Name _____ Date _____

Bacteria and Viruses

What are bacteria and viruses and why are they important?

Before You Read

Before you read the chapter, think about what you know about bacteria and viruses. In the first column, write three things you already know about these organisms. In the second column, record three things that you would like to learn more about. When you have completed the chapter, think about what you have learned, and complete the **What I Learned** *column.*

K What I Know	W What I Want to Learn	L What I Learned

Chapter Vocabulary

Lesson 1	Lesson 2	Lesson 3
NEW bacterium flagellum fission conjugation endospore	**NEW** decomposition nitrogen fixation bioremediation pathogen antibiotic pasteurization	**NEW** virus antibody vaccine **REVIEW** mutation

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A Lesson Content Vocabulary page for each lesson is provided in the Chapter Resources Files.

Lesson 1 What are bacteria?

Scan *Lesson 1. Then write three questions that you have about bacteria in your Science Journal. Try to answer your questions as you read.*

Main Idea

Characteristics of Bacteria

I found this on page 231.

I found this on page 231.

I found this on page 232.

I found this on page 232.

Drawings should resemble photo examples shown in SE Lesson 1, Table 1.

Details

Define bacteria.

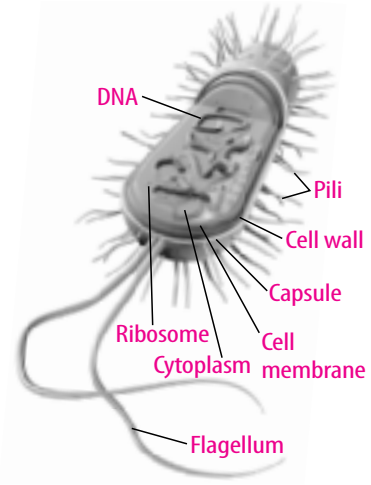
Bacteria: microscopic prokaryotes (unicellular organisms with no nucleus or other membrane-bound organelles)

Identify *six examples of places where bacteria live.*

1. air
2. glaciers
3. ocean floor
4. soil
5. in or on living organisms
6. in or on dead organisms

Diagram *an example of a* bacterium. *Label the listed structures.*

ribosome
cytoplasm
cell membrane
pili
DNA
flagellum
capsule
cell wall



Draw *and name 3 basic shapes of* bacteria.

Name	round or sphere-shaped	rod-shaped	spiral-shaped
Drawing			

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Main Idea

Details

I found this on page 232.

Describe *how* bacteria *compare in size with plant and animal cells.*

Bacteria are much smaller, ranging from 1/5 to 1/100 the size of plant or animal cells.

I found this on page 233.

Identify *3 ways in which* bacteria *obtain energy.*

Ways bacteria obtain energy

1. take in food from outside sources
2. make own food from light
3. make own food from chemical reactions

I found this on page 233.

Contrast *anaerobic* bacteria *with aerobic* bacteria.

Aerobic Bacteria	Anaerobic Bacteria
need oxygen to live	do not need oxygen to live

I found this on page 234.

Identify *3 ways in which different types of* bacteria *move.*

1. flagella
2. twist or spiral
3. use pili like grappling hooks

I found this on page 234.

Differentiate *between* fission *and* conjugation.

Fission: cell division that forms two genetically identical cells

Conjugation: Two bacterial cells combine their genetic material; no new cells are formed.

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Main Idea

Endospores

I found this on page 235.

Details

Sequence *the formation of an* endospore.

1. Bacteria in favorable conditions form without endospores.
2. Conditions become unfavorable, and a/an endospore forms around DNA.
3. The cell dissolves, but the protected DNA can survive.

Archaea

I found this on page 235.

Compare and contrast bacteria *and archaea. List five similarities and three differences.*

Similarities	Differences
1. prokaryote	1. Ribosomes of archaea more closely resemble the ribosomes of eukaryotes.
2. cell wall	2. Archaea contain unique molecules in plasma membranes.
3. no nucleus	3. Archaea often live in extreme environments.
4. no membrane-bound organelles	
5. DNA in single circular strand (chromosome)	

Synthesize It Explain how conjugation and the reproductive processes of bacteria are beneficial to their survival.

Accept all reasonable responses. Sample answer: Because bacteria are unicellular and reproduce through fission, they can multiply very rapidly. However, asexual reproduction can limit genetic variation and become a risk factor for bacteria in a changing environment. Bacteria overcome this drawback through conjugation, which increases genetic diversity.

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Lesson 2 Bacteria in Nature

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

Main Idea

Beneficial Bacteria

Sample answers are shown.

I found this on page 239.

I found this on page 240.

I found this on page 240.

I found this on page 241.

I found this on page 241.

Harmful Bacteria

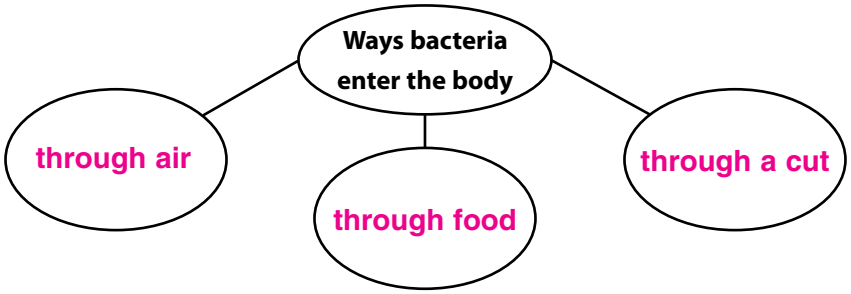
I found this on page 242.

Details

Explain *and provide examples of ways in which bacteria can be beneficial.*

Benefit	Explanation and Example
Digestion	Many organisms rely on bacteria living in their digestive systems to survive. Bacteria in the human digestive system make vitamin K, which helps blood clot.
Decomposition	Bacteria feed on dead organic matter. Bacteria feeding on a dead tree break down the tree and release nutrients back into the soil.
Nitrogen fixation	Plants use nitrogen to make proteins, but plants cannot use the form of nitrogen free in the air. Roots of beans and peas contain bacteria that convert nitrogen into a form plants can use.
Bioremediation	Some bacteria eat environmental pollutants. Organisms break down sewage into less harmful material that can be used for fertilizer.
Production of food	Bacteria are used in the production of yogurt, cheeses, buttermilk, vinegar, and soy sauce.

Identify *three ways in which bacterial* pathogens *enter the body.*



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Main Idea

Details

I found this on page 242.

Identify *2 ways bacteria can cause disease.*

1. damaging tissue
2. releasing toxins

I found this on page 243.

Sequence *the development of* antibiotic *resistance.*

1. Antibiotic is added to a colony of bacteria. It kills most bacteria, but a few cells have mutations that enable them to survive.
2. Resistant bacteria survive and reproduce.
3. More of the same antibiotic is added to the colony.
4. Antibiotic now affects a smaller percentage of the colony. Surviving bacteria continue to reproduce.

I found this on page 243.

Explain *the relationship between bacteria and food poisoning.*

Bacteria in food can reproduce, break down the food, and cause it to spoil. Toxins released into the food by this process can cause severe illness.

Synthesize It Summarize ways in which human health might be both improved and harmed if there were no bacteria.

Accept all reasonable responses. Sample answer: Without bacteria, there would be no food poisoning nor bacterial infection; however, dead materials would pile up all around us and never decompose.

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Lesson 3 What are viruses?

Scan *Lesson 3. Read the lesson titles and bold words. Look at the pictures. Identify three facts you discovered about viruses. Write the facts in your Science Journal.*

Main Idea

Characteristics of Viruses

I found this on page 247 .

I found this on page 247 .

I found this on page 247 .

I found this on page 247 .

I found this on page 248 .

Details

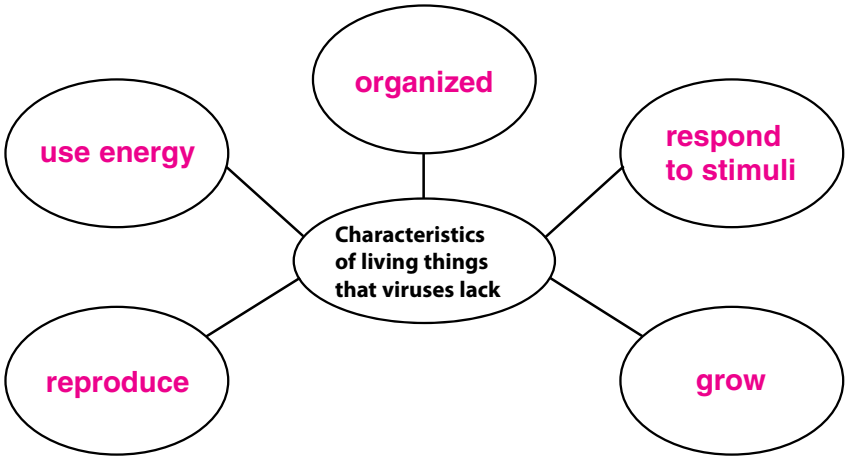
Define viruses.

strands of DNA or RNA surrounded by a layer of protein

Characterize viruses *by completing the table.*

Identify five illnesses caused by viruses. sample answers	1. chicken pox 2. mumps 3. measles 4. polio 5. influenza or a cold
Identify four shapes of viruses.	1. cylinder 2. sphere 3. crystal 4. bacteriophage
Identify four ways viruses contrast with bacteria.	1. 20 to 30 times smaller 2. no nucleus 3. no organelles 4. no cell membrane

Identify *characteristics of living things that* viruses *lack.*



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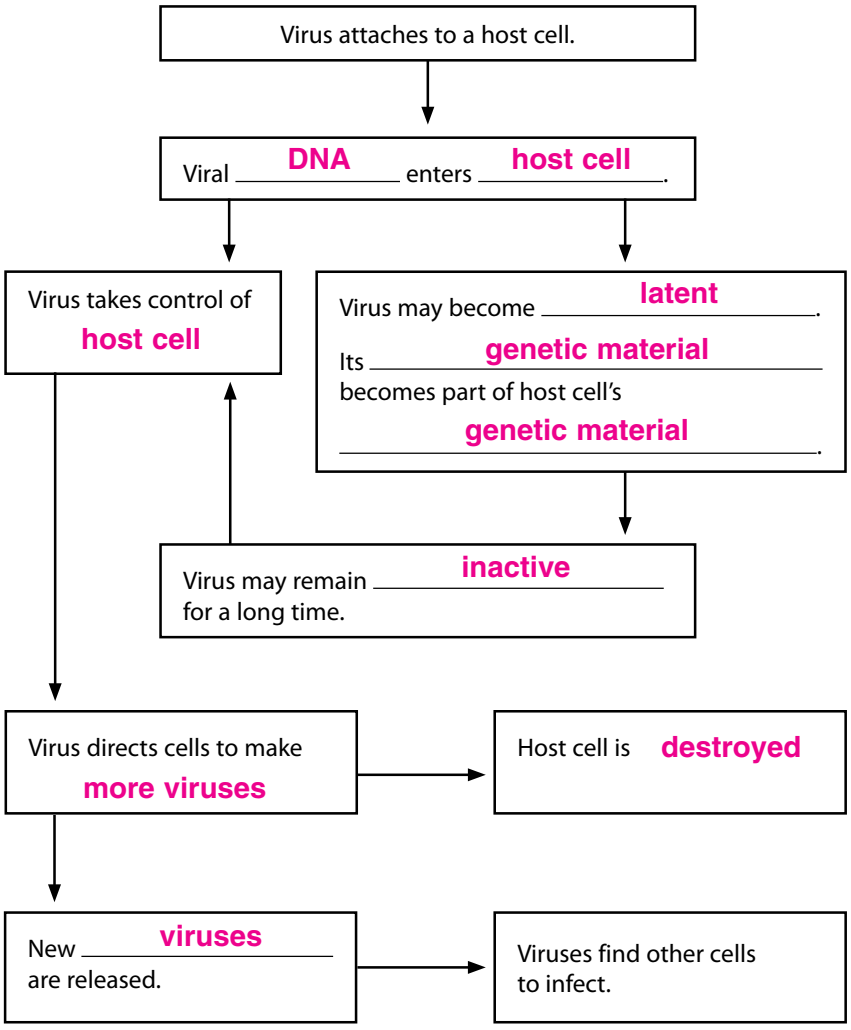
Main Idea

I found this on page 249 .

Details

Organize *information about viral replication.*



I found this on page 249 .

Explain *viral mutation.*

Viral DNA or RNA changes as viruses replicate, allowing viruses to adjust to changes in host cells.

Viral Diseases

I found this on page 250 .

Complete *the cause and effect diagram.*

Cause	Effect
Viruses attack and destroy specific host cells.	symptoms of disease (can be immediate or latent)

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Main Idea

Details

Treating and Preventing Viral Diseases

I found this on page 251.

Identify *two ways to prevent the spread of viral diseases.*

1. Limit contact with infected individuals.
2. Practice good hygiene, such as hand washing.

I found this on page 251.

Organize *information about* antibodies.

Antibodies

Definition: proteins that can attach to a pathogen and make it useless

2 types of immunity

1. acquired
2. natural

What antibodies do

- bind to viruses to keep them from attaching to host cells
- target viruses and signal the body to destroy them

I found this on page 252.

Explain *how a* vaccine *works.*

Deactivated pathogens trigger the body's production of antibodies.

Research with Viruses

I found this on page 252.

Identify *two reasons scientists conduct research with* viruses.

1. to treat and prevent viral disease
2. to use viruses beneficially in gene therapy

Summarize It Explain how a person can be infected with many viruses but might not appear sick.

Accept all reasonable responses. Sample answer: Viruses can invade host cells but remain latent for many years. The person's cells carry the virus, but the virus does not destroy the cells, so the person does not show symptoms of illness.

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Review Bacteria and Viruses

Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned. Complete the **What I Learned** *column on the first page of the chapter.*

Use this checklist to help you study.

- ❑ Complete your Foldables® Chapter Project.
- ❑ Study your *Science Notebook* on this chapter.
- ❑ Study the definitions of vocabulary words.
- ❑ Reread the chapter, and review the charts, graphs, and illustrations.
- ❑ Review the Understanding Key Concepts at the end of each lesson.
- ❑ Look over the Chapter Review at the end of the chapter.

Summarize It Reread the chapter Big Idea and the lesson Key Concepts. Throughout history, there have been many examples of large numbers of people in a culture dying of new illnesses when outsiders discovered where they lived. Use what you have learned about bacteria and viruses to explain why this happened.

Accept all reasonable responses. Sample answer: People who have lived together in one place have been exposed to the same pathogens and built up immunities to them over time. When outsiders arrive, they also are carriers of bacteria and viruses. They introduce new pathogens to the environment for which the indigenous peoples do not have antibodies. Many indigenous people can become sick and die from these new pathogens before the population has a chance to build up immunity.

Challenge *Design a beneficial bacterium or virus. Write an explanation of how it would interact with its environment to do something helpful for humans.*

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