apparatus in making proteins. 4: Describe the function of chloroplasts and mitochondria in the cell. 5: Describe the function of the cell membrane.

Lesson Summary

- Cell Organization Eukaryotic cells contain a nucleus and many specialized structures. Cytoplasm is the fluid portion of a cell. Organelles are structures that have specialized functions in eukaryotic cells. The nucleus contains DNA and controls the activity of a cell.
- Organelles That Store, Clean Up, and Support These structures include:
 - vacuoles: membrane-enclosed saclike structures that store water, salts, and organic molecules
 - lysosomes: organelles filled with enzymes that break down large molecules and organelles no longer useful
 - the cytoskeleton: a network of protein filaments; helps cell maintain its shape and is involved in movement
 - centrioles: organelles made from tubulins; they help organize cell division in animal cells
- Organelles That Build Proteins Three kinds of organelles work with the nucleus to make and distribute proteins:
 - ribosomes: small particles of RNA and protein found throughout the cytoplasm in all cells; they produce proteins by following coded instructions from DNA
 - the endoplasmic reticulum (ER): an internal membrane system where lipid components of the cell membrane are assembled, along with proteins and other materials
 - the Golgi apparatus: an organelle that appears as a stack of flattened membranes; it modifies, sorts, and packages proteins and other materials from the ER for storage in the cell or release outside the cell
- Organelles That Capture and Release Energy Two types of organelles act as power plants of the cells. Both types are surrounded by two membranes.
 - Chloroplasts capture the energy from sunlight and convert it into food that contains chemical energy in a process called photosynthesis. Cells of plants and some other organisms contain chloroplasts, which contain chlorophyll.
 - Mitochondria are found in nearly all eukaryotic cells; they convert the chemical energy stored in food to a usable form.

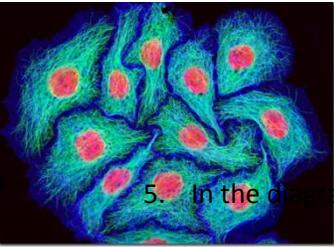
Cell Organization

1. Describe the relationship between the cytoplasm and the nucleus of a cell. _____

2. What does the term *organelle* mean literally? _____

Organelles That Store, Clean Up, and Support

3. What are vacuoles? _____
4. What are the two roles of the central vacuole in plant cells? _____

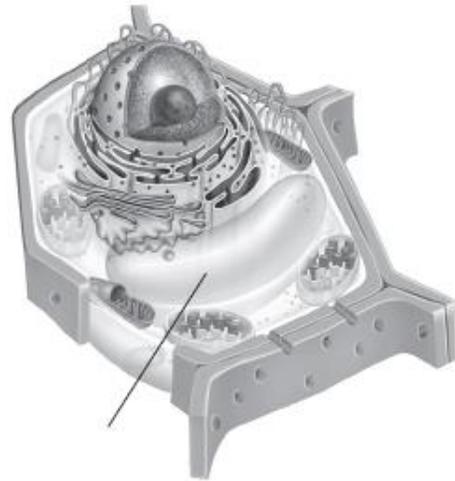


Cell Theory, Structure and Transport

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5. In the diagrams of the animal cell and the plant cell, label the structures indicated by the lines.



6. What is the role of lysosomes in the cell? Why is this role vital? _____

7. Which structures of the cytoskeleton are found in animal cells but not in plant cells? _____

8. What other structures of the cytoskeleton would show the same pattern of microtubules as a flagellum?

Organelles That Build Proteins

9. What are ribosomes? What do they do? _____

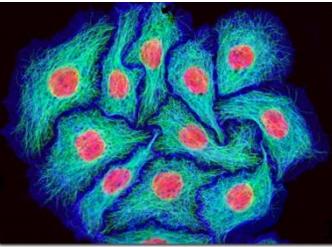
10. In which organelle are the lipid components of the cell membrane assembled? _____

11. What is the difference between rough ER and smooth ER? _____

12. Using the cell as a factory analogy, describe the role of the Golgi apparatus in cells. _____

13. Suppose a cell's Golgi apparatus does not function properly. How might this problem affect other cells?

14. Chloroplasts and mitochondria contain their own genetic information in the form of _____.



Cell Theory, Structure and Transport

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5. Lynn Margulis has suggested that mitochondria and chloroplasts are descendants of ancient _____.

The Nucleus

- 16. The granular material visible within the nucleus is called _____.
- 17. Chromatin consists of _____ bound to _____.
- 18. What are chromosomes? _____

- 19. Most nuclei contain a small, dense region known as the _____.
- 20. The nucleolus is where the assembly of _____ begins.
- 21. What is the nuclear envelope? _____

Cytoskeleton

22. The _____ is a network of protein filaments that helps the cell to maintain its shape.

23. Complete the table about structures that make up the cytoskeleton.

STRUCTURES OF THE CYTOSKELETON

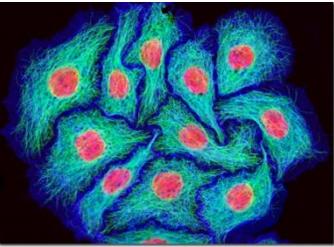
Structure	Description	Functions
		Maintain cell shape, help build cilia and flagella, form centrioles in cell division
		Support the cell, help cells move

Match the organelle with its description.

- 24. _____ Ribosome a. Uses energy from sunlight to make energy-rich food
- 25. _____ ER b. Stack of membranes in which enzymes attach carbohydrates and lipids to proteins
- 26. _____ Golgi apparatus c. Uses energy from food to make high energy compounds
- 27. _____ Lysosome d. An internal membrane system in which parts membranes and proteins are built
- 28. _____ Vacuole e. Saclike structure that stores materials
- 29. _____ Chloroplast f. Small particle of RNA and protein that produces protein
- 30. _____ Mitochondrion g. Filled with enzymes used to break down food into particles that can be used

True/False Practice: If the statement is True, write "True." If the statement is false, replace the underlined word with a different one that will make the statement true.

- 1. An electron microscope uses a beam of electrons that are focused by magnetic fields, while a light microscope uses light to magnify an image. _____
- 2. Prokaryotes are usually much larger cells than eukaryotes. _____



Cell Theory, Structure and Transport

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3. If a cell of an organism contains (has) a nucleus, the organism is a prokaryote.

4. The cell is the basic unit of structure and function in living things. _____
5. In most cells, the structure that controls the cell's activities is the ribosomes.

6. The cell wall is a flexible boundary between cell and its environment . _____
7. Despite differences in size and shape, at some point all cells have DNA and a plasma membrane.

8. The main difference in a eukaryotic cell from a prokaryotic cell is the presence of a cell wall.

9. The cell theory states that all living things are made up of cells. _____
10. The cell theory states that all cells store their DNA in the nucleus. _____
11. The cell theory states that cells are the basic units of structure and function in living things.

12. The cell theory states that new cells are produced from existing cells. _____
13. Mitochondria are found in plant and animal cells, and chloroplasts are found in plant cells only.

14. The word organelle simply means "specialized organs." _____
15. Some examples of prokaryotes are plants, animals, and fungi. _____
16. Some examples of eukaryotes are bacteria. _____
17. Anton van Leeuwenhoek used a compound microscope to see chambers within cork and named them "cells". _____
18. The fluid portion of the cell outside the nucleus that contains nutrients is called the cytoplasm.

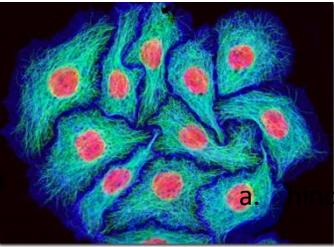
19. Vacuoles are usually much larger and more numerous in plants than animals.

20. Plant cells usually have a circular, flexible shape. _____

7.3 Guided Reading

Multiple Choice: Circle the correct answer.

1. Which term refers to the condition that exists when *no* net change in concentration results from diffusion?
 - a. concentration
 - b. equilibrium
 - c. osmosis
 - d. randomness
2. Which process can move molecules from a lower concentration solution on one side of the membrane to a higher concentration solution on the other side?
 - a. active transport
 - facilitated diffusion
3. Which process does not require energy?
 - a. active transport
 - facilitated diffusion
4. What does the word *facilitated* mean in *facilitated diffusion*?



Cell Theory, Structure and Transport

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a. _____ dered _____ helped

5. In the table below, draw how each type of cell will look after being placed in a hypertonic solution.

Appearance of Cells in a Hypertonic Solution	
Animal Cells	Plant Cells

For Questions 6–8, Write the letter of the correct answer on the line at the left

Situation

Result

- | | | |
|-------|--|-----------------------------|
| _____ | 6. Cells are in an isotonic solution. | a. The cells lose water. |
| _____ | 7. Cells are in a hypertonic solution. | b. The cells gain water. |
| _____ | 8. Cells are in a hypotonic solution. | c. The cells stay the same. |

Active Transport

9. What is the function of active transport in moving small molecules and ions across cell membranes?

10. How does ATP enable transport proteins to move ions across a cell membrane?

11. Complete the table to summarize the types of bulk transport.

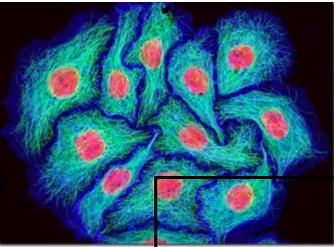
Types of Bulk Transport	
Type	Description
Endocytosis	
Phagocytosis	
Exocytosis	

12. Most sports drinks are isotonic in relation to human body fluids. Explain why athletes should drink solutions that are isotonic to body fluids when they exercise rather than ones that are hypotonic to body fluids (contain a greater proportion of water in comparison to the fluids in and around human body cells).

13. **Compare/Contrast Table** Use a compare/contrast table when you want to see the similarities and differences between two or more objects or processes. Select words or phrases from the box to complete the table comparing passive and active transport.

diffusion	energy required	exocytosis	osmosis
endocytosis	energy not required	facilitated diffusion	protein pumps

Passive Transport	Active Transport
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Cell Theory, Structure and Transport

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Plasma Membrane

14. The plasma membranes is a double-layered sheet called a(an) _____.

15. What is the difference in the function of the proteins and the carbohydrates attached to a cell membrane?

Cell Walls

16. Cell walls are found in _____, algae, _____, and many prokaryotes.

17. What is the main function of the cell wall? _____

18. What is the concentration of a solution? _____

19. Diffusion is the process by which molecules tend to move from an area where they are _____ concentrated to an area where they are _____ concentrated.

20. What is meant when a system has reached equilibrium?

21. What does it mean that biological membranes are selectively permeable?

22. Osmosis is the diffusion of _____ through a selectively permeable membrane.

23. Water will move across the membrane until _____ is reached.

24. What is the role of protein channels in the cell membrane? _____

25. The energy-requiring process that moves material across a cell membrane against a concentration difference is called _____.