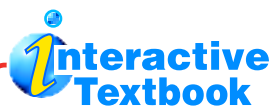


Study Guide



- Complete student edition
- Section and chapter self-assessments
- Assessment reports for teachers

Help Students Read

Building Vocabulary

Vocabulary Rating Chart Have each student construct a chart with four columns labeled *Term, Can Define or Use It, Have Heard or Seen It,* and *Don't Know*. Tell students to copy the Key Terms from this chapter into the first column and rate their knowledge by putting a check in one of the other columns. Then have them reread the parts that pertain to Key Terms in question.

Words in Context Help students learn the meaning of new words or phrases by examining context. Tell students to look for familiar words or phrases that surround a new term; these are clues to the new term's meaning.

Connecting Concepts

Concept Maps Help students develop one way to show how the information in the chapter is related. A virus is a nonliving particle that enters a cell and then reproduces; a bacterium is a unicellular organism whose cell does not contain a nucleus. Have students brainstorm to identify the key concepts, key terms, details, and examples. Then write each one on a sticky note and attach it at random to chart paper or to the board.

Tell students that this concept map will be organized in hierarchical order and to begin at the top with the key concepts. Ask students these questions to guide them to categorize the information on the stickies: **What are some characteristics of viruses? Describe the basic structure of a virus. What structures can be found in a bacterial cell?**

1 Viruses

Key Concepts

- Although viruses can multiply, they do so differently than organisms. Viruses can multiply only when they are inside a living cell.
- All viruses have two basic parts: an outer coat that protects the virus and an inner core made of genetic material.
- Once inside a cell, a virus's genetic material takes over many of the cell's functions. The genetic material instructs the cell to produce the virus's proteins and genetic material. These proteins and genetic material then assemble into new viruses.

Key Terms

virus
host
parasite
bacteriophage



2 Bacteria

Key Concepts

- Bacteria are prokaryotes. The genetic material in their cells is not contained in a nucleus.
- Bacteria must have a source of food and a way of breaking down the food to release its energy.
- When bacteria have plenty of food, the right temperature, and other suitable conditions, they thrive and reproduce frequently.
- Bacteria are involved in oxygen and food production, environmental recycling and cleanup, and in health maintenance and medicine production.

Key Terms

bacteria
cytoplasm
ribosome
flagellum
respiration
binary fission
asexual reproduction
sexual reproduction
conjugation
endospore
pasteurization
decomposer

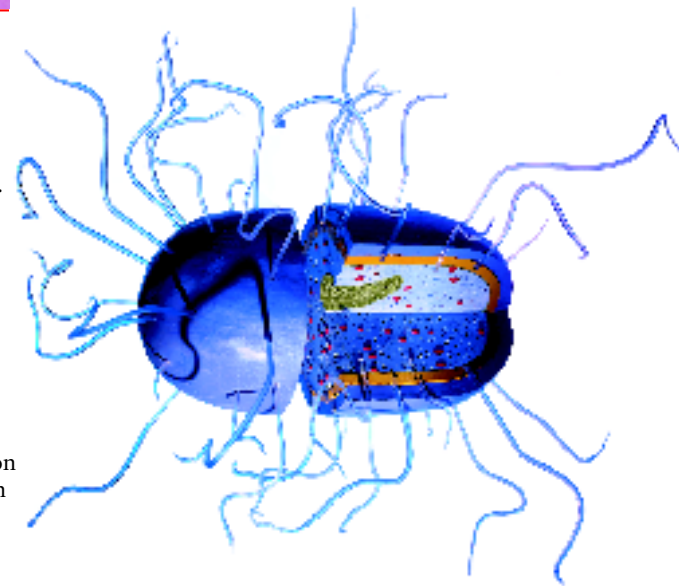
3 Viruses, Bacteria, and Your Health

Key Concepts

- Infectious diseases can spread through contact with an infected person, a contaminated object, an infected animal, or an environmental source.
- Fortunately, many bacterial diseases can be cured with medications known as antibiotics.
- Unlike with bacterial diseases, there are currently no medications that can cure viral infections.
- Vaccines are important tools that help prevent the spread of infectious diseases.

Key Terms

infectious disease
toxin
antibiotic
antibiotic resistance
vaccine



Prompt students by using connecting words or phrases, such as “is composed of,” “reproduces by,” and “can cause” to indicate the basis for the organization of the map. The phrases should form a sentence between or among a set of concepts.

Answer

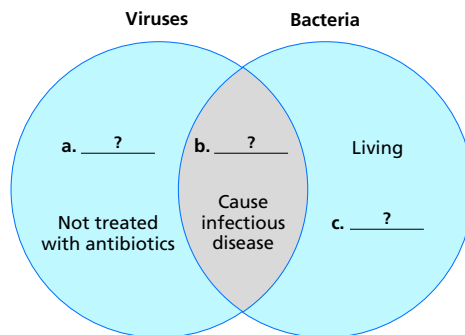
Accept all logical presentations by students.

All in One Teaching Resources

- [Key Terms Review: Viruses and Bacteria](#)
- [Connecting Concepts: Viruses and Bacteria](#)

Organizing Information

Comparing and Contrasting Copy the Venn diagram comparing viruses and bacteria onto a separate sheet of paper. Then complete it and add a title. (For more information on Comparing and Contrasting, see the Skills Handbook.)



Reviewing Key Terms

Choose the letter of the best answer.

- Bacteriophages are viruses that attack and destroy
 - other viruses.
 - bacteria.
 - plants.
 - humans.
- Which part of a virus determines which host cells it can infect?
 - nucleus
 - ribosomes
 - flagellum
 - surface proteins
- Viruses multiply
 - by conjugation.
 - by binary fission.
 - by taking over a cell's functions.
 - both asexually and sexually.
- Most bacteria are surrounded by a rigid protective structure called the
 - cell wall.
 - cell membrane.
 - protein coat.
 - flagellum.
- Which of the following help prevent the spread of infectious diseases?
 - toxins
 - vaccines
 - parasites
 - endospores

If the statement is true, write *true*. If it is false, change the underlined word or words to make the statement true.

- Active viruses enter a cell and immediately begin to multiply.
- During conjugation, one bacterium transfers genetic material to another bacterial cell.
- Binary fission is the process of breaking down food to release energy.
- Bacteria form endospores to survive unfavorable conditions in their surroundings.
- A vaccine is a chemical that can kill bacteria without harming a person's cells.

Writing in Science

Debate Suppose you are preparing for a debate about whether bacteria are beneficial or harmful. Select one side of the argument and write a paragraph defending your position. Be sure to give an example to support your argument.



Viruses and Bacteria:
Bacteria
Video Preview
Video Field Trip
Video Assessment

Organizing Information

- Nonliving
- Can be useful
- Treated with antibiotics

Possible title: Comparing Viruses and Bacteria

Reviewing Key Terms

- b
- d
- c
- a
- b
- True
- True
- False; Respiration
- True
- False; An antibiotic

Writing in Science

Writing Mode Persuasion

Scoring Rubric

- Exceeds criteria
- Meets criteria; develops sound argument supported by facts and an example
- Includes clear position but weak support
- Incomplete; argument not supported by facts



Discovery
CHANNEL
SCHOOL
Video
Assessment

Viruses and Bacteria

Show the Video Assessment to review chapter content and as a prompt for the writing assignment. Discussion questions: **Besides through flea bites, how else was the plague spread?** (Rats; one form of the plague spread through the air contaminated by infected people) **What might have brought the plague to an end?** (The population that survived had a natural immunity to the bacteria. The rats that were carrying the plague themselves died.)

All in One Teaching Resources

- [Transparency A17](#)
- [Chapter Test](#)
- [Performance Assessment Teacher Notes](#)
- [Performance Assessment Student Worksheet](#)
- [Performance Assessment Scoring Rubric](#)



Review and Assessment

Checking Concepts

11. Viruses are not cells; do not carry on the functions of cells; cannot reproduce on their own.
12. The proteins in the coat of the virus will fit only with certain proteins on the surface of a cell.
13. After a hidden virus enters a host cell, its genetic material becomes part of the cell's genetic material. When the host cell divides, the virus's genetic material is copied along with the host's genetic material. When certain conditions cause the virus's genetic material to become active, it takes over the cell's functions.

14. Cell wall—protects the cell; cell membrane—controls what materials enter and leave the cell; cytoplasm—contains ribosomes and genetic material; ribosomes—produce protein; genetic material—contains instructions for the cell's functions; flagellum—helps cell to move

15. Most bacteria reproduce asexually by binary fission, especially when conditions are favorable. Some bacteria can reproduce sexually by conjugation.

16. They help you digest food, make vitamins for you, and keep harmful bacteria from living in your tissues.

17. Antibiotics kill bacteria without harming body cells. For example, penicillin weakens the cell walls of some bacteria and causes them to burst.

18. Vaccines stimulate the body to produce chemicals that fight off specific invading viruses and bacteria.

Thinking Critically

19. A—rodlike; B—spiral
20. Both invade the host cell and cause it to start producing new viruses. With an active virus, the takeover occurs immediately after entry into the cell. With hidden viruses, the genetic material of the virus is incorporated into the cell's genetic material and it can be years before the virus actively takes over the cell.
21. A substance that includes living cells because viruses need to infect living cells in order to multiply
22. The bacteria may develop antibiotic resistance. Not all the bacteria will be killed if the antibiotic course is stopped early. Any resistant bacteria will survive and reproduce. A second or third antibiotic might then be necessary.

Checking Concepts

11. List three ways that viruses differ from cells.
12. Explain why a certain virus will attach to only one or a few types of cells.
13. Describe how a hidden virus multiplies.
14. What are the parts of a bacterial cell? Explain the role of each part.
15. Describe how bacteria reproduce.
16. How do the bacteria that live in your intestines help you?
17. Explain how antibiotics kill bacteria.
18. How do vaccines prevent the spread of some infectious diseases?

Thinking Critically

19. **Classifying** Classify the bacteria in each photo according to their shape.



A



B

20. **Comparing and Contrasting** Describe the similarities and differences between active and hidden viruses.
21. **Problem Solving** Bacteria will grow in the laboratory on a gelatin-like substance called agar. Viruses will not grow on agar. If you needed to grow viruses in the laboratory, what kind of substance would you have to use? Explain your reasoning.
22. **Predicting** A friend has been prescribed a ten-day course of antibiotics for a bacterial infection. Your friend feels much better after three days and decides to stop taking the medication. What do you think might happen and why?

Math Practice

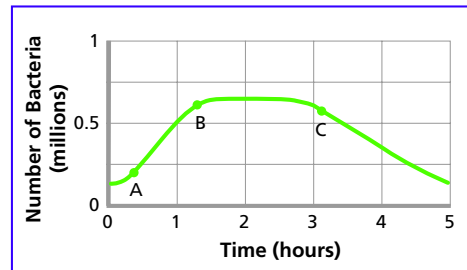
23. **Diameter** How much greater is the diameter of a penny than the diameter of a dime?

Applying Skills

Use the graph to answer Questions 24–27.

The graph shows how the number of bacteria that grow on a food source changes over time.

A Bacterial Population Over Time



24. **Reading Graphs** What do the numbers on the vertical axis represent?
25. **Interpreting Data** Explain what is happening between points A and B.
26. **Developing Hypotheses** Develop a hypothesis to explain why the number of bacteria appears to stay constant between points B and C.
27. **Designing Experiments** How could you test the hypothesis you developed in Question 26? What would your results show?

Lab zone Chapter Project

Performance Assessment Present your project to your class. Explain why you chose the questions and survey group that you did. Use graphs or other visual displays to highlight any patterns that you found. Be sure to support your conclusions with data.

Lab zone Chapter Project

L3

Project Wrap-Up Have students present their projects while their classmates take notes. Students' conclusions must be drawn from the results of their own surveys. Encourage students to compare their data with other sources.

Test-Taking Tip

Answering a Constructed-Response Question

A constructed-response question asks you to compose an answer in paragraph form. Read the question carefully and note the type of information your response should contain. Your answer should address all the specific points the question asks for. Before you begin writing, you can create an outline to organize the information for your response.

Sample Question

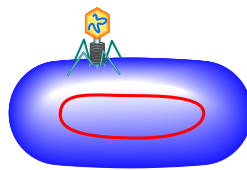
Describe four ways that infectious diseases can spread. Give an example of a disease that spreads by each method.

Answer

The question asks for a specific number of descriptions—four. You also are asked to provide an example for each description. You might begin your answer by listing the four ways infectious diseases spread. Then you could go on to explain each item in your list in further detail. You should end each description with an example.

Choose the letter of the best answer.

- If you know that an organism is a prokaryote, you know that
 - its cell does not contain a nucleus.
 - its cell does not contain ribosomes.
 - the organism is a heterotroph.
 - the organism cannot move on its own.
 - Which of these statements about the sizes of bacteria and viruses is true?
 - Viruses can be seen with a hand lens but bacteria cannot.
 - Both bacteria and viruses can be seen with a hand lens.
 - Bacteria can be seen with a light microscope but viruses cannot.
 - Neither bacteria nor viruses can be seen with a light microscope.
3. What will most likely happen after the virus in the diagram attaches to the bacterial cell?



- The virus will inject its proteins into the bacterial cell.
 - The virus will inject its genetic material into the bacterial cell.
 - The bacterial cell will inject its proteins into the virus.
 - The bacterial cell will inject its genetic material into the virus.
- Which of the following statements about viruses is *not* true?
 - Viruses can multiply only inside a living cell.
 - Viruses have genetic material.
 - Virus particles are smaller than bacterial cells.
 - Diseases caused by viruses can be cured by antibiotics.
 - Paola grew a new culture of bacteria and measured the population's growth over time. The number of bacteria increased sharply over the first few hours but then tapered off. Which of the following statements about these observations is true?
 - The initial conditions for bacterial growth were favorable.
 - The number of bacteria increased as the bacteria reproduced asexually.
 - After a period of time, the bacteria started to run out of food, space, and other resources.
 - all of the above

Constructed Response

- Compare and contrast viruses and bacteria with respect to their sizes, structures, and methods of reproduction.

- The diameter of a penny is 1.9 cm. The diameter of a dime is 1.7 cm. The diameter of a penny is 0.2 cm greater than the diameter of a dime.

Applying Skills

- Numbers of bacteria in millions
- Bacteria are rapidly reproducing because they have plenty of food available.
- Sample: The number of bacteria stays constant between points B and C because the amount of food available to the bacteria can support only this number of bacteria.
- Students might suggest preparing petri dishes with different amounts of food and graphing the growth patterns of the bacteria.

Standardized Test Prep

- A
- H
- B
- J
- D
- Size: Viruses are very small and are measured in nanometers. Bacteria vary in size, but are larger than viruses and can be seen by a light microscope.

Structure: Viruses have two parts, a protein coat that protects the virus, and an inner core made of genetic material. Bacteria have a cell wall, a cell membrane, cytoplasm with ribosomes in it and with genetic material,

and may have a flagellum.

Methods of reproduction: Viruses enter a host cell and the virus's genetic material takes over many of the cell's functions. It instructs the cell to produce the virus's proteins and genetic material. Bacteria may reproduce by asexual or sexual reproduction, or the formation of endospores.