



*Resources for*  
**AT-HOME  
LEARNING**  
**K-12 CURRICULUM & INSTRUCTION**



**DURHAM**  
PUBLIC SCHOOLS

**Science 7**  
**Cells and Unicellular Organisms:**  
**7.L.1.1, 7.L.1.2**

These materials are supplemental and will not be counted for a grade; students will not be penalized if the packet is not completed.

pages 44, 47 (br) Hutchings Photography/Digital Light Source

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**EC Services:** Each student with a disability has unique learning needs related to his/her disability, so it is very difficult to make recommendations for accommodations and how to differentiate learning that would be relevant to all students. If possible, referencing the supplementary aids and services (classroom accommodations) portion of each student's Individualized Education Program (IEP) to assist with access/accommodation needs may be helpful for parents who may be facilitating the supplementary work at home.

**Servicios de Necesidades Excepcionales:** Cada estudiante con una invalidez tiene necesidades de aprendizaje únicas relacionadas a su invalidez, entonces es bastante difícil hacer recomendaciones para acomodaciones y como diferenciar aprendizaje que sería pertinente para todos los estudiantes. Si es posible, referenciar las ayudas suplementarias y servicios (acomodaciones de salón de clase) porción del Programa Educativo Individualizado (PEI) de cada estudiante para ayudar con necesidades de acceso/acomodación puede ser útil para los padres que pueden estar facilitando el trabajo suplementario en casa.

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**ESL Instructional Services:** Since school is cancelled and these are not instructional days students will not be receiving direct services. Packets for ELs will be included with other instructional material that will go to schools. ESL teachers will follow their schools' guidance.

**Servicios Instruccionales de Inglés como Segundo Lenguaje:** Ya que se cancela la escuela y estos no son días de instrucción, los estudiantes no recibirán servicios directos. Los Paquetes para los estudiantes del idioma inglés se incluirán con otro material instructivo que llegarán a las escuelas. Los profesores de Inglés como Segundo Lenguaje seguirán la dirección de la escuela.

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**Advanced Academics Services:** Advanced learners need differentiation which provides them with more complex materials, tasks, and activities than their age peers – tasks that lead to authentic learning. To respect the unique learning needs of every student who needs more challenge, supplemental materials will be provided to offer 1) extension activities that are designed to broaden the understanding of a particular subject, idea, or concept by adding depth and complexity; and/or 2) enrichment options that provide a variety of learning opportunities that enhance a student's interests and talents through creative and academic exploration. These choice materials will be available in your student's At Home packet for your reference and student engagement opportunities.

**Servicios Académicos Avanzados:** Los estudiantes avanzados necesitan una diferenciación que les proporcione materiales, tareas y actividades más complejas que sus compañeros de edad-- tareas que conducen al aprendizaje auténtico. Para respetar las necesidades de aprendizaje únicas de cada estudiante que necesita más desafíos, se proporcionarán materiales suplementarios para ofrecer 1) actividades de extensión que están diseñadas para ampliar la comprensión de un tema, idea o concepto en particular al agregar profundidad y complejidad; y/o 2) opciones de enriquecimiento que proporcionan una variedad de oportunidades de aprendizaje que mejoran los intereses y talentos de un estudiante a través de la exploración creativa y académica. Estos materiales de elección estarán disponibles en el paquete de estudiantes para completar en casa para su referencia y oportunidades de participación estudiantil.



# **Ten Day Instructional Packet**

## **Science 7**

### **Cells & Protists**

**Cells: Days 1-5**

**Protists: Days 6-10**



## **Cells: Days 1-5**

## A Close-Up View

Look closely and you will see the small hairs on this damselfly's legs and the thin veins that span this leaf. However, the photo does not reveal the tiniest details of these organisms. Both plants and animals are made of tiny units called cells. Cells are too small to observe with the unaided eye.

- 1 Describe the leaf and its function, and compare it to the parts of the damselfly. Do you think the cells of the leaf and damselfly are different? Discuss.
- 2 How do scientists observe and study cells?
- 3 Why do plants and animals need a large number and variety of cells, not just a few cells of the same kind?



# Lesson 2 Cells

**Scan** Lesson 2. Read the lesson titles and bold words. Look at the pictures. Identify three facts you discovered about cells. Record your facts in your Science Journal.

## Main Idea

**What are cells?**

I found this on page \_\_\_\_\_.

**What are cells made of?**

I found this on page \_\_\_\_\_.

**Types of Cells**

I found this on page \_\_\_\_\_.

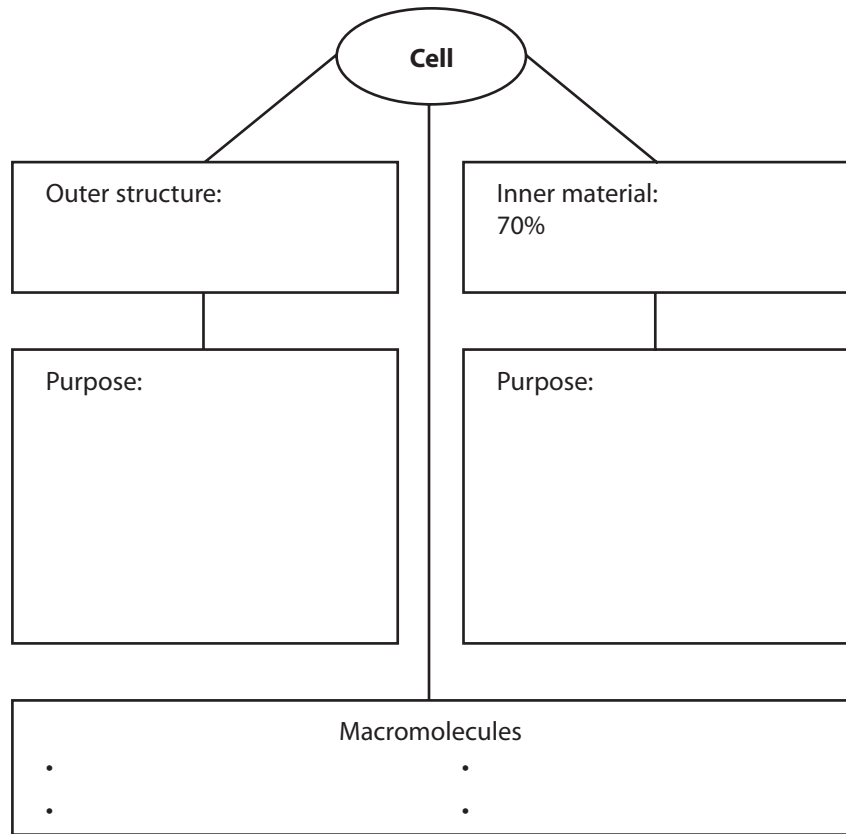
## Details

**Contrast** the numbers of cells that make up organisms.

Most Organisms: \_\_\_\_\_

Humans: \_\_\_\_\_

 **Characterize** the makeup of cells.



**Describe** types of cells.

Prokaryotic cells	Eukaryotic cells

# Life's Classification and Structure

## Cells

### ..... Before You Read .....

**What do you think?** Read the three statements below and decide whether you agree or disagree with them. Place an A in the Before column if you agree with the statement or a D if you disagree. After you've read this lesson, reread the statements to see if you have changed your mind.

Before	Statement	After
	4. <i>Cell wall</i> is a term used to describe the cell membrane.	
	5. Prokaryotic cells contain a nucleus.	
	6. Plants use chloroplasts to process energy.	

### ..... Read to Learn .....

#### What are cells?

What is one thing all living organisms have in common? All organisms have one or more cells. Cells are the basic units of organisms. Most organisms have only one cell. Some organisms have many cells. Humans have about 100 trillion cells! Most cells are so small that they can be seen only with a microscope. Microscopes are used to view details of small objects or things that are too small to be seen by the unaided eye.

Scientists first used microscopes to look at cells more than 300 years ago. Cells can be different shapes and sizes. Nerve cells are long and slender. Many female reproductive cells, or eggs, are large and round. ✓

#### What are cells made of?

Recall that all cells are made of four macromolecules—nucleic acids, lipids, proteins, and carbohydrates. Cells also have many other characteristics. For example, all cells are surrounded by an outer structure called a cell membrane. The cell membrane keeps substances such as macromolecules inside the cell. It also helps protect cells by keeping harmful substances from entering. About 70 percent of the inside of a cell is water. Because many of the substances inside a cell are dissolved in water, they move easily within the cell. ✓

#### Key Concepts

- What is a cell made of?
- How do the parts of a cell enable it to survive?

#### Mark the Text

#### Identify the Main Ideas

Write a phrase beside each paragraph that summarizes the main point of the paragraph. Use the phrases to review the lesson.

#### Reading Check

**1. Explain** Why is a microscope needed to view most cells?

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#### Key Concept Check

**2. Relate** What is a cell made of?

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## Types of Cells

There are two main types of cells, as shown in the figure below. Structures in the two types of cells are organized differently. **Prokaryotic** (pro kayr ee AH tihk) **cells do not have a nucleus or other membrane-bound organelles.** Organelles are structures in cells that carry out specific functions. The few organelles in prokaryotic cells are not surrounded by membranes. Organisms with prokaryotic cells are called prokaryotes. Most prokaryotes are unicellular organisms, such as bacteria.

### Reading Check

**3. State** What are the two main types of cells?

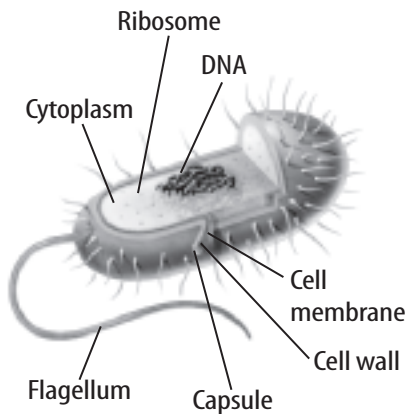
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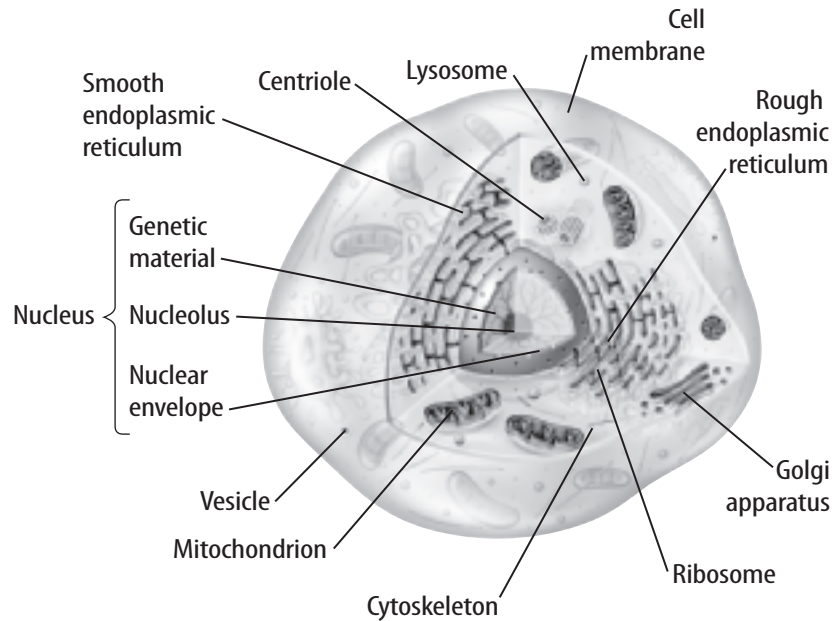
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**Eukaryotic** (yew ker ee AH tihk) **cells have a nucleus and other membrane-bound organelles.** Most multicellular organisms and some unicellular organisms are eukaryotes. The eukaryotic cell shown in the figure below contains many structures that are not in a prokaryotic cell. In eukaryotes, membranes surround most of the organelles, including the nucleus. ✓

### Prokaryotic and Eukaryotic Cells



**Prokaryotic Cell**



**Eukaryotic Cell**

### Visual Check

**4. Compare** What structures are in both prokaryotic and eukaryotic cells?

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## The Outside of a Cell

As you have just read, the cell membrane surrounds a cell. Much like a fence surrounds a school, the cell membrane helps keep substances inside a cell separate from the substances outside a cell. A more rigid layer, called a cell wall, also surrounds some cells.

## Cell Membrane

The cell membrane is made of lipids and proteins. Recall that lipids and proteins are macromolecules that help cells function. Lipids in the cell membrane protect the inside of a cell from the external environment. Proteins in the cell membrane transport substances between a cell's environment and the inside of the cell. Proteins in the cell membrane also communicate with other cells and organisms and sense changes in the cell's environment. ✓

## Cell Wall

In addition to a cell membrane, some cells have a cell wall, as shown in the figure below. The cell wall is a strong, rigid layer outside the cell membrane. Cells in plants, fungi, and many types of bacteria have cell walls. They provide structure and help protect the cell from the outside environment. Most cell walls are made from different types of carbohydrates.

### ✓ Reading Check

**5. Summarize** the major components of cell membranes.

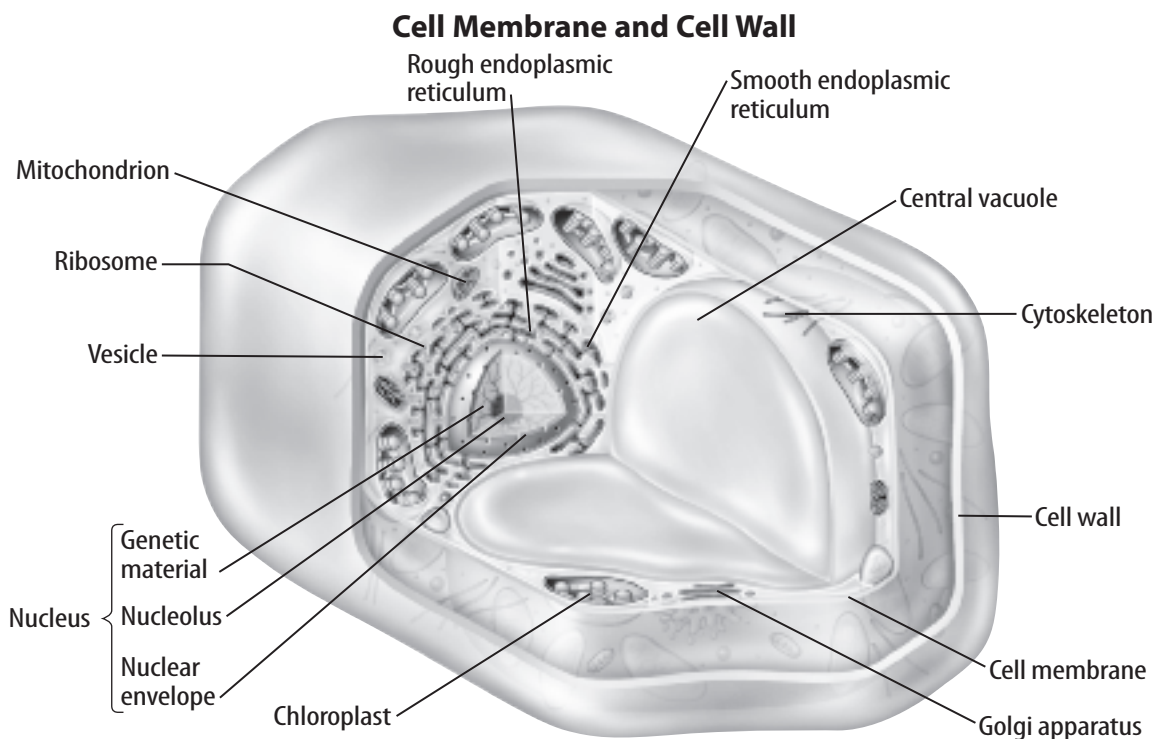
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## The Inside of a Cell

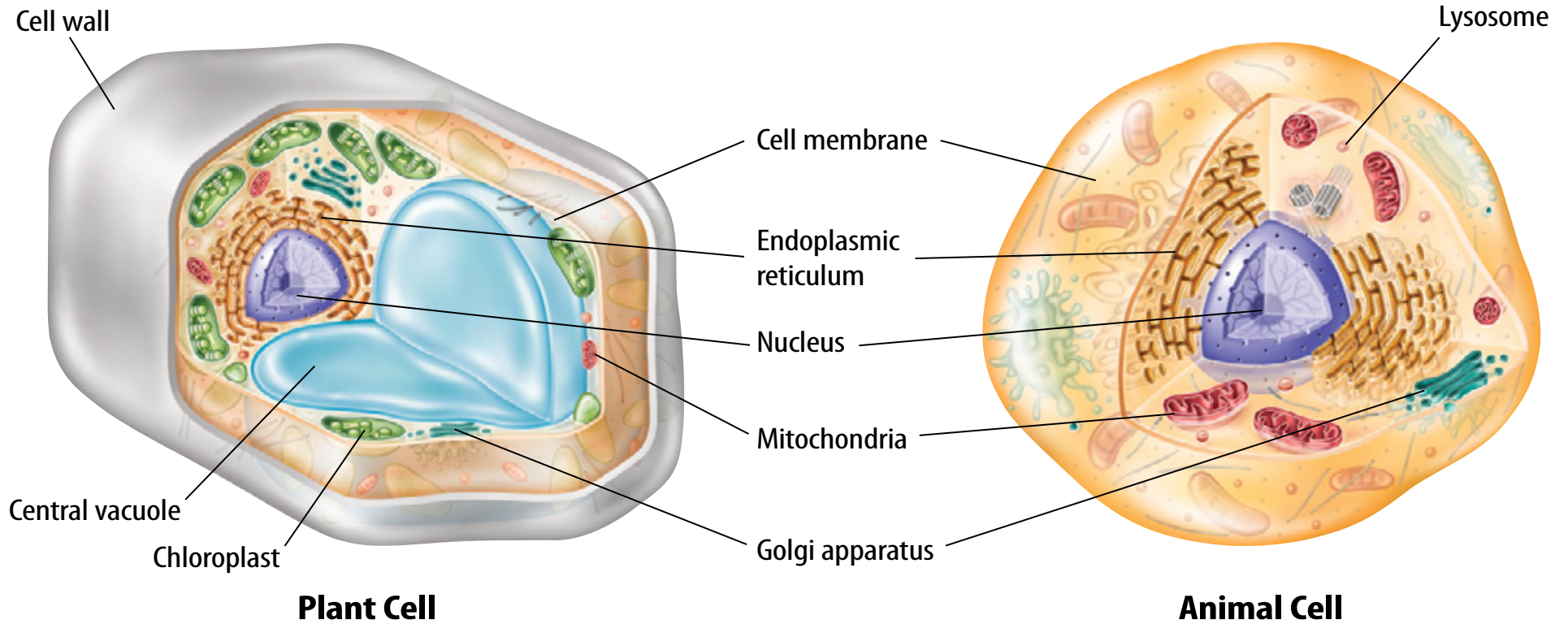
Recall that the inside of a cell is mainly water. Many substances used for communication, energy, and growth dissolve in water. This makes it easier for the substances to move around inside a cell. Water also gives cells their shapes and helps keep the structures inside a cell organized. The organelles inside a cell perform specific functions. They control cell activities, provide energy, transport materials, and store materials.

### ✓ Visual Check

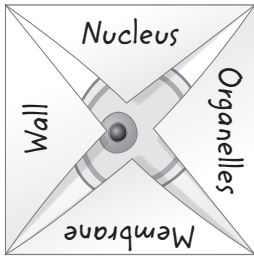
**6. Locate** Is the cell wall found inside or outside the cell membrane?

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## Plant and Animal Cells



Make an envelope book and use the inside to illustrate a cell. Use the tabs to label and describe the cellular structures.



**Reading Check**

**7. Identify** What type of macromolecule is DNA?

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**Reading Check**

**8. Name** What energy molecule is made in a mitochondrion?

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**Cytoplasm**

The liquid part of a cell inside the cell membrane is called the **cytoplasm**. It contains water, macromolecules, and other substances. In eukaryotic cells, the organelles are located in the cytoplasm. Proteins in the cytoplasm provide structure and help organelles and other substances move around.

**Controlling Cell Activities**

Genetic material, called DNA, stores the information that controls all of a cell's activities. DNA is a type of macromolecule called a nucleic acid. The DNA transfers its information to another nucleic acid called RNA. RNA gives cells instructions about which proteins need to be made.

In prokaryotic cells, DNA is in the cytoplasm. In eukaryotic cells, DNA is stored in an organelle called the nucleus. A membrane, called the nuclear membrane, surrounds the nucleus. Tiny holes in the nuclear membrane let certain substances move between the nucleus and the cytoplasm.

**Energy for the Cell**

You read in Lesson 1 that all living things use energy. Proteins in the cytoplasm process energy in prokaryotes. Eukaryotes have special organelles called chloroplasts and mitochondria (mi tuh KAHN dree uh; singular, mitochondrion) that process energy.

**Mitochondria** Most eukaryotes contain hundreds of mitochondria. **Mitochondria** are organelles that break down food and release energy. Molecules called ATP—adenosine triphosphate (uh DEN uh seen • tri FAHS fayt)—store this energy. ATP provides a cell with energy to perform many functions, such as making proteins, storing information, and communicating with other cells.

**Chloroplasts** Energy also can be processed in organelles called chloroplasts. Plants and many other autotrophs have chloroplasts and mitochondria. Animal cells do not have chloroplasts. Chloroplasts capture light energy and convert it into chemical energy in a process called photosynthesis. Chloroplasts contain many structures that capture light energy. Like the reactions that occur in mitochondria, ATP molecules are produced during photosynthesis. However, photosynthesis also produces carbohydrates such as glucose that also are used to store energy.

## Protein Production

You just read that cells use protein for many functions. These proteins are made on the surface of ribosomes that are in the cytoplasm of prokaryotic and eukaryotic cells. In eukaryotic cells, some ribosomes are attached to an organelle called the endoplasmic reticulum (en duh PLAZ mihk • rih TIHK yuh lum). Endoplasmic reticulum is made of folded membranes. The proteins can be processed and can move inside the cell through the endoplasmic reticulum. ✓

## Cell Storage

What happens to the molecules that are made in a cell? An organelle called the Golgi (GAWL jee) apparatus packages proteins into tiny organelles called vesicles. Vesicles transport proteins around a cell. Organelles called vacuoles store other molecules. A vacuole is usually the largest organelle in a plant cell. In plant cells, vacuoles also store water and provide support. In contrast to the vacuoles in all plant cells, only some animal and bacterial cells contain vacuoles. The vacuoles in animal and bacterial cells are smaller than the ones in plant cells. ✓

### ✓ Reading Check

**9. Express** Where are ribosomes found in eukaryotic cells?

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### ✓ Key Concept Check

**10. Describe** How do the parts of a cell enable it to survive?

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## ..... After You Read .....

### Mini Glossary

**cytoplasm:** the liquid part of a cell inside the cell membrane

**eukaryotic (yew ker ee AH tihk) cell:** a cell that has a nucleus and other membrane-bound organelles

**mitochondrion (mi tuh KAHN dree un):** an organelle that breaks down food and releases energy

**prokaryotic (pro kayr ee AH tihk) cell:** a cell that does not have a nucleus or other membrane-bound organelles

1. Review the terms and their definitions in the Mini Glossary. Write a sentence discussing what is found in cytoplasm.

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2. Identify the organelle that performs each function described in the table and write its letter in the left column.

a. chloroplast

c. Golgi apparatus

e. vacuole

b. cell wall

d. nucleus

f. vesicle

Organelle	Function
	stores DNA in eukaryotic cells
	transports proteins around a cell
	stores water and provides support in plants
	processes energy in plant cells
	packages proteins in vesicles
	protects the cell from the outside environment

3. Explain how DNA and RNA work together.

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### What do you think **NOW?**

Reread the statements at the beginning of the lesson. Fill in the After column with an A if you agree with the statement or a D if you disagree. Did you change your mind?



Log on to [ConnectED.mcgraw-hill.com](http://ConnectED.mcgraw-hill.com) and access your textbook to find this lesson's resources.



## Lesson 2 | Cells (continued)

### Main Idea

I found this on page \_\_\_\_\_.


### The Outside of a Cell

I found this on page \_\_\_\_\_.

### The Inside of a Cell


I found this on page \_\_\_\_\_.

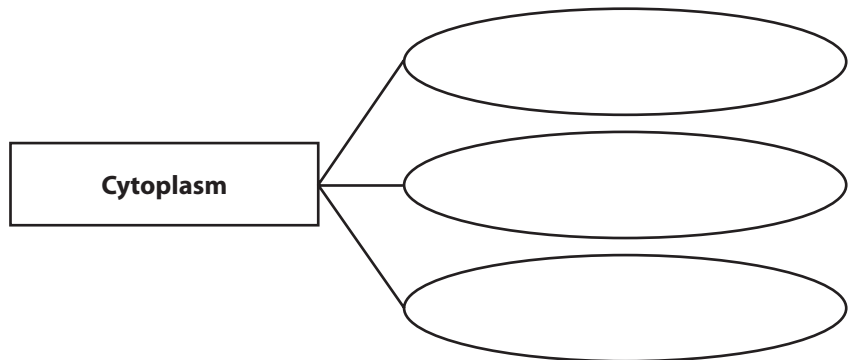
### Details

 **Model** a prokaryotic cell. Draw and label the cell, using different colors for different structures. Circle the names of at least two structures that are also present in eukaryotic cells.

**Contrast** a cell membrane with a cell wall.

Cell Membrane	Cell Wall

 **Characterize** the contents of the cytoplasm in cells of eukaryotic organisms.



## Lesson 2 | Cells (continued)

### Main Idea

I found this on page \_\_\_\_\_.

I found this on page \_\_\_\_\_.

I found this on page \_\_\_\_\_.

### Details



**Distinguish** the nucleic acid DNA from RNA.

DNA	RNA



**Compare and contrast** the functions and locations of a mitochondrion and a chloroplast.

Mitochondrion	Both	Chloroplast



**Describe** the roles of different cell structures.

Structure	Role
Ribosomes	
Endoplasmic reticulum	
Golgi apparatus	
Vesicles	
Vacuoles	



**Analyze It** Generalize how prokaryotic and eukaryotic cells relate to unicellular and multicellular organisms.

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**Content Vocabulary**

**LESSON 2**

**Cells**

**Directions:** Use the terms below to complete the concept map. NOTE: You may need to change a term to its plural form.

cytoplasm

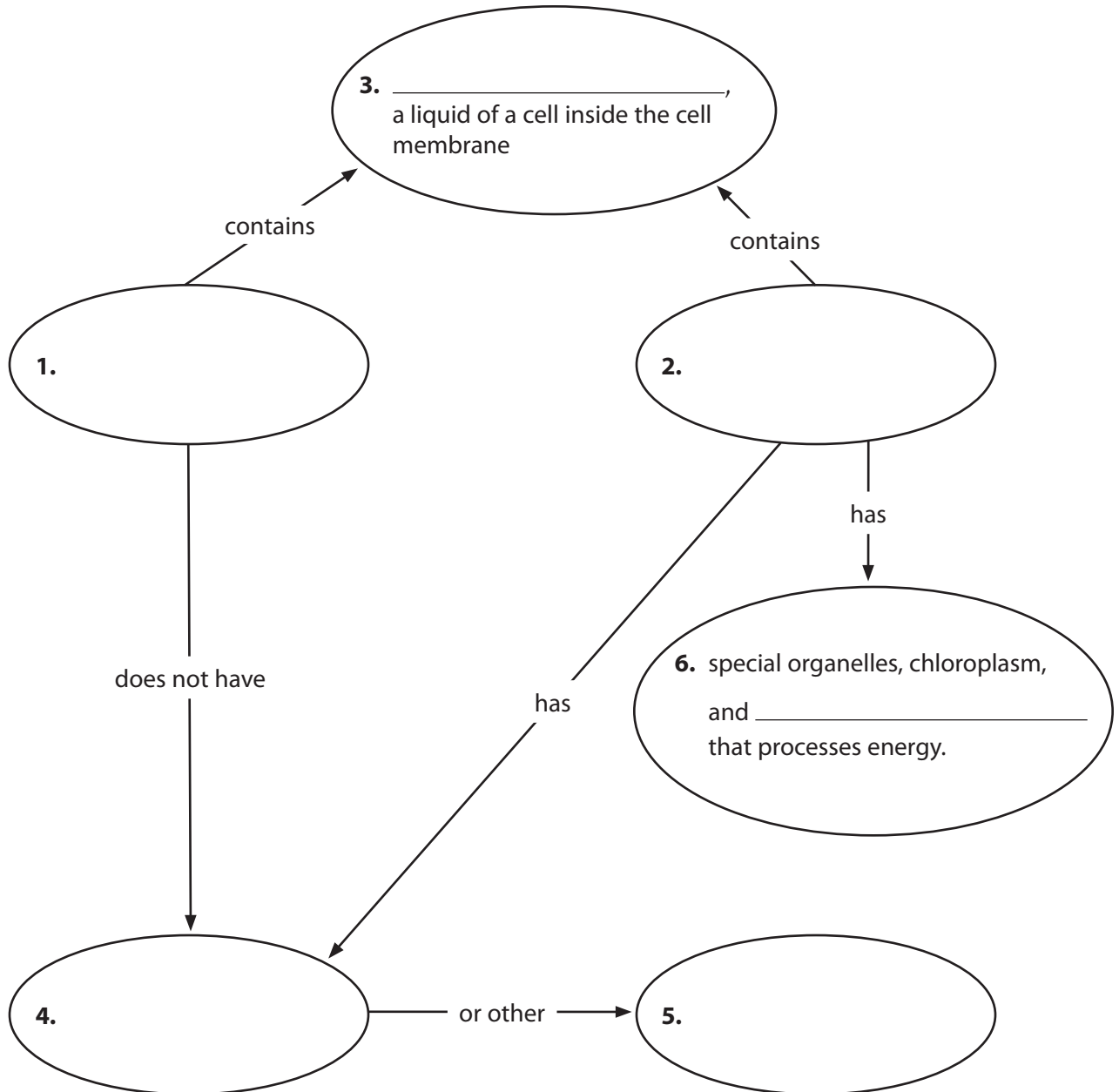
eukaryotic cell

mitochondrion

nucleus

organelle

prokaryotic cell



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**Lesson Outline****LESSON 2****Cells****A. What are cells?**

1. All living things have \_\_\_\_\_, which are the basic unit of an organism.
2. Most cells are so small that a(n) \_\_\_\_\_ needs to be used to see them.
3. Cells have many different shapes and \_\_\_\_\_.

**B. What are cells made of?**

1. All cells are made of four types of \_\_\_\_\_—nucleic acids, lipids, proteins, and \_\_\_\_\_.
2. The \_\_\_\_\_ is an outer structure that surrounds all cells.
3. About 70 percent of the material inside a cell is \_\_\_\_\_.

**C. Types of Cells**

1. \_\_\_\_\_ cells are cells that do not have a nucleus or other membrane-bound organelles.
2. Structures in cells that carry out specific functions are called \_\_\_\_\_.
3. Cells that have a nucleus and other membrane-bound organelles are called \_\_\_\_\_ cells.
  - a. \_\_\_\_\_ include most multicellular organisms as well as some unicellular organisms.
  - b. In eukaryotes, most of the organelles, including the nucleus, are surrounded by \_\_\_\_\_.

**D. The Outside of a Cell**

1. The cell membrane is made of lipids and \_\_\_\_\_.
  - a. Lipids in the cell membrane protect the \_\_\_\_\_ of a cell from the environment outside the cell.
  - b. \_\_\_\_\_ in the cell membrane transport substances between a cell's environment and the inside of the cell and \_\_\_\_\_ with other cells.
2. A strong, rigid layer outside the cell membrane of some cells is called the \_\_\_\_\_.

## Lesson Outline continued

### E. The Inside of a Cell

1. The \_\_\_\_\_ is the liquid part of a cell inside the cell membrane.
2. The information that controls all cell activities is stored in DNA, which is the cell's \_\_\_\_\_ material.
  - a. DNA is a type of macromolecule called a(n) \_\_\_\_\_.
  - b. The function of RNA is to give cells instructions about which \_\_\_\_\_ need to be made.
  - c. In eukaryotic cells, DNA is stored in an organelle called the \_\_\_\_\_.
3. In prokaryotes, proteins in the \_\_\_\_\_ process energy.
4. Eukaryotes have organelles, called \_\_\_\_\_, which break down food and release energy.
5. Adenosine triphosphate, or \_\_\_\_\_, is a molecule that stores \_\_\_\_\_ for later use in carrying out cell functions.
6. Plants and many other autotrophs have energy-processing organelles called \_\_\_\_\_ as well as mitochondria.
  - a. Chloroplasts capture light energy and convert it into chemical energy in a process called \_\_\_\_\_.
  - b. Photosynthesis produces ATP and also \_\_\_\_\_ such as glucose that are used to store energy.
7. Proteins are made on the surface of \_\_\_\_\_, which are found in the \_\_\_\_\_ of prokaryotic and eukaryotic cells.
8. The ribosomes in eukaryotic cells are attached to an organelle called the \_\_\_\_\_.
9. After proteins are made, an organelle called the \_\_\_\_\_ packages them into tiny organelles called vesicles.
10. Water and other molecules are stored in organelles called \_\_\_\_\_.

**Content Practice A****LESSON 2****Cells**

**Directions:** Unscramble the word bank terms. On each line, write the unscrambled term that correctly completes each sentence. Some terms will be used more than once.

ckaryprooti lcesl \_\_\_\_\_

kayroticeu sllice \_\_\_\_\_

cpytolmas \_\_\_\_\_

driaochonmit \_\_\_\_\_

1. The liquid part of a cell inside the cell membrane is called the \_\_\_\_\_.
2. \_\_\_\_\_ do not have a nucleus or other membrane-bound organelles.
3. \_\_\_\_\_ are organelles that break down food and release energy.
4. Most eukaryotes contain hundreds of \_\_\_\_\_.
5. Most \_\_\_\_\_ are unicellular organisms, such as bacteria.
6. \_\_\_\_\_ contains water, macromolecules, and other substances.
7. \_\_\_\_\_ have a nucleus and other membrane-bound organelles.
8. Organisms that have \_\_\_\_\_ are called prokaryotes.

**Content Practice B****LESSON 2****Cells**

**Directions:** Circle the term in parentheses that correctly completes each sentence.

1. A (cell/nerve) is the basic unit of an organism.
2. Cells contain four types of (macromolecules/structures)—nucleic acids, lipids, proteins, and carbohydrates.
3. (Carbohydrates/Organelles) are structures in cells that carry out specific functions.
4. The (macromolecule/cell membrane) helps keep the inside of a cell separate from the outside of a cell.
5. Some cells also are surrounded by a more rigid layer called a cell (wall/environment).
6. Cell walls provide (water/structure) and help protect the cell from the outside environment.
7. (Water/Cell membranes) give(s) cells their shape and help(s) keep their internal structures organized.
8. (Carbohydrates/Proteins) in the cytoplasm provide structure and help organelles and other substances move around.

**Key Concept Builder** 

**LESSON 2**

# Cells

**Key Concept** What is a cell made of?

**Directions:** Answer each question or respond to each statement on the lines provided.

1. **Describe** the appearance of cells. Give two examples.

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2. What are prokaryotes? Give one example.

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3. Give one characteristic that distinguishes prokaryotic cells from eukaryotic cells.

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4. What does ATP stand for, and what are its functions?

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5. What are chloroplasts?

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6. Where are cell proteins made?

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**Key Concept Builder** 

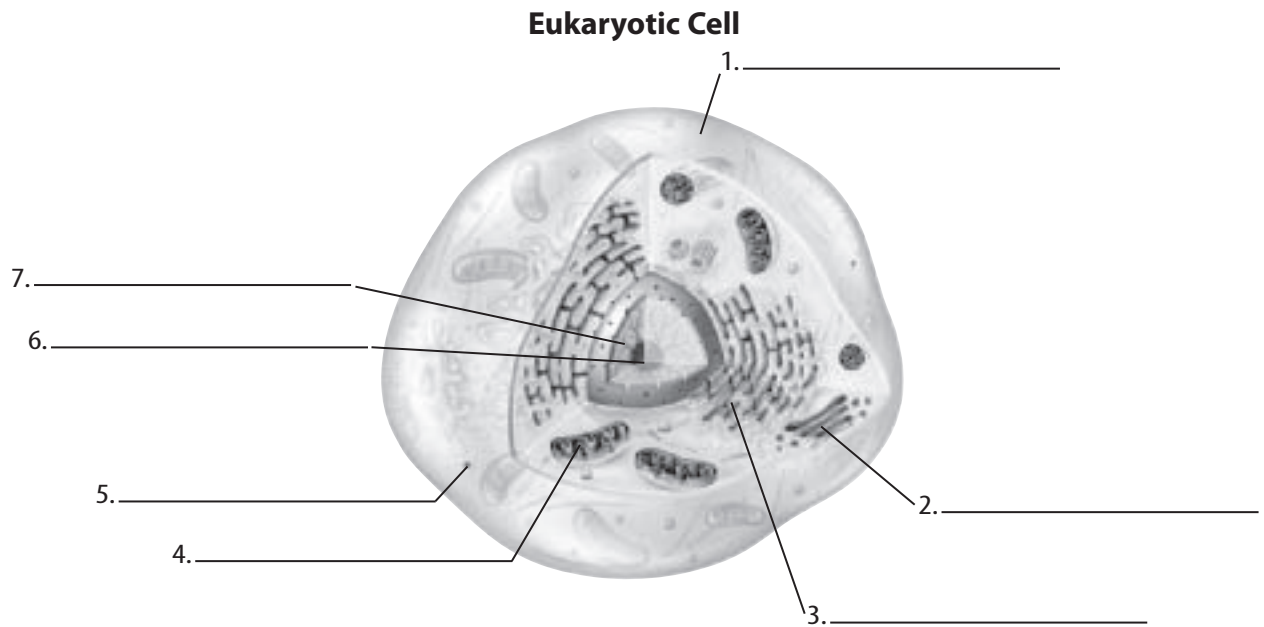
**LESSON 2**

**Cells**

**Key Concept** What is a cell made of?

**Directions:** Label this diagram by writing the correct term from the word bank on each line. Each term is used only once.

- |               |                  |                 |               |
|---------------|------------------|-----------------|---------------|
| cell membrane | genetic material | Golgi apparatus | mitochondrion |
| nucleus       | ribosome         | vesicle         |               |



**Directions:** Complete the chart with the correct terms from the word bank in the space provided. Some terms may be used more than once.

- |               |           |           |     |        |
|---------------|-----------|-----------|-----|--------|
| cell membrane | cell wall | cytoplasm | DNA | lipids |
| organelles    | nucleus   | proteins  | RNA | water  |

Inside of Cell		Outside of Cell
8.	12.	15.
9.	13.	16.
10.	14.	17.
11.		18.

**Key Concept Builder** **LESSON 2**

## Cells

**Key Concept** How do the parts of a cell enable it to survive?

**Directions:** Circle the term in parentheses that correctly completes each sentence.

1. (Carbohydrates/Proteins) in the cytoplasm process energy in (prokaryotes/eukaryotes).
2. (Eukaryotes/Prokaryotes) have special organelles called the (chloroplasts and mitochondria/DNA and RNA).
3. (Chloroplasts/Mitochondria) are organelles that break down food and release energy.
4. ATP molecules are produced (before/during) photosynthesis.
5. Photosynthesis produces carbohydrates such as glucose that are used to (store/create) energy.
6. In eukaryotic cells, the ribosomes are attached to an organelle called the (cytoplasm/endoplasmic reticulum).
7. Proteins can be processed and can move (inside/outside) the cell through the endoplasmic reticulum.
8. An organelle called the Golgi apparatus packages proteins into tiny organelles called (vesicles/vacuoles).



**Key Concept Builder** 

**LESSON 2**

# Cells

**Key Concept** How do the parts of a cell enable it to survive?

**Directions:** *With a partner, write and answer a question about each topic.*

**1.** vacuoles

Question: \_\_\_\_\_

Answer: \_\_\_\_\_

**2.** cell storage

Question: \_\_\_\_\_

Answer: \_\_\_\_\_

**3.** protein production

Question: \_\_\_\_\_

Answer: \_\_\_\_\_

**4.** chloroplasts

Question: \_\_\_\_\_

Answer: \_\_\_\_\_

**5.** mitochondria

Question: \_\_\_\_\_

Answer: \_\_\_\_\_

**6.** cell energy

Question: \_\_\_\_\_

Answer: \_\_\_\_\_

**7.** controlling cell activities

Question: \_\_\_\_\_

Answer: \_\_\_\_\_

**8.** cytoplasm

Question: \_\_\_\_\_

Answer: \_\_\_\_\_

**Enrichment****LESSON 2****Cancer Cells**

How do cancer cells differ from normal cells? Unlike normal cells, cancer cells have lost their ability to control cell division.

**What is cancer?**

Cancer is a term for diseases in which normal cells divide without control and are able to invade other tissues. There are more than 100 different types of cancer. Most cancers are named for the organ where they are first diagnosed, such as lung cancer.

Other names of cancers group types according to tissues where they originate. A carcinoma is a cancer that begins in skin or other epidermal tissue. Lymphomas begin in immune system tissue. Leukemia is a cancer that begins in blood-forming tissue.

**Normal Cells**

Normal cells differ in their functions according to the type of tissue they are part of, but all perform certain basic functions.

1. Each healthy cell makes an exact copy of itself when it divides. If an error is made, the cell is sometimes destroyed.
2. Normal cells stop reproducing when they are coded by DNA to stop. Some cells, such as bone or skin cells, won't divide unless there is an injury. Nerve cells don't divide to heal an injury like skin cells do.
3. Normal cells stick together to form tissues. They send and receive

**Applying Critical-Thinking Skills**

**Directions:** Answer each question or respond to each statement.

1. **Research** In what way does smoking cigarettes increase your risk of developing cancer?
2. **Infer** Why do bone cells or skin cells begin to divide when there is an injury? Name one type of cell that will not divide when there is an injury.

chemical signals to other cells in the tissue.

4. Normal cells self destruct if they are damaged and are then carried away as waste. Some molecules are recycled.
5. Healthy cells have a life cycle. They are formed, differentiate, mature, and die.

**What about cancer cells?**

Cancer cells are abnormal in several ways.

1. Cancer cells often begin with an error in replication that is not repaired; cell division produces copies of the error.
2. Cancer cells often do not stop dividing. They divide over and over again.
3. Cancer cells lose their sticky molecules, so they can leave their tissue and move to other parts of the body. Neither do they send or receive communications with other cells.
4. Cancer cells do not die when they move or when they are damaged.

**Risk and Cure**

Every scientist researching cancer hopes to be the one to find a cure, but that reality is still some time away. The risks of developing many types of cancer can be reduced by eating a healthy diet and exercising regularly and by not forming unhealthy habits such as smoking.

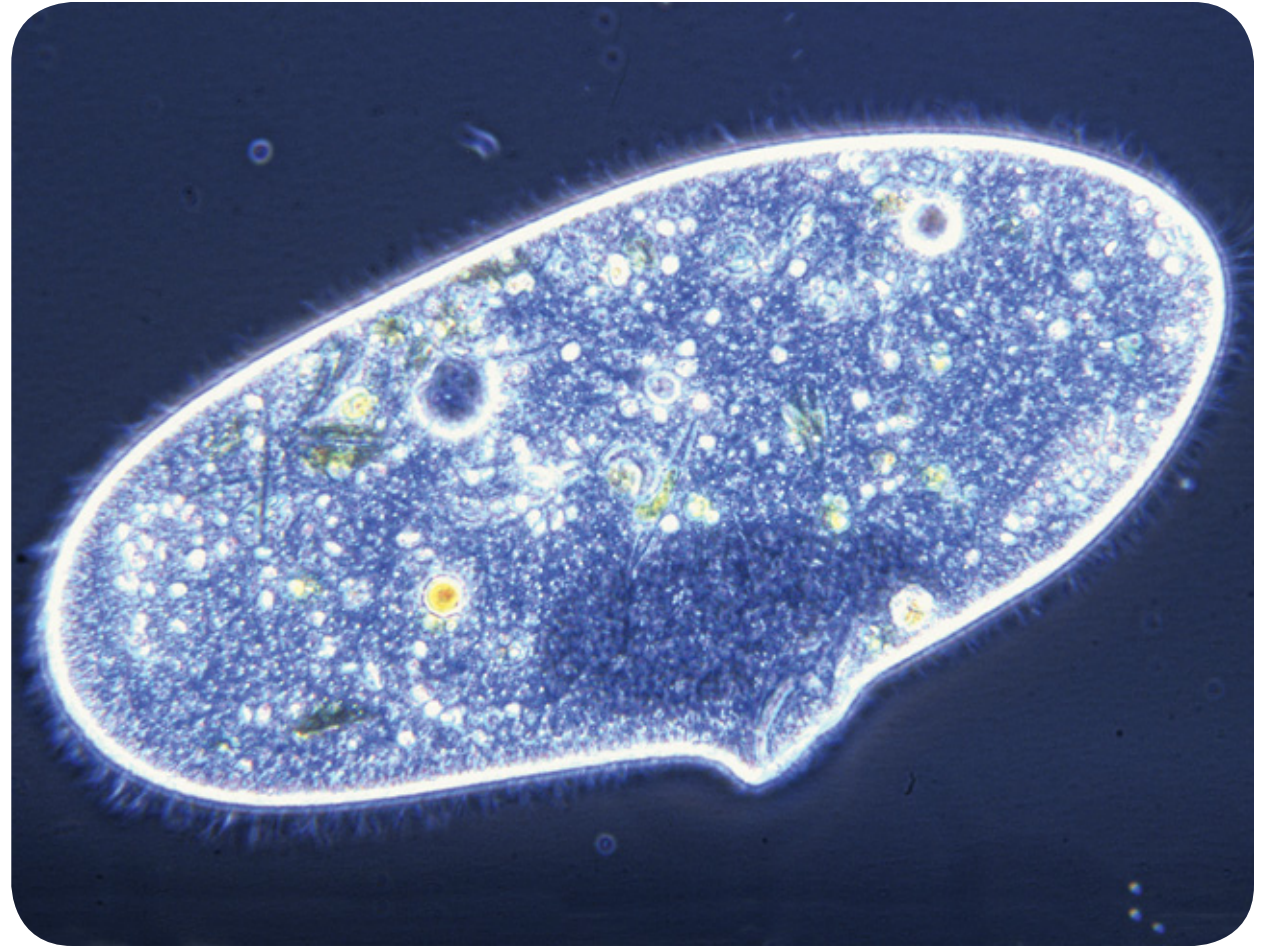


## **Protists: Days 6-10**

## Meet the Paramecium

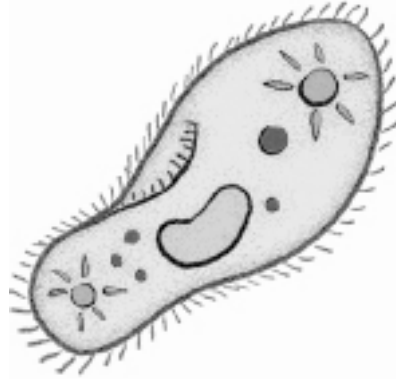
When you look through a microscope at a drop of pond water, you can discover some amazing living things. The paramecium that looks so large in the photograph is only a fraction of a millimeter in length.

- ❶ How many cells make up the paramecium?
- ❷ What might you learn about a paramecium by observing it over time?
- ❸ What would happen to the paramecium if the pond it lived in dried up? Explain.





# What are protists?



Protists are a diverse classification of organisms. When the students in Mrs. Applebee’s science class were asked “What are protists?” they had different ideas. Here are some of their ideas:

Anna: I think they share most of their characteristics with plants.

Jordan: I think they share most of their characteristics with animals.

Ken: I think they share most of their characteristics with fungi.

Alysha: I think they share most of their characteristics with bacteria.

Joaquin: I think they share characteristics with animals, plants, and fungi.

LaVon: I don’t think they share characteristics with any of the organisms you mentioned. They have their own unique characteristics.

Which student do you agree with the most? Explain why you agree.

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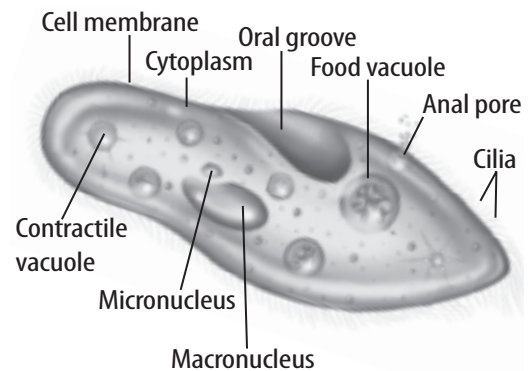
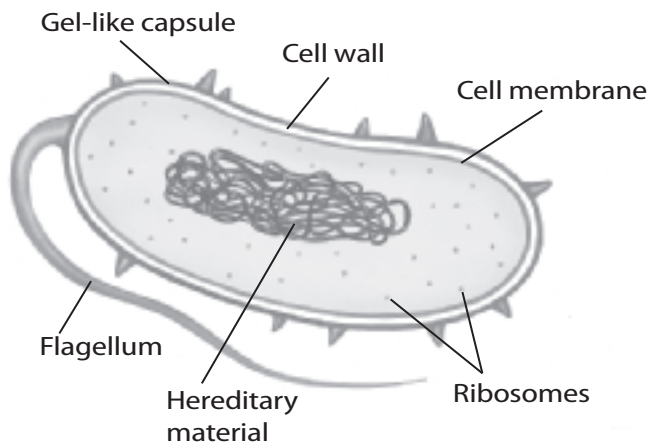
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# Unicellular Organisms

Unicellular organisms have only one cell. These organisms do all the things needed for their survival within that one cell. An amoeba is a unicellular organism. It takes in, or ingests, other unicellular organisms for food to get energy. Unicellular organisms also respond to their environment, get rid of waste, grow, and reproduce. Unicellular organisms include both prokaryotes and some eukaryotes.

## Prokaryotes

A cell without a membrane-bound nucleus is a prokaryotic cell. In general, prokaryotic cells are smaller than eukaryotic cells. As shown below on the left, prokaryotic cells also have fewer cell structures. A unicellular organism made of one prokaryotic cell is called a prokaryote. Some prokaryotes live in groups called colonies. Some can also live in extreme environments. The heat-loving bacteria that live in hot springs get their energy from sulfur instead of light.



## Eukaryotes

A eukaryotic cell has a nucleus surrounded by a membrane and many specialized organelles as shown above on the right. This paramecium has an organelle called a contractile vacuole. The contractile vacuole collects extra water from the paramecium's cytoplasm and pumps it out. The contractile vacuole keeps the paramecium from swelling and bursting.

A unicellular organism that is made of one eukaryotic cell is called a eukaryote. There are thousands of different unicellular eukaryotes. The alga that grows on the inside of an aquarium and the fungus that causes athlete's foot are unicellular eukaryotes. ✓

### Visual Check

**2. Highlight** each area where the hereditary material is located.

### Reading Check

**3. Identify** one example of a eukaryotic organism.

\_\_\_\_\_

\_\_\_\_\_

## Lesson 2 Levels of Organization

**Predict** three facts that will be discussed in Lesson 2 after reading the headings. Write your predictions in your Science Journal.

### Main Idea

#### Life's Organization

I found this on page \_\_\_\_\_.

#### Unicellular Organisms

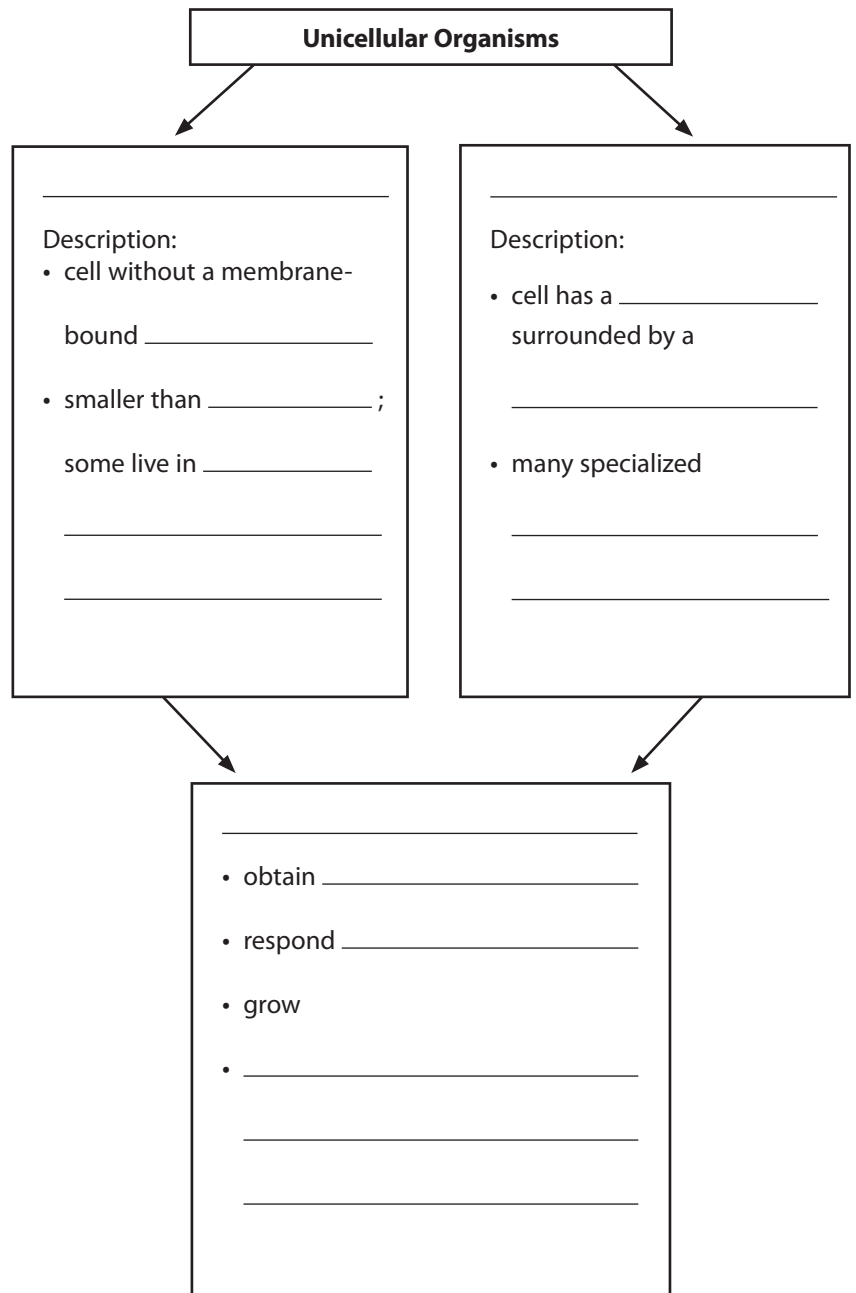
I found this on page \_\_\_\_\_.

### Details

**Summarize** life's organization.

All organisms \_\_\_\_\_.

**Organize** information about unicellular organisms by completing the graphic organizer.



# Quick Vocabulary

## Lesson 1

- algae** plantlike protists that produce food through photosynthesis
- amoeba** common sarcodine with unusual adaptation for movement and obtaining nutrients
- asexual reproduction** one parent reproduces without a sperm and an egg joining
- cilia** short, hairlike organelles that grow on the surface of some protists
- diatom** plantlike protist with a hard outer wall
- paramecium** protist with cilia and two nuclei
- process** event marked by gradual changes that lead toward a particular result
- protist** member of a group of eukaryotic organisms
- protozoan** protist resembling a tiny animal
- pseudopod** temporary “foot” made when an amoeba pushes part of its body outward

## Lesson 2

- ascus** reproductive structure where spores develop on sac fungi
- basidium** fungal reproductive structure that produces sexual spores
- hyphae** fungal structures that absorb minerals and water
- lichen** structure formed when fungi and certain photosynthetic organisms grow together
- mushroom** basidiocarp of a club fungi
- mycelium** network of hyphae
- mycorrhizae** structure formed by plant roots and hyphae woven together
- zygosporangia** tiny stalks that form when the fungus undergoes sexual reproduction



# Lesson 1 What are protists?

**Skim** Lesson 1 in your book. Read the headings and look at the photos and illustrations. Write three things you want to learn more about as you read the lesson. Write your ideas in your Science Journal.

## Main Idea

### What are protists?

I found this on page \_\_\_\_\_.

I found this on page \_\_\_\_\_.

### Plantlike Protists

I found this on page \_\_\_\_\_.

## Details

**Identify** the 1 thing all protists have in common.

\_\_\_\_\_

 **Classify** the 3 groups of protists by completing the chart.

	Plantlike	Animal-like	Funguslike
Method of obtaining food			
Number of cells			

**Summarize** information about plantlike protists. Write two facts about each protist below.

Diatoms: \_\_\_\_\_

\_\_\_\_\_

Dinoflagellates: \_\_\_\_\_

\_\_\_\_\_

Euglenoids: \_\_\_\_\_

\_\_\_\_\_

Algae: \_\_\_\_\_

\_\_\_\_\_

# Protists and Fungi

## What are protists?

### Key Concepts

- What are the different types of protists and how do they compare?
- How are protists beneficial?

### Study Coach

**Use an Outline** As you read, make an outline to summarize the information in the lesson. Use the main headings in the lesson as the main headings in your outline. Complete the outline with the information under each heading.

### Reading Check

**1. Identify** What is a protist?

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### ..... Before You Read .....


**What do you think?** Read the three statements below and decide whether you agree or disagree with them. Place an A in the Before column if you agree with the statement or a D if you disagree. After you've read this lesson, reread the statements and see if you have changed your mind.

Before	Statement	After
	1. Protists are grouped together because they all look similar.	
	2. Some protists cause harm to other organisms.	
	3. Many protists make their own food.	

### ..... Read to Learn .....

## What are protists?

When you see a living thing, you might think about whether it is a plant or an animal. You might know that a dog is an animal because of its fur and that a flower is a plant because of its green leaves. If you looked only at the cells of a plant or an animal, you might still know what it is. A plant cell has a cell wall and often contains chloroplasts. An animal cell has a cellular membrane but does not have chloroplasts. But some organisms, such as protists, are not as easy to identify and classify.


A **protist** is a eukaryotic organism that can be plantlike, animal-like, or funguslike. Protists share some characteristics with plants, animals, and fungi. But they do not share enough characteristics to be classified within any of those groups. Although all protists belong to one group, they are very different from one another. They have many different methods of movement and finding food. 

## Reproduction of Protists

Most protists reproduce asexually. The offspring are exact copies of the parent. Asexual reproduction creates new organisms quickly.

Many protists can also reproduce sexually. The offspring are genetically different from the parents. Sexual reproduction takes more time, but it creates new organisms with a variety of characteristics.

## Classification of Protists

Most organisms are classified according to their similarities. But scientists must use a different approach for classifying protists. Usually, any eukaryote that is not a plant, an animal, or a fungus is classified as a protist. Protists, however, might still look and act like plants, animals, or fungi. Therefore, scientists classify protists in categories based on which group they are most similar to. The table below introduces the plantlike, animal-like, and funguslike protists. 

Classification	Plantlike	Animal-Like	Funguslike
Example	algae	paramecia	slime molds
Characteristics	make their own food; unicellular or multicellular	eat other organisms for food; mostly microscopic and unicellular	break down organic matter for food; mostly multicellular

## Plantlike Protists

You might have seen brown, green, or red seaweed at the beach or in an aquarium. These seaweeds are algae (AL jee). **Algae** are plantlike protists that use light energy and carbon dioxide to produce food through photosynthesis. There are several kinds of plantlike protists. Most plantlike protists are much smaller than funguslike multicellular organisms.

## REVIEW VOCABULARY

### asexual reproduction

a type of reproduction in which one parent reproduces without a sperm and egg joining

## Key Concept Check

**2. Identify** What are the different types of protists?

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## Interpreting Tables

**3. Identify** List two types of protists that can be multicellular.

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## Visual Check

**4. Identify** Which plantlike protists do not have flagella? (Circle the correct answer.)

- a. diatoms
- b. dinoflagellates
- c. euglenoids

## Reading Check

**5. Explain** What is the purpose of flagella?

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## Reading Check

**6. Name** one characteristic that euglenoids share with plants.

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Diatom



Dinoflagellate



Euglena



### Diatoms

A **diatom** (DI uh tahm) is a type of microscopic, plantlike protist with a hard outer wall. Diatoms are so common that a cup of lake or pond water might hold thousands of diatoms. The cell walls of diatoms contain a large amount of silica, the main mineral in glass. Diatoms often look like colored glass. An example of a diatom is shown above.

### Dinoflagellates

A dinoflagellate (di noh FLA juh lat) is a unicellular, plantlike protist that has flagella. Flagella are whiplike parts that help some protists move. The flagella whip back and forth, causing the dinoflagellate to spin. Some dinoflagellates glow in the dark when they are disturbed. This is caused by a chemical reaction in their cells. An example of a dinoflagellate is shown above. ✓

### Euglenoids

A euglenoid (yew GLEE noyd) is a unicellular, plantlike protist with a flagellum at one end of its body. Euglenoids do not have cell walls. Instead, they are covered by a rigid, rubbery cell coat called a pellicle (PEL ih kul). Euglenoids have eyespots that detect light and determine where they move. A euglenoid is shown above. Euglenoids swim quickly in water or move slowly along moist surfaces. Euglenoids have chloroplasts and make their own food. If there is not enough light for photosynthesis to occur, they can absorb nutrients from decaying matter in the water. Animals such as tadpoles and small fish eat euglenoids. ✓

## Algae

Recall that algae are plantlike protists that make their own food through photosynthesis. Some algae are large and multicellular, such as seaweed. Other algae are unicellular and can be seen only with a microscope. Algae are classified as red, green, or brown, depending on the pigments they contain. Some types of red and brown algae look similar to plants. But they do not have the ability to transport water and nutrients, as plants do. They do not have roots. They have holdfasts, structures with a glue-like substance that helps them stick to rocks. ✓

One unusual green algae is volvox. Volvox cells form a large sphere held together with strands of cytoplasm. These cells move as a group and beat their flagella at the same time. Some cells have the parts necessary for sexual reproduction. Volvox cells in the front of the group have larger eyespots that sense light for photosynthesis.

## The Importance of Algae

You might be surprised by all of the materials you use that contain algae. Algae are in many ice creams, marshmallows, and puddings. Algae are also in products such as toothpaste, lotions, fertilizers, and some swimming-pool filters.

## Algae and Ecosystems

Algae are food for animals and animal-like protists. They also give shelter to many organisms that live in water. Groups of tall brown algae are called kelp forests.

Algae and other photosynthetic protists can help remove pollution from water. But this pollution can be food for the algae, causing the population of algae to increase quickly. The algae produce waste products that can poison other organisms. When large numbers of algae are present, the water can look red or brown. This is called red tide, which is a harmful algal bloom. ✓

## Animal-Like Protists

Some protists are more like animals than plants. **Protozoans** (proh tuh ZOH unz) are protists that resemble tiny animals. These animal-like protists share several characteristics. They do not have chloroplasts or make their own food. Protozoans are usually microscopic and unicellular. Most are found in wet environments.

### ✓ Reading Check

**7. Describe** How do red and brown multicellular algae differ from plants?

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### 💡 Think it Over

**8. Discuss** How are algae beneficial to an ecosystem?

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### ✓ Reading Check

**9. Explain** What causes a red tide?

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**Reading Check**

**10. Identify** What function do cilia perform?

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**Visual Check**

**11. Explain** What are the characteristics of a paramecium?

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**Reading Check**

**12. Identify** two different sources of food for flagellates.

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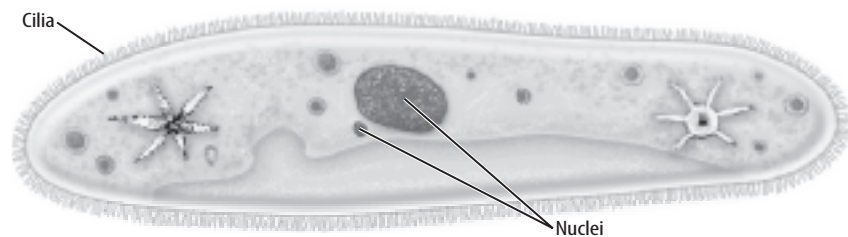
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## Ciliates

Many protists have cilia (SIH lee uh). **Cilia** are short, hairlike structures that grow on the surface of some protists. Protists with cilia are called ciliates. As shown in the figure below, the entire surface of the cell is covered by cilia. The beating cilia help move the animal-like protist through water. ✓

A **paramecium** (pa ruh MEE see um) is a protist with cilia and two types of nuclei. A paramecium, like most ciliates, gets its food by forcing water through a groove in its side. The groove closes and a food vacuole, or storage area, forms within the cell. The food particles are digested and the extra water is forced back out of the cell. Ciliates reproduce asexually. They can exchange some genetic material through a process called conjugation (kahn juh GAY shun).



## Flagellates

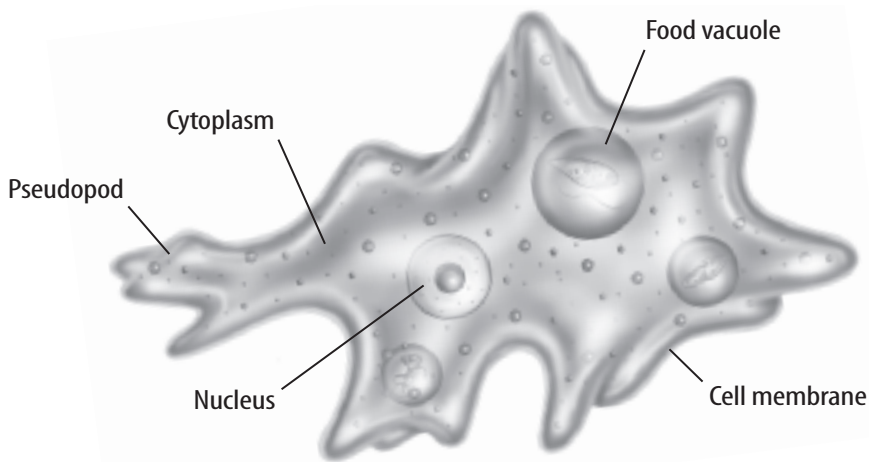
Recall that dinoflagellates are a type of plantlike protist that uses one or more flagella to move. Flagellates are a type of protozoan that also has one or more flagellum. A flagellate does not always spin when it moves.

Flagellates eat decaying matter, including plants, animals, and other protists. Many flagellates live in the digestive systems of animals and absorb nutrients from food moving through the systems. ✓

## Sarcodines

Animal-like protists called sarcodines (SAR kuh dineez) have no specific shape. At rest, they look like a glob of cytoplasm, or cellular material. These animal-like protists can ooze into almost any shape. An **amoeba** (uh MEE buh) is one common sarcodine with an unusual adaptation for movement and getting nutrients.

An amoeba moves with a pseudopod, as shown below. A **pseudopod** is a temporary “foot” that forms as the organism pushes part of its body outward. An amoeba moves by stretching out a pseudopod, then oozing the rest of its body up into the pseudopod.



Amoebas also use pseudopods to get nutrients. An amoeba will surround a smaller organism or food particle with its pseudopod and then ooze around it. A food vacuole forms inside the pseudopod, where the food is digested.

Most sarcodines get nutrients and energy by eating other organisms. Some make their own food. Others live in human digestive systems, where they get nutrients and energy.

### Visual Check

**13. Explain** How does an amoeba use its pseudopod to move?

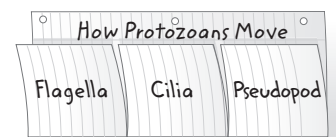
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### FOLDABLES<sup>®</sup>

Use a three-tab book to organize your notes about protozoans and how they move.



## The Importance of Protozoans

Protozoans are important members of ecosystems. They break down dead plant and animal matter. This decomposed matter is then recycled into the environment and used by other living organisms.

Some protozoans can cause diseases. They act as parasites and live inside a host organism. Inside the host organism, the protozoan feeds off the host and can kill it.

Malaria is one disease caused by protists. Malaria is spread to humans by mosquitoes, as shown in the figure below. Protozoan parasites called plasmodia live and reproduce in red blood cells. Malaria kills more than a million people yearly.

### Key Concept Check

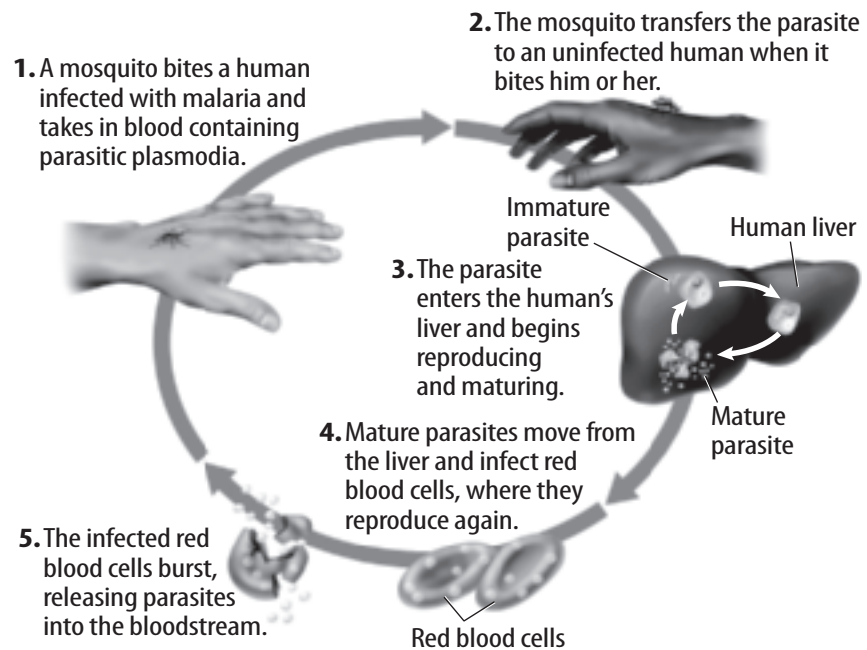
**14. Discuss** How are protists helpful and harmful to humans?

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### Visual Check

**15. Identify** Circle the stage when the parasite transfers to a healthy human.






## Funguslike Protists

There is another category of protists, the funguslike protists. Funguslike protists share some characteristics with fungi, but they have some differences that cause them to be classified as protists.

### Slime and Water Molds

Slime molds are funguslike protists. They come in a variety of colors and forms. Slime molds often live on the surface of plants. The body of a slime mold is made of cell material and nuclei floating in a slimy mass. Most slime molds absorb nutrients from organic materials in the environment. 

Water molds are funguslike protists. They can be parasites, or they might feed on dead organisms. In the past, they were classified as fungi. Now, however, these organisms are classified as protists. Water molds can cause disease in plants.

Slime molds and water molds reproduce sexually and asexually. They usually reproduce sexually when conditions are harsh.

### Importance of Funguslike Protists

Funguslike protists are an important part of an ecosystem. They help break down dead plant and animal matter. This makes the nutrients from these dead organisms available for living organisms. But not all slime molds and water molds are helpful.

Many funguslike protists attack and consume living plants. In 1845, a water mold destroyed more than half of Ireland's potato crop. This was known as the Irish Potato Famine. More than one million people starved as a result of this famine.

#### Reading Check

**16. Explain** Where do slime molds get their nutrients?

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#### Think it Over

**17. Discuss** How are funguslike protists beneficial to an environment?

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## ..... After You Read .....

### Mini Glossary

**algae (AL jee):** plantlike protists that produce food through photosynthesis using light energy and carbon dioxide

**amoeba (uh MEE buh):** one common sarcodine with an unusual adaptation for movement and getting nutrients

**cilia (SIH lee uh):** short, hairlike structures that grow on the surface of some protists

**diatom (DI uh tahm):** a type of microscopic plantlike protist with a hard outer wall

**paramecium (pa ruh MEE see um):** a protist with cilia and two types of nuclei

**protist:** a eukaryote organism that can be plantlike, animal-like, or funguslike

**protozoans (proh tuh ZOH unz):** protists that resemble tiny animals

**pseudopod:** a temporary "foot" that forms as an organism pushes part of its body outward

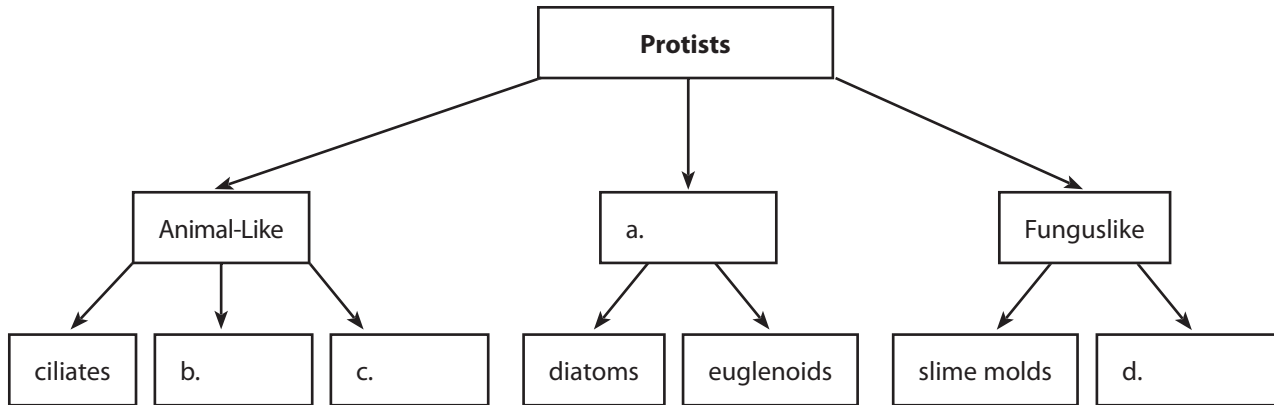
1. Review the terms and their definitions in the Mini Glossary. Write a sentence comparing two different types of protists.

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2. Fill in the chart below about the different types of protists.



3. How did the use of an outline help you understand what you read?

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### What do you think **NOW?**

Reread the statements at the beginning of the lesson. Fill in the After column with an A if you agree with the statement or a D if you disagree. Did you change your mind?



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# Lesson 1 | What are protists? (continued)

## Main Idea

### The Importance of Algae

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## Details

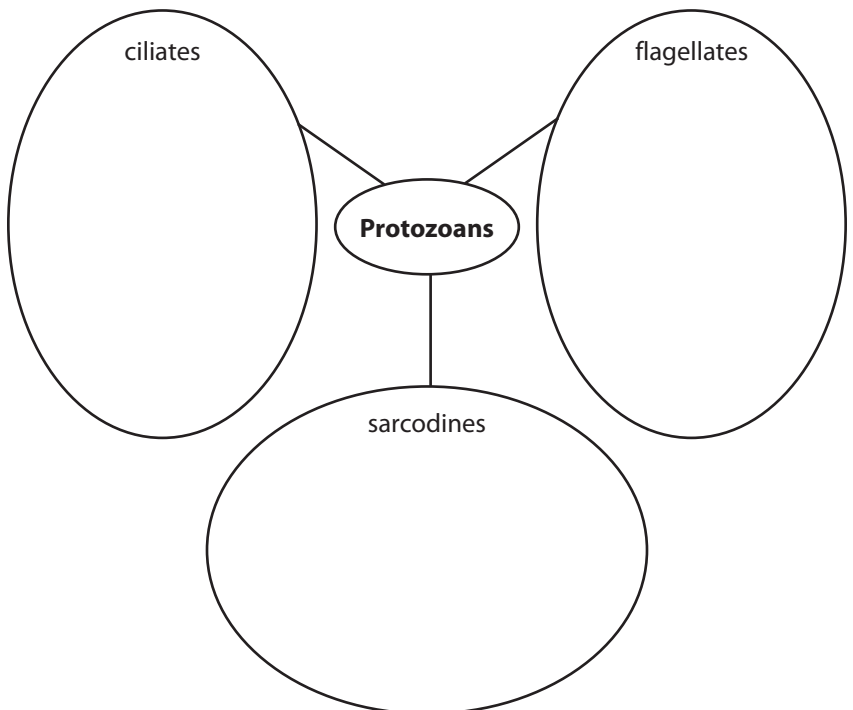
 **Evaluate** the importance of algae.

Human Uses of Algae	Algae and Ecosystems

### Animal-like Protists

I found this on page \_\_\_\_\_.

**Create** a spider map to identify the major characteristics of the 3 groups of protozoans. Record at least two characteristics of each group.



# Lesson 1 | What are protists? (continued)

## Main Idea

### The Importance of Protozoans

I found this on page \_\_\_\_\_.


### Funguslike Protists

I found this on page \_\_\_\_\_.

### Importance of Funguslike Protists

I found this on page \_\_\_\_\_.

## Details


 **Organize** information about the importance of protozoans. Identify one way that protozoans are beneficial. Identify one way that protozoans are harmful.

Helpful: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Harmful: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_


**Identify** two examples of funguslike protists.

1. \_\_\_\_\_
2. \_\_\_\_\_

 **Classify** the roles of funguslike protists as helpful or harmful.

- break down dead plant and animal matter
- attack and consume living plants

Helpful	Harmful

 **Analyze It** Animals and animal-like protists share some characteristics. Tell how the organisms in these groups are the same. Then hypothesize why scientists have placed them in different groups.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

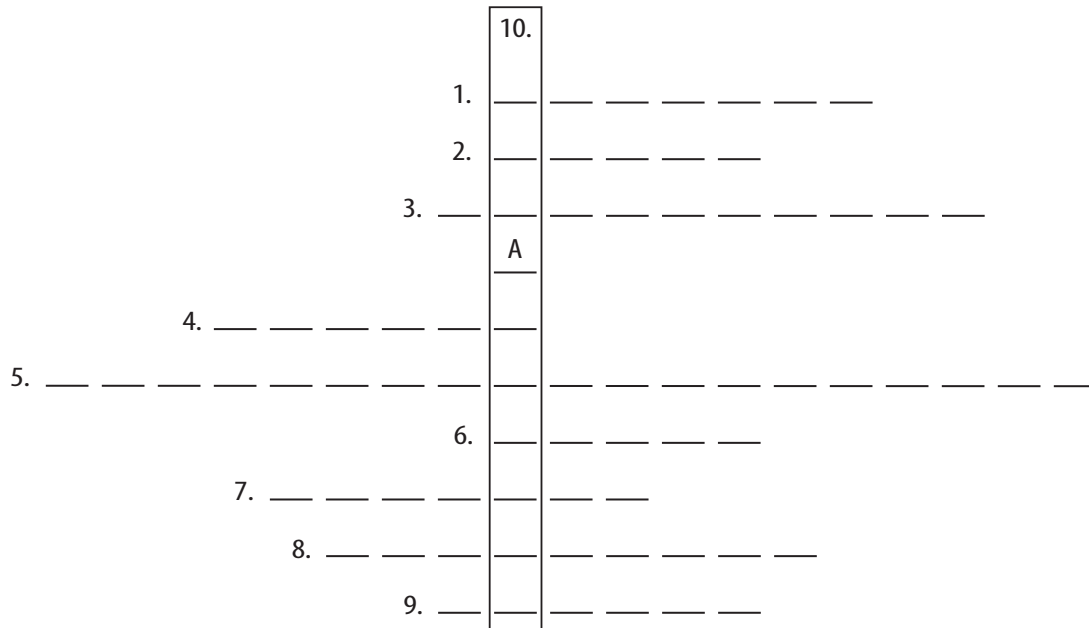
## Content Vocabulary

## LESSON 1

### What are protists?

**Directions:** Use the clues and the terms listed below to complete the puzzle. NOTE: The letters in the vertical box will spell the tenth term.

algae                      amoeba                      asexual reproduction                      cilia                      diatom  
 paramecium                      process                      protist                      protozoan                      pseudopod



1. A(n) \_\_\_\_\_ is marked by gradual changes.
2. \_\_\_\_\_ are plantlike protists that produce food through photosynthesis.
3. Protists that resemble tiny animals are \_\_\_\_\_.
4. A plantlike protist that has a hard outer wall is a(n) \_\_\_\_\_.
5. \_\_\_\_\_ is reproduction without the joining of a sperm and egg.
6. Some protists have \_\_\_\_\_, or short hairs, on their surfaces.
7. A(n) \_\_\_\_\_ is a member of a group of organisms that have a membrane-bound nucleus.
8. A(n) \_\_\_\_\_ helps some unicellular organisms move.
9. The \_\_\_\_\_ is a sarcodine with unusual modes of movement and getting nutrients.
10. The letters in the vertical box spell \_\_\_\_\_, a type of protist with cilia and two nuclei.

**Lesson Outline****LESSON 1*****What are protists?*****A. What are protists?**

1. Organisms can be classified by the structures in their \_\_\_\_\_.
2. A(n) \_\_\_\_\_ is a member of a group of eukaryotic organisms. Eukaryotic cells all have a(n) \_\_\_\_\_ nucleus.
3. Most protists reproduce through \_\_\_\_\_. That means the offspring are a(n) \_\_\_\_\_ of the parent.
4. Protists are very \_\_\_\_\_ and have a variety of adaptations for movement and finding food. They often \_\_\_\_\_ other types of organisms.

**B. Plantlike Protists**

1. \_\_\_\_\_ are plantlike protists that use light energy and carbon dioxide. They produce food through a process called \_\_\_\_\_.
2. A(n) \_\_\_\_\_ is a microscopic plantlike protist that has a hard outer wall.
3. A dinoflagellate is a unicellular plantlike protist that has \_\_\_\_\_, which are whiplike parts that enable it to move.
4. A(n) \_\_\_\_\_ is a unicellular plantlike protist that has a flagellum at one end of its body. It has no cell wall.
5. Algae are classified as red, green, or brown, depending on the \_\_\_\_\_ they contain. Although they resemble plants, algae have \_\_\_\_\_ rather than roots.

**C. The Importance of Algae**

1. Algae provide \_\_\_\_\_ for animals and animal-like protists.
2. \_\_\_\_\_ provide shelter for small organisms that become food for otters and seals.
3. Algae can be toxic when they reproduce quickly in a(n) \_\_\_\_\_.

**D. Animal-like Protists**

1. \_\_\_\_\_ are protists that resemble tiny animals. They are usually microscopic, and all are \_\_\_\_\_.
2. A(n) \_\_\_\_\_ is a protist with cilia and two nuclei.

## Lesson Outline continued

3. Flagellates are a type of protozoa that have \_\_\_\_\_ similar to those of dinoflagellates.
4. An amoeba is a(n) \_\_\_\_\_, a protist that has no specific shape.
5. An amoeba moves and eats with a(n) \_\_\_\_\_. It pushes part of its body outward to form a(n) \_\_\_\_\_ "foot."

### E. The Importance of Protozoans

1. Many protozoans \_\_\_\_\_ dead animals and plants.
2. Some protozoans are \_\_\_\_\_ that cause disease.  
\_\_\_\_\_ is a serious illness caused by protozoan plasmodia.

### F. Funguslike Protists

1. The body of a(n) \_\_\_\_\_ is composed of cell material and nuclei floating in a slimy mass.
2. Water molds are funguslike protists that live as \_\_\_\_\_, or feed on dead organisms.

### G. Importance of Funguslike Protists

1. Funguslike protists play a valuable role in the ecosystem by breaking down dead \_\_\_\_\_ and \_\_\_\_\_. They help make \_\_\_\_\_ available for other living things.
2. Water mold destroyed more than half of Ireland's \_\_\_\_\_.

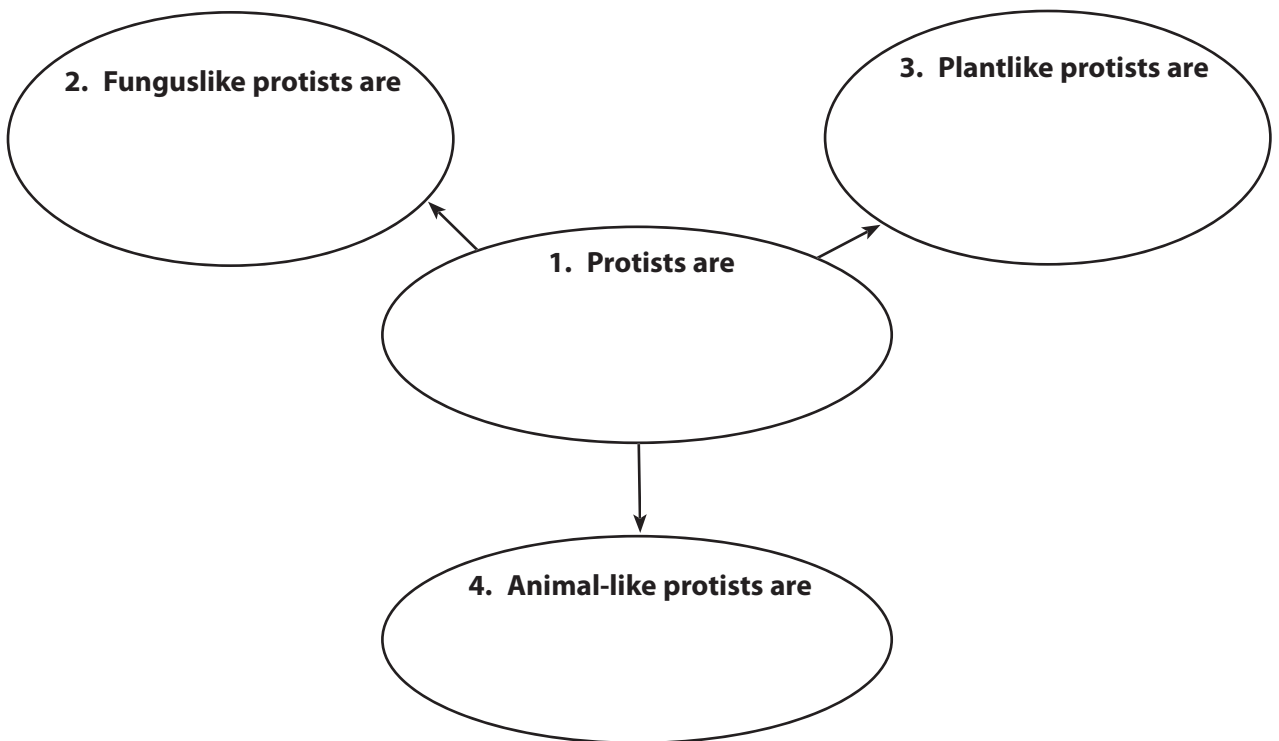
**Content Practice A**

**LESSON 1**

**What are protists?**

**Directions:** Complete this concept map by choosing the phrase that finishes each sentence and writing it in the correct space.

- ... unicellular and ingest other organisms for nutrients.
- ... mostly multicellular organisms that break down organic matter for food.
- ... eukaryotic organisms that share characteristics with plants, animals, and fungi.
- ... unicellular or multicellular organisms that make their own food.



**Directions:** Draw and label one plantlike protist, one animal-like protist, and one funguslike protist.

Plantlike Protist	Animal-like Protist	Funguslike Protist
<p><b>5.</b> Name of protist:</p>	<p><b>6.</b> Name of protist:</p>	<p><b>7.</b> Name of protist:</p>



**Content Practice B**

**LESSON 1**

**What are protists?**

**Directions:** List a fact next to each bullet to complete the chart.

<b>Protists</b>	
<b>Information to Find</b>	<b>Answers</b>
1. How are organisms classified?	<ul style="list-style-type: none"> <li>•</li> <li>•</li> </ul>
2. How do most protists reproduce?	<ul style="list-style-type: none"> <li>•</li> </ul>
3. How are protists categorized?	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> </ul>
4. What are the characteristics of plantlike protists?	<ul style="list-style-type: none"> <li>•</li> <li>•</li> </ul>
5. What are the characteristics of animal-like protists?	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> </ul>
6. What are two examples of plantlike protists?	<ul style="list-style-type: none"> <li>•</li> <li>•</li> </ul>
7. What are three benefits of algae?	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> </ul>
8. What are three characteristics of protozoans?	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> </ul>
9. What are three types of animal-like protists?	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> </ul>
10. What is one benefit and one harmful quality of protozoans?	<ul style="list-style-type: none"> <li>•</li> <li>•</li> </ul>
11. What is one benefit and one harmful quality of funguslike protists?	<ul style="list-style-type: none"> <li>•</li> </ul>

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**Key Concept Builder** **LESSON 1****What are protists?**

**Key Concept** What are the different types of protists, and how do they compare?

**Directions:** On the line before each description, write the letter of the term that correctly matches it.

- |   |                                |
|---|--------------------------------|
| _____ 1. a member of a group of eukaryotic organisms that shares some characteristics with plants, animals, and fungi | <b>A.</b> pellicle             |
| _____ 2. type of reproduction in which exact copies are produced and populations can increase rapidly                 | <b>B.</b> asexual reproduction |
| _____ 3. plantlike protists that use photosynthesis   | <b>C.</b> euglenoids           |
| _____ 4. tough, rubbery cell coat that takes the place of a cell wall   | <b>D.</b> holdfasts            |
| _____ 5. common unicellular protists that resemble tiny animals and usually live in a wet environment                 | <b>E.</b> protist              |
| _____ 6. structures with a chemical-like glue that fastens them to rock   | <b>F.</b> sarcodine            |
| _____ 7. common plantlike protists that have hard outer walls   | <b>G.</b> diatoms              |
| _____ 8. protists that have no specific shape   | <b>H.</b> algae                |
| _____ 9. type of reproduction in which offspring are genetically different from the parents                           | <b>I.</b> paramecium           |
| _____ 10. plantlike protists that have a flagellum at one end of the body and lack cell walls                         | <b>J.</b> dinoflagellate       |
| _____ 11. funguslike protists that live as parasites or feed on dead organisms and often cause diseases in plants     | <b>K.</b> sexual reproduction  |
| _____ 12. unicellular plantlike protist that uses flagella to spin  | <b>L.</b> protozoans           |
| _____ 13. a type of unusual unicellular green algae that comes together to form a sphere that has eyespots            | <b>M.</b> volvox               |
| _____ 14. a common protist with cilia and two nuclei  | <b>N.</b> pseudopods           |
| _____ 15. what amoebas use to move  | <b>O.</b> water molds          |

**Key Concept Builder** 

**LESSON 1**

## ***What are protists?***

**Key Concept** What are the different types of protists, and how do they compare?

**Directions:** Answer each question on the lines provided. Use complete sentences.

1. What are the three categories of protists?

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2. How do protists reproduce?

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3. Why are algae classified as plantlike protists?

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4. In what way are algae harmful?

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5. What is the purpose of flagella?

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6. Which plantlike protist do you find to be the most interesting? Why?

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**Key Concept Builder** 

**LESSON 1**

**What are protists?**

**Key Concept** What are the different types of protists, and how do they compare?

**Directions:** *Work with a partner. Answer each question in the space provided.*

Question	Answer
What is a protist?	
How are protists categorized?	

Question	Answer
What are the characteristics of plantlike protists?	
What are four examples of plantlike protists?	
How does a euglenoid find light?	
How does a dinoflagellate move?	

Question	Answer
What are the characteristics of animal-like protists?	
What are two characteristics of protozoans?	
How do ciliates help protozoans move?	
What are flagellates?	

Question	Answer
What are the characteristics of funguslike protists?	
What are two examples of funguslike protists?	

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**Key Concept Builder** 

**LESSON 1**

***What are protists?***

**Key Concept** How are protists beneficial?

**Directions:** Write the category of each protist and describe its effects on the ecosystem. Then place an X in the correct column to show whether each effect benefits or harms the ecosystem.

Name of Protists	Category of Protists	Effect on the Ecosystem	Beneficial to the Ecosystem	Harmful to the Ecosystem
Algae				
Protozoans				
Slime and water molds				

**Enrichment****LESSON 1**

## Harmful Algal Blooms

Tiny algae form the base of many freshwater and saltwater ecosystems. They are beneficial in many ways. But under the right conditions, certain algae release toxins that harm aquatic organisms and affect human health. This phenomenon is known as a harmful algal bloom (HAB).

Scientists are still studying the factors that appear to trigger HABs. They know that HABs can be caused by an increase in nutrients such as those used to fertilize crops or lawns. The nutrients run off into water systems, where they cause an increase in the algae population. Other changes that can make conditions right for an algal bloom include warmer water, more sunlight, and reduction in water circulation.

### Impacts of HABs

HABs can impact an ecosystem in several ways. When algae are found in massive quantities, less light penetrates the water, affecting other organisms. The algae outcompete other aquatic plants, such as sea grass, for limited space. Certain species that come into contact with the toxic algae can die. Brown tides, for example, have severely reduced the mussel population off the coast of Rhode Island. The population of bay scallops in New York harbors has declined by 80 percent due to HABs. The decomposition of large masses of algae also

impacts ecosystems. Decomposition uses up the available oxygen in the water, and many oxygen-sensitive species die.

HABs can affect people, too. The toxins from HABs can travel throughout the food web. When zooplankton or small fish eat toxic algae, their bodies store the toxins. Organisms that eat the zooplankton or small fish also consume the toxins. Humans can be affected by the toxins when they eat shellfish that have consumed toxic algae directly or indirectly. Health problems associated with HABs include diarrhea and neurological damage.

### What can be done?

Scientists at the National Oceanic and Atmospheric Administration (NOAA) are studying the causes of HABs, as well as ways to predict and prevent the phenomenon. They use satellites and other remote-sensing technology to identify and monitor HABs. They issue warnings for coastal communities that are likely to experience HABs.

Similar programs are in place for freshwater ecosystems. Lakes, rivers, and ponds are monitored by state and local agencies. Efforts to reduce freshwater HABs include decreasing the amount of fertilizer and pesticide that enter the water. Wherever HABs appear, authorities stress that people and animals should not swim or play in affected water.

### Applying Critical-Thinking Skills

**Directions:** *Respond to each statement.*

1. **State** the factors that appear to trigger HABs.
2. **Recommend** some actions that the average person can take to help prevent HABs.
3. **Infer** how HABs in the Atlantic Ocean could affect someone who lives in the central United States.

**Lesson Quiz A****LESSON 1****What are protists?****Multiple Choice**

**Directions:** On the line before each question, write the letter of the correct answer.

- \_\_\_\_\_ 1. Why are some protists helpful?
- A. They help stop malaria.
  - B. They destroy harmful plants.
  - C. They break down dead matter.
- \_\_\_\_\_ 2. Which protists look like tiny animals?
- A. algae
  - B. diatoms
  - C. protozoans

**Matching**

**Directions:** On the line before each definition, write the letter of the term that matches it correctly. Each term is used only once.

**Matching Set 1**

- |   |               |
|---|---------------|
| _____ 3. funguslike protist that causes plant diseases                                    | A. algae      |
| _____ 4. plantlike protists that carry out photosynthesis                                 | B. amoeba     |
| _____ 5. animal-like protist that uses a pseudopod for movement and for getting nutrients | C. water mold |

**Matching Set 2**

- |  |               |
|--|---------------|
| _____ 6. whiplike structures that some protists use for movement | D. paramecium |
| _____ 7. a plantlike protist that has a hard outer shell         | E. flagellum  |
| _____ 8. protozoan that has cilia and two nuclei                 | F. diatom     |