Unit 5 Resources
Bacteria, Viruses, Protists, and Fungi
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Student Lab Safety Form

Student Name: ____________________________

Date: ____________________________

Lab Title: ____________________________

In order to show your teacher that you understand the safety concerns of this lab, the following questions must be answered after the teacher explains the information to you. You must have your teacher initial this form before you can proceed with the lab.

1. How would you describe what you will be doing during this lab?

2. What are the safety concerns associated with this lab (as explained by your teacher)?
   - ____________________________
   - ____________________________
   - ____________________________
   - ____________________________
   - ____________________________
   - ____________________________

3. What additional safety concerns or questions do you have?

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Reproducible Pages

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Before reading Chapter 18, predict answers to questions about the chapter content based on what you already know. Circle the letter of the correct answer, and then explain your reasoning.

1. Rance visits a doctor and learns he has a bacterial infection for which the doctor prescribes an antibiotic. Rance asks the doctor what the bacteria look like, and the doctor shows him a photograph of the bacteria. Which does Rance observe in the photo?
   A. a small nucleus with a thin membrane
   B. complex organelles such as mitochondria
   C. fragments of RNA but no DNA strands
   D. long, whiplike structures called flagella
   Explain.

2. Cheryl tells her friend a fact she learned during science class. She explains that a spoonful of soil contains billions of bacteria. Cheryl's friend calls the bacteria disgusting germs, and she wishes all bacteria would become extinct. Cheryl explains the importance of soil bacteria to her friend. Which does she tell her friend?
   A. Bacteria in soil absorb water and transfer it to tree roots.
   B. Soil bacteria decompose dead organisms into vital nutrients.
   C. The bacteria in soil are a major food source for invertebrates.
   D. Without soil bacteria, soil organisms could not digest food.
   Explain.

3. During health class, Juanita learns about common diseases caused by viral infections. About what diseases does she learn?

   ________________________________  ________________________________
   ________________________________  ________________________________
You are already familiar with animal cells. How do animal cells compare to the cells of bacteria? Bacteria are the most common organisms in your environment. In fact, billions of bacteria live on and in your body. Many species of bacteria can cause diseases. What makes bacteria different from your own cells?

Procedure
1. Read and complete the lab safety form.
2. Use a compound light microscope to observe the slides of animal and bacterial cells.
3. Complete a data table listing the similarities and differences between the two types of cells.

Data and Observations

Analysis
1. Describe the different cells you observed. What did you notice about each?


2. Infer whether they are living things. What leads you to these conclusions?
MiniLab

Classify Bacteria

What types of characteristics are used to divide bacteria into groups? Bacteria can be stained to show the differences in peptidoglycan (PG) in their cell walls. Based on this difference in their cell walls, bacteria are divided into two main groups.

**Procedure**

1. Read and complete the lab safety form.
2. Choose four different slides of bacteria that have been stained to show cell wall differences. The slides will be labeled with the names of the bacteria and marked either thick PG layer or thin PG layer.
3. Use the oil immersion lens of your microscope to observe the four slides.
4. Record all of your observations, including those about the cell color, in a table.

**Data and Observations**

**Analysis**

1. **Interpret Data** Based on your observations, make a hypothesis about how to differentiate between the two groups of bacteria.

   ________________________________
   ________________________________
   ________________________________
   ________________________________

2. **Describe** two different cell shapes you saw on the slides you observed.

   ________________________________
   ________________________________
   ________________________________
   ________________________________
Design Your Own BioLab

CHAPTER 18

How can the most effective antibiotics be determined?

Background: A patient is suffering from a serious bacterial infection, and as the doctor, you must choose from several new antibiotics to treat the infection.

Question: How can the effectiveness of antibiotics be tested?

Materials

Choose materials that would be appropriate for this lab. Possible materials include:
- bacteria cultures
- sterile nutrient agar
- petri dishes
- antibiotic disks
- control disks
- forceps
- Bunsen burner
- marking pen
- long-handle cotton swabs
- 70% ethanol
- thermometer
- pot
- disinfectant
- autoclave disposal bag

Safety Precautions

WARNING: Clean your work area with disinfectant after you finish.

Plan and Perform the Experiment

1. Read and complete the lab safety form.
2. Design an experiment to test the effectiveness of different antibiotics. Identify the controls and variables in your experiment.
3. Create a data table for recording your observations and measurements.
4. Make sure your teacher approves your plan before you proceed.
5. Conduct your experiment.
6. Cleanup and Disposal Dispose of all materials according to your teacher’s instructions. Disinfect your area.

Data and Observations
Analyze and Conclude

1. **Compare and Contrast**  What are the effects of the different antibiotics for the bacteria species you tested?


2. **Hypothesize**  Why would a doctor instruct you to take all of your prescribed antibiotics for a bacterial infection even if you start feeling better before the pills run out?


3. **Explain**  What were the limitations of your experimental design?


4. **Error Analysis**  Compare and contrast the observations and measurements collected by your group with the data from the experiments designed by other groups. Identify possible sources of error in your experimental data.


*Design Your Own BioLab, How can the most effective antibiotics be determined?* continued
Real-World Biology: Analysis

CHAPTER 18

Prion Diseases

Many people live in areas where they never see deer. However, there are some areas that are overpopulated with deer. An overpopulation of deer can be harmful to people and to the deer. For example, in urban areas the number of car accidents involving deer increases. An overpopulation of deer is also harmful to ecosystems because deer feed on plants. As deer run out of plants to eat, they begin to starve. A high concentration of deer in an area also makes the deer more susceptible to diseases.

One disease that concerns scientists and hunters is chronic wasting disease (CWD) in deer and elk. It is classified as a transmissible spongiform encephalopathy (TSE), which is caused by prions and affects the animal’s brain. Other TSEs, or prion diseases, include scrapie in sheep, bovine spongiform encephalopathy (mad cow disease) in cattle, and Creutzfeldt-Jacob disease in humans. Prion diseases are fatal. In this activity, you will analyze information about the spread of CWD and what is being done to try to prevent its spread.

Part A: The Spread of Chronic Wasting Disease

Chronic wasting disease was first reported as a wasting syndrome in captive deer in a Colorado research facility in the late 1960s. Deer with this disease had a change in behavior and appearance. Among other symptoms, they lost weight, stumbled, ground their teeth, and had tremors. They all died from the disease. Then CWD was reported in a Wyoming research facility. In 1978, the disease was recognized as a transmissible spongiform encephalopathy.

The table below summarizes information about the spread of CWD in deer and elk since the late 1960s. When cases of CWD are found in a new area, the evidence suggests that people have moved captive animals to farms or other facilities without knowing the animals were diseased. If animals with CWD escape into the wild, they transmit the disease to animals living in the area. CWD was transmitted to Wisconsin deer in this way. In other states, such as New Mexico, the origin of the disease is not known.

<table>
<thead>
<tr>
<th>Date</th>
<th>Location of Animals with CWD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late 1960s to 1980</td>
<td>disease found in deer and elk in research facilities in Colorado and Wyoming</td>
</tr>
<tr>
<td>1981</td>
<td>first known occurrence of CWD in wild animals; wild deer and elk in Colorado found with CWD</td>
</tr>
<tr>
<td>1985</td>
<td>disease found in wild deer and elk in Wyoming</td>
</tr>
<tr>
<td>1990s</td>
<td>northeastern Colorado and southeastern Wyoming described as an endemic area for CWD, meaning that animals with the disease are confined to this specific area</td>
</tr>
<tr>
<td>1996 to 2000</td>
<td>CWD diagnosed in farmed elk herds in Colorado, Kansas, Montana, Nebraska, Oklahoma, and South Dakota</td>
</tr>
<tr>
<td>2001</td>
<td>a wild mule deer in Nebraska found with CWD; the area of animals with CDW extended into southwestern Nebraska</td>
</tr>
<tr>
<td>2000 to 2002</td>
<td>CWD found in wild deer in northwestern Nebraska, southern New Mexico, southwestern South Dakota, south-central Wisconsin, and northwestern Colorado</td>
</tr>
</tbody>
</table>
Analyze and Conclude
Respond to each question.

1. **Summarize** How would you describe the spread of CWD in the last 40 years?

2. **Suggest** What suggestions would you make for preventing the spread of CWD to states that are not near any current cases of CWD?

---

**Part B: Concerns About Chronic Wasting Disease**

Scientists know how most diseases caused by bacteria and viruses are transmitted. However, they do not know exactly how diseases caused by prions are transmitted. Evidence suggests that prion diseases are passed from one animal to another. Sheep get scrapie from other sheep. Deer and elk get CWD from other deer and elk. Scientists are working to determine whether prions in soil, water, or an animal’s food can transmit CWD. Scientists do know that body parts from sheep, some of which had scrapie, were used to manufacture food for cows. Cows that ate this contaminated food developed mad cow disease. People can develop Creutzfeldt-Jacob disease if they eat contaminated meat from these cows. At the present time, the risk of CWD being transmitted to humans is low. No known cases exist. But the increasing spread of the disease does increase the exposure that humans have to the disease. More research needs to be done before scientists fully understand CWD.

---

Analyze and Conclude
Respond to each question.

1. **Apply** Some areas have laws that prohibit people from feeding wild deer. How might these laws help prevent the spread of CWD?

2. **Recommend** Deer and elk can have CWD for years before they show any symptoms. Tests can indicate the presence of the disease before symptoms are noticeable. Based on what is known about transmission of other prion diseases, what would you recommend for people who hunt deer or elk for food?
Many bacteria and viruses do not cause disease in humans. However, each year millions of people around the world are affected by bacterial and viral diseases. Scientists work to understand the causes and symptoms of these diseases and how they are transmitted. This information helps to develop vaccines, antibiotics, and antiviral drugs to combat the wide variety of human bacterial and viral diseases.

Select The table below lists 12 human diseases that are caused by a bacterium or virus. Select one of the diseases to research.

Research Once you have selected a disease, research information about it. Questions to consider while researching the disease include: What are the symptoms of the disease? How is it transmitted? Is the disease infectious? Are there any vaccines or treatments available? Where does the disease commonly occur? Have there been any important historical outbreaks of the disease?

Discuss Use your textbook and other reference materials to find information. Discuss your topic and possible answers to your questions with your teacher and classmates.

Write Finally, based on your research and class discussion, write an article about the disease you selected. Provide answers for any questions you researched and discussed. Be sure to properly cite the sources you used to write your article.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Pathogen</th>
<th>Pathogen Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthrax</td>
<td>Bacillus anthracis</td>
<td>bacterium</td>
</tr>
<tr>
<td>Chicken pox</td>
<td>varicella</td>
<td>virus</td>
</tr>
<tr>
<td>Ebola</td>
<td>filovirus</td>
<td>virus</td>
</tr>
<tr>
<td>Gas gangrene</td>
<td>Clostridium perfringens</td>
<td>bacterium</td>
</tr>
<tr>
<td>Mumps</td>
<td>paramyxovirus</td>
<td>virus</td>
</tr>
<tr>
<td>Pneumonic plague</td>
<td>Yersinia pestis</td>
<td>bacterium</td>
</tr>
<tr>
<td>Smallpox</td>
<td>variola</td>
<td>virus</td>
</tr>
<tr>
<td>Rabies</td>
<td>rhabdovirus</td>
<td>virus</td>
</tr>
<tr>
<td>Tetanus</td>
<td>Clostridium tetani</td>
<td>bacterium</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>Mycobacterium tuberculosis</td>
<td>bacterium</td>
</tr>
<tr>
<td>Whooping cough</td>
<td>Bordetella pertussis</td>
<td>bacterium</td>
</tr>
<tr>
<td>Yellow fever</td>
<td>flavivirus</td>
<td>virus</td>
</tr>
</tbody>
</table>
Complete the events chain about how the lytic cycle and lysogenic cycle in viral infections are related. These terms may be used more than once: cytoplasm, dormant, exocytosis, genetic material, host cell, host cell chromosome, lysogenic cycle, lytic cycle, protein coat, viral genes.

A virus attaches to the _________________.

The ________________ of the virus enters the host’s _________________.

In the ________ ________________, viral DNA enters the nucleus of the host cell.

The viral DNA integrates into a(n) _________________.

Viral genes can remain ________________ for some time.

Activation of the viral genes results in the _________________.

In the lytic cycle, the host cell makes copies of viral DNA or RNA.

The ________________ instruct the host cell to make viral protein capsids and viral enzymes.

The ________________ forms around the nucleic acids of new viruses.

New viruses leave the cell by ________________ or by causing the cell to lyse.
Study Guide

CHAPTER 18

Section 1: Bacteria

In your textbook, read about the diversity of prokaryotes.

Respond to each statement.

1. **State** one way in which eubacteria and archaebacteria are different and one way in which they are the same.

2. **State** one way in which thermoacidophiles and halophiles are different and one way in which they are the same.

In your textbook, read about prokaryote structure.

*Label the diagram of the bacterial cell. Use these choices:*

- capsule
- cell wall
- chromosome
- flagella
- pili
- plasma membrane

![Diagram of bacterial cell]

3. ____________________________

4. ____________________________

5. ____________________________

6. ____________________________

7. ____________________________

8. ____________________________
In your textbook, read about prokaryote structure, identifying prokaryotes, and survival of bacteria.

Match the definition in Column A with the term in Column B.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. part of the composition of the cell walls of eubacteria</td>
<td>A. nucleoid</td>
</tr>
<tr>
<td>10. dormant bacterial cell</td>
<td>B. plasmid</td>
</tr>
<tr>
<td>11. area of prokaryotic cell containing a large circular chromosome</td>
<td>C. peptidoglycan</td>
</tr>
<tr>
<td>12. small circular DNA in prokaryotic cell</td>
<td>D. endospore</td>
</tr>
</tbody>
</table>

Complete the table below by drawing each type of prokaryote.

<table>
<thead>
<tr>
<th>Cocci</th>
<th>Bacilli</th>
<th>Spirochetes</th>
</tr>
</thead>
</table>

In your textbook, read about the ecology of bacteria.

Use each of the terms below only once to complete the passage.

antibiotics  bacteria  decomposers  disease
nitrogen  nitrogen fixation  normal flora  symbiotically
vitamin K  yogurt

Most (16) ________________________________ are beneficial. Some bacteria are
(17) ________________________________ that return vital nutrients to the environment. Certain types of
bacteria use (18) ________________________________ gas directly and convert this gas into compounds that
plants can use. This process is called (19) ________________________________ . Some bacteria called
(20) ________________________________ live in and on the human body. *Escherichia coli* live
(21) ________________________________ in the gut of humans and produce
(22) ________________________________ , which humans need for blood clotting. Many food
products, such as cheese and (23) ________________________________ , are made with the aid of bacteria.
Other bacteria make (24) ________________________________ . A small percentage of bacteria can cause
(25) ________________________________ .
Study Guide

CHAPTER 18

Section 2: Viruses and Prions

In your textbook, read about viruses and viral infection.

Match the definition in Column A with the term in Column B.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. genetic material of a virus</td>
<td>A. virus</td>
</tr>
<tr>
<td>2. where a virus attaches to a host cell</td>
<td>B. bacteriophage</td>
</tr>
<tr>
<td>3. nonliving particle that replicates inside a living cell</td>
<td>C. DNA or RNA</td>
</tr>
<tr>
<td>4. outer layer of virus made of proteins</td>
<td>D. capsid</td>
</tr>
<tr>
<td>5. nervous system disease</td>
<td>E. AIDS</td>
</tr>
<tr>
<td>6. a virus that infects bacteria</td>
<td>F. rabies</td>
</tr>
<tr>
<td>7. a cell in which a virus replicates</td>
<td>G. host</td>
</tr>
<tr>
<td>8. a virus that is spread through sexual contact</td>
<td>H. receptor site</td>
</tr>
</tbody>
</table>

Complete the table by checking the correct column(s) for each description.

<table>
<thead>
<tr>
<th>Description</th>
<th>Lytic Cycle</th>
<th>Lysogenic Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Viral genes are expressed immediately after the virus infects the host cell.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Many new viruses are assembled.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. This cycle is preceded by a virus entering a host cell.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Viral DNA is integrated into the host cell’s chromosome.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Viruses are released from the host cell by lysis or exocytosis.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. The viral genes can remain dormant for months or years.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In your textbook, read about retroviruses. Use each of the terms below only once to complete the passage.

<table>
<thead>
<tr>
<th>cancer-causing</th>
<th>DNA</th>
<th>host cell</th>
<th>human immunodeficiency virus (HIV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>nucleus</td>
<td>retrovirus</td>
<td>reverse transcriptase</td>
<td>RNA</td>
</tr>
</tbody>
</table>

Some disease-causing viruses have (15) ___________________________ instead of DNA. This type of virus is called a (16) ___________________________. The best-known virus of this type is (17) ___________________________. Some (18) ___________________________ viruses belong to this group. In the core of the virus is RNA and an enzyme called (19) ___________________________, which is the enzyme that transcribes (20) ___________________________ from viral RNA. Then DNA moves into the (21) ___________________________ of a cell, and the (22) ___________________________ manufactures and assembles new HIV particles.

In your textbook, read about viruses and prions. Complete the table by checking the correct column(s) for each description.

<table>
<thead>
<tr>
<th>Description</th>
<th>Viruses</th>
<th>Prions</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. Made of a protein</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Replicate in cells of organisms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. Made of a nonliving strand of genetic material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. Normally live in cells</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. Cause infection and disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. Cause proteins to mutate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29. Attach to host cell and enter the cytoplasm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If the statement is true, write true. If the statement is false, replace the italicized term or phrase to make it true.

30. Mutated prions are shaped like a rod.

31. A disease in cattle associated with prions is mad cow disease.

32. Abnormal prions cause nerve cells in the heart to burst.
En tu libro de texto, lee acerca de la diversidad de las procariotas.

Responde a cada afirmación.

1. **Indica** una manera en la cual las eubacterias y las arqueobacterias se diferencian y otra manera en la cual se asemejan.

2. **Indica** una manera en la cual los termoacidófilos y los halófilos se diferencian y otra manera en la cual se asemejan.

En tu libro de texto, lee acerca de la estructura de las procariotas.

Identifica el diagrama de la célula bacterial. Usa estas opciones:

- cápsula
- pared celular
- cromosoma
- membrana plasmática
- flagelos
- pelos

3. 

4. 

5. 

6. 

7. 

8. 

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En tu libro de texto, lee acerca de la estructura de las procariotas, la identificación de las procariotas y la supervivencia de las bacterias.

Relaciona la definición de la columna A con el término de la columna B.

<table>
<thead>
<tr>
<th>Columna A</th>
<th>Columna B</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. parte de la composición de las paredes celulares de las eubacterias</td>
<td>A. nucleóide</td>
</tr>
<tr>
<td>10. célula bacterial latenteo</td>
<td>B. plásmido</td>
</tr>
<tr>
<td>11. área de una célula procariótica que contiene un cromosoma circular</td>
<td>C. peptidoglicano</td>
</tr>
<tr>
<td>grande</td>
<td>D. endospora</td>
</tr>
<tr>
<td>12. ADN circular pequeño en una célula procariótica</td>
<td></td>
</tr>
</tbody>
</table>

Completa la siguiente tabla con el dibujo de cada tipo de procariota.

<table>
<thead>
<tr>
<th>Cocos</th>
<th>Bacilos</th>
<th>Espiroquetas</th>
</tr>
</thead>
</table>

En tu libro de texto, lee acerca de la ecología de las bacterias.

Usa cada uno de los siguientes términos sólo una vez para completar el párrafo.

antibióticos bacteria descomponedores enfermedades
fijación de nitrógeno flora normal nitrógeno simbioticamente
vitamina K yogurt

La mayoría de las (16) brindan beneficios. Algunas bacterias son (17) que devuelven nutrientes vitales al ambiente. Ciertos tipos de bacterias usan el gas (18) directamente y convierten este gas en compuestos que las plantas pueden usar. Este proceso se llama (19) . Algunas bacterias llamadas (20) viven por dentro y por fuera del cuerpo humano. La Escherichia coli vive (21) en el intestino de los humanos y produce (22) , la cual es necesaria para los humanos para la coagulación de la sangre. Muchos productos alimenticios, como el queso y el (23) , se preparan con la ayuda de bacterias. Otras bacterias producen (24) . Un pequeño porcentaje de bacteria puede causar (25) .
Guía de estudio
CAPÍTULO 18
Sección 2: Los virus y los priones

En tu libro de texto, lee acerca de los virus y la infección viral.

Relaciona la definición de la columna A con el término de la columna B.

<table>
<thead>
<tr>
<th>Columna A</th>
<th>Columna B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. material genético de un virus</td>
<td>A. virus</td>
</tr>
<tr>
<td>2. donde un virus se adhiere a una célula huésped</td>
<td>B. bacteriófago</td>
</tr>
<tr>
<td>3. partícula no viviente que se replica dentro de una célula viva</td>
<td>C. ADN o ARN</td>
</tr>
<tr>
<td>4. capa exterior del virus hecho de proteínas</td>
<td>D. cápside</td>
</tr>
<tr>
<td>5. enfermedad del sistema nervioso</td>
<td>E. SIDA</td>
</tr>
<tr>
<td>6. un virus que infecta las bacterias</td>
<td>F. rabia</td>
</tr>
<tr>
<td>7. una célula en la cual un virus se replica</td>
<td>G. huésped</td>
</tr>
<tr>
<td>8. un virus que se propaga mediante contacto sexual</td>
<td>H. sitio receptor</td>
</tr>
</tbody>
</table>

Completa la tabla marcando la(s) columna(s) correcta(s) para cada descripción.

<table>
<thead>
<tr>
<th>Descripción</th>
<th>Ciclo lítico</th>
<th>Ciclo lisogénioco</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Los genes virales se expresan inmediatamente después de que el virus infecta la célula huésped.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Muchos virus nuevos se arman.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Este ciclo está precedido por un virus que entra a una célula huésped.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. El ADN viral se integra en el cromosoma de la célula huésped.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Los virus se liberan de la célula huésped mediante el proceso de lisis o exocitosis.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Los genes virales pueden permanecer latentes por meses o años.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
En tu libro de texto, lee acerca de los retrovirus.

Usa cada uno de los siguientes términos sólo una vez para completar el párrafo.

<table>
<thead>
<tr>
<th>ADN</th>
<th>ARN</th>
<th>ADN</th>
<th>ARN</th>
</tr>
</thead>
<tbody>
<tr>
<td>núcleo</td>
<td>virus de inmunodeficiencia humana (VIH)</td>
<td>causan cáncer</td>
<td>célula huésped</td>
</tr>
<tr>
<td>transcriptasa inversa</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Algunos virus que causan enfermedades tienen (15) _________________ en vez de ADN. Este tipo de virus se denomina (16) _________________ . El virus de este tipo más conocido es el (17) _________________ . Algunos virus que (18) _________________ pertenecen a este grupo. En el centro del virus se encuentra el ARN y una enzima llamada (19) _________________ , la cual es la enzima que transcribe el (20) _________________ del ARN viral. Luego, el ADN se traslada al (21) _________________ de una célula, y la (22) _________________ fabrica y arma nuevas partículas de VIH.

En tu libro de texto, lee acerca de los virus y los priones.

Completa la tabla marcando la(s) columna(s) correcta(s) para cada descripción.

<table>
<thead>
<tr>
<th>Descripción</th>
<th>Virus</th>
<th>Priones</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. Están hechos de una proteína</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Se replican en las células de los organismos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. Están hechos de una cadena de material genético no viviente</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. Normalmente viven en las células</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. Causan infecciones y enfermedades</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. Causan que las proteínas muten</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29. Se pegan a la célula huésped y entran al citoplasma</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Si la afirmación es verdadera, escribe «verdadero». Si la afirmación es falsa, sustituye el término o la frase en cursiva para volverla verdadera.

30. Los priones mutados tienen forma de varilla.

31. Una enfermedad en el ganado relacionada con los priones es la enfermedad de las vacas locas.

32. Los priones anormales causan que las células nerviosas en el corazón exploten.
Section 1: Bacteria

After reading the section in your textbook, respond to each statement.

1. **Specify** the three ways in which prokaryotes obtain energy for cellular respiration.

   __________________________________________
   __________________________________________
   __________________________________________

2. **Discuss** the functions of pili.

   __________________________________________
   __________________________________________
   __________________________________________

3. **Describe** the structure of prokaryotes.

   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________

4. **Compare** and **contrast** eubacteria and archaeaebacteria.

   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________

5. **Clarify** why creation of endospores is not considered a type of reproduction.

   __________________________________________
   __________________________________________
After reading the section in your textbook, respond to each statement.

1. Define prion.

2. Describe the general structure of a virus.

3. Theorize why viruses are thought to have evolved after cells instead of before.

4. Summarize viral infection of a cell.

5. Distinguish between the lytic cycle and the lysogenic cycle.
CHAPTER 18
Assessment
Student Recording Sheet

Section 18.1
Vocabulary Review

Choose the vocabulary term that does not belong, and explain why it does not belong.

1. ___________________________________________

2. ___________________________________________

3. ___________________________________________

Understand Key Concepts

Select the best answer from the choices given, and fill in the corresponding circle.

4. A B C D

5. A B C D

6. A B C D

7. A B C D

8. A B C D

9. A B C D

10. A B C D

Constructed Response

11. ___________________________________________

12. ___________________________________________

13. ___________________________________________

Think Critically

14. ___________________________________________
CHAPTER 18
Assessment
Student Recording Sheet

15. ___________________________________________________________

16. ___________________________________________________________

Section 18.2
Vocabulary Review
Write a sentence that connects the vocabulary terms in each pair.

17. ___________________________________________________________

18. ___________________________________________________________

19. ___________________________________________________________

20. ___________________________________________________________

Understand Key Concepts
Select the best answer from the choices given, and fill in the corresponding circle.

21. A B C D  
22. A B C D

23. A B C D  
24. A B C D

25. A B C D  
26. A B C D

27. A B C D  
28. A B C D

Constructed Response
28. ___________________________________________________________

29. ___________________________________________________________

30. Record your answer for question 30 on a separate sheet of paper.
CHAPTER 18  
Assessment

Student Recording Sheet

Think Critically

31.

32.

33.

34.

Additional Assessment

35. **Writing in Biology**  Record your answer for question 35 on a separate sheet of paper.

36. **Writing in Biology**

Document-Based Questions

37.

38.

39.

Cumulative Review

40.

41.

42.

43.
CHAPTER 18
Assessment
Student Recording Sheet

Standardized Test Practice

Multiple Choice

Select the best answer from the choices given, and fill in the corresponding circle.

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D
6. A B C D
7. A B C D
8. A B C D
9. A B C D

Short Answer

Answer each question with complete sentences.

10. 

11. 

12. 

13. 

14. 

15. 

Extended Response

Answer each question with complete sentences.

16. 

17. 

18. 

19. 

Essay Question

20. Record your answer for question 20 on a separate sheet of paper.
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Chapter 19 Protists

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<td>Section Quick Check 2</td>
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<td>Section Quick Check 4</td>
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<td>Chapter Test A</td>
<td>61</td>
</tr>
<tr>
<td>Chapter Test B</td>
<td>64</td>
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<td>Chapter Test C</td>
<td>67</td>
</tr>
<tr>
<td>Student Recording Sheet</td>
<td>71</td>
</tr>
</tbody>
</table>
Before reading Chapter 19, predict answers to questions about the chapter content based on what you already know. Circle the letter of the correct answer, and then explain your reasoning.

1. A biologist is studying the organisms found in a drop of pond water. He views long strands of green algae and the roots of water hyacinth plants under the microscope’s magnification. Swimming between the algae strands, he views amoebas, paramecium, and other protozoans. He also discovers microscopic aquatic worms thrashing in the water droplet as well as rotifers feeding around detritus. Which plantlike protist did the scientist observe?
   A. algae  
   B. amoeba  
   C. hyacinth  
   D. rotifer  

Explain.

2. A hiker walks through a forest after a heavy rain. She lifts up a rotting log and discovers a bright yellow slime mold covering a portion of the wet wood. In a large puddle, she sees the fuzzy white strands of a water mold covering a dead insect. Which type of organism are the slime mold and water mold?
   A. algae  
   B. fungi  
   C. plant  
   D. protist  

Explain.

3. A friend of yours describes small protists she saw under a microscope during a science lab. She believes all protists live in freshwater. Critique her hypothesis.


Launch Lab

What is a protist?

The Kingdom Protista is similar to a drawer or closet in which you keep odds and ends that do not seem to fit any other place. The Kingdom Protista is composed of three groups of organisms that do not fit in any other kingdom. In this lab, you will observe the three groups of protists.

Procedure

1. Read and complete the lab safety form.
2. In the space below, construct a data table to record your observations.
3. Observe different types of protists using a microscope, noting their similarities and differences. Record your observations, notes, and illustrations in your data table.

Data and Observations

Analysis

1. Organize the protists with similar characteristics into groups using the data that you collected.

2. Infer which of your groups are animal-like, plantlike, or funguslike.
**MiniLab**

**CHAPTER 19**

Investigate Photosynthesis in Algae

How much sunlight does green algae need to undergo photosynthesis? Algae contain photosynthetic pigments that allow them to produce food by using energy from the Sun. Observe green algae to determine whether the amount of light affects photosynthesis.

**Procedure**

1. Read and complete the lab safety form.
2. Obtain samples of green algae from your teacher. Place the sample of each type of algae in different locations in the classroom. Be sure one location is completely dark.
3. Hypothesize what will happen to the algae in each location.
4. Check each specimen every other day for a week. Create a data table in the space below and record your observations.

**Data and Observations**

**Analysis**

1. **Describe** the evidence you used to determine whether photosynthesis was occurring.

   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________

2. **Conclude** Was your hypothesis supported? Explain.

   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________

3. **Predict** What organelles would you expect to see if you looked at each type of algae under a microscope?

   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________
MiniLab

CHAPTER 19

Investigate Slime Molds

What is a slime mold? In a kingdom of interesting creatures, slime molds are perhaps the most interesting. Observe different types of slime molds, and observe the unusual nature of their “bodies.”

Procedure

1. Read and complete the lab safety form.
2. Obtain slides of different specimens of slime molds. Examine the slides under a microscope.

3. In the space below, create a data table to record your information. Sketch and describe each specimen.

Data and Observations

Analysis

1. Compare and contrast the specimens.

2. Identify specimens that have similar characteristics. Explain why the specimens are similar.

3. Think Critically How would you classify each specimen that you examined? Explain.
Background: Animals respond and react to the world around them. One such type of reaction is known as *taxis* in which an animal orients itself toward (positive) or away (negative) from a stimulus. Some of the things animals respond to are light (phototaxis), temperature (thermotaxis), chemicals (chemotaxis), and gravity (gravitaxis).

Question: *How do simple unicellular, animal-like protozoa respond to stimuli?*

Materials
- cultures of live protozoa
- compound microscope
- glass slides and cover slips
- materials needed to produce stimuli

Safety Precautions

**WARNING:** *Use care when handling slides. Dispose of any broken glass in a container provided by your teacher. Always wear goggles in the lab.*

Plan and Perform the Experiment

1. Read and complete the lab safety form.
2. Design an experiment to answer the question. Reword the original question to include the taxis you plan to investigate.
3. When complete, have your teacher approve your experimental design.
4. Collect the materials and supplies needed and begin conducting your experiment.
5. Dispose of your protozoan cultures as instructed by your teacher.

Data and Observations
Analyze and Conclude

1. Observe and Infer  Some protozoa are often described as animal-like. What animal-like characteristics did you observe?

2. State the Problem  What stimuli were you trying to test with your experimental design?

3. Hypothesize  What was your hypothesis for the question to be solved?

4. Summarize  What data did you collect during the experiment?

5. Analyze and Conclude  Did your data support your hypothesis? What is your conclusion?

6. Error Analysis  Compare your data and conclusions with other students in your class. Explain the differences in data.
Marine animals depend on diatoms and other unicellular algae as their food source. Can you imagine eating crunchy diatoms for lunch? People have been eating many species of multicellular algae since ancient times. They are good sources of many different vitamins and minerals.

Although algae are not plants, the algae that people eat are often called seaweed. People in Japan, Scotland, Norway, the Pacific Islands, coastal South American countries, and other countries near coastal water have eaten seaweed for thousands of years. Today, algae are harvested, dried, and shipped around the world.

Because algae can be shipped anywhere, people in countries far from coastal water can prepare foods with algae.

People boil algae as vegetables, use them in soups and as seasoning in rice dishes, use them as snack food, and cook them with soybeans. Most algae eaten by people are red and brown algae, but some green algae also are eaten. Table 1 lists a few of the many species of algae commonly used today. Have you ever eaten algae? If you answered no, you might be surprised. In this activity, you will investigate food additives made from algae.

Table 1

<table>
<thead>
<tr>
<th>Algae</th>
<th>Product</th>
<th>Foods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown algae: many species of Laminaria, such as Laminaria angustata and Laminaria longissima</td>
<td>usually sold dried and known as kombu</td>
<td>used to season broth and soup; deep-fried or sautéed; used as an ingredient in main dishes</td>
</tr>
<tr>
<td>Brown algae: Undaria pinnatifida</td>
<td>usually sold dried, but sometimes available raw and known as wakame</td>
<td>softened by soaking in water and used in soups and salads</td>
</tr>
<tr>
<td>Red algae: many species of Porphyra, such as Porphyra tenera</td>
<td>usually sold as dry sheets known as nori or laver</td>
<td>toasted and used to wrap sushi, rice balls, or rice crackers; crumbled and sprinkled on foods such as rice and noodles</td>
</tr>
</tbody>
</table>

Algae and Food Additives

If you eat mostly fresh fruits and vegetables, grains, and unprocessed foods, you don’t eat many food additives. However, stores are filled with processed and packaged foods that make preparing and eating meals easier. Food additives make the preparation of these foods possible, make them taste and look better, and keep them fresh and safe to eat. Three food additives that are made from algae are listed in Table 2. Some common foods that often contain these additives are listed in Table 3. Study the tables, and then answer the questions.
### Real-World Biology: Analysis, Algae in Your Foods

#### Table 2

<table>
<thead>
<tr>
<th>Food Additive</th>
<th>Sources</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agar</td>
<td>red algae, such as <em>Gelidium</em>, <em>Gracilaria</em>, and <em>Pterocladia</em></td>
<td>used for thickening and suspending; used for stabilizing, to help foods maintain a uniform texture or consistency; used as a substitute for gelatin; used as an antidrying agent in breads and pastry</td>
</tr>
<tr>
<td>Alginates</td>
<td>brown algae, such as <em>Macrocystis</em> and <em>Laminaria</em></td>
<td>used for thickening, suspending, emulsifying, gel forming, and film forming; used for stabilizing, to help foods maintain a uniform texture or consistency</td>
</tr>
<tr>
<td>Carrageenan</td>
<td>red algae, such as <em>Gigartina stellata</em>, <em>Chondrus crispus</em>, and <em>Eucheuma</em></td>
<td>used as a thickener; used for stabilizing, to help foods maintain a uniform texture or consistency</td>
</tr>
</tbody>
</table>

#### Table 3

<table>
<thead>
<tr>
<th>Food</th>
<th>Agar</th>
<th>Alginates</th>
<th>Carrageenan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bread</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheese</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Chocolate milk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creamed soup</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy dessert</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Dry mix</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Evaporated milk</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Frozen food</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Fruit juice</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Ice cream</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Milk pudding</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Pasta</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Sauce and gravy</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Syrup, topping, and icing</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whipped topping</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Yogurt</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

#### Analyze and Conclude

**Respond to each question and statement.**

1. **Name** some foods or food additives made from algae.

2. **List** the genera of algae that are used most often as foods.

3. **Apply** Gelatin is an animal product used to make jelly-like desserts. Using your knowledge of food additives, tell what a vegetarian could use to make jelly-like desserts.

4. **Infer** Using your knowledge of algae and geography, why do you think algae are eaten more often in Japan and Pacific Ocean islands than in Arizona and New Mexico?

5. **Judge** Why might it be desirable to make food additives from algae?

---

**Careers in Biology**

**Food Technology** Visit biologygmh.com for information on food technologists. What are the responsibilities of a food technologist?
Enrichment

CHAPTER 19

Group Project: Impact of Protists on Humans

Protists are some of the most diverse organisms on Earth. They include unicellular, multicellular, and colonial organisms and can be similar to animals, plants, and fungi. Protists obtain nutrients through photosynthesis and also by ingesting other organisms, scavenging dead plant or animal debris, and living within other organisms as parasites. Some protists have major impacts on humans, causing human disease and destroying crops.

Select Working in a small group, select one of the protist species listed in the table to research in depth. For example, one group in your class might choose to research *Plasmopara viticola*, while another group researches *Trypanosoma brucei*.

Research Once you have selected a protist, find out how humans are currently affected by the organism or have been affected by the organism in the past. Use your textbook and other reference books to find the information. Look for photographs of the protist. Your research should include eradication methods that have been used or are being used. Also find information about the protist’s habitat, life cycle, and method of disease transmission.

Present Finally, present the information that you learned about the protist to your class. Display any photographs of the protist that you found. A diagram showing the protist’s life cycle, including any host organisms, would be useful.

<table>
<thead>
<tr>
<th>Type of Protist</th>
<th>Protist Species Name</th>
<th>Impact on Humans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protozoa—animal-like</td>
<td><em>Cryptosporidium parvum</em></td>
<td>human intestinal problems</td>
</tr>
<tr>
<td></td>
<td><em>Giardia lamblia</em></td>
<td>human intestinal problems</td>
</tr>
<tr>
<td></td>
<td><em>Trypanosoma brucei</em></td>
<td>African sleeping sickness</td>
</tr>
<tr>
<td></td>
<td><em>Trypanosoma cruzi</em></td>
<td>Chagas’ disease</td>
</tr>
<tr>
<td>Algae—plantlike</td>
<td><em>Gymnodinium catenatum</em></td>
<td>red tides, toxic to humans</td>
</tr>
<tr>
<td></td>
<td><em>Pfiesteria piscicida</em></td>
<td>human neurological or skin disorders</td>
</tr>
<tr>
<td>Funguslike</td>
<td><em>Phytophthora infestans</em></td>
<td>Irish potato blight</td>
</tr>
<tr>
<td></td>
<td><em>Plasmopara viticola</em></td>
<td>downy mildew of grapes</td>
</tr>
</tbody>
</table>
Complete the network tree about the classification of protists. These terms may be used more than once: algae, cilia, ciliates, flagella, food, nutrients, protists, protozoans, pseudopods, slime molds, sporozoans.

1. include the

animal-like

2.

include the

plantlike

3.

funguslike

4. which make their own

5.

which absorb

6. which move and sweep in food using

sarcodines

7. which reproduce using

zooflagellates

8. spores

9. which move and envelop food using

10.

11.
Study Guide

CHAPTER 19

Section 1: Introduction to Protists

In your textbook, read about protists.

Match the definition in Column A with the term in Column B.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>protist that makes its own food through photosynthesis</td>
</tr>
<tr>
<td>2.</td>
<td>protist that eats other unicellular organisms</td>
</tr>
<tr>
<td>3.</td>
<td>protist that absorbs its nutrients from dead organisms</td>
</tr>
<tr>
<td>4.</td>
<td>type of cell that all protists have</td>
</tr>
<tr>
<td>5.</td>
<td>digests wood for termites</td>
</tr>
</tbody>
</table>

In your textbook, read about classifying protists and the origin of protists.

Use each of the terms below only once to complete the passage.

amoeba  autotroph  endosymbiosis  evolutionary history
food     food source  heterotroph  kelp

The classification of protists into three groups is based on their (6) __________________________.
For example, the diagram above shows a(n) (7) __________________________. It is shown eating
(8) __________________________, which makes it a(n) (9) __________________________.
The giant (10) __________________________, which is a(n) (11) __________________________,
is an example of a plantlike protist. The (12) __________________________ of protists is not well known. However, (13) __________________________ is thought to have been part of this process.
In your textbook, read about paramecia.

Label the diagram of the paramecium. Use these choices:

cilia contractile vacuole macronucleus micronucleus oral groove

1. 

2. 

3. 

4. 

5. 

In your textbook, read about Ciliophora, Sarcodina, Apicomplexa, and Zoomastigina.

Complete the table by checking the correct column(s) for each description.

<table>
<thead>
<tr>
<th>Description</th>
<th>Ciliophora</th>
<th>Sarcodina</th>
<th>Apicomplexa</th>
<th>Zoomastigina</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Reproduce through spores</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Use flagella for movement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Have numerous short, hairlike projections</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Use pseudopods for feeding and locomotion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Respond to each statement.

10. Name two phyla of protists that have members that cause diseases in humans.

__________________________________________________________________________

__________________________________________________________________________

11. Describe what Chagas’ disease is and what causes it.

__________________________________________________________________________

__________________________________________________________________________

12. Explain how African sleeping sickness is transmitted to humans.

__________________________________________________________________________

__________________________________________________________________________
CHAPTER 19
Section 3: Algae—Plantlike Protists

In your textbook, read about the characteristics, diversity, and life cycle of algae.

If the statement is true, write true. If the statement is false, replace the italicized term or phrase to make it true.

1. The three criteria used to classify algae are the types of chlorophyll and secondary pigments, the method of chlorophyll storage, and the composition of the cell wall.

2. All algae are considered plantlike because they contain photosynthetic pigments.

3. Algal blooms occur when euglenoids reproduce in great numbers due to plentiful food and favorable environmental conditions.

4. Bioluminescent dinoflagellates emit light and are usually found in salt water.

5. Algae that have characteristics of both plants and animals are chrysophytes.

6. The secondary pigment fucoxanthin accounts for the color of red algae.

7. Algae are high in protein and contain minerals, trace elements, and vitamins.

8. Many algae have a life cycle called alternation of generations.

In your textbook, read about the life cycle of algae.

Label the diagram. Use these choices:

<table>
<thead>
<tr>
<th>gametes</th>
<th>gametophytes</th>
<th>spores</th>
<th>sporophyte</th>
</tr>
</thead>
</table>

9. _________________________

10. _________________________

11. _________________________

12. _________________________
Study Guide

CHAPTER 19
Section 4: Funguslike Protists

In your textbook, read about funguslike protists.

Write the term or phrase that best completes each statement. Use these choices:

- acrasin
- chitin
- Myxomycota
- Oomycota
- Phytophthora infestans
- plasmodium

1. The cell walls of funguslike protists do not contain ___________________________ like the cell walls of true fungi.

2. Some slime molds form a(n) __________________________, which is a moving mass of cytoplasm.

3. A chemical called __________________________ signals slime mold amoeboid cells to congregate and form a single sluglike colony.

4. Acellular slime molds belong to the phylum __________________________.

5. Water molds and downy mildew in the phylum __________________________ are often found in water or damp places.

6. The downy mildew __________________________ devastated the potato crop in Ireland in the nineteenth century, causing many people to starve.

In your textbook, read about slime molds.

Identify the following life cycles as cycles for acellular slime molds or cellular slime molds.

Haploid amoeba-like cells → sexual reproduction → diploid zygote → giant cell → meiosis, then multiple mitosis → cell rupture → haploid amoeba-like cells

7. __________________________

Spores → haploid flagellated and amoeba-like cells → fertilization → diploid plasmodium → meiosis → spores

8. __________________________

The diagram shows a multicellular amoeba-like mass.

For each statement below, write true or false.

9. The diagram shows a plasmodium.

______________________________

10. The diagram shows a cellular slime mold.

______________________________
En tu libro de texto, lee acerca de los protistas.  
Relaciona la definición de la columna A con el término de la columna B.

<table>
<thead>
<tr>
<th>Columna A</th>
<th>Columna B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. protista que produce su propio alimento a través de la fotosíntesis</td>
<td>A. eucariota</td>
</tr>
<tr>
<td>2. protista que come otros organismos unicelulares</td>
<td>B. microsporidio</td>
</tr>
<tr>
<td>3. protista que absorbe sus nutrientes de organismos muertos</td>
<td>C. moho de agua</td>
</tr>
<tr>
<td>4. tipo de célula que todos los protistas tienen</td>
<td>D. protozoario</td>
</tr>
<tr>
<td>5. digiere madera para las termitas</td>
<td>E. alga</td>
</tr>
</tbody>
</table>

En tu libro de texto, lee acerca de la clasificación y el origen de los protistas.  
Usa cada uno de los siguientes términos sólo una vez para completar el párrafo.

alimento  ameba  autótrofo  endosimbiosis  
fuente alimenticia  heterótrofo  historia evolutiva  kelp

La clasificación de los protistas en tres grupos se basa en su (6) ______________________________.  Por ejemplo, el diagrama anterior muestra una (7) ______________________________.  Aparece absorbiendo (8) ______________________________, lo cual la hace un (9) ______________________________.  El (10) ______________________________ gigante, el cual es un (11) ______________________________, es un ejemplo de un protista tipo planta.  La (12) ______________________________ de los protistas no es muy conocida.  Sin embargo, se considera que la (13) ______________________________ ha sido parte de este proceso.
En tu libro de texto, lee acerca de los paramecios.

Identifica el diagrama del paramecio. Usa estas opciones:

- cilio
- hendidura oral
- macronúcleo
- micronúcleo
- vacuola contráctil

1. 

2. 

3. 

En tu libro de texto, lee acerca de los Ciliados, Sarcodinos, Apicomplejos y Zoomastiginos.

Completa la tabla marcando la(s) columna(s) correcta(s) para cada descripción.

<table>
<thead>
<tr>
<th>Descripción</th>
<th>Ciliados</th>
<th>Sarcodinos</th>
<th>Apicomplejos</th>
<th>Zoomastiginos</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Se reproducen por medio de esporas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Usan flagelos para el movimiento</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Tienen varias proyecciones cortas parecidas al pelo</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Usan seudópodos para alimentación y locomoción</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Responde a cada afirmación.

10. **Nombra** los dos filos de protistas que tienen miembros que provocan enfermedades en los humanos.

    

11. **Describe** qué es la enfermedad de Chagas y qué la provoca.

    

12. **Explica** cómo se transmite a los humanos la enfermedad africana del sueño.

    

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En tu libro de texto, lee acerca de las características, la diversidad y el ciclo de vida de las algas.

Si la afirmación es verdadera, escribe «verdadero». Si la afirmación es falsa, sustituye el término o la frase en cursiva para volverla verdadera.

1. Los tres criterios utilizados para clasificar las algas son los tipos de clorofila y pigmentos secundarios, el método de almacenamiento de la clorofila y la composición de la pared celular.

2. Todas las algas se consideran *semejantes a las plantas* debido a que contienen pigmentos fotosintéticos.

3. Los florecimientos algales ocurren cuando *los euglenoides* se reproducen en grandes cantidades debido a abundancia de alimento y a condiciones ambientales favorables.

4. Los dinoflagelados *bioluminiscentes* emiten luces y por lo general se encuentran en el agua salada.

5. Las algas que tienen características tanto de plantas como de animales son *crisófitas*.

6. El pigmento secundario fucoxantina es el responsable del color del *algroja*.

7. Las algas tienen muchas proteínas y contienen *minerales, elementos traza y vitaminas*.

8. Muchas algas tienen un ciclo de vida llamado *alternación de generaciones*.

En tu libro de texto, lee acerca del ciclo de vida del alga.

*Identifica el diagrama. Usa estas opciones:*

- esporas
- esporofitos
- gametos
- gametofitos

9. 
10. 
11. 
12. 

En tu libro de texto, lee acerca de los protistas semejantes a los hongos.

Escribe el término que mejor completa cada afirmación. Usa estas opciones:

- acrasina
- Phytophthora infestans
- Mixomicetes
- Oomicetes
- plasmodio
- quitina

1. Las paredes celulares de los protistas semejantes a los hongos no contienen __________________________ como las paredes celulares de los hongos verdaderos.

2. Algunos mohos limosos forman un __________________________, el cual es una masa de citoplasma en movimiento.

3. Un químico llamado __________________________ indica a las células ameboides del moho limoso que se congreguen y formen una sola colonia semejante a la babosa.

4. Los mohos limosos acelulares pertenecen al filo __________________________.

5. Los mohos de agua y el moho lanudo del filo __________________________ a menudo se encuentran en el agua o lugares húmedos.

6. El moho lanudo __________________________ acabó con la cosecha de papas en Irlanda en el siglo XIX, lo que provocó hambruna entre la gente.

En tu libro de texto, lee acerca de los mohos limosos.

Identifica los siguientes ciclos de vida como los ciclos de los mohos limosos acelulares o de los mohos limosos celulares.

Células haploides semejantes a la ameba → reproducción sexual → cigoto diploide → célula gigante → meiosis, luego mitosis múltiple → ruptura celular → células haploides semejantes a la ameba

7. __________________________

Esporas → células haploides flageladas y semejantes a la ameba → fertilización → plasmodio diploide → meiosis → esporas

8. __________________________

El diagrama muestra una masa multicelular semejante a la ameba. Para cada afirmación a continuación, escribe «verdadero» o «falso».


10. El diagrama muestra un moho limoso celular.
Section 1: Introduction to Protists

After reading the section in your textbook, respond to each statement.

1. **Recall** where protists are usually found.

   ____________________________________________________________

2. **Identify** the characteristics an organism must have to be a member of Kingdom Protista.

   ____________________________________________________________

3. **Explain** why the organization of Kingdom Protista will most likely change.

   ____________________________________________________________

4. **Apply** the theory of endosymbiosis to the existence of photosynthetic protists.

   ____________________________________________________________

   ____________________________________________________________

   ____________________________________________________________

5. **Correct** the following statement: Archaebacteria and certain of their organelles evolved from eubacteria and protists.

   ____________________________________________________________

   ____________________________________________________________

   ____________________________________________________________

   ____________________________________________________________
Quick Check

CHAPTER 19
Section 2: Protozoans—Animal-like Protists

After reading the section in your textbook, respond to each statement.

1. **Name** the characteristic of protozoans that biologists use for classification.

2. **Describe** the structure of an amoeba.

3. **Compare** and **contrast** the structure and function of cilia and flagella.

4. **Decide** whether sarcodines are more like ciliates or sporozoans. Explain.

5. **Speculate** about whether or not a paramecium that lives in the ocean would need a contractile vacuole.
Section Quick Check

CHAPTER 19
Section 3: Algae—Plantlike Protists

After reading the section in your textbook, respond to each statement.

1. List the three characteristics scientists use to classify algae.

2. Discuss the reasons that green algae are considered the algae most like plants.

3. Summarize the process of alternation of generations, which occurs in the life cycles of many algae.

4. Differentiate the way in which diatoms store their food from the way in which other algae store food.

5. Assess the importance of algae to humans.
Section Quick Check

CHAPTER 19
Section 4: Funguslike Protists

After reading the section in your textbook, respond to each statement.

1. State where water molds and downy mildews live.

2. Recount how a downy mildew affected the population of the United States in the nineteenth century.

3. Discuss why slime molds in the phylum Myxomycota are called acellular.

4. Compare and contrast slime molds and fungi.

5. Distinguish the motile masses of acellular and cellular slime molds.
CHAPTER 19
Assessment
Student Recording Sheet

Section 19.1
Vocabulary Review
Write complete sentences, using the vocabulary term that best answers each question.

1. ____________________________________
2. ____________________________________

Understand Key Concepts
Select the best answer from the choices given, and fill in the corresponding circle.

3. A B C D
4. A B C D
5. A B C D
6. A B C D
7. A B C D

Constructed Response
8. ____________________________________
9. Careers in Biology __________________________

Think Critically
10. ____________________________________

Section 19.2
Vocabulary Review
Write a definition for each structure, and provide an example of an organism where the structure could be found.

11. ____________________________________
12. ____________________________________
13. ____________________________________
CHAPTER 19
Assessment
Student Recording Sheet

Understand Key Concepts
Select the best answer from the choices given, and fill in the corresponding circle.

14. A B C D
15. A B C D
16. A B C D

Constructed Response
17. ________________________________________________
18. ________________________________________________

Think Critically
19.–20. Record your answers for questions 19 and 20 on a separate sheet of paper.

Section 19.3
Vocabulary Review
Write the vocabulary term that best matches each definition.

21. ____________________ 22. ____________________ 23. ____________________

Understand Key Concepts
Select the best answer from the choices given, and fill in the corresponding circle.

25. A B C D 27. A B C D

Constructed Response
29. ________________________________________________
30. ________________________________________________
31. ________________________________________________

Think Critically
32. ________________________________________________
CHAPTER 19
Assessment
Student Recording Sheet

33. ____________________________________________

Section 19.4
Vocabulary Review
Write the vocabulary term that makes each sentence true.
34. ________________________ 35. ________________________

Understand Key Concepts
Select the best answer from the choices given, and fill in the corresponding circle.
36. A B C D 37. A B C D

Constructed Response
38. ____________________________________________

39. Record your answer for question 39 on a separate sheet of paper.

Think Critically
40. ____________________________________________

Additional Assessment
41. Writing in Biology Record your answer for question 41 on a separate sheet of paper.

Document-Based Questions
42. ____________________________________________

43. ____________________________________________

44. ____________________________________________

Cumulative Review
45.–47. Record your answers for questions 45–47 on a separate sheet of paper.
CHAPTER 19  
Assessment  
Student Recording Sheet

Standardized Test Practice

Multiple Choice

Select the best answer from the choices given, and fill in the corresponding circle.

1. A B C D  
2. A B C D  
3. A B C D  
4. A B C D  
5. A B C D  
6. A B C D  
7. A B C D  
8. A B C D

Short Answer

Answer each question with complete sentences.

9. Record your answer for question 9 on a separate sheet of paper.

10. 

11. 

12. 

13. 

Extended Response

Answer the following question with complete sentences.

14. 

Essay Question

15. Record your answer for question 15 on a separate sheet of paper.
# Chapter 20  Fungi

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<th>Section</th>
<th>Page</th>
</tr>
</thead>
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<tr>
<td>Launch Lab</td>
<td>78</td>
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<tr>
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<td>79</td>
</tr>
<tr>
<td>MiniLab (2)</td>
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<td>Section Quick Check 3</td>
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<tr>
<td>Chapter Test A</td>
<td>98</td>
</tr>
<tr>
<td>Chapter Test B</td>
<td>101</td>
</tr>
<tr>
<td>Chapter Test C</td>
<td>104</td>
</tr>
<tr>
<td>Student Recording Sheet</td>
<td>107</td>
</tr>
</tbody>
</table>
Diagnostic Test

CHAPTER 20
Fungi

Before reading Chapter 20, predict answers to questions about the chapter content based on what you already know. Circle the letter of the correct answer, and then explain your reasoning.

1. A biology student is surveying forest floor organisms. She stops to observe the living things growing on a fallen log. She notices patches of dark moss and light green lichens growing on the log’s surface. Green vines are wrapped around one end of the log, and brown mushrooms have sprouted from the log’s moist underside. A black slime mold spreads out across the opposite side of the log. The student makes notes in her field journal. Which would be included in her notes?
   A. Forest floor plants growing on the log include moss, lichens, and vines.
   B. Mushroom roots extend across the log’s surface and into decaying matter.
   C. The reproductive structures of mushroom fungi sprout in moist materials.
   D. Several species of fungi, including moss and slime mold, were observed.

   Explain.

2. Gerald discovers dozens of puffballs growing in his backyard after a night of rain. He squeezes a puffball, and a cloud of brown particles erupts from the sac. Gerald suspects that this is the way puffballs reproduce, and he decides to research fungi reproductive methods. Which would be part of his research?
   A. Fungi only use asexual reproduction to clone themselves.
   B. Fungi reproduce sexually to develop fungi seeds.
   C. Sperm cells are dispersed as a form of external fertilization.
   D. Spores are the primary reproductive structures of fungi.

   Explain.

3. A friend of yours is searching through her refrigerator when she discovers a half-filled jar of salsa covered with mold. In disgust, she claims that fungi serve no valuable purpose. Critique her statement, and discuss how you would respond to her.
Fungi display enormous diversity. The organisms in this kingdom vary in size from a single cell to a mushroom found in the Malheur National Forest that is 5.6 km wide! In this lab, you will observe some of the differences among fungi.

**Procedure**
1. Read and complete the lab safety form.
2. In the space below, create a data table to record your observations of the fungi samples provided by your teacher.
3. Study each fungus carefully. Wash your hands thoroughly after handling fungi.

4. Describe each fungus sample as completely as you can. Include properties like color, shape, size, and growth medium.
5. Dispose of fungi and clean your work station according to your teacher’s instructions.

**Data and Observations**

**Analysis**

1. **Contrast**  What physical characteristics varied most among your samples?

2. **Compare**  Summarize any similarities you observed or can infer among the fungi you examined.
CHAPTER 20

Examine Yeast Growth

What is the relationship between yeast reproduction and the availability of food?
Yeasts are unicellular fungi. These organisms feed on sugars, producing carbon dioxide and ethyl alcohol in the process. Yeasts reproduce asexually and can multiply quickly under optimal growth conditions.

Procedure

1. Read and complete the lab safety form.
2. Label four 250-mL Erlenmeyer flasks 1–4.
3. In the space below, create a data table to record your results.
4. Add 100 mL warm water to each flask and do not cover the flasks.
5. Add 0.0 g, 0.5 g, 1.0 g, or 1.5 g of table sugar to each one of the flasks.
6. Add one packet of dry yeast to each flask. Swirl flasks with a glass rod until contents are thoroughly mixed.
7. Observe and record the changes in the flasks every 5 min for 20 min.
8. Clean up your work station according to your teacher’s instructions.

Data and Observations

Analysis

1. Conclude What is the relationship between yeast reproduction and the availability of sugar?

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

2. Analyze How might your results have changed if the flasks had been covered during your experiment?

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________
How does salt affect mold growth? Chemical preservatives, including salt (sodium chloride), are often used to influence mold growth on a variety of foods.

**Procedure**

1. Read and complete the lab safety form.
2. Obtain two slices of bread. Touch one object in the room with both sides of both slices.
3. Using a spray bottle filled with water, lightly moisten both sides of both slices of bread evenly.
4. Place one bread slice into a self-sealing bag. Seal the bag and label it with your name, the date, and the object wiped with the bread.
5. Sprinkle salt on both sides of the second slice. Place the slice into another bag and seal it. Label this bag as you did the first, but note that salt was added.
6. In the space below, create a table to record your observations.
7. Record observations daily for ten days. Your table should include descriptions, as well as measurements of any mold that has formed.

**Data and Observations**

**Analysis**

1. **Identify** Which slice grew more mold?

2. **Conclude** Did the salt affect mold growth?
**Design Your Own BioLab**

**CHAPTER 20**

**How do environmental factors affect mold growth?**

**Background:** Molds can grow under a wide range of conditions. Consider the differences in your kitchen alone. Molds can grow in a cool refrigerator or in a dark bread box on the counter. They grow on foods that contain varying amounts of sugar, protein, and moisture.

**Question:** How does a specific environmental factor change the rate of mold growth?

**Materials**

Choose materials that would be appropriate for this lab. Possible materials include:

- mold from a food source
- plain powdered gelatin (contains protein only)
- bread
- sugar
- prepared gelatin in small cup
- cotton swab
- aluminum foil or plastic wrap
- small cup
- thermometer
- graduated cylinder
- spray bottle

**Safety Precautions**

**WARNING:** Never eat food used in the lab.

**Plan and Perform the Experiment**

1. Read and complete the lab safety form.
2. Make a list of environmental factors that might affect mold growth. Based on this list, develop a question to investigate.
3. Design an experiment that will help you answer this question. Remember, only one environmental factor should vary in your experimental conditions.
4. Write your hypothesis and design a data table.
5. Make sure your teacher approves your plan before you proceed.
6. Use cotton swabs to transfer mold from the food source to your trial cups.
7. Record observations for 5–7 days.
8. **Cleanup and Disposal** Place trial cups in the area designated by your teacher. Clean and return all equipment used in the lab. Wash your hands thoroughly.

**Data and Observations**
Design Your Own BioLab, How do environmental factors affect mold growth? continued

Analyze and Conclude
1. Identify  What are the independent and dependent variables in your experiment? Explain how the independent variable was changed.

2. Compare  Describe differences you noticed among trial samples.

3. Describe  What steps did you take to limit variables in this experiment? Make a list of constants.

4. Interpret the Data  How did the environmental factor you changed affect the rate of mold growth?

5. Conclude  Was your hypothesis supported? Explain.

6. Error Analysis  Is it possible that more than one variable was introduced in your experiment? How would you change your experimental plans?
Mold spores move through the air outside and inside schools and homes. You can’t see them, but tiny mold spores probably are floating past you in the air right now. When they land in a spot that provides the conditions they need to survive, they start to grow quickly. They get the nutrients they need by digesting and absorbing the material on which they are growing. The material could be carpet, walls, wood, paper, or even your food.

While some foods are made by using certain molds or fungi, most moldy foods should not be eaten. Such foods could possibly make you sick. Some scientists think certain mold spores and toxins produced by molds can make people sick if there are high concentrations in the air. People can reduce the chances of molds growing in their homes by controlling the conditions that molds need to grow. In this activity, you will investigate the conditions that affect the growth of mold and learn how mold growth can be controlled.

**Procedure**

1. Read and complete the lab safety form.
2. Obtain a slice of white bread without preservatives from your teacher, and let it stand uncovered overnight.
3. After 24 h, divide the slice of bread into four equal parts. Place them in four clean petri dishes with lids labeled as shown in the drawings below.
4. Use a dropper to add ten drops of water to the bread in dish B and ten drops of water to the bread in dish D.
5. Tape a lid on each of the four dishes. Place the petri dishes in a warm, dark closet or another dark area of the classroom.
6. Observe the petri dishes every day for the next several days. Record your observations in the table below. Look for signs of white, thready, or hairy growth. This is the common bread mold *Rhizopus*, a heterotrophic organism composed of many branching filaments called hyphae. Hyphae secrete an enzyme that digests organic substances to produce the characteristic “moldy” odor.
7. As soon as bread mold appears on one of your pieces of bread, place the petri dishes labeled “cold” (dishes C and D) in a dark container in the refrigerator. Be sure to mark the date in the table.
8. Compare the fungal growth among the petri dishes for the next several days. Record all your observations.

<table>
<thead>
<tr>
<th>Observations (Presence of Mold, Color, and Other Characteristics)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Date</strong></td>
</tr>
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Real-World Biology: Lab
Analyse and Conclude

Respond to each question and statement.

1. Identify which petri dish showed the greatest mold growth.

2. Explain why bread mold might have failed to grow in a petri dish.

3. Relate Other than to dry out the bread, what was the purpose of leaving the bread out overnight in this experiment? By doing this, what do we learn about the reproductive strategies of fungi?

4. Describe how placing the petri dishes in a cold environment affected fungal growth.

5. Discuss Based on your observations, what would you do if you wanted to discourage the growth of mold?

6. People have developed a variety of methods, such as drying, canning, salting, and freezing, to prevent foods from decomposing. Infer how each of these techniques might inhibit the growth of fungi.

Food Industry Visit biologygmh.com for information on food science technicians. What are the responsibilities of a food science technician?
Fungi make up one of the most diverse groups of organisms on Earth. They are eukaryotes, and most are multicellular. Fungi form important symbiotic and mutualistic associations with other organisms. For example, most plants depend on fungi to assist in the absorption of minerals and nutrients from the soil. As decomposers, fungi play a vital role in terrestrial ecosystems. Fungi are important sources of food and drugs. However, they also can cause allergies, disease, and death. Fungi can be delicious or deadly.

Select  Suppose you are writing an article about fungi for a scientific magazine. The table below lists seven species of fungi, the phylum to which each species belongs, uses of the fungi, and diseases and side effects caused by the fungi. Using the table, select one of the fungi to research.

Research  Once you have selected a fungus, collect as much information as possible about it. Consider the following questions while researching the fungus: Does the fungus secrete any chemicals that make it useful or harmful to humans or other organisms? How, if at all, does the fungus cause disease? Are there any historical examples of disease outbreaks or major problems caused by the fungus?

Discuss  Use your textbook and other reference materials for information. Discuss your topic and possible answers to your questions with your teacher and classmates.

Write  Finally, based on your research and class discussion, write an article about the fungus you selected. Provide answers for any questions you researched and discussed. Be sure to properly cite the sources you used to write your article.

<table>
<thead>
<tr>
<th>Fungi</th>
<th>Phylum</th>
<th>Use</th>
<th>Disease/Toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillium notatum</td>
<td>Deuteromycota (imperfect fungi)</td>
<td>source of antibiotic</td>
<td>forms ergots on rye; if eaten, can cause gangrene, muscle pain, hallucinations, and death</td>
</tr>
<tr>
<td>Claviceps purpurea</td>
<td>Ascomycota</td>
<td>treating high blood pressure, controlling bleeding</td>
<td></td>
</tr>
<tr>
<td>Ophiostoma ulmi</td>
<td>Ascomycota</td>
<td></td>
<td>Dutch elm disease</td>
</tr>
<tr>
<td>Saccharomyces cerevisiae</td>
<td>Ascomycota</td>
<td>baking, brewing, and wine making</td>
<td></td>
</tr>
<tr>
<td>Amanita phalloides</td>
<td>Basidiomycota</td>
<td></td>
<td>can cause death if eaten</td>
</tr>
<tr>
<td>Coccidioides immitis</td>
<td>Deuteromycota (imperfect fungi)</td>
<td></td>
<td>valley fever</td>
</tr>
<tr>
<td>Puccinia graminis</td>
<td>Basidiomycota</td>
<td></td>
<td>wheat rust</td>
</tr>
</tbody>
</table>
Complete the flowchart about feeding relationships of fungi. These terms may be used more than once: dead organisms, haustoria, living hosts, mutualistic, mutualistic relationship, other organisms, parasitic, raw materials, saprophytic, symbiotically, waste matter.

1. Fungi can be which transform organic substances from

2. which absorb nutrients from by means of

3. which live in a with other

4. organic substances from

5. and

6. into usable by

7. and

8. living organisms

9. usable by

10.
In your textbook, read about the characteristics of fungi.

Match the definition in Column A with the term in Column B.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. netlike body of a fungus</td>
<td>A. fruiting body</td>
</tr>
<tr>
<td>2. cross-walls between fungal cells</td>
<td>B. hyphae</td>
</tr>
<tr>
<td>3. filaments in a multicellular fungus</td>
<td>C. mycelium</td>
</tr>
<tr>
<td>4. unicellular fungus</td>
<td>D. septa</td>
</tr>
<tr>
<td>5. fungal reproductive structure</td>
<td>E. yeast</td>
</tr>
</tbody>
</table>

In your textbook, read about nutrition in fungi.

Complete the table by checking the correct column(s) for each characteristic.

<table>
<thead>
<tr>
<th>Fungi Characteristic</th>
<th>Saprophytic Fungi</th>
<th>Parasitic Fungi</th>
<th>Mutualistic Fungi</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Harmful to host</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Helpful to host</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Heterotrophs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Organic litter reducers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Symbiosis</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In your textbook, read about reproduction in fungi.

Write the term that best completes each statement. Use these choices:

- asexually
- meiosis
- sporangia
- survival
- wind

11. Fungi reproduce ______________________ by fragmentation, budding, or producing spores.
12. Producing a large number of spores increases a species’ chances of _________________.
13. Fungal spores can be dispersed by animals, water, and _________________.
14. ______________________ protect spores and keep them from drying out until they are released.
15. Fungi might produce spores by ______________________ or mitosis.
In your textbook, read about the diversity of fungi.

Match the definition in Column A with the term in Column B.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. includes bread molds and other molds</td>
<td>A. Ascomycota</td>
</tr>
<tr>
<td>2. appears to lack a sexual stage in life cycle</td>
<td>B. Basidiomycota</td>
</tr>
<tr>
<td>3. produces flagellated spores</td>
<td>C. Chytridiomycota</td>
</tr>
<tr>
<td>4. most common fungi phylum; includes yeast</td>
<td>D. Deuteromycota</td>
</tr>
<tr>
<td>5. includes mushrooms</td>
<td>E. Zygomycota</td>
</tr>
</tbody>
</table>

In your textbook, read about reproduction in common molds.

Label the diagram of a common mold. Use these choices:

- mating strains
- rhizoids
- sporangia
- spores
- stolons

6. __________________________ 7. __________________________ 8. __________________________ 9. __________________________ 10. __________________________

Use each of the terms above only once to complete the passage.

Hyphae called (11) __________________________ penetrate the food, anchor the mycelium, and absorb nutrients. Asexual (12) __________________________ germinate on a food source, and hyphae begin to grow. Hyphae called (13) __________________________ grow across the surface of the food source and form a mycelium. Special hyphae grow upward to form (14) __________________________ that are filled with asexual spores. In sexual reproduction, parts of two haploid (15) __________________________ fuse to form a diploid structure.
In your textbook, read about sac fungi, club fungi, and other fungi.

In the space at the left, write the letter of the term or phrase that best completes each statement.

16. Most members of the phylum Ascomycota are _____
   A. aquatic.
   B. molds.
   C. multicellular.
   D. unicellular.

17. Sac fungi produce spore-bearing hyphae called _____
   A. ascospores.
   B. conidiophores.
   C. gametangia.
   D. zygomycetes.

18. The ascus of a sac fungi _____
   A. develops into a haploid mycellium.
   B. is a saclike structure where spores develop.
   C. is where the hyphae develop.
   D. produces four haploid nuclei.

19. The fruiting body of a club fungi is called a _____
   A. basidiocarp.
   B. gametangium.
   C. sac.
   D. stolon.

20. The rapid growth of basidiocarps is due to _____
   A. cell division.
   B. cell enlargement.
   C. meiotic division.
   D. water intake.

21. Saprophytic basidiocarps produce enzymes that _____
   A. are beneficial for plants.
   B. decompose wood.
   C. make bread dough rise.
   D. suggest they are related to protists.

22. Another name for the deuteromycetes is _____
   A. club fungi.
   B. common molds.
   C. imperfect fungi.
   D. sac fungi.

In your textbook, read about club fungi and the life cycle of a mushroom.

Label the diagram of the mushroom and parts of its life cycle. Use these choices:

basidium caps spores

23. 
24. 
25. 
In your textbook, read about fungi and photosynthesizers.

Complete the Venn diagram by writing the number of each phrase in the appropriate place. These phrases may be used more than once.

1. associated with plant roots
2. important for soil formation
3. important for agricultural crops
4. associated with a green alga or cyanobacterium
5. obtain nutrients from photosynthesizing partner
6. mutualistic relationship between fungi and other organism
7. fungus that absorbs and concentrates minerals and increases root surface area for plant
8. fungus that provides a dense web of hyphae in which algae or cyanobacterium can grow

Mycorrhizae

Lichens

Both

In your textbook, read about fungi and humans.

If the statement is true, write true. If the statement is false, replace the italicized word or phrase to make it true.

9. Penicillin is a drug that comes from a fungus. Another fungus is the source of anti-headache drugs for organ transplant patients.

10. People eat fungi such as truffles, mushrooms, and the yeast in bread. Fungi also give flavor to cheeses and cola drinks.

11. Respiration produces airy bread and the alcohol in beer and wine.

12. The use of fungi and bacteria to remove pollution is called enviromediation.
Guía de estudio

Sección 1: Características de los hongos

En tu libro de texto, lee acerca de las características de los hongos.

Relaciona la definición de la columna A con el término de la columna B.

<table>
<thead>
<tr>
<th>Columna A</th>
<th>Columna B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. cuerpo de un hongo en forma de malla</td>
<td>A. cuerpo fructífero</td>
</tr>
<tr>
<td>2. paredes entre las celdas fúngicas</td>
<td>B. hifas</td>
</tr>
<tr>
<td>3. filamentos en un hongo multicelular</td>
<td>C. micelio</td>
</tr>
<tr>
<td>4. hongo unicelular</td>
<td>D. septa</td>
</tr>
<tr>
<td>5. estructura fúngica reproductiva</td>
<td>E. levadura</td>
</tr>
</tbody>
</table>

En tu libro de texto, lee acerca de la nutrición de los hongos.

Completa la tabla marcando la(s) columna(s) correcta(s) para cada característica.

<table>
<thead>
<tr>
<th>Características de los hongos</th>
<th>Hongos saprofitos</th>
<th>Hongos parasíticos</th>
<th>Hongos mutualistas</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Nocivos para el huésped</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Útiles para el huésped</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Heterótrofos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Reductores de basura orgánica</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Símbiosis</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

En tu libro de texto, lee acerca de la reproducción de los hongos.

Escribe el término que mejor complete cada afirmación. Usa estas opciones:

- asexualmente
- esporangios
- meiosis
- supervivencia
- viento

11. Los hongos se reproducen __________________________ mediante la fragmentación, al germinar o producir esporas.

12. Producir un gran número de esporas aumenta las probabilidades de __________________________ de las especies.

13. Las esporas fúngicas pueden dispersarse a través de los animales, el agua y el __________________________.

14. Los __________________________ protegen las esporas y evitan que se sequen hasta que se liberen.

15. Los hongos podrían producir esporas mediante la __________________________ o la mitosis.
Guía de estudio

CAPÍTULO 20

Sección 2: Diversidad de los hongos

En tu libro de texto, lee acerca de la diversidad de los hongos.

Relaciona la definición de la columna A con el término de la columna B.

<table>
<thead>
<tr>
<th>Columna A</th>
<th>Columna B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. incluyen el moho del pan y otros mohos</td>
<td>A. Ascomicetes</td>
</tr>
<tr>
<td>2. parecen carecer de una etapa sexual en el ciclo de vida</td>
<td>B. Basidiomicetes</td>
</tr>
<tr>
<td>3. producen esporas flageladas</td>
<td>C. Quitridiomicetes</td>
</tr>
<tr>
<td>4. el filo de hongo más común; incluyen la levadura</td>
<td>D. Deuteromicetes</td>
</tr>
<tr>
<td>5. incluyen los hongos comestibles</td>
<td>E. Zigomicetes</td>
</tr>
</tbody>
</table>

En tu libro de texto, lee acerca de la reproducción en los mohos comunes.

Identifica las partes del diagrama de un moho común. Usa estas opciones:

- cepas fecundantes
- esporangios
- esporas
- estolones
- rizoides

6. __________________________
7. __________________________
8. __________________________
9. __________________________
10. __________________________

Usa cada uno de los términos anteriores una vez únicamente para completar el párrafo.

Las hifas llamadas (11) __________________________ penetran en el alimento, se anclan en el micelio y absorben nutrientes. Las (12) __________________________ asexuales germinan en una fuente de alimento y las hifas empiezan a crecer. Las hifas llamadas (13) __________________________ crecen en la superficie del alimento y forman un micelio. Las hifas especiales crecen hacia arriba hasta formar (14) __________________________ , los cuales están llenos de esporas asexuales. En la reproducción sexual, las partes de las dos (15) __________________________ haploides se fusionan para formar una estructura diploide.
En tu libro de texto, lee acerca de los hongos saculares, hongos de palo y otros hongos.

En el espacio a la izquierda, escribe la letra del término o frase que mejor complete cada afirmación.

16. La mayoría de los miembros del filo ascomicetes son ______
   A. acuáticos.  C. multicelulares.
   B. mohos.     D. unicelulares.

17. Los hongos saculares producen hifas portadoras de esporas llamadas ______
   A. ascosporas. C. gametangios.
   B. conidióforos. D. zigomicetes.

18. El ascomiceto de un hongo sacular ______
   A. es donde las hifas se desarrollan.
   B. es una estructura en forma de saco donde las esporas se desarrollan.
   C. produce cuatro núcleos haploides.
   D. se convierte en un micelio haploide.

19. El cuerpo fructífero de un hongo de palo se llama ______
   A. basidiocarpo. C. estolón.
   B. bolsa.       D. gametangio.

20. El crecimiento rápido de los basidiocarpos se debe a ______
   A. el agrandamiento celular. C. la división meiótica.
   B. la división celular.   D. la ingesta de agua.

21. Los basidiocarpos saprofíticos producen enzimas que ______
   A. descomponen la madera.
   B. hacen que la masa de pan crezca.
   C. indican que están relacionadas con los protistas.
   D. son de beneficio para las plantas.

22. Otro nombre para los deuteromicetes es ______
   A. hongos de palo.  C. hongos saculares.
   B. hongos imperfectos. D. mohos comunes.

En tu libro de texto, lee acerca de los hongos de palo y el ciclo de vida de un hongo seta.

Identifica el diagrama del hongo seta y las partes de su ciclo de vida. Usa estas opciones:

23. ________  24. ________  25. ________

basidio capuchones esporas
En tu libro de texto, lee acerca de los hongos y los fotosintetizadores.

Completa el diagrama de Venn con los números de las siguientes frases en la ubicación correcta. Las frases se pueden usar más de una vez.

1. importantes para los cultivos agrícolas
2. importantes para la formación del suelo
3. tienen relación con las raíces de las plantas
4. tienen relación con algas verdes o cianobacterias
5. relación mutualista entre hongos y otro organismo
6. obtienen nutrientes de un compañero fotosintetizador
7. hongo que absorbe y concentra minerales y aumenta el área superficial de la raíz para la planta
8. hongo que ofrece una red densa de hifas en la cual las algas o las cianobacterias pueden crecer

En tu libro de texto, lee acerca de los hongos y los seres humanos.

Si la afirmación es verdadera, escribe «verdadero». Si la afirmación es falsa, sustituye la palabra o frase para volverla verdadera.

9. La penicilina es un fármaco que proviene de un hongo. Otro hongo es la fuente de fármacos contra los dolores de cabeza para pacientes de transplante de órganos.

10. Las personas comen hongos como las trufas, las setas y la levadura en el pan. Los hongos también dan sabor a quesos y a las bebidas cola.

11. La respiración produce pan esponjado y el alcohol en la cerveza y el vino.

12. El uso de hongos y bacterias para eliminar la contaminación se denomina remediación ambiental.
Quick Check

CHAPTER 20
Section 1: Characteristics of Fungi

After reading the section in your textbook, respond to each statement.

1. **Tell** how yeasts are different from other fungi.

2. **Explain** how extensive hyphae are an advantage to fungi.

3. **Describe** multicellular fungi in a sentence. Use the terms *hyphae*, *mycelium*, and *fruiting body* in your answer.

4. **Distinguish** the functions of spores and sporophores in fungi.

5. **Evaluate** the role of saprophytic fungi in the environment.
Section Quick Check

CHAPTER 20

Section 2: Diversity of Fungi

After reading the section in your textbook, respond to each statement.

1. **State** the two criteria scientists use to divide fungi into phyla.

2. **Identify** the phylum that contains only unicellular fungi.

3. **Contrast** an ascocarp and a basidiocarp.

4. **Summarize** the process of sexual reproduction in fungi.

5. **Predict** how the numbers of species of deuteromycetes and ascomycetes are likely to change over time.
Section Quick Check

Section 3: Ecology of Fungi

After reading the section in your textbook, respond to each statement.

1. Name two kinds of mutualistic relationships that involve fungi.

2. Explain how mycorrhizae are beneficial to plants.

3. Describe how fungi are used in bioremediation.

4. Differentiate the roles of the fungus and the alga (also called cyanobacterium) in lichens.

5. Speculate about the importance of harmful fungi in ecosystems.
CHAPTER 20
Assessment
Student Recording Sheet

Section 20.1
Vocabulary Review

Write the vocabulary term that makes each sentence true.

1. ____________ 2. ____________ 3. ____________

Understand Key Concepts

Select the best answer from the choices given, and fill in the corresponding circle.

5. A B C D 7. A B C D

Constructed Response

9. ____________________________________________
   ____________________________________________
10. ____________________________________________
   ____________________________________________

11. Record your answer for question 11 on a separate sheet of paper.

Think Critically

12. ____________________________________________
   ____________________________________________
13. ____________________________________________
   ____________________________________________

Section 20.2
Vocabulary Review

Explain the difference between the vocabulary terms in each pair.

14. ____________________________________________
   ____________________________________________
15. ____________________________________________
   ____________________________________________
CHAPTER 20
Assessment

Student Recording Sheet

16. ______________________

________________________________________________________________________

Understand Key Concepts
Select the best answer from the choices given, and fill in the corresponding circle.

17. A B C D
18. A B C D
19. A B C D
20. A B C D
21. A B C D

Constructed Response

22. ______________________

________________________________________________________________________

23. Record your answer for question 23 on a separate piece of paper.
24. Record your answer for question 24 on a separate piece of paper.

Think Critically

Section 20.3
Vocabulary Review
Write the vocabulary term that best answers each question.

27. ______________________
28. ______________________
29. ______________________

Understand Key Concepts
Select the best answer from the choices given, and fill in the corresponding circle.

30. A B C D
31. A B C D
32. A B C D

Constructed Response

33. ______________________

________________________________________________________________________

34. ______________________

________________________________________________________________________
Think Critically

35. 

36. Record your answer for question 36 on a separate sheet of paper.

37. **Careers in Biology** Record your answer for question 37 on a separate sheet of paper.

38. Record your answer for question 38 on a separate sheet of paper.

39. 

Additional Assessment

40. **Writing in Biology** Record your answer for question 40 on a separate sheet of paper.

Document-Based Questions

41. 

42. 

43. 

Cumulative Review

44. 


CHAPTER 20
Assessment
Student Recording Sheet

Standardized Test Practice

Multiple Choice

Select the best answer from the choices given, and fill in the corresponding circle.

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D
6. A B C D
7. A B C D
8. A B C D

Short Answer

Answer each question with complete sentences.

9. 

10. Record your answer for question 10 on a separate sheet of paper.

11. 

12. 

13. 

14. 

Extended Response

Answer each question with complete sentences.

15. Record your answer for question 15 on a separate sheet of paper.

16. 

17. 

18. 

Essay Question

19. Record your answer for question 19 on a separate sheet of paper.