About the Consultant

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This note-taking guide is designed to help you succeed in learning science content. Each chapter includes:

- **Science Journals** help you make connections to the concepts in the chapter.
- **Vocabulary Activities** help you understand information better.
- **K-W-L Charts** help you assess what you already know about a concept, identify what you want to find out, and then assess what you learned.
- **Note-taking tools based on the Cornell Note-Taking System**

Before You Read

Use the "What I Know" column to list the things you know about cells. Then list the questions you have about cells in the "What I Want to Find Out" column.

<table>
<thead>
<tr>
<th>K</th>
<th>W</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>What I Know</td>
<td>What I Want to Find Out</td>
<td>What I Learned</td>
</tr>
</tbody>
</table>

Imagine that you are small enough to fit inside a cell. Describe what you think you might observe while you are there.

**Main Idea**

Skim Section 1 of the chapter. Write three questions that come to mind from reading the headings and the illustration captions.

1. 
2. 
3. 

**Review Vocabulary**

<table>
<thead>
<tr>
<th>New Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>cell</td>
</tr>
<tr>
<td>eukaryotic cell</td>
</tr>
<tr>
<td>plasma membrane</td>
</tr>
</tbody>
</table>

**Use your book or dictionary to define each term.**
Section 7.3 Structures and Organelles

Cytoplasm and Cytoskeleton

Compare the cytoplasm and cytoskeleton by defining each in the boxes.

<table>
<thead>
<tr>
<th>Cytoplasm</th>
<th>Cytoskeleton</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Identify the part of the cell that corresponds to each function described:

- Cytoplasm:
  - Directs cell processes; contains the cell's DNA, stores information for cell growth, function, and reproduction
  - Double membrane that surrounds the nucleus
  - Helps manufacture proteins
  - Produces ribosomes inside the nucleus
  - Site of ribosome attachment; can be smooth or rough
  - Modifies, sorts, and packages proteins for transport outside the cell
  - Membrane-bound storage area within the cell
  - Vacuole that contains substances that digest excess or worn-out organelles
  - Converts fuel particles (sugars) into usable energy
  - Captures light energy and converts it to chemical energy through photosynthesis
  - Gives support to plant cells
  - Projections that allow the cell to move or to move substances along the surface of the cell

- Cytoskeleton:
  - Supports network of long, thin protein fibers forming a framework for the cell and providing an anchor for organelles

Cell Structures

I found this information on page ______________.

SE, pp. 193–199
RE, pp. 75–78

Compare the cytoplasm and cytoskeleton by defining each in the boxes.

<table>
<thead>
<tr>
<th>Cytoplasm</th>
<th>Cytoskeleton</th>
</tr>
</thead>
<tbody>
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<tr>
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<td></td>
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</tr>
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Cellular Structure and Function

Using Your Science Notebook

Writing Activities help you understand the information being presented and make connections between the concepts and the real world.

Graphic Organizers provide a visual format for organizing the section's important information.
Note-Taking Tips

Your notes are a reminder of what you learned in class. Taking good notes can help you succeed in science. The following tips will help you take better classroom notes.

• Before class, ask what your teacher will be discussing in class. Review mentally what you already know about the concept.
• Be an active listener. Focus on what your teacher is saying. Listen for important concepts. Pay attention to words, examples, and/or diagrams your teacher emphasizes.
• Write your notes as clearly and concisely as possible. The following symbols and abbreviations may be helpful in your note-taking.

<table>
<thead>
<tr>
<th>Word or Phrase</th>
<th>Symbol or Abbreviation</th>
<th>Word or Phrase</th>
<th>Symbol or Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>for example</td>
<td>e.g.</td>
<td>and</td>
<td>+</td>
</tr>
<tr>
<td>such as</td>
<td>i.e.</td>
<td>approximately</td>
<td>≈</td>
</tr>
<tr>
<td>with</td>
<td>w/</td>
<td>therefore</td>
<td>∴</td>
</tr>
<tr>
<td>without</td>
<td>w/o</td>
<td>versus</td>
<td>vs</td>
</tr>
</tbody>
</table>

• Use a symbol such as a star (★) or an asterisk (*) to emphasize important concepts. Place a question mark (?) next to anything that you do not understand.
• Ask questions and participate in class discussion.
• Draw and label pictures or diagrams to help clarify a concept.
• When working out an example, write what you are doing to solve the problem next to each step. Be sure to use your own words.
• Review your notes as soon as possible after class. During this time, organize and summarize new concepts and clarify misunderstandings.

Note-Taking Don’ts

• Don’t write every word. Concentrate on the main ideas and concepts.
• Don’t use someone else’s notes. They may not make sense.
• Don’t doodle. It distracts you from listening actively.
• Don’t lose focus or you will become lost in your note-taking.
The Study of Life

Before You Read

Use the “What I Know” column to list the things you know about biology. Then list the questions you have about biology in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I Know</th>
<th>W</th>
<th>What I Want to Find Out</th>
<th>L</th>
<th>What I Learned</th>
</tr>
</thead>
</table>

Animals, plants, and even bacteria and viruses are considered living things. But what do we mean when we say that an organism is a living thing? In the space below, describe two characteristics that are common to all living things.
The Study of Life
Section 1.1 Introduction to Biology

Skim Section 1 of the chapter. Write three questions that come to mind from reading the headings and illustration captions.

1. 
2. 
3. 

Review Vocabulary
Use your book or dictionary to define environment.

environment

New Vocabulary
Use your book or dictionary to help you write the correct vocabulary term in each blank.

_________ is the science of life. A(n) ___________ is anything that has all the characteristics of life. All living things are arranged in an orderly way. In other words, living things have ___________. Most living things begin as one cell. The addition of mass is called ___________. Over an organism’s life, natural changes, called _____________, take place. The production of offspring, or ____________, must occur to enable the group of breeding organisms, or ____________, to continue to exist. A living thing also has the ability to react to a(n) ___________ from its internal or external environment. The reaction is called a ___________. An organism must be able to maintain its internal conditions. If anything upsets its normal state, processes to restore ____________ begin. Any inherited characteristic, or ____________, developed in a species over time can enhance the species’ ability to survive and produce offspring in its environment.
Section 1.1 Introduction to Biology (continued)

**Main Idea**

The Science of Life

*I found this information on page ____________.*

**Details**

Identify *four kinds of information you will learn about living things when you study biology.*

- [ ]
- [ ]
- [ ]
- [ ]

What Do Biologists Do?

*I found this information on page ____________.*

**Model** *one specific question that a biologist might seek to answer for each of the following areas of study.*

<table>
<thead>
<tr>
<th>Area of Study</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diversity of life</td>
<td></td>
</tr>
<tr>
<td>Diseases</td>
<td></td>
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<tr>
<td>New technologies</td>
<td></td>
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<tr>
<td>Agriculture</td>
<td></td>
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<tr>
<td>Environment</td>
<td></td>
</tr>
</tbody>
</table>

**Analyze** *the specific type of work in biology that you might like to do, and explain why.*

Type of work: ____________________________

Reason: _________________________________
Main Idea

The Characteristics of Life

I found this information on page _________.

Details

Identify the eight characteristics that something must have to be alive.

Sequence the levels of organization listed below in the correct order from least complex to most complex.

- organ
- cell
- tissue
- atoms and molecules
- organ system

CONNECT

A friend argues that a car is alive because its parts form organized systems and it requires energy (gasoline and battery power). How would you respond to your friend?

__________
The Study of Life
Section 1.2 The Nature of Science

Main Idea

Scan the titles, boldfaced words, pictures, figures, and captions in Section 2. Write two facts you discovered about the nature of science as you scanned the section.

1. __________________________________________
2. __________________________________________

Details

Review Vocabulary

Use your book or dictionary to define investigation.

investigation __________________________________________

New Vocabulary

Use your book or dictionary to define each term.

ethics __________________________________________
forensics _______________________________________
metric system _____________________________________
peer review ______________________________________
science _________________________________________
SI ______________________________________________
theory __________________________________________

Academic Vocabulary

Define unbiased to show its scientific meaning.

unbiased _________________________________________
Section 1.2 The Nature of Science (continued)

Main Idea

What is science?

I found this information on page __________.

Details

Classify each statement as a characteristic of a science, a pseudoscience, or both.

- makes unbiased observations
- often driven by cultural or commercial goals
- makes claims about the natural world
- physics
- astrology

Science

- 
- 
- 
- 

Both

- 

Pseudoscience

- 

Analyze what is required for a proposed explanation to become accepted as a theory.

Identify what each SI unit listed below is used to measure.

gram: _____________________ meter: _____________________
second: ____________________ liter: _____________________
Section 1.2 The Nature of Science (continued)

**Main Idea**

Science in Everyday Life

I found this information on page _________.

**Details**

Identify an environmental issue, and explain why you think it is an important topic for scientific study.

Issue: ________________________________

Importance: ___________________________

____________________________________

____________________________________

____________________________________

Analyze an ethical issue. Choose one issue involving ethics mentioned in the text. Write a statement summarizing each side of the issue, both for and against.

Issue: ________________________________

For: ________________________________

Against: ____________________________

Explain why it is important for you to become science literate.

____________________________________

____________________________________

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**Summarize**

Identify clues you would look for to judge whether a claim is based on science or pseudoscience.

____________________________________

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The Study of Life
Section 1.3 Methods of Science

Main Idea

Skim Section 3 of the chapter. Write two questions that come to mind from reading the headings and illustration captions.

1. 

2. 

Review Vocabulary

Use your book or dictionary to define theory.

theory

New Vocabulary

Write the correct vocabulary term in the left column for each definition below.

- information gained from observations
- group in an experiment that is exposed to the factor being tested
- direct method of gathering information in an orderly way
- group in an experiment that is not exposed to the factor being tested and is used for comparison
- organized series of events in scientific inquiry
- factor in an experiment that results from or depends on changes to the independent variable
- logo that alerts you about a specific danger during lab activities
- factor that remains fixed during an experiment while the independent and dependent variables change
- tested factor in an experiment that might affect the outcome
- testable explanation of a situation
- investigation done in a controlled setting that tests a hypothesis
- logical conclusion based on gathered information
- occurrence of accidental or unexpected, but fortunate, results
Section 1.3 Methods of Science (continued)

Main Idea

Ask a Question
I found this information on page __________.

Form a Hypothesis
I found this information on page __________.

Collect the Data
I found this information on page __________.

Details

Sequence the basic steps in scientific methods by completing the flowchart.

- [ ]
- [ ]
- [ ]
- [ ]
- [ ]

Analyze the relationship between a hypothesis and a theory.

- [ ]
- [ ]
- [ ]

Identify the parts of the experiment described in the table below.

<table>
<thead>
<tr>
<th>Experiment: A biologist gives a new kind of food to a group of dogs and compares the weight gain of these dogs over time to a group of similar dogs that do not receive the new food.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Experimental group:</strong></td>
</tr>
<tr>
<td><strong>Control group:</strong></td>
</tr>
<tr>
<td><strong>Independent variable:</strong></td>
</tr>
<tr>
<td><strong>Dependent variable:</strong></td>
</tr>
</tbody>
</table>
Analyze an experiment in which one group of plants receives extra fertilizer and another group receives extra water. Is the experiment controlled or uncontrolled? Support your answer.

**Model** a line graph from the data in the table below. Plot the points, and draw a line connecting the points.

<table>
<thead>
<tr>
<th>Grizzly Bears in Park X</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year</strong></td>
</tr>
<tr>
<td>2001</td>
</tr>
<tr>
<td>2002</td>
</tr>
<tr>
<td>2003</td>
</tr>
<tr>
<td>2004</td>
</tr>
<tr>
<td>2005</td>
</tr>
</tbody>
</table>

**Summarize** what the above graph shows about grizzly bears in Park X.

**Analyze** why it is important for biologists to report their results in scientific journals.

**State** what you will do when you see a safety symbol in a lab activity.
Principles of Ecology

Before You Read

Use the “What I Know” column to list the things you know about ecology. Then list the questions you have about ecology in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I Know</th>
<th>W</th>
<th>What I Want to Find Out</th>
<th>L</th>
<th>What I Learned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Science Journal**

Organisms such as birds get what they need to survive from their environment. Hypothesize why is it important for birds to be able to fly long distances.
**Principles of Ecology**  
*Section 2.1 Organisms and Their Relationships*

**Main Idea**

*Skim Section 1 of the chapter. Write two questions that come to mind from the headings and illustration captions.*

**Details**

Use the vocabulary words in the left margin to complete the graphic organizer below. List the biological levels from largest to smallest.

<table>
<thead>
<tr>
<th>Levels of Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

**New Vocabulary**

- abiotic factor
- biological community
- biome
- biosphere
- biotic factor
- commensalism
- ecology
- ecosystem
- habitat
- mutualism
- niche
- parasitism
- population
- predation
- symbiosis

**Compare the terms in the tables by defining them side by side.**

<table>
<thead>
<tr>
<th>habitat</th>
<th>niche</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>abiotic factor</th>
<th>biotic factor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>symbiosis</th>
<th>commensalism</th>
<th>mutualism</th>
<th>parasitism</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>predation</th>
</tr>
</thead>
</table>

12  *Principles of Ecology*
Create a journal entry. Imagine that you are an ecologist. Choose one plant or animal in nature and write three relationships of that organism in its environment.

Journal Entry
Organism ____________________________ Date ________

1. ______________________________
   ______________________________
   ______________________________

2. ______________________________
   ______________________________
   ______________________________

3. ______________________________
   ______________________________
   ______________________________

Sequence the abiotic and biotic factors. Write abiotic or biotic in each square.

1. lack of rainfall  2. dry soil  3. certain plants die
4. rivers dry up  5. animals do not reproduce  6. the population of a species diminishes

Identify each level of organization that is described.

__________ a group of organisms of all the same species
__________ interacting populations
__________ an individual living thing made of cells
__________ all the different populations in a community
__________ a large group of organisms that share the same climate and have similar types of communities
Model a community with several organisms. Show two organisms occupying the same niche. Below your sketch, explain why those two organisms cannot usually occupy the same niche for long.

Rephrase mutualism, commensalism, and parasitism in your own words. Provide an example of each term.

1. 

2. 

3. 

Bacteria live inside our bodies. Analyze helpful, neutral, and harmful things that bacteria do while living in our bodies. Incorporate the terms parasitism, mutualism, habitat, and niche in your discussion.
Scan Section 2 of the chapter. Make a list of the ways in which organisms obtain energy.

Review Vocabulary
Use your book or dictionary to define energy. Then name the ultimate source of energy for Earth.

New Vocabulary
Use your book or dictionary to fill in vocabulary terms in this paragraph about food chains.

In a _______, matter and energy move from _________ to ____________ to ____________. A food chain is made of many steps; each organism in the food chain represents a step called a ___________. An ___________ is a heterotroph that eats only plants, whereas a ____________ preys on other heterotrophs. An ____________ eats both plants and animals. Nutrients are returned to the soil, air, and water by ____________. A model that shows all the possible feeding relationships at each trophic level is called a ___________. If you were a scientist and you wanted to determine the weight of living matter at a certain trophic level, you would measure the _________.

Academic Vocabulary
Define foundation to show its scientific meaning.
Main Idea

Energy in an Ecosystem

I found this information on page ________.

Details

Summarize three ways that organisms get energy, by completing the table.

<table>
<thead>
<tr>
<th>Type of Organism</th>
<th>Autotrophs</th>
<th>Other name(s) for this type</th>
<th>Food comes from</th>
<th>Chemical reactions that occur</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>consumers, herbivores, carnivores, scavengers, omnivores</td>
<td>no other name</td>
<td>1.</td>
<td>The organisms that are eaten are turned into energy and molecules for the consumer's body.</td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Examples

Design your own three-step example of the flow of energy.

Classify each of the following organisms as an autotroph or a heterotroph. Put an A in front of those that are autotrophs and an H in front of those that are autotrophs.

1. Alligator
2. Squirrel
3. Maple tree
4. Whale
5. Moss
6. Siberian tiger
7. Daffodil
8. Rhinoceros
9. Dandelion
10. Rabbit
11. Tomato
12. Cockroach
Section 2.2 Flow of Energy in an Ecosystem (continued)

Main Idea

Models of Energy Flow

I found this information on page __________.

Details

Contrast a food chain with a food web.

State three things that an ecological pyramid shows that food webs and food chains do not show.

Create a food web and name the organisms you include. Indicate each organism’s trophic level.

SUMMARIZE

Analyze the place in the food chain in which you participate. Use the vocabulary terms from this section that apply to you.
Principles of Ecology
Section 2.3 Cycling of Matter

Scan the titles, boldfaced words, pictures, figures, and captions in Section 3. Write two facts you discovered about animals as you scanned the section.

1. 

2. 

Use your book or dictionary to define cycle. Then give an example of a cycle.

Use your book or dictionary to define each vocabulary term.

biogeochemical cycle

denitrification

matter

nitrogen fixation

nutrient
Section 2.3 Cycling of Matter (continued)

**Main Idea**

Cycles in the Biosphere

I found this information on page __________.

**Details**

Create minimodels for each cycle of matter in nature. Use words or pictures to sketch a simple example for each type of cycle to show the movement of matter.

<table>
<thead>
<tr>
<th>A. The Water Cycle</th>
<th>B. The Carbon Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. The Nitrogen Cycle</th>
<th>D. The Phosphorus Cycle (short-term and long-term)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Details

Describe each of the cycles in nature. Identify where each cycle is found, how organisms use them, and what key words relate to them.

<table>
<thead>
<tr>
<th></th>
<th>Water</th>
<th>Carbon/oxygen</th>
<th>Nitrogen</th>
<th>Phosphorus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where found</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How used</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Key words in the cycle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summarize

Analyze current farming practices that are designed to make the best use of energy flow in ecosystems and cycles of matter.
Communities, Biomes, and Ecosystems

Before You Read

Before you read the chapter, respond to these statements.
1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Communities, Biomes, and Ecosystems</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Once an ecosystem is established, its plant and animal species remain the same.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Over time, a forest can develop from bare rock.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Mountains are not a biome because climate, plants, and animals change with elevation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Most of Earth’s freshwater is locked in ice.</td>
<td></td>
</tr>
</tbody>
</table>

Science Journal

“Organisms in a community reflect the resources and climate of that community.” Give some examples to illustrate this statement.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Communities, Biomes, and Ecosystems
Section 3.1 Community Ecology

Main Idea

Skim Section 1 of the chapter. List three facts you discovered about ecosystems.

1. 
2. 
3. 

Details

Use your book or dictionary to define abiotic factor.

abiotic factor

Use the new vocabulary terms to complete the following sentences

Your community includes the people, other animals, plants, bacteria, and fungi in your area. A limiting factor is any abiotic or biotic factor that restricts the numbers, reproduction, or distribution of organisms. The ability of any organism to survive when subjected to abiotic or biotic factors is its tolerance. Changing abiotic or biotic factors can trigger ecological succession—the replacement of one community with another. Primary succession occurs when a community becomes established in an area of exposed rock without topsoil. Eventually, a stable, mature climax community can develop from bare rock. If a disturbance, such as fire, removes the community but not the soil, an orderly and predictable change called secondary succession restores the community over time.
Communities

Predict how an unusually prolonged drought might affect a biological community.

Create a tolerance graph similar to the Tolerance of Steelhead Trout figure in your book. Title your graph Tolerance of Plant A. Label the zones. Then label the limits of each zone according to the facts about Plant A listed below.

- can live at an elevation between 1,000 and 2,000 m
- can live at an elevation between 5,000 and 6,000 m
- cannot live above 6,000 m
- grows best between 2,000 and 5,000 m
- cannot live below 1,000 m

Infer other abiotic factors that might limit the survival of Plant A.
Ecological Succession

Contrast primary succession and secondary succession. Give an example of each.

Sequence the following steps in the primary succession of a forest by writing each step in the flowchart.

- perennial herbs and grasses
- lichens
- shade-tolerant trees
- bare rock
- shrubs and shade-intolerant trees
- small annual plants

CONNECT

Suppose that a recent flood devastated a wildlife preserve in your area. Local leaders suggested organizing volunteers to plant trees in the damaged area. Evaluate your plan and support your reasoning.
# Communities, Biomes, and Ecosystems

## Section 3.2 Terrestrial Biomes

### Main Idea

**Skim**

Section 2 of the chapter. Write two questions that come to mind from reading the headings and the illustration captions.

1. ______________________

2. ______________________

### Details

Use your book or dictionary to define **biome**.

### Review Vocabulary

- **biome**

### New Vocabulary

- **latitude**

Use your book or dictionary to define the following term.

### Compare the terms in the tables by defining them side by side.

<table>
<thead>
<tr>
<th>weather</th>
<th>climate</th>
</tr>
</thead>
</table>

### Describe the vegetation and growing conditions for each biome.

<table>
<thead>
<tr>
<th>tundra:</th>
<th>boreal forest:</th>
<th>temperate forest:</th>
</tr>
</thead>
<tbody>
<tr>
<td>woodlands:</td>
<td>grassland:</td>
<td>desert:</td>
</tr>
<tr>
<td>tropical savanna:</td>
<td>tropical seasonal forest:</td>
<td>tropical rain forest:</td>
</tr>
</tbody>
</table>
Section 3.2 Terrestrial Biomes (continued)

Main Idea
Effects of Latitude and Climate

I found this information on page __________

Details
Model the latitude lines, poles, equator, Tropic of Cancer, Tropic of Capricorn, and the Sun below.

Analyze how latitude affects climate and why.

Identify three factors other than latitude that affect climate.

Sequence the boreal forest, temperate forest, and tundra in the diagram below.

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26 Communities, Biomes, and Ecosystems
Section 3.2 Terrestrial Biomes (continued)

Main Idea | Details
---|---

**Classify** the land biome described by each characteristic below.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Biome</th>
</tr>
</thead>
<tbody>
<tr>
<td>most trees drop their leaves during the dry season</td>
<td></td>
</tr>
<tr>
<td>annual rate of evaporation exceeds rate of precipitation</td>
<td></td>
</tr>
<tr>
<td>open areas of trees and mixed shrubs along the west coasts of North and South America</td>
<td></td>
</tr>
<tr>
<td>most diverse of all biomes, with a canopy and understory of vegetation</td>
<td></td>
</tr>
<tr>
<td>grasses and scattered trees; receives less precipitation than other tropical areas</td>
<td></td>
</tr>
<tr>
<td>thick cover of grasses with underground stems and buds that can survive fires</td>
<td></td>
</tr>
<tr>
<td>dense evergreen forest; also called northern coniferous forest or taiga</td>
<td></td>
</tr>
<tr>
<td>composed of broad-leaved deciduous trees; has four well-defined seasons</td>
<td></td>
</tr>
<tr>
<td>treeless; has a layer of permanently frozen soil below the surface called permafrost</td>
<td></td>
</tr>
</tbody>
</table>

**Other Terrestrial Areas**

*I found this information on page ________*

**Analyze** why the two land areas below are not true biomes.

Mountains: __________________________

Polar regions: __________________________

**Connect** Compare and contrast a tundra to a desert. Include latitude, climate, and major biomes.

______________________________

______________________________

______________________________

______________________________

______________________________
Scan the titles, boldfaced words, figures, and captions in Section 3. Write three facts you discovered about aquatic ecosystems.

1. 
2. 
3. 

Use your book or dictionary to define salinity.

Write the correct term in the left column for each definition below.

- deepest areas of a large lake
- narrow band where the ocean meets land
- area of the open ocean that is too deep for sunlight to penetrate
- area of the open ocean to a depth of about 200 m that is shallow enough for sunlight to penetrate
- deepest region of the ocean
- areas of land such as marshes, swamps, and bogs that are saturated with water and that support aquatic plants
- area of a lake or pond that is closest to shore
- ecosystem that is formed where a freshwater river or stream merges with the ocean
- open water area of a lake or pond that is well lit and dominated by plankton
- area of sand, silt, and dead organisms along the ocean floor
- material that is deposited by water, wind, or glaciers
- free-floating photosynthetic autotrophs that live in freshwater or marine ecosystems
Section 3.3 Aquatic Ecosystems (continued)

**Main Idea**

The Water on Earth

I found this information on page ___________.

**Details**

Complete this paragraph about the distribution of water on the Earth.

By far, _____________ is the most common type of water on Earth. Of the 2.5 percent of _____________ on Earth, most is locked in the ice of _____________. Most freshwater species live in ____________, ____________, ____________, ____________, and ____________ that make up only ______ percent of all freshwater. The remaining freshwater is found in _____________.

Analyze how the speed of water flow affects life in a river by writing more or less in the appropriate boxes in the figure.

**Freshwater Ecosystems**

I found this information on page _____________.

Compare the zones of lakes and ponds by completing the table below.

<table>
<thead>
<tr>
<th>Zone</th>
<th>Location</th>
<th>Example Species</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>well-lit open water area</td>
<td>limited due to cold and reduced light and oxygen</td>
</tr>
<tr>
<td>littoral</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section 3.3 Aquatic Ecosystems (continued)

**Main Idea**

**Transitional Aquatic Ecosystems**

Compare transitional aquatic ecosystems. Identify two types in the organizer below and describe the environments each type combines.

**Details**

Transitional Aquatic Ecosystems

<table>
<thead>
<tr>
<th>Combine:</th>
<th>Combine:</th>
</tr>
</thead>
</table>

**Marine Ecosystems**

Identify the marine ecosystems. Write the name of the zone in each box in the figure below.

- Shore
- Ocean floor
- Extremes depth

**SUMMARIZE**

Analyze several adaptations that would help organisms survive in the intertidal zone.

---

30 Communities, Biomes, and Ecosystems
Population Ecology

Before You Read

Use the “What I Know” column to list the things you know about population biology. Then list the questions you have about population biology in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>W</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>What I Know</td>
<td>What I Want to Find Out</td>
<td>What I Learned</td>
</tr>
</tbody>
</table>

White-tailed deer have become so numerous in some areas of the United States that they are a nuisance. Why do you think these deer populations have grown so large?
Population Ecology
Section 4.1 Population Dynamics

Main Idea

Details

Skim Section 1 of the chapter. Write three questions that come to mind from reading the headings and illustration captions.

1. _____________________________________________

2. _____________________________________________

3. _____________________________________________

Review Vocabulary

Use your book or dictionary to define population.

population

New Vocabulary

Compare the terms in the tables by defining them side by side.

<table>
<thead>
<tr>
<th>population density</th>
<th>dispersion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>density-independent factor</th>
<th>density-independent factor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>carrying capacity</th>
<th>pop. growth rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>emigration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>immigration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>population density</th>
<th>carrying capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Academic Vocabulary

Define fluctuate to show its scientific meaning.

______________________________
Population Characteristics

Identify each pattern of dispersion represented below.

Analyze why populations are limited in their spatial distribution.

Classify each limiting factor below as either density-independent or density-dependent by placing an X in the appropriate column.

---

Factor | Density-Independent | Density-Dependent
---|---|---
Lava flow | | |
Number of predators | | |
Spread of disease | | |
Especially cold winter | | |
Toxic chemical spill into a stream | | |
Another species competing for the same resources | | |
Diverting a river for irrigation | | |
Fungus that attacks elm trees | | |

Analyze how the expansion of housing developments in southern California might limit coyote populations in the area.
Section 4.1 Population Dynamics (continued)

**Main Idea**

Population-limiting factors

I found this information on page __________.

**Details**

Identify four main factors in a population’s growth rate.

<table>
<thead>
<tr>
<th>Factors in Population’s Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
</tr>
<tr>
<td>•</td>
</tr>
</tbody>
</table>

Compare the general shapes of the curves of population growth graphs. Draw the appropriate graph. Label the lag phase, exponential growth phase, and carrying capacity. Below each graph, describe what the graph shows.

Exponential Population Growth

Logistic Population Growth

**Summarize**

Analyze whether humans are r-strategists or k-strategists.

Explain why. Support your reasoning.

_____________________________

_____________________________

_____________________________

_____________________________

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## Population Ecology

Section 4.2 Human Population

<table>
<thead>
<tr>
<th>Main Idea</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Skim</strong> Section 2 of the chapter. Make a list of the ways in which human populations change.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Review Vocabulary</strong></th>
<th>Use your book or dictionary to define carrying capacity.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>carrying capacity</strong></td>
<td>--------------------------------------------------------</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>New Vocabulary</strong></th>
<th>Use your book or dictionary to define each term.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>age structure</strong></td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td><strong>demographic transition</strong></td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td><strong>demography</strong></td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td><strong>zero population growth (ZPG)</strong></td>
<td>--------------------------------------------------</td>
</tr>
</tbody>
</table>

---

*Population Ecology* 
35
Section 4.2 Human Population (continued)

**Main Idea**

Human Population Growth

I found this information on page __________

**Details**

Summarize two examples of events that could produce each of the following effects.

Effect: decline in world population growth

Events that could produce this effect: ______________________

Effect: increase in world population growth

Events that could produce this effect: ______________________

Examine the graph below. Then complete the table that follows.

![Graph of Percent Increase in Human Population](image)

<table>
<thead>
<tr>
<th>Year</th>
<th>Approximate Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>2025 (estimated)</td>
<td></td>
</tr>
</tbody>
</table>

What are the main reasons for the expected trend in human population between now and 2050?
**Main Idea**

**Trends in Human Population Growth**

I found this information on page __________.

**Details**

Calculate the population growth rate for each fictitious country listed in the table below.

<table>
<thead>
<tr>
<th>Country</th>
<th>Births per 1000</th>
<th>Deaths per 1000</th>
<th>Growth rate (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>25</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>14</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>12</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

Compare trends in industrialized nations and developing countries in terms of the following factors.

Population growth rate: ______________________________________________________

____________________________________

Resource use by individuals: __________________________________________________

____________________________________

Identify three factors that could keep the human population from reaching its carrying capacity.

1. ______________________________________________________

2. ______________________________________________________

3. ______________________________________________________

**SUMMARIZE**

Imagine that medical science discovered a cure for all cancers. Analyze how this medical achievement might affect life on Earth.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
Create a demographic profile for an imaginary country by describing its population characteristics below. List the sources of your data.

<table>
<thead>
<tr>
<th>Name of country:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geographic location:</td>
</tr>
<tr>
<td>Is it classified as a developing country or as an industrialized nation?</td>
</tr>
<tr>
<td>Population size:</td>
</tr>
<tr>
<td>Population density:</td>
</tr>
<tr>
<td>Description of the population’s spatial distribution across the country’s land area:</td>
</tr>
<tr>
<td>Birthrate:</td>
</tr>
<tr>
<td>Death rate:</td>
</tr>
<tr>
<td>Current population growth rate:</td>
</tr>
<tr>
<td>Expected population growth rate in the next 10 to 20 years:</td>
</tr>
<tr>
<td>General age structure:</td>
</tr>
<tr>
<td>Major factors promoting population growth:</td>
</tr>
<tr>
<td>Major factors limiting population growth:</td>
</tr>
<tr>
<td>Data sources used:</td>
</tr>
</tbody>
</table>

FURTHER INQUIRY

Tie It Together
Biodiversity and Conservation

Before You Read

*Before you read the chapter, respond to these statements.*

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Biodiversity and Conservation</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Biodiversity is the variety of ecosystems in the biosphere.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Genetic diversity tends to decrease over time in small pieces of habitat.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Nonnative species can damage an ecosystem.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The first national park was established in the United States in 1972.</td>
<td></td>
</tr>
</tbody>
</table>

Science Journal

*For many years the bald eagle was close to extinction but now lives and reproduces in the wild. Hypothesize how scientists used their knowledge of diversity to save the bald eagle.*

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---

---

---

---

---

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### Main Idea

**Skim** Section 1 of the chapter. Read the headings and the illustration captions. Write two questions that come to mind.

1. 
2. 

### Details

**Review Vocabulary**

*gene*

*New Vocabulary*

*biodiversity*  

*ecosystem diversity*  

*extinction*  

*genetic diversity*  

*species diversity*  

**Academic Vocabulary**

*diverse*

*Define diverse to show its scientific meaning.*
What is Biodiversity?

I found this information on page ___________.

Compare and contrast the species biodiversity of different areas.

<table>
<thead>
<tr>
<th>Plants</th>
<th>Animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rain Forest</td>
<td>Corn Field</td>
</tr>
</tbody>
</table>

Describe observable differences among the types of biodiversity using a forest ecosystem.

<table>
<thead>
<tr>
<th>Type of Biodiversity</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genetic diversity</td>
<td></td>
</tr>
<tr>
<td>Species diversity</td>
<td></td>
</tr>
<tr>
<td>Ecosystem diversity</td>
<td></td>
</tr>
</tbody>
</table>

Analyze how genetic diversity in a population of fishes in a stream can help the fishes resist disease.
Section 5.1  Biodiversity (continued)

Main Idea

The Importance of Biodiversity

I found this information on page ________.

Details

Summarize why species should be preserved as a possible source of useful genes.

<table>
<thead>
<tr>
<th>Organisms that might have value include</th>
<th>Agriculture</th>
<th>Medicine</th>
</tr>
</thead>
<tbody>
<tr>
<td>These organisms someday might be useful as</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Identify resources and services that a healthy biosphere provides to people.

<table>
<thead>
<tr>
<th>Resources</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
<td>3.</td>
</tr>
<tr>
<td>4.</td>
<td>4.</td>
</tr>
</tbody>
</table>

Organize how humans are dependent on plants and animals by describing two ways that you use products of each.

<table>
<thead>
<tr>
<th>Products of Animals</th>
<th>Products of Plants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summarize

Explain how the health of the biosphere impacts the health of people.
Biodiversity and Conservation
Section 5.2 Threats to Biodiversity

Main Idea

Scan the titles, boldfaced words, figures, and captions in Section 2. List three threats you discovered to biodiversity.

1. __________________________
   __________________________
   __________________________

2. __________________________
   __________________________
   __________________________

3. __________________________
   __________________________
   __________________________

New Vocabulary

Use your book or dictionary to define the following terms.

food web

biological magnification

edge effect

eutrophication

habitat fragmentation

introduced species

overexploitation

Review Vocabulary

Use your book or dictionary to define food web.

food web

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Extinction Rates
I found this information on page ________.

Factors That Threaten Biodiversity
I found this information on page ________.

**Main Idea**

**Details**

**Summarize** extinction rates by completing the sentences below.

- ________________________ is slow and gradual. It is caused as ________________________ change by natural processes. A ________________________ is an event in which extinctions increase dramatically. Some scientists believe we are in a period of ________________________ today.

**Sequence** the series of events describing how a habitat can be disrupted. The first one has been done for you.

- Owls that prey on small mammals decline.
- Deer eat most of the young trees in a forest.
- Squirrels and rabbits that live in and around trees decline.
- Deer that are prey for predators increase in number.
- Birds that eat the insects decline.
- Overhunting causes natural predators to disappear.
- Insects that live in the bark of trees decline.

Overhunting causes natural predators to disappear.

Ferns, which deer do not eat, grow instead of trees.

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Section 5.2 Threats to Biodiversity (continued)

**Main Idea**

**Details**

Explain why carnivores are subject to biological magnification of substances like DDT and PCBs.

Describe the effects of each change in habitat on species of animals.

<table>
<thead>
<tr>
<th>Edge effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Introduced species</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pollution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Habitat fragmentation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Habitat loss</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

CONNECT

Imagine a habitat near you. Hypothesize what would happen to the ecosystem if one species died out. Support your reasoning with information from this section.

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
Read the main idea of Section 3 of the chapter and look at the figures and captions in the section. Predict two ways that people are preserving biodiversity.

1. 

2. 

Use your book or dictionary to define natural resources.

Use your book or dictionary to define the following terms.

- biological augmentation
- bioremediation
- endemic
- nonrenewable resource
- renewable resource
- sustainable use
Section 5.3 Conserving Biodiversity (continued)

**Main Idea**

**Natural Resources**

I found this information on page __________.

**Details**

Compare and contrast renewable and nonrenewable resources by writing characteristics of each in the Venn diagram.

![Venn diagram]

Choose the diagram that best represents a habitat corridor. Explain your choice.

A.   B.   C.

Summarize the purpose of a habitat corridor. Provide an example to support your response.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Section 5.3 Conserving Biodiversity (continued)

(Continued)

Main Idea

Restoring Ecosystems

I found this information on page ________.

Details

Organize the factors that impact how long it takes for an ecosystem to recover after a disaster.

<table>
<thead>
<tr>
<th>Method:</th>
<th>How it works:</th>
<th>Example:</th>
</tr>
</thead>
</table>

Explain the methods ecologists use to restore ecosystems.

<table>
<thead>
<tr>
<th>Method:</th>
<th>How it works:</th>
<th>Example:</th>
</tr>
</thead>
</table>

Legally Protecting Biodiversity

I found this information on page ________.

Rephrase a law or treaty designed to protect biodiversity.

<table>
<thead>
<tr>
<th>Who or what:</th>
<th>When:</th>
<th>How:</th>
</tr>
</thead>
</table>

Summarize

hot spots.

Analyze how sustainable use could preserve biodiversity in

__________
**Chemistry in Biology**

**Before You Read**

*Before you read the chapter, respond to these statements.*

1. Write an **A** if you agree with the statement.
2. Write a **D** if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Chemistry in Biology</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Atoms are the smallest particles in matter.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Chemical reactions occur constantly inside your body.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• About 70 percent of your body is water.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Almost all molecules in living things contain the element carbon.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Science Journal**

Consider the characteristics of a living and a nonliving thing. Describe a few ways that the two are alike and a few ways that the two are different.

---

---
Chemistry in Biology
Section 6.1 Atoms, Elements, and Compounds

Main Idea

Scan the headings and boldfaced words in Section 1 of the chapter. Predict two things that you think might be discussed.

1. __________________________________________________________________________
2. __________________________________________________________________________

Review Vocabulary

substance

New Vocabulary

Compare the terms in the table by defining them side by side.

<table>
<thead>
<tr>
<th>atom</th>
<th>electron</th>
<th>nucleus</th>
<th>neutron</th>
</tr>
</thead>
<tbody>
<tr>
<td>proton</td>
<td>electron</td>
<td>nucleus</td>
<td>neutron</td>
</tr>
</tbody>
</table>

Complete the paragraph below using the terms listed to the left.

A substance that cannot be broken down into other substances is a(n) _________. Carbon-14 is a(n) _________. It has a different number of neutrons than other carbon atoms. A(n) _________. forms when two or more elements combine. The chemical bond that holds the elements together is a(n) _________. When electrons are shared. A substance with this kind of bond is called a(n) _________. An atom that has lost or gained one or more electrons becomes a(n) _________., which carries an electric charge. Two of these oppositely charged atoms can form an electrical attraction called a(n) _________. An attraction between oppositely charged regions of molecules is called a(n) _____________________.

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Section 6.1 Atoms, Elements, and Compounds (continued)

**Main Idea**

**Atoms**
I found this information on page __________.

**Details**

Model an oxygen atom and label the parts. Note the type of electric charge for each part. Then complete the sentence that follows.

The overall charge of the oxygen atom is __________, because the atom ________________________________________________________________________________________________.

**Elements**
I found this information on page __________.

Compare and contrast the characteristics of carbon-14 by completing the following sentences.

Structurally, carbon-14 differs from other carbon atoms because ________________________________________________________________________________________________.

Carbon-14 is radioactive because ________________________________________________________________________________________________.

Knowing the half-life of carbon-14 enables scientists to ________________________________________________________________________________________________.

**Compounds**
I found this information on page __________.

Identify four unique characteristics of compounds.

1. ________________________________________________________________________________________________
2. ________________________________________________________________________________________________
3. ________________________________________________________________________________________________
4. ________________________________________________________________________________________________
Section 6.1 Atoms, Elements, and Compounds (continued)

**Main Idea**

**Chemical Bonds**
I found this information on page ________

**Details**

Label the following parts of the water molecule illustrated below.
- hydrogen atom(s)  • first energy level
- oxygen atom(s)  • second energy level
- covalent bonds

Compare positively and negatively charged ions.

Atom becomes positively charged when it becomes negatively charged when it.

Identify the type of substances held together by van der Waals forces. Include indicators of electric charges.

**van der Waals Forces**
I found this information on page ________

**CONNECT**

A chemical compound in your toothpaste helps protect your teeth from decay. The formula for this compound is Na₂PO₃F. Use the periodic table in your book to identify each element in this compound.
## Main Idea

**Details**

**Skim** Section 2 of the chapter. Write two facts that you discovered as you read the headings and illustration captions.

1. 

2. 

**Review Vocabulary**

*Use your book or dictionary to define process.*

<table>
<thead>
<tr>
<th>process</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

**New Vocabulary**

*Use your book or dictionary to define each term.*

<table>
<thead>
<tr>
<th>activation energy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>active site</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>catalyst</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>chemical reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>enzyme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>product</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>reactant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>substrate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

**Academic Vocabulary**

*Define coefficient to show its scientific meaning.*

<table>
<thead>
<tr>
<th>coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
Section 6.2 Chemical Reactions (continued)

Main Idea

Reactants and Products

I found this information on page ________

Energy of Reactions

I found this information on page ________

Details

Label the sides of the following equation as either products or reactants.

\[ \text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O} \]

Calculate the number of atoms of each element in the chemical equation above. Record the information in the table below.

<table>
<thead>
<tr>
<th>Element Symbol</th>
<th>Element Name</th>
<th>Number of Atoms (reactant side)</th>
<th>Number of Atoms (product side)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analyze the formula to check to see if it is balanced. Support your reasons.

________________________________________

________________________________________

Compare what happens to energy in exothermic and endothermic reactions by completing the diagram below.

Exothermic Reaction

During the reaction, energy is ____________________________.

As a result, the energy of the product is ____________ than the energy of the reactants.

Endothermic Reaction

During the reaction, energy is ____________________________.

As a result, the energy of the product is ____________ than the energy of the reactants.
Section 6.2 Chemical Reactions (continued)

**Main Idea**

**Enzymes**

I found this information on page ___________.

**Details**

**Summarize** key characteristics of an enzyme by completing the organizer below.

- Composed of:
- Purpose:
- Reusable?
- Participates in how many different types of reactions?
- Activity level affected by:

**Analyze** how an enzyme works by completing the following paragraph.

For a substrate to bind with a particular enzyme, the ________________ and ________________ of the substrate must match that of the enzyme’s ________________. In the enzyme-substrate complex, chemical bonds in the ________________ are broken and ________________ form. The results of the interaction between an enzyme and its ________________ are products, which are released by the ________________.

**Summarize**

Analyze the role of catalysts in chemical reactions.
Chemistry in Biology
Section 6.3 Water and Solutions

Main Idea

Scan Section 3 of the chapter. Identify two facts you discovered about water.

1. __________________________________________

2. __________________________________________

Details

Review Vocabulary

Use your book or dictionary to define physical property.

physical property

New Vocabulary

Write the correct vocabulary term in the left column for each definition below.

substance that releases hydroxide ions when dissolved in water
substance that releases hydrogen ions when dissolved in water
substance in which another substance is dissolved
mixture that can react with an acid or a base to keep the pH within a particular range
measure of concentration of hydrogen ions in a solution
substance that is dissolved in a solvent
weak interaction involving a hydrogen atom and a fluorine, oxygen, or nitrogen atom
molecule that has oppositely charged regions
mixture that has a uniform composition throughout
combination of two or more substances in which each substance retains its individual characteristics and properties

Academic Vocabulary

Define suspend to show its scientific meaning.

suspend
Main Idea

Water’s Polarity

I found this information on page _________.

Details

Analyze polarity by writing attract or repel to complete the diagram.

<table>
<thead>
<tr>
<th>+</th>
<th>-</th>
<th>+</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

Analyze reasons for water’s polarity and the effect of polarity.

<table>
<thead>
<tr>
<th>Polarity of Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reasons for polarity:</td>
</tr>
</tbody>
</table>

Identify the properties of water that allow it to help an organism maintain homeostasis.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water can separate the ions in many compounds.</td>
<td></td>
</tr>
<tr>
<td>Water will form hydrogen bonds with other surfaces. Capillary action is one result.</td>
<td></td>
</tr>
<tr>
<td>Water has a slight positive charge on one side of the molecule and a slight negative charge on the other side.</td>
<td></td>
</tr>
<tr>
<td>Water molecules are attracted to each other.</td>
<td></td>
</tr>
</tbody>
</table>
Mixtures with Water

Identify each of the following mixtures as either homogeneous or heterogeneous.

- Sand and sugar
- Salt and water
- Blood

For any homogeneous mixture above, identify the solvent and the solute.
Solvent: ____________________  Solute: ____________________

Construct a model of acidic solutions and basic solutions by placing each of the items below in the correct sequence on the scale.

- releases some hydrogen ions
- releases many hydrogen ions
- water
- releases some hydroxide ions
- releases many hydroxide ions

Acidic solutions  Basic solutions

Summarize
Analyze how water is important to life.
## Main Idea

**Details**

*Skim* Section 4 of the chapter. Write two facts that you learned from reading the headings and illustration captions.

1. 

2. 

### Review Vocabulary

**organic compound**

Use your book or dictionary to define organic compound.

### New Vocabulary

**amino acid**

Use your book or dictionary to define each term.

**carbohydrate**

**lipid**

**macromolecule**

**nucleic acid**

**nucleotide**

**polymer**

**protein**
**Main Idea**

**Organic Chemistry**

I found this information on page ________

---

**Details**

**Contrast** an organic compound to an inorganic compound.

---

**Model** a carbon atom, and label its parts. Then use a label to point out and briefly explain why carbon can form a variety of organic compounds.

---

**Macromolecules**

I found this information on page ________

---

**Compare** the composition and functions of the four major groups of biological macromolecules by completing the table below.

<table>
<thead>
<tr>
<th>Group</th>
<th>Composition</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>amino acids made of carbon, nitrogen, oxygen, hydrogen, and sometimes sulfur</td>
<td>store energy; provide structural support</td>
</tr>
<tr>
<td>Nucleic acids</td>
<td></td>
<td>store energy; provide steroids; waterproof coatings</td>
</tr>
</tbody>
</table>

---
Section 6.4 The Building Blocks of Life (continued)

Main Idea

I found this information on page _________.

Details

Evaluate the number of molecules of each element in the carbohydrate described by the formula below.

\((\text{CH}_2\text{O})_6\)

Carbon: _________ Hydrogen: _________ Oxygen: _________

Ratio of carbon, hydrogen, and oxygen: ________________________

Type of carbohydrate: ________________________

Model the two general shapes of proteins named below.

Pleat

Helix

Describe nucleic acids by filling in the following chart.

<table>
<thead>
<tr>
<th>Units that Make Up Nucleotides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function of DNA:</td>
</tr>
<tr>
<td>Function of RNA:</td>
</tr>
</tbody>
</table>

Connect

Identify two examples of foods that contain high amounts of each of the following macromolecules: carbohydrates, lipids, and proteins. If you need help, read food labels.
Tie It Together

You have read about chemical reactions. Now create a simple science review manual explaining how chemical reactions allow living things to grow and develop. Your review manual should be easy to read and contain basic information and specific examples. Include diagrams to illustrate the ideas. Use the space below to create an outline for your review manual.
# Cellular Structure and Function

## Before You Read

*Use the “What I Know” column to list the things you know about cells. Then list the questions you have about cells in the “What I Want to Find Out” column.*

<table>
<thead>
<tr>
<th>K</th>
<th>W</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>What I Know</td>
<td>What I Want to Find Out</td>
<td>What I Learned</td>
</tr>
</tbody>
</table>

### Science Journal

Imagine that you are small enough to fit inside a cell. Describe what you think you might observe while you are there.
**Main Idea**

Use your book or dictionary to define organization.

**New Vocabulary**

Use your book or dictionary to define each term.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>organization</td>
<td></td>
</tr>
<tr>
<td>cell</td>
<td></td>
</tr>
<tr>
<td>cell theory</td>
<td></td>
</tr>
<tr>
<td>eukaryotic cell</td>
<td></td>
</tr>
<tr>
<td>nucleus</td>
<td></td>
</tr>
<tr>
<td>organelle</td>
<td></td>
</tr>
<tr>
<td>plasma membrane</td>
<td></td>
</tr>
<tr>
<td>prokaryotic cell</td>
<td></td>
</tr>
</tbody>
</table>
Section 7.1 Cell Discovery and Theory (continued)

**Main Idea**

History of the Cell Theory

*I found this information on page ____________.*

**Details**

*Identify the three main ideas of the cell theory. Then write a short sentence for each one describing each idea.*

---

Microscope Technology

*I found this information on page ____________.*

**Summarize** information about electron microscopes using five or six bullet points.

---

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Basic Cell Types

Compare and contrast eukaryotic and prokaryotic cells by putting the phrases in the Venn diagram.

- bacteria
- contain organelles
- have loose strands of DNA
- have a nucleus

- have membrane-bound organelles
- multicellular organisms
- unicellular organisms
- do not have membrane-bound organelles

Model a eukaryotic cell. Label the parts of the cell.

Summarize

Analyze how more sophisticated microscopes have allowed scientists to advance their knowledge of cells.
Scan the illustrations and captions in Section 2 of the chapter. List two facts you discovered about the plasma membrane.

1. 

2. 

Use your book or dictionary to define ion.

Use your book or dictionary to define each term.

**fluid mosaic model**

**phospholipid bilayer**

**selective permeability**

**transport protein**
Function of the Plasma Membrane

I found this information on page __________

Analyze what would happen if the cell membrane were not selectively permeable. Support your response.

Identify five ways that the membrane can deal with materials.

Model a phospholipid, and label its parts. Describe how the phospholipid functions to make up the fluid membrane.
Model the plasma membrane. Label each part, and describe the function of that part in detail.

Discuss how the terms fluid and mosaic describe the plasma membrane.

Fluid:

Mosaic:

SUMMARIZE

Analyze the role of the plasma membrane in maintaining homeostasis in the cell.
**Main Idea**

**Details**

**Skim** Section 3 of the chapter. Write two questions that come to mind from reading the headings and the illustration captions.

1. 

2. 

**Review Vocabulary**

Use your book or dictionary to define enzyme.

**New Vocabulary**

Write each term in the table under the heading that best describes it.

<table>
<thead>
<tr>
<th>Cell Structure (5)</th>
<th>Related to Genetic Material (2)</th>
<th>Food, Storage, and Waste (5)</th>
<th>Energy (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Compare and contrast each pair of terms by defining them and noting their differences.

<table>
<thead>
<tr>
<th>Chloroplast</th>
<th>Mitochondrion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacuole</td>
<td>Centriole</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Cilium</td>
<td>Flagellum</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Main Idea**

**Cytoplasm and Cytoskeleton**

*I found this information on page ____________.*

**Cell Structures**

*I found this information on page ____________.*

**Details**

**Compare** the cytoplasm and cytoskeleton by defining each in the boxes.

<table>
<thead>
<tr>
<th></th>
<th><strong>Cytoplasm</strong></th>
<th><strong>Cytoskeleton</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cytoplasm</strong></td>
<td>directs cell processes; contains the cell’s DNA; stores information for cell growth, function, and reproduction</td>
<td></td>
</tr>
<tr>
<td><strong>Cytoskeleton</strong></td>
<td>double membrane that surrounds the nucleus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>helps manufacture proteins</td>
<td></td>
</tr>
<tr>
<td></td>
<td>produces ribosomes inside the nucleus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>site of ribosome attachment; can be smooth or rough</td>
<td></td>
</tr>
<tr>
<td></td>
<td>modifies, sorts, and packages proteins for transport outside the cell</td>
<td></td>
</tr>
<tr>
<td></td>
<td>membrane-bound storage area within the cell</td>
<td></td>
</tr>
<tr>
<td></td>
<td>vesicle that contains substances that digest excess or worn-out organelles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>structure near the nucleus that functions during cell division</td>
<td></td>
</tr>
<tr>
<td></td>
<td>converts fuel particles (sugars) into useable energy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>captures light energy and converts it to chemical energy through photosynthesis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>gives support to plant cells</td>
<td></td>
</tr>
<tr>
<td></td>
<td>projections that allow the cell to move or to move substances along the surface of the cell</td>
<td></td>
</tr>
</tbody>
</table>

**Identify** the part of the cell that corresponds to each function described.
Comparing Cells

Compare and contrast the cell parts found in the following categories.

- Plant Cells Only
- Both Plants and Animals
- Animal/Protist Cells Only

Sequence the steps that describe how proteins are made by completing the flowchart.

- ___________ picks up information from DNA.

- ___________ and ___________ leave the nucleus.

- ___________ and ribosomes work together to make ___________ on the surface of the ___________.

Connect

Create and describe a unique model for the structure and function of the cell.
**Main Idea**

**Details**

**Skim** Section 4 of the chapter. Write two questions that come to mind from reading the headings and the illustration captions.

1. 

2. 

**Review Vocabulary**

*homeostasis*

Use your book or dictionary to define homeostasis.

**New Vocabulary**

Write the correct vocabulary term in the left column for each definition below.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>process by which the plasma membrane surrounds a substance outside the cell and moves it inside the cell</td>
</tr>
<tr>
<td></td>
<td>movement of substances from a region of lower concentration to a region of higher concentration</td>
</tr>
<tr>
<td></td>
<td>net movement of particles from an area where there are many particles of the substance to an area where there are fewer</td>
</tr>
<tr>
<td></td>
<td>solution that has a higher concentration of solutes in the cell</td>
</tr>
<tr>
<td></td>
<td>solution in which the inside of the cell and the solution it is in have the same concentration of water and solutes</td>
</tr>
<tr>
<td></td>
<td>process by which the plasma membrane surrounds a substance inside the cell and moves it outside the cell</td>
</tr>
<tr>
<td></td>
<td>diffusion of water across a selectively permeable membrane</td>
</tr>
<tr>
<td></td>
<td>form of transport that uses transport proteins to move other ions and small molecules across the plasma membrane</td>
</tr>
<tr>
<td></td>
<td>condition in which there is continuous movement but no overall change in concentration</td>
</tr>
<tr>
<td></td>
<td>solution that has a lower concentration of solutes in the cell</td>
</tr>
</tbody>
</table>
Section 7.4 Cellular Transport (continued)

**Main Idea**

**Diffusion**

I found this information on page _________

**Osmosis:** Diffusion of Water

I found this information on page _________

**Details**

Rephrase the process of diffusion in your own words, and give an example.

Summarize the relationship between water and the plasma membrane by completing the concept web below.

Model a cell in a hypertonic, hypotonic, and isotonic solution. Underneath each model, summarize the effect of each solution on the cell.

<table>
<thead>
<tr>
<th>Solutions</th>
<th>Hypertonic</th>
<th>Hypotonic</th>
<th>Isotonic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Main Idea**

Active Transport and Transport of Large Particles

I found this information on page ____________.

**Details**

Classify and summarize the five ways particles move through the membrane. Make notes and sketches in the rectangle for each one.

- simple diffusion
- facilitated diffusion
- active transport
- exocytosis
- endocytosis

**CONNECT**

Think of real-life movement between locations, and make analogies of the five different kinds of transport that occurs through the cell membrane. Explain how each type of transport works in your analogy.

________________________

________________________

________________________

________________________

________________________

________________________
Make a concept web to show the main ideas and important details in this chapter, and the relationships between the facts you learned. Hint: You might find it easier to list the facts or topics you want to include first, then decide how to connect them in the web.
Before you read the chapter, respond to these statements.
   1. Write an A if you agree with the statement.
   2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Cellular Energy</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Energy can be transformed, but it cannot be created or destroyed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• ATP is a molecule used by cells to store energy.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Photosynthesis takes place inside the chloroplasts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Cellular respiration occurs in two stages: glycolysis and the Calvin cycle.</td>
<td></td>
</tr>
</tbody>
</table>

Science Journal

*How does energy get to cells? How do cells use energy? Write your own ideas.*
Section 8.1 How Organisms Obtain Energy

**Main Idea**
Scan Section 1 of the chapter and make a list of three general ways in which cells use energy.

1. ________________________________
2. ________________________________
3. ________________________________

**Details**
Use your book or dictionary to define metabolism.

**Review Vocabulary**

metabolism

**New Vocabulary**

Use your book or dictionary to define each vocabulary term.

- adenosine triphosphate
- cellular respiration
- energy
- metabolism
- photosynthesis
- thermodynamics
Section 8.1 How Organisms Obtain Energy (continued)

**Main Idea**

Transformation of Energy

*I found this information on page ____________.*

**Details**

Organize at least seven of your body’s cell processes that require energy.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Energy in Cell Processes

- ...
- ...
- ...
- ...
- ...
- ...
- ...

**Metabolism**

*I found this information on page ____________.*

**Compare** the laws about how energy flows. Give an example of each.

<table>
<thead>
<tr>
<th></th>
<th>First Law of Thermodynamics</th>
<th>Second Law of Thermodynamics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Example</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sequence** the flow of energy from the Sun to heterotrophs.

- ...
- ...
- ...
- ...
- ...
- ...

Cellular Energy
Section 8.1 How Organisms Obtain Energy (continued)

Main Idea

ATP: The Unit of Cellular Energy

I found this information on page _________.

Details

Compare and contrast catabolic and anabolic pathways by writing characteristics of each in the Venn diagram.

<table>
<thead>
<tr>
<th>Catabolic</th>
<th>Both</th>
<th>Anabolic</th>
</tr>
</thead>
</table>

Summarize ATP and ADP.

ATP
Explain how your body uses ATP and list the three parts of the molecule.

ADP
Explain how ADP is made from ATP.

Design a concept map to show the three most important ideas from this section.
### Cellular Energy
Section 8.2 Photosynthesis

**Main Idea**

**Details**

Scan Section 2 of the chapter. Write two questions that come to mind from reading the headings and the illustration captions.

1. 
2. 

**Review Vocabulary**

Use your book or dictionary to define carbohydrate.

- carbohydrate

**New Vocabulary**

Use your book or dictionary to define each vocabulary term.

- Calvin cycle
- granum
- NADP+
- pigments
- rubisco
- stroma
- thylakoid

**Academic Vocabulary**

Define transport to show its scientific meaning.

- transport
Main Idea

Overview of Photosynthesis

I found this information on page ____________.

Details

Summarize the functions of the light-dependent and light-independent reactions by completing the sentences.

Phase One:
Light Reactions

I found this information on page ____________.

Plants and other green organisms ________________ from ________________. The light-dependent reactions change ________________ into the molecules ________________. The light-dependent reactions use ________________ to make ________________.

The light-independent reactions produce ________________, which are then made into ________________, such as ________________, which stores energy in plants.

Create a concept web to summarize what you know about chloroplasts and chlorophyll.

Analyze how leaves change color in the fall.

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________
Section 8.2 Photosynthesis (continued)

**Main Idea**

**Phase Two: The Calvin Cycle**

*I found this information on page ____________.*

**Details**

**Model** light-dependent reactions in a flow chart.

---

**Compare** light-dependent and light-independent reactions by putting each phrase into the correct part of the Venn diagram.

- forms stored energy
- makes NADPH
- makes sugar
- needs sunlight

- occurs in the chloroplast
- occurs in the dark
- uses Calvin cycle
- uses electron transport chain

---

**Compare** two alternative photosynthesis pathways. Identify plants that use each pathway.

<table>
<thead>
<tr>
<th>Pathway:</th>
<th>Pathway:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Description:</td>
</tr>
<tr>
<td>Plants that use this pathway:</td>
<td>Plants that use this pathway:</td>
</tr>
</tbody>
</table>

---

**Summarize**

Explain the results of light-dependent and light-independent reactions.

---

*Cellular Energy 83*
## Cellular Energy

### Section 8.3 Cellular Respiration

### Main Idea

**Scan** the headings, illustrations, and captions in Section 3 of the chapter. Write three facts that you discover about cellular respiration.

1. 
2. 
3. 

### Details

**Review Vocabulary**

*Use your book or dictionary to define* cyanobacterium.

<table>
<thead>
<tr>
<th>cyanobacterium</th>
</tr>
</thead>
<tbody>
<tr>
<td>____________________________</td>
</tr>
<tr>
<td>____________________________</td>
</tr>
<tr>
<td>____________________________</td>
</tr>
</tbody>
</table>

**New Vocabulary**

*Read the definitions below and write the correct vocabulary term in the blank.*

<table>
<thead>
<tr>
<th>metabolic process that does not require oxygen</th>
</tr>
</thead>
<tbody>
<tr>
<td>in cellular respiration, a series of anaerobic chemical reactions in the cytoplasm that break down glucose into pyruvic acid; forms a net profit of two ATP molecules</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>metabolic processes that require oxygen</th>
</tr>
</thead>
<tbody>
<tr>
<td>in cellular respiration, a cycle of chemical reactions that break down glucose and produce ATP; energizes electron carriers that pass the energized electrons on to the electron transport chain</td>
</tr>
</tbody>
</table>

| a series of anaerobic reactions in the cytoplasm that regenerate NAD\(^+\) for glycolysis and produce ATP; supplies energy for aerobic organisms when oxygen is low |
| in cellular respiration, the processes that take place in the mitochondrion and require oxygen; includes the Krebs cycle and electron transport |
Overview of Cellular Respiration
I found this information on page ____________.

Glycolysis, Krebs Cycle, and Electron Transport
I found this information on page ____________.

Rephrase the function of cellular respiration in your own words. Write the equation that describes it.

Function: __________________________
Equation: __________________________

Compare and summarize the three stages of cellular respiration.

<table>
<thead>
<tr>
<th>Glycolysis</th>
<th>Krebs Cycle</th>
<th>Electron Transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>takes place in</td>
<td>takes place in</td>
<td>takes place in</td>
</tr>
<tr>
<td>produces two ATP molecules for every glucose molecule that is broken down</td>
<td>produces</td>
<td>provides energy for ATP production</td>
</tr>
<tr>
<td></td>
<td></td>
<td>final electron acceptor is</td>
</tr>
</tbody>
</table>

Sequence events that lead to fermentation in aerobic organisms.

Cause: __________________________
Fermentation follows __________________________
It replaces the Krebs cycle and __________________________
Fermentation is needed to __________________________
Summarize a process of fermentation that is useful to humans.

Compare photosynthesis and respiration in a Venn diagram.

Create a graphic organizer to compare aerobic and anaerobic processes.
# Cellular Reproduction

## Before You Read

Use the "What I Know" column to list the things you know about how cells work. Then list the questions you have about how cells work in the "What I Want to Find Out" column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I Know</th>
<th>W</th>
<th>What I Want to Find Out</th>
<th>L</th>
<th>What I Learned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Science Journal**

*New cells are created in your body every day. Write about the reasons your body might need new cells.*

---

---

---

---

---

---

---

---

---

---

---

---
Scan the titles, boldfaced words, pictures, figures, and captions in Section 1. Write three facts you discovered about cellular growth as you scanned the section.

1. 
2. 
3. 

Use your book or dictionary to define carbohydrate.

Use your book or dictionary to define each term.

cell cycle 
chromatin 
chromosome 
cytokinesis 
interphase 
mitosis 

Section 9.1 Cellular Growth (continued)

**Main Idea**

**Cell Size Limitations**

I found this information on page __________.

**Details**

**Analyze** movement of nutrients and wastes as cell size increases.

If a __________ transport of __________ by __________ slows down, therefore, cells __________ before __________.

**Describe** how surface area-to-volume ratio relates to cell size by completing the sentence.

As a cell grows larger, its __________ increases more rapidly than its __________, thus surface area-to-volume ratio __________.

**Complete** the diagram of the cell cycle. Describe the main events in each stage.

---

The Cell Cycle

I found this information on page __________.
Section 9.1 Cellular Growth (continued)

Main Idea

I found this information on page _______

Details

Organize information about chromosomes in the concept web.

Chromosomes

Identify four events that occur in a cell during interphase.

1. ____________________ 3. ____________________
2. ____________________ 4. ____________________

Summarize

Analyze the relationship between cell size and the stages of the cell cycle.

________________________

________________________

________________________

________________________
Scan Section 2 of the chapter. From the headings and illustrations list the four stages of mitosis.

1. __________________  3. __________________
2. __________________  4. __________________

Use your book or dictionary to define life cycle.

Use your book or dictionary to define the following terms.

- anaphase
- centromere
- metaphase
- prophase
- sister chromatid
- spindle apparatus
- telophase
Section 9.2 Mitosis and Cytokinesis (continued)

**Main Idea**

**Mitosis**

I found this information on page ____________

**The Stages of Mitosis**

I found this information on page ____________

**Details**

**Identify** two functions of mitosis in animals.

Function of mitosis in animals

**Model** the stages of mitosis and the process of cytokinesis. Draw and label a cell in each stage, name each stage, and describe what is happening.

<table>
<thead>
<tr>
<th>Name of Phase</th>
<th>Sketch of Cell</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cytokinesis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Summarize** the similarities and differences of any two phases of mitosis.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Section 9.2 Mitosis and Cytokinesis (continued)

**Main Idea**

I found this information on page __________.

**Details**

**Summarize the function of each structure in mitosis.**

- centromeres: ____________
- microtubules: ____________
- motor proteins: ____________
- spindle apparatus: ____________

**Cytokinesis**

I found this information on page __________.

**Compare and contrast cytokinesis in plant and animal cells.**

<table>
<thead>
<tr>
<th>Cytokinesis in Plant Cells</th>
<th>Both</th>
<th>Cytokinesis in Animal Cells</th>
</tr>
</thead>
</table>

**SUMMARIZE**

Create a concept map describing the stages of the cell cycle.
Scan the illustrations and read the captions in Section 3 of the chapter. Write three facts you discovered about stem cells.

1. 
2. 
3. 

Use your book or dictionary to define nucleotide.

Use your book or dictionary to define the following term.
apoptosis

cancer

carcinogen

cyclin

cyclin-dependent kinase

stem cell
**Main Idea**

**Normal Cell Cycle**

*I found this information on page __________.*

**Details**

**Summarize** how cells regulate the cell cycle. Choose from the list of words to complete the paragraph.

- checkpoints  
- cyclin-dependent kinases  
- cyclin/CDK  
- cyclins  
- cytokinesis  
- G₂ stage  
- mitosis  
- G₁ stage  
- S stage

Cells use __________ and ____________ to control the cell cycle. Different combinations of __________ start the cell cycle at different ____________. The cell also uses ____________ to monitor the cycle for quality control. In ____________, the cell checks the DNA for damage. If there is any damage, the cycle won’t proceed to ____________. In ____________, if the spindle apparatus is malfunctioning, the cycle won’t proceed to ____________.

**Abnormal Cell Cycle**

*I found this information on page __________.*

**Sequence** the causes and effects of cancer by completing the flow chart below.

```
Cancer is ____________________________

Cancer is the result of ____________________________

Cells lose control when ____________________________

Cancer cells cause damage by ____________________________
```

**Identify** four environmental factors that cause cancer.

1. ____________________________
2. ____________________________
3. ____________________________
4. ____________________________
**Main Idea**

**Apoptosis**
I found this information on page __________

**Details**

**Summarize** information about apoptosis.

<table>
<thead>
<tr>
<th>Apoptosis is</th>
<th>Organisms use apoptosis to</th>
<th>Two processes that use apoptosis:</th>
</tr>
</thead>
</table>

1.  
2.  

**Stem Cells**
I found this information on page __________

**Connect**
A classmate thinks that cancer and apoptosis are both harmful to organisms. Do you agree or disagree? Explain your reasoning.

---

**Venn Diagram**

**Compare and contrast** adult and embryonic stem cells by writing characteristics in the Venn diagram.

- Adult
- Both
- Embryonic

---

96  Cellular Reproduction
Sexual Reproduction and Genetics

Before You Read

Use the “What I Know” column to list the things you know about genetics. Then list the questions you have about genetics in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I Know</th>
<th>W</th>
<th>What I Want to Find Out</th>
<th>L</th>
<th>What I Learned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Science Journal**

Genetics explains why you have inherited certain characteristics from your parents. Write about some characteristics that you have inherited from your own parents, or similarities in other families, animals, or plants that you think might have been inherited.

_________________________
_________________________
_________________________
_________________________
_________________________
Sexual Reproduction and Genetics
Section 10.1 Meiosis

Main Idea

Skim the headings and illustration captions in Section 1 of the chapter. Write three facts you discovered about meiosis as you scanned the section.

1. 
2. 
3. 

Details

Review Vocabulary

Use your book or dictionary to define chromosome.
______________________________

New Vocabulary

diploid
gamete
gene
haploid
homologous chromosomes
meiosis
fertilization
crossing over

Use the terms in the left margin to complete the paragraph below.

A segment of DNA on a chromosome that controls the production of a protein is called a __________. A __________ cell contains two copies of each chromosome. A sex cell, or __________, is __________, meaning it contains one copy of each chromosome. ________________ are pairs of chromosomes, one from each parent.

Describe three processes that occur during sexual reproduction.

<table>
<thead>
<tr>
<th></th>
<th>Meiosis</th>
<th>Fertilization</th>
<th>Crossing Over</th>
</tr>
</thead>
<tbody>
<tr>
<td>What happens?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is the product?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Main Idea**

Chromosomes and Chromosome Numbers

*I found this information on page ____________.

Meiosis I, Meiosis II, and The Importance of Meiosis

*I found this information on page ____________.

**Details**

**Identify** three characteristics that are the same in each member of a pair of homologous chromosomes. Name one thing that is different.

<table>
<thead>
<tr>
<th>Same</th>
<th>Different</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
</tbody>
</table>

**Compare and contrast** the phases of Meiosis I and Meiosis II.

*Sketch each phase.*

<table>
<thead>
<tr>
<th>Meiosis I</th>
<th>Prophase I</th>
<th>Metaphase I</th>
<th>Anaphase I</th>
<th>Telophase I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sketch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Meiosis II</th>
<th>Prophase II</th>
<th>Metaphase II</th>
<th>Anaphase II</th>
<th>Telophase II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sketch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Analyze** the chart above to determine the phase of meiosis when crossing over can occur. Mark a star on the correct phase.
**Main Idea**

**Sexual Reproduction v. Asexual Reproduction**

*I found this information on page ____________.*

**Details**

**Compare** *meiosis and mitosis* by filling in the chart below.

<table>
<thead>
<tr>
<th></th>
<th>Mitosis</th>
<th>Meiosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of DNA replications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of cell divisions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of daughter cells</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chromosome number of daughter cells</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Organize** *information on how meiosis produces genetic variation.*

Meiosis produces ____________________________

**Compare** *sexual reproduction and asexual reproduction* by completing the paragraph with the terms below.

- sexual reproduction • protists • animals • genes
- asexual reproduction • mammals • plants • genetic diversity

In _________________________, an organism inherits its genetic material from a single parent. The new organism has the same ________ as its parent. In _________________________, an organism inherits genetic material from two different parents. Sexual reproduction increases _________________________, whereas asexual reproduction does not. ________, simple ________, and most ________ can reproduce sexually or asexually. ________ only reproduce sexually.

**Summarize**

Explain how meiosis and fertilization produce genetic variation during sexual reproduction.

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________
Sexual Reproduction and Genetics

Section 10.2 Mendelian Genetics

**Main Idea**

**Details**

**Skim** Section 1 of the chapter, and then write two questions that come to mind from reading the headings and illustration captions.

1. 

2. 

**Review Vocabulary**

Use your book or dictionary to define segregation.

**New Vocabulary**

Use terms in the left margin to complete the paragraph below.

is the branch of biology that studies how traits are inherited. offspring result from parents that have different forms of for certain traits. Mendel’s states that every individual has two alleles of each gene and when gametes are produced, each gamete receives one of these alleles. Mendel’s states that genes for different traits are inherited independently of each other.

**Compare and contrast each pair of terms by defining them and/or noting their differences.**

<table>
<thead>
<tr>
<th>dominant trait</th>
<th>recessive trait</th>
</tr>
</thead>
<tbody>
<tr>
<td>genotype</td>
<td>phenotype</td>
</tr>
<tr>
<td>heterozygous</td>
<td>homozygous</td>
</tr>
<tr>
<td>homozygous</td>
<td>heterozygous</td>
</tr>
</tbody>
</table>
Describe how a plant self-pollinates.

Infer why Mendel used cross-pollination to study inheritance.

Analyze Mendel’s experiment with green-seed and yellow-seed pea plants by completing this summary paragraph.

Mendel used only ______ lines, which consistently produced the same trait in the offspring. He controlled variables by __________________________. When he crossed a green-seed plant with a yellow-seed plant, the F₁ offspring were ______ percent yellow and ______ percent green. He allowed the F₁ plants to __________ to produce _______ plants. The F₂ plants were ______ percent yellow and ______ percent green. Mendel concluded that each trait has two forms, called ______________. Mendel called yellow seed color the __________ form and green seed color the __________ form of the trait.

Compare genotypes and phenotypes for pea plants.

<table>
<thead>
<tr>
<th>Genotype</th>
<th>Homozygous or Heterozygous</th>
<th>Phenotype</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>homozygous</td>
<td></td>
</tr>
<tr>
<td></td>
<td>heterozygous</td>
<td></td>
</tr>
<tr>
<td>yy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section 10.2  Mendelian Genetics (continued)

**Main Idea**

I found this information on page ________.

**Details**

**Demonstrate** the law of independent assortment by listing the 4 alleles that are produced when a pea plant with the genotype RrYy produces gametes.

1. ___  2. ___  3. ___  4. ___

**Punnett Squares and Probability**

I found this information on page ________.

**Complete** the Punnett squares for height in the F₁ and F₂ generations. Tall plants (T) are dominant over short plants (t). Write the expected genotypes and the probability for each.

<table>
<thead>
<tr>
<th></th>
<th>F₁</th>
<th></th>
<th>F₂</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>t</td>
<td>T</td>
<td>T</td>
<td>t</td>
<td></td>
</tr>
<tr>
<td>t</td>
<td></td>
<td>t</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Identify** the genotypes within the Punnett square showing the dihybrid cross of seed color and seed texture. The first row has been done for you. Write the expected phenotypic ratio.

<table>
<thead>
<tr>
<th></th>
<th>YR</th>
<th>yR</th>
<th>Yr</th>
<th>yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>YR</td>
<td>YYRR</td>
<td>YyRR</td>
<td>YYRr</td>
<td>YyRr</td>
</tr>
<tr>
<td>yR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yr</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yr</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Phenotypic ratio: ____________________________

**SUMMARIZE**

Discuss the effects of Mendel’s two laws (segregation and independent assortment). Give an example.
Sexual Reproduction and Genetics

Section 10.3 Gene Linkage and Polyploidy

Main Idea

Scan the headings, boldfaced words, pictures, figures, and captions in Section 3.

- Read all section titles.
- Read all boldfaced words.
- Look at all pictures and read the captions.
- Look at all figures.
- Read all captions.

Predict three things that you think will be discussed.

1. ________________________________
   ________________________________

2. ________________________________
   ________________________________

3. ________________________________
   ________________________________

Review Vocabulary

Use your book or dictionary to define protein.

protein

New Vocabulary

Use your book or dictionary to define each term.

genetic recombination

polyplody
Section 10.3 Gene Linkage and Polyploidy (continued)

Main Idea

Genetic Recombination

I found this information on page __________.

Details

Calculate the number of chromosome combinations due to independent assortment by filling in the chart. Use the formula $2^n$. The first one has been done for you.

<table>
<thead>
<tr>
<th>Species</th>
<th>Chromosome Number ($n$)</th>
<th>Possible Combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pea</td>
<td>7</td>
<td>$2^7 = 128$</td>
</tr>
<tr>
<td>Housefly</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Cabbage</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Fruit fly</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Frog</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

Gene Linkage and Chromosome Maps

I found this information on page __________.

Summarize at least five pieces of information about genetic recombination by creating a concept map below.
Complete the paragraph about gene linkage.
- chromosomes  farther  inherited  sequence
- crossing over  individual genes  linked

Genes close together on the same chromosome are ______.
Linked genes are usually ______ together. ____________, not ____________, follow Mendel’s law of independent assortment. Linked genes might become separated, as a result of ____________. Crossing over is more likely to happen if genes are ______ apart on a chromosome.

Analyze whether the gene linkage is an exception to, or an example of, Mendel’s law of independent assortment. Use an example from your book.

Identify four species that show polyploidy.
1. ________________  3. ________________
2. ________________  4. ________________

Compare and contrast gene linkage to polyploidy and how they do not follow all of Mendel’s laws of inheritance.
Complex Inheritance and Human Heredity

Before You Read

Use the “What I Know” column to list the things you know about human heredity and genetics. Then list the questions you have about these topics in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>W</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What I Know</strong></td>
<td><strong>What I Want to Find Out</strong></td>
<td><strong>What I Learned</strong></td>
</tr>
</tbody>
</table>

Describe how you think a child’s DNA is different from his or her mother’s DNA and father’s DNA.

---

---

---

---

---

---
Complex Inheritance and Human Heredity
Section 1.1 Basic Patterns of Human Inheritance

Main Idea

Detailed

Skim and Scan Section 1 of the chapter. Use the checklist as a guide.

Read all section titles.

Read all boldfaced words.

Read all tables and graphs.

Look at all pictures and read the captions.

Think about what you already know about patterns of heredity and human genetics.

Write three facts you discovered about patterns of heredity and human genetics as you scanned the section.

1. ____________________________________________________________

2. ____________________________________________________________

3. ____________________________________________________________

Review Vocabulary

Use your book or dictionary to define genes.

New Vocabulary

Use your book or dictionary to define each vocabulary term.

carrier

pedigree

Academic Vocabulary

Define decline to show its scientific meaning.

genes

carrier

pedigree

decline

Explain why pedigrees are needed to identify the carriers of a recessive trait in a family.
Section 11.1 Basic Patterns of Human Inheritance (continued)

**Main Idea**

**Recessive Genetic Disorders**

I found this information on page __________.

**Details**

Write three facts about recessive heredity in the concept map.

- Simple Recessive Heredity
  - Who:
  - What:
  - How:

**Dominant Genetic Disorders**

I found this information on page __________.

Identify two examples of dominant genetic disorders in humans.

dominant genetic disorders

Summarize the facts about Huntington’s disease by completing the concept map below.

- There is no effective __________.
- A __________ analysis could help people better understand their own risks and the risks to their __________.
- The disease causes a breakdown in __________ __________.
- The disease is caused by a __________ __________.
- The symptoms don’t appear until a person is between the ages of ____ and ____.
Main Idea

Pedigrees

I found this information on page ____________

Analyzing Pedigrees

I found this information on page ____________

Details

Summarize pedigree symbols by naming them and then drawing them in the right-hand column of the table. Sketches should resemble those in the book.

<table>
<thead>
<tr>
<th>Description of Symbol</th>
<th>Sketch of Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>male</td>
<td>square</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Evaluate the inheritance of achondroplasia shown in the pedigree.

Parent with achondroplasia: __________________________

Number of children with achondroplasia: __________________

Genotype of the younger son: __________________________

Connect

Create a pedigree diagram for an imaginary family. Pick a trait and designate it as dominant, then shade the boxes to show who has recessive genes, who has dominant genes, and who is likely heterozygous.
Complex Inheritance and Human Heredity
Section 11.2 Complex Patterns of Inheritance

Main Idea

Details

Skim Section 2 of the chapter. Write two questions that come to mind from reading the headings and illustration captions.

1. 

2. 

New Vocabulary

Use your book or dictionary to define gamete.

Use your book or dictionary to define each term.

- autosomes
- codominance
- epistasis
- incomplete dominance
- multiple alleles
- polygenic trait
- sex chromosomes
- sex-linked traits
Section 11.2 Complex Patterns of Inheritance (continued)

**Main Idea**

**Incomplete Dominance**

I found this information on page __________.

**Codominance**

I found this information on page __________.

**Multiple Alleles**

I found this information on page __________.

**Details**

**Analyze** the ratios of offspring of the following snapdragon pairs. 
*Hint*: To write the genotypes, designate the dominant red allele as R and the recessive white allele as r.

<table>
<thead>
<tr>
<th>Parent Flowers</th>
<th>Genotypes of Parent Flowers</th>
<th>Punnett Square</th>
<th>Ratio of Offspring</th>
</tr>
</thead>
<tbody>
<tr>
<td>red and white</td>
<td>RR × rr</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td></td>
<td>r</td>
<td>Rr</td>
</tr>
<tr>
<td></td>
<td></td>
<td>r</td>
<td>Rr</td>
</tr>
<tr>
<td>pink and white</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>red and pink</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pink and pink</td>
<td>×</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Epistasis, Sex Determination, Dosage Compensation, Sex-Linked Traits, and Polygenic Traits

I found this information on page ___________.

Environmental Influences

I found this information on page ___________.

Twin Studies

I found this information on page ___________.

Connect

Think of some traits in people, plants, or animals. Describe one trait and tell whether you think the trait is a dominant/recessive, multiple allele, codominant, incompletely dominant, sex-linked, or polygenic trait. Explain your reasoning.
Complex Inheritance and Human Heredity

Section 11.3 Chromosomes and Human Heredity

Main Idea

**Organize Information** Make a list of some physical characteristics that appear in your family members or friends. Try to determine how each trait is inherited by examining its inheritance pattern.

Details

Review Vocabulary

*Use your book or dictionary to define mitosis.*

mitosis

New Vocabulary

*Use your book or dictionary to define the following terms.*

nondisjunction

telomere

Define karyotype and describe its use. Then make a sketch of a human karyotype in the space below.

karyotype
Main Idea

Karyotype Studies
I found this information on page ________.

Details

Sequence how a scientist makes a karyotype.

1.  

2.  

3.  

4.  

Compare and contrast karyotype studies and pedigrees by writing characteristics in the Venn diagram.

Telomeres
I found this information on page ________.

Describe telomeres by completing the paragraph.

Telomeres are made of _________ and _________.
They are located at ____________________________.
Their function is ____________________________.
Main Idea

Nondisjunction

I found this information on page __________.

Details

Model a picture showing the ways that nondisjunction during meiosis can produce a sex cell with an extra copy of a chromosome.

Model a karyotype of a boy with Down's syndrome.

Fetal Testing

I found this information on page __________.

Summarize the following facts about fetal testing.

• how an abnormal number of chromosomes is identified

• four possible results of abnormal chromosome numbers

Summarize

Analyze how nondisjunction during meiosis could lead to Klinefelter's syndrome.
Molecular Genetics

Before You Read

Before you read the chapter, respond to these statements.
1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Molecular Genetics</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• James Watson and Francis Crick discovered that DNA was the genetic material.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• DNA replication is the same in prokaryotes and eukaryotes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Information in a cell flows from DNA to RNA to protein.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• A mutation is a permanent change in a cell’s DNA.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Science Journal

Ponies on the Shetland Islands in Scotland have short stature, thick hair, strength, and hardiness so they can thrive in their harsh environment. How do you think the DNA of their population has changed over time?
Molecular Genetics
Section 12.1 DNA: The Genetic Material

**Main Idea**

**Details**

Scan Section 1 of the chapter. Identify the results of three DNA experiments.

1. 
2. 
3. 

Use your book or dictionary to define nucleic acid.

**Review Vocabulary**

nucleic acid

**New Vocabulary**

Use your book or dictionary to define each term. In the box to the right, make a sketch to help you remember each term.

double helix

nucleosome

**Academic Vocabulary**

Define transform to show its scientific meaning.

transform
Main Idea — Discovery of the Genetic Material

I found this information on page _______.

Details — Complete the table below about geneticists and their discoveries.

<table>
<thead>
<tr>
<th>Scientist</th>
<th>Discovery</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fredrick Griffith</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oswald Avery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alfred Hershey and Martha Chase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>James Watson and Francis Crick</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Main Idea — DNA Structure

I found this information on page _______.

Details — Organize the characteristics of nucleotides by filling in the graphic organizer below.

Characteristics of Nucleotides

- All nucleotides have
  - a five-carbon
  - a negative
  - one of four

In DNA it is

and in RNA it is

In DNA they are

and in RNA they are
Section 12.1 DNA: The Genetic Material (continued)

**Main Idea**

I found this information on page ____________.

**Create** a memory device to help you remember how the nitrogenous bases are always paired.

**Analyze** the DNA molecule by explaining how each word applies to the molecule. Use a sketch to back up your explanation in each case.

<table>
<thead>
<tr>
<th>Word and What It Means</th>
<th>Sketch of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>complementary:</td>
<td></td>
</tr>
<tr>
<td>helix:</td>
<td></td>
</tr>
<tr>
<td>double (as in “double helix”):</td>
<td></td>
</tr>
</tbody>
</table>

**Synthesize and rephrase** how a DNA strand that is 200 million bases long can fit inside a cell.

**Chromosome Structure**

I found this information on page ____________.

**State how Watson and Crick’s DNA structure supported Chargaff’s rules.**

---

120  Molecular Genetics
Scan Section 2 of the chapter. Write three questions that come to mind from reading the headings and the illustration captions.

1. 
2. 
3. 

Use your book or dictionary to define template.

Use your book or dictionary to define the following terms. Then look through the section to find a sentence with each term. Write the sentence.

**DNA polymerase**

**Okazaki fragment**

**semiconservative replication**
Section 12.2 Replication of DNA (continued)

Main Idea

Semiconservative Replication

I found this information on page _________.

Details

Describe semiconservative DNA replication.

<table>
<thead>
<tr>
<th>Model</th>
<th>During replication, the parental strands</th>
<th>The new DNA molecule is composed of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semiconservative replication</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sequence and model each step in the replication of a DNA molecule. Write about what happens, and draw a DNA molecule going through each step. In the last box, describe and draw the products of replication.

A.                                  B.                                      

C.                                  D.                                      

Analyze how a DNA molecule acts like a template.
Complete the table below on the role of each protein in DNA replication. The first one has been done for you.

<table>
<thead>
<tr>
<th>Protein</th>
<th>Stage of DNA Replication</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNA helicase</td>
<td>unwinding</td>
<td>unwinds and unzips the DNA</td>
</tr>
<tr>
<td>DNA ligase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DNA polymerase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RNA primase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single-stranded binding protein</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comparing DNA Replication in Eukaryotes and Prokaryotes

Contrast the differences between prokaryotic and eukaryotic DNA replication.

<table>
<thead>
<tr>
<th></th>
<th>Eukaryotes</th>
<th>Prokaryotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of origins for DNA replication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Where replication takes place in the cell</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summarize

Analyze how the activity of DNA polymerase is consistent with Watson and Crick’s model of semiconservative replication.
Scan the headings and boldfaced words for the section. Predict two things that you think might be discussed.

1. 

2. 

Use your book or dictionary to define synthesis.

Write the correct term in the left column for each definition below.

process in which RNA is synthesized from DNA

a group of three nitrogenous bases in DNA or mRNA that code for one amino acid

nucleic acid made of ribose, phosphate, and one of four nitrogenous bases—adenine, cytosine, guanine, or uracil

intervening DNA sequences that are transcribed and then removed from the final mRNA

process by which mRNA directs the synthesis of a protein

long strands of RNA that are complementary to one strand of DNA

protein coding sequences in DNA that are transcribed into mRNA and translated into protein

small RNA molecules that transport amino acids to the ribosome

an enzyme that catalyzes the synthesis of mRNA using DNA as a template

RNA molecules that make up part of the ribosome
Section 12.3 DNA, RNA, and Protein (continued)

**Main Idea**

**Central Dogma**

I found this information on page _________.

**Details**

**Compare and contrast** RNA and DNA by writing at least five characteristics of their structure and composition in the Venn diagram.

```
RNA          Both         DNA
```

**State** the central dogma of biology.

RNA codes for DNA directs the synthesis of _________.

**Compare** the function of each type of RNA molecule by completing the table.

<table>
<thead>
<tr>
<th>Type of RNA</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>mRNA</td>
<td></td>
</tr>
<tr>
<td>rRNA</td>
<td></td>
</tr>
<tr>
<td>tRNA</td>
<td></td>
</tr>
</tbody>
</table>

**Sequence** the steps in transcription of RNA.
Section 12.3 DNA, RNA, and Protein (continued)

**Main Idea**

The Code, One Gene—One Enzyme

*I found this information on page ________.*

**Details**

**Identify** four examples of codons and state the instructions they encode.

1. ____________________________

2. ____________________________

3. ____________________________

4. ____________________________

**Model** the movement of tRNA molecules showing the translation process.

____________

**State** the updated version of Beadle and Tatum’s hypothesis.

__________________________ codes for ____________________________

**Summarize**

Create a flow chart to describe the formation of a protein.

Describe the activities of DNA and the three types of RNA.
Scan the illustrations and tables in Section 3. Predict the effect of mutations on organisms.

**Review Vocabulary**

Use your book or dictionary to define prokaryote.

prokaryote

**New Vocabulary**

Use your book or dictionary to define the following terms.

gene regulation

mutagen

mutation

operon

**Academic Vocabulary**

Define substitution and write a sentence to show its scientific meaning.

substitution
Section 12.4 Gene Regulation and Mutation (continued)

**Main Idea**

**Prokaryote Gene Regulation**

I found this information on page ____________.

**Details**

Describe gene regulation in prokaryotes by using the terms below to complete the paragraph.

- *E. coli*  
- environment  
- genes  
- metabolic pathway  
- operator  
- promoter  
- proteins  
- repressor  
- RNA polymerase

An operon is a cluster of genes in ______________. These genes make _______________ that work together in one _______________. An operon is able to respond to changes in the _______________. The _______________ is a segment of DNA that acts as a switch for transcription, turning the operon on or off. When the operon is on, [RNA polymerase] binds to the _______________ and transcribes the DNA. When the operon is off, a _______________ blocks transcription.

Compare and contrast the *trp* operon and the *lac* operon.

<table>
<thead>
<tr>
<th></th>
<th><em>Trp Operon</em></th>
<th><em>Lac Operon</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Responds to the presence of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transcription is turned on when</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The repressor is active when</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When the operon is turned on, the cell can</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analyze the ways eukaryotes control gene expression.

<table>
<thead>
<tr>
<th>Molecule</th>
<th>Effect on Gene Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hox genes</td>
<td></td>
</tr>
<tr>
<td>Nucleosomes</td>
<td></td>
</tr>
<tr>
<td>Small interfering RNA</td>
<td></td>
</tr>
<tr>
<td>Transcription factors</td>
<td></td>
</tr>
</tbody>
</table>
Section 12.4 Gene Regulation and Mutation (continued)

**Main Idea**

*Mutations*

I found this information on page ____________.

**Details**

**Compare and contrast** a point mutation and a frameshift mutation by defining each mutation and stating its consequence.

<table>
<thead>
<tr>
<th>Point mutation happens when</th>
<th>consequence:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frameshift mutation occurs when</th>
<th>consequence:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Analyze** each type of DNA mutation and its result. Sketch what each change might look like.

<table>
<thead>
<tr>
<th>Mutation</th>
<th>Result</th>
<th>Sketch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missense mutation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonsense mutation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chromosome rearrangement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chromosome deletion</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SUMMARIZE**

Discuss why a mutagen can have longer-lasting effects in a sex cell than in a body cell.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Create a concept web to tie together what you learned in this chapter about molecular genetics. Hint: You might find it easier to first list the facts or topics you want to include, then decide how to connect them in the web.
Genetics and Biotechnology

Before You Read

Before you read the chapter, respond to these statements.
1. Write an A if you agree with the statement.
2. Write an D if you disagree with the statement.

Before You Read | Genetics and Biotechnology | After You Read
--- | --- | ---
• Hybridization is a type of selective breeding. |  |
• Genetic engineering is the process of breeding animals for desired traits. |  |
• Polymerase chain reaction is a way to make millions of copies of a fragment of DNA. |  |
• Scientists have determined the sequence of all human DNA. |  |

Science Journal

Describe two examples of genetic technology that have affected your life or that you have read about in the news.
Genetics and Biotechnology
Section 13.1 Applied Genetics

Main Idea

Scan Section 1 of the chapter. Use the checklist as a guide.

☐ Read all section titles.
☐ Read all boldfaced words.
☐ Read all tables and graphs.
☐ Look at all pictures and read the captions.

Write three facts you discovered about genetic technology.
1. _________________________________________________________
2. _________________________________________________________
3. _________________________________________________________

Review Vocabulary
Use your book or dictionary to define hybrid.

hybrid

New Vocabulary
Use your book or dictionary to define each term. Then look through the section to find a sentence with each term and write the sentence.

inbreeding

selective breeding

test cross
**Main Idea**

**Selective Breeding**

*I found this information on page _______.*

**Details**

**Summarize** selective breeding by completing the prompts.

**Goal:** ____________________________________________

**Example:** _________________________________________

The offspring of parents that have different forms of a trait:

__________________________.

Two different types of selective breeding:

__________________________ and ________________________.

**Analyze** inbreeding and hybridization by identifying the effect, an advantage, and a disadvantage of each.

**Inbreeding**

- advantage: __________________________
- effect: ____________________________
- disadvantage: ______________________

**Hybridization**

- advantage: __________________________
- effect: ____________________________
- disadvantage: ______________________
Test Cross

I found this information on page ___________.

Analyze the use of a test cross to determine the genotype of a yellow flower by completing the prompts. The first one has been done for you.

The genotype of the white flower: YY

Possible genotypes of the yellow flower: ________________

<table>
<thead>
<tr>
<th></th>
<th>Possible Phenotypes</th>
<th>Possible Genotypes</th>
</tr>
</thead>
<tbody>
<tr>
<td>offspring if the yellow flower is heterozygous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>offspring if the yellow flower is homozygous</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Create a Punnett Square that shows the result of each test cross.

Heterozygous: 

Homozygous: 

Summarize how test crosses work by using the words genotype and phenotype to complete the sentence.

In a test cross, the ___________ of the offspring can reveal the ___________ of the parents.

Connect

Selective breeding practices have been used since ancient times. Provide specific examples where selective breeding has resulted in plants or animals that are familiar to us today.
Scan Section 2 of the chapter. Write two questions that come to mind from reading the headings and illustration captions.

1. 

2. 

Use your book or dictionary to define DNA.

Use your book or dictionary to define each term.

DNA

method of manipulating DNA from one organism and inserting the DNA fragment into a host organism of the same or different species

the total DNA present in the nucleus of each cell

bacterial enzyme that can cut foreign DNA at a specific nucleotide sequence

a method of separating DNA fragments by size with the use of an electric current

DNA made by recombining fragments of DNA from different sources

small, circular, double-stranded DNA found in bacterial cells and used as a vector

an enzyme that is used to join DNA fragments; used by the cell for DNA repair and replication

a method for getting plasmid DNA into bacterial cells

the process of creating a genetically identical copy of an organism or gene

a technique for making millions of copies of a specific region of DNA

organism that contains functional recombinant DNA from a different organism
Genetic Engineering

I found this information on page _________.

Identify one transgenic organism from this chapter. Describe how it was created. Then use your imagination to think of another possible transgenic organism that could be made and identify the original organisms that could be used to make it.

Complete the paragraph about DNA tools by using the words below.

- blunt ends
- Eco RI
- restriction enzymes
- gel electrophoresis
- sticky ends

Scientists use _____________ to cut DNA at specific sequences, and _____________ to separate fragments based on size. Some _____________ create DNA with single-stranded, _____________. _____________ is an example of this type of enzyme. The resulting DNA fragments can be joined with other DNA fragments that have complementary _____________. Other _____________ create _____________, which can be joined to another DNA fragment that has _____________.

Compare the DNA tools and techniques used in genetic engineering.

<table>
<thead>
<tr>
<th>Genetic Engineering Application</th>
<th>Tool or Technique Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make millions of copies of a region of DNA</td>
<td></td>
</tr>
<tr>
<td>Determine the order of nucleotides</td>
<td></td>
</tr>
<tr>
<td>Chemically join together two fragments of DNA</td>
<td></td>
</tr>
<tr>
<td>Carry recombinant DNA into bacteria</td>
<td></td>
</tr>
<tr>
<td>Produce large amounts of recombinant DNA</td>
<td></td>
</tr>
</tbody>
</table>
Section 13.2 DNA Technology (continued)

Main Idea

I found this information on page ________.

Details

Describe the functions of the components of PCR.

- thermocycler: ________________________________
- primers: ________________________________
- nucleotides: ________________________________
- DNA polymerase: ________________________________

Biotechnology

I found this information on page ________.

Organize advances that have been made in transgenic organisms.

<table>
<thead>
<tr>
<th>Area</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>transgenic animals</td>
<td></td>
</tr>
<tr>
<td>transgenic plants</td>
<td></td>
</tr>
<tr>
<td>transgenic bacteria</td>
<td></td>
</tr>
</tbody>
</table>

Summarize the uses of genetic technology.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Scan Section 3 of the chapter. Use the checklist as a guide.

☐ Read all section titles.
☐ Read all boldfaced words.
☐ Look at all illustrations and read the captions.

Write three facts you discovered as you scanned the section.
1. 
2. 
3. 

New Vocabulary

Use your book or dictionary to define each term.

bioinformatics

DNA microarray

haplotype

pharmacogenomics

single nucleotide polymorphism

Academic Vocabulary

Define sequence to show its scientific meaning. Write a sentence using sequence.

sequence
Section 13.3 The Human Genome (continued)

**Main Idea**

**The Human Genome Project**

*I found this information on page __________.*

**Details**

**Sequence** the steps in gene sequencing by writing the steps in order.

- [ ]
- [ ]
- [ ]
- [ ]

**Organize** three applications of DNA fingerprinting.

- DNA fingerprinting

**Identifying Genes**

*I found this information on page __________.*

**Identify** different ways to find genes in DNA sequences. Name the organisms for which each method is used.

<table>
<thead>
<tr>
<th>Method for identifying genes</th>
<th>Organism</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Genetics and Biotechnology* 139
**Main Idea**

Bioinformatics, DNA Microarrays, The Genome and Genetic Disorders, Genomics and Proteomics

I found this information on page 140.

**Details**

Organize the techniques that have arisen in the age of genomics. Give one benefit or application for each technique. The first one has been done for you.

<table>
<thead>
<tr>
<th>Description</th>
<th>Technique</th>
<th>Application or Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>inserting recombinant DNA into human cells to treat diseases</td>
<td>gene therapy</td>
<td>might someday be used to cure genetic diseases</td>
</tr>
<tr>
<td>slides or chips used to analyze complex changes in gene expression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>an international effort to describe regions of linked variations in the human genome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the study of how to manage large amounts of biological information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the study of all of the DNA in the genome of an organism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the study and cataloging of an organism’s proteins</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the study of how to match a person’s genetics to the drugs they are prescribed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Summarize**

Discuss the applications of genetic technology that you think might affect your life in the future and the limitations you think there will be on DNA technology.

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
The History of Life

Before You Read

Use the “What I Know” column to list the things you know about the history of life. Then list the questions you have about the history of life in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I Know</th>
<th>W</th>
<th>What I Want to Find Out</th>
<th>L</th>
<th>What I Learned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Science Journal

Think about early life on Earth. Describe the physical conditions that needed to be present in order for life to begin to form.

---

---

---
The History of Life
Section 14.1 Fossil Evidence of Change

Main Idea

Details

Skim Section 1 of the chapter. Write two questions that come to mind from reading the headings and the illustration captions.

1. ____________________________
2. ____________________________

Review Vocabulary

Use your book or dictionary to define extinction.

New Vocabulary

Use the terms in the left column to complete the paragraph below.

Scientists measure Earth’s geological and biological events using the ________________, which is divided into __________ and __________. The ________________ is the name of a period of rapid change during which the ancestors of most animal groups emerged. A layer of soot found between rock layers worldwide, known as the ________________, might indicate that a large meteorite collided with Earth.

The theory of ______________ describes Earth’s surface as large plates that move over Earth’s thick, liquid interior. These plates are made up of various types of rocks. ______________ are scientists who study __________. They determine the relative age of rocks using ______________, which compares the sequence of rock layers. The ______________ states that younger rock layers are deposited on top of older rock layers. Another method of determining the age of rocks is ______________, which measures the decay of radioactive isotopes. The rate of decay can be measured using ______________, the amount of time required for half of a radioactive isotope to decay.
Earth’s Early History

I found this information on page ___________.

Sequence the organizer below by listing the order of events that led to the formation of life in the oceans. The last step has been done for you.

Volcanoes erupted, giving off gases and forming the early atmosphere.

Clues in Rocks

I found this information on page ___________.

Identify three types of materials in which fossils are found.

1. ________________________________________
2. ________________________________________
3. ________________________________________

Compare relative and radiometric dating using the table below. Provide three facts for each type of dating.

<table>
<thead>
<tr>
<th>Relative Dating</th>
<th>Radiometric Dating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
<td>3.</td>
</tr>
</tbody>
</table>
### The Geologic Time Scale

**Main Idea**

Summarize the four eras of the geologic time scale using the table below.

<table>
<thead>
<tr>
<th>Geologic Era</th>
<th>Major Biological Events</th>
<th>Organisms that Appeared</th>
<th>Other Facts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>unicellular life,</td>
<td>includes Earth’s formation, almost</td>
</tr>
<tr>
<td></td>
<td></td>
<td>eukaryotic cells,</td>
<td>90% of Earth’s entire history</td>
</tr>
<tr>
<td></td>
<td></td>
<td>small marine animals</td>
<td></td>
</tr>
<tr>
<td>Cambrian</td>
<td>Cambrian explosion at</td>
<td>dinosaurs, small</td>
<td></td>
</tr>
<tr>
<td></td>
<td>beginning of Paleozoic,</td>
<td>mammals, flowering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>mass extinction at end</td>
<td>plants, birds</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>following extinction of</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>dinosaurs, mammals</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>diversify</td>
<td></td>
</tr>
</tbody>
</table>

**Details**

Rephrase the current theory on the cause of the mass extinction at the end of the Mesozoic era.

Discuss how palentologists use relative and radiometric dating to support the geologic timescale.
The History of Life
Section 14.2 The Origin of Life

Main Idea

Details

Scan Section 2 of the chapter. Use the checklist as a guide.

☐ Read all section titles.
☐ Read all boldfaced words.
☐ Look at all pictures and read the captions.
☐ Think about what you already know about the history of life.

Write three facts you discovered about the origin of life.

1. 
2. 
3. 

Review Vocabulary

Use your book or dictionary to define amino acid. Use the term in a sentence to show its scientific meaning.

amino acid

New Vocabulary

Use your book or dictionary to define each term.

dendosymbiott theory

spontaneous generation

toey of biogenesis

Academic Vocabulary

Define mechanism to show its scientific meaning.

mechanism
Create a cartoon that illustrates how Redi’s experiment was used to disprove spontaneous generation.

Compare spontaneous generation and biogenesis.

Model Oparin’s primordial soup hypothesis for the formation of simple organic molecules by filling in the graphic organizer below.

Identify four requirements for life using the concept map below.
Section 14.2 The Origin of Life (continued)

Main Idea

Cellular Evolution

I found this information on page _______.

Details

Sequence how oxygen accumulated in the atmosphere and the effect it had on life by completing the flowchart below.

- little oxygen in atmosphere; all living things are anaerobic
- 
- ozone layer forms

Identify three properties that mitochondria and chloroplasts share with prokaryotes.

1. ____________________________

2. ____________________________

3. ____________________________

Analyze the endosymbiont theory of the evolution of plant cells by completing the sequence chart.

- bacteria evolved into mitochondria
- 
- 

Summarize

Analyze how the four requirements for life were identified by scientists.

____________________________________

____________________________________

____________________________________

____________________________________

____________________________________

____________________________________
Write an analogy to explain the difference between radiometric and relative dating. Develop a second analogy to explain the endosymbiont theory.

**Analogy of dating methods used by palentologists:**

**Analogy of endosymbiont theory:**
Use the “What I Know” column to list the things you know about evolution. Then list the questions you have about evolution in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I Know</th>
<th>W</th>
<th>What I Want to Find Out</th>
<th>L</th>
<th>What I Learned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Life has evolved slowly on Earth. Certain organisms evolved in response to changes in their environment. Describe an adaptation of an organism that you see around you. How has the organism become better suited to its environment as a result of this adaptation?

---

- Life has evolved slowly on Earth. Certain organisms evolved in response to changes in their environment. Describe an adaptation of an organism that you see around you. How has the organism become better suited to its environment as a result of this adaptation?

---

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---

- Life has evolved slowly on Earth. Certain organisms evolved in response to changes in their environment. Describe an adaptation of an organism that you see around you. How has the organism become better suited to its environment as a result of this adaptation?
Evolution

Section 15.1 Darwin’s Theory of Natural Selection

Main Idea

Skim Section 1 of the chapter. Write three questions that come to mind from reading the headings and illustration captions.

1. 

2. 

3. 

Details

Use your book or dictionary to define selective breeding.

Review Vocabulary

selective breeding

Use your book or dictionary to define each term.

New Vocabulary

artificial selection

evolution

natural selection

Write a short paragraph that uses at least two of the terms above.

____________________________________

____________________________________

____________________________________

____________________________________

____________________________________

____________________________________

____________________________________

____________________________________

____________________________________
Section 15.1 Darwin’s Theory of Natural Selection (continued)

**Main Idea**

Developing the Theory of Natural Selection

I found this information on page _______.

**Details**

Summarize three observations Darwin made in his research on the South American mainland.

1. ______________________________________
2. ______________________________________
3. ______________________________________

Identify three organisms from the Galápagos Islands and their distinguishing characteristics.

<table>
<thead>
<tr>
<th>Organism</th>
<th>Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analyze Darwin’s hypothesis on the origin of Galápagos finches by filling in the flow chart. The first step has been done for you.

Finches migrate from South America to the Galápagos islands.

Summarize three observations that Darwin made in his research with pigeons.

1. ______________________________________
2. ______________________________________
3. ______________________________________
Section 15.1 Darwin’s Theory of Natural Selection (continued)

Main Idea
I found this information on page ___________.

Details
Identify the four principles of natural selection.

1. ________________________________
2. ________________________________
3. ________________________________
4. ________________________________

Summarize natural selection by completing the sentences below.

Organisms with ________ traits are able to ________ and pass their traits on to their ________, who then reproduce.

Those without such favorable traits are more likely to ________ before reproducing.

The Origin of Species
I found this information on page ___________.

Sequence the events that led to the publication of Darwin’s ideas.

<table>
<thead>
<tr>
<th>Darwin begins work on a book describing</th>
<th>In 1858, Darwin and ________ present their findings on ________ to the scientific community.</th>
<th>In 1859, Darwin publishes a book titled ________</th>
</tr>
</thead>
</table>

Summarize
Discuss Darwin’s different observations that led him to propose the theory of natural selection.

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
## Evolution

### Section 15.2 Evidence of Evolution

**Main Idea**

Scan Section 2 of the chapter. List the lines of evidence that support Darwin’s theory of evolution by natural selection.

**Details**

---

**Review Vocabulary**

Use your book or dictionary to define fossil.

- **fossil**

**New Vocabulary**

Use your book or dictionary to define the following terms.

- **analogous structures**
- **ancestral trait**
- **biogeography**
- **camouflage**
- **derived trait**
- **embryo**
- **fitness**
- **homologous structures**
- **mimicry**
- **vestigial structure**
Summarize the role that anatomy plays in teaching us about evolution by completing the table below.

<table>
<thead>
<tr>
<th>Structure</th>
<th>What is it?</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homologous structure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analogous structure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vestigial structure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embryo</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Identify ways scientists interpret relationships among species by completing the organizer below.
Section 15.2 Evidence of Evolution (continued)

Main Idea

Adaptation

I found this information on page ________.

Details

Compare similarities and differences between adaptations and non-adaptations by writing yes or no in the table. Then give an example of an adaptation and a non-adaptation.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Adaptations</th>
<th>Non-Adaptations</th>
</tr>
</thead>
<tbody>
<tr>
<td>inherited traits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>increase survival or reproduction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>by-product arising from other evolutionary changes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example:

Apply Give examples of how animals use camouflage and mimicry in order to protect themselves. Use examples that are not given in your book.

Camouflage

Mimicry

Structural Adaptations

Analyze how antibiotics can lose their effectiveness over time.

Summarize Explain why fossils are important tools in understanding evolution.
**Evolution**

Section 15.3 Shaping Evolutionary Theory

**Main Idea**

**Scan** Section 3 of the chapter. Write two facts that you discover.

1. ________________________________

2. ________________________________

**Details**

**Review Vocabulary**

*Use your book or dictionary to define allele.*

**New Vocabulary**

*Write the correct vocabulary term in the left column for each definition below.*

allele frequencies remain the same unless acted upon by a factor

random evolution that occurs in a small, separate subpopulation

process of a large population declining in number then rebounding to a large number again

mechanism that operates before fertilization occurs

change in the allele frequencies in a population by chance

selection which removes organisms with extreme expressions of a trait

mechanism that operates after fertilization occurs to ensure that resulting hybrid remains infertile

selection which shifts a population toward an extreme trait

selection which removes individuals with average traits

change in a trait based on competition for mates

speciation in the presence of a barrier

speciation without any barriers
Section 15.3 Shaping Evolutionary Theory (continued)

**Main Idea**

Mechanisms of Evolution

* I found this information on page __________.

**Details**

Sequence the steps associated with genetic equilibrium by completing the graphic organizer below.

1. make up a
2. at a certain
3. which, over time, results in

Identify three ways that genetic equilibrium can be disrupted.

1. ________________
2. ________________
3. ________________

Contrast geographic isolation and reproductive isolation.

Compare natural selection and sexual selection by completing the table.

<table>
<thead>
<tr>
<th>Species Changes Based on</th>
<th>Increases Fitness?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural selection</td>
<td></td>
</tr>
<tr>
<td>Sexual selection</td>
<td></td>
</tr>
</tbody>
</table>
Section 15.3  Shaping Evolutionary Theory  (continued)

**Main Idea**

**Speciation**

I found this information on page __________

**Details**

Compare *allopatric speciation* and *sympatric speciation* by writing one fact in each segment of the Venn diagram below.

![Venn diagram](image)

Label each model as representing divergent evolution or convergent evolution.

Species A

Species X

Species Y

Species B

Species C

share similar traits

Summarize the current thoughts about the rate of speciation by completing the table below.

<table>
<thead>
<tr>
<th>Gradualism</th>
<th>Punctuated Equilibrium</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Summarize**

List three possible patterns of evolution and an example of each.

1. 
2. 
3.
Primate Evolution

Before You Read

Use the “What I Know” column to list the things you know about the way primates evolved. Then list the questions you have about primate evolution in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>W</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>What I Know</td>
<td>What I Want to Find Out</td>
<td>What I Learned</td>
</tr>
</tbody>
</table>

Science Journal

The ability of an organism to adapt to its surroundings is needed for survival. Describe the adaptations you think were most important to the survival of primates in a variety of climates.
Primate Evolution
Section 16.1 Primates

Main Idea

Scan the title and main idea of Section 1. List two things that might be discussed in this section.

1. ________________________________
2. ________________________________

Details

Review Vocabulary

Use your book or dictionary to define extinction.

extinction

New Vocabulary

Use your book or dictionary to define each term.

anthropoid

arboreal

binocular vision

diurnal

hominin

nocturnal

opposable first digit

prehensile tail

Academic Vocabulary

Define diverge to show its scientific meaning.
diverge

Name ____________________________ Date _______________

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Characteristics of Primates

I found this information on page _________.

Identify the benefits of the following primate characteristics.

<table>
<thead>
<tr>
<th>Primate Characteristic</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opposable first digit</td>
<td></td>
</tr>
<tr>
<td>Binocular vision</td>
<td></td>
</tr>
<tr>
<td>Unspecialized teeth</td>
<td></td>
</tr>
<tr>
<td>Flexible shoulders and hips</td>
<td></td>
</tr>
<tr>
<td>Large, complex brain</td>
<td></td>
</tr>
<tr>
<td>Low reproductive rate</td>
<td></td>
</tr>
</tbody>
</table>

Primate Groups

I found this information on page _________.

Identify the primate groups in the diagram below.

Strepsirrhines

I found this information on page _________.

Summarize a theory on why lemurs are found only on Madagascar and nearby islands.

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Classify the subgroups of anthropoids by completing the diagram.

**Anthropoids**

- Example: tamarins
- Example: baboons
- Example: humans

Summarize primate evolution by completing the time line below.

- 85 mya:
- 50 mya:
- 60 mya:
- 35–25 mya:

Analyze the theory that the rise of flowering trees had a great impact on primate evolution. Explain why.
Primate Evolution
Section 16.2 Hominoids to Hominins

Main Idea

Scan the time line and other illustrations in Section 2 of the chapter. Write two questions that come to mind.

1. 

2. 

Review Vocabulary
Use your book or dictionary to define savanna.

savanna

New Vocabulary
Use your book or dictionary to define each term.

australopithecine

bipedal

hominoid

Place the first australopithecines and first hominoids in the general time line below.

about 25 mya  about 4.2 mya
Section 16.2 Hominoids to Hominins (continued)

**Main Idea**

**Hominoids**

I found this information on page ____________.

**Details**

**Sequence** hominoid divergence by placing the primates listed below in the proper location on the flowchart.

- gorillas
- gibbons
- chimpanzees and bonobos
- humans
- orangutans

[Flowchart diagram]

**Describe** why the Proconsul species was an important find for scientists.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

**Hominins**

I found this information on page ____________.

**Label** five adaptations for bipedalism on the skeleton.

[Diagram of human skeleton]
Describe some potential advantages and disadvantages of bipedalism compared to quadrupedalism.

Disadvantages of bipedalism: [Blank]
Advantages of bipedalism: [Blank]

Identify a key discovery by each of the following scientists. Then analyze how the discovery contributed to the debate about which adaptation evolved first: larger brain or bipedalism.

<table>
<thead>
<tr>
<th>Scientist</th>
<th>Discovery</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raymond Dart</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donald Johanson</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mary Leakey</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CONNECT
Analyze why scientists have difficulty classifying many hominin fossils.

[Blank lines for analysis]
Primate Evolution
Section 16.3 Human Ancestry

Main Idea

Scan Section 3 of the chapter. Use the checklist as a guide.

- Read all section titles.
- Read all boldfaced words.
- Read all tables, figures, and graphs.
- Look at all pictures and read the captions.

Write two facts you discovered as you scanned the section.
1. ____________________________________________
2. ____________________________________________

Review Vocabulary

Use your book or dictionary to define mitochondrion.

mitochondrion

__________________________________________

New Vocabulary

Use your book or dictionary to define each term.

Cro-Magnon

__________________________________________

Homo

__________________________________________

Neanderthal

__________________________________________
**Main Idea**

The *Homo* Genus

*I found this information on page __________.*

**Details**

**Identify** the correct species from the list below for each of the following characteristics.

- *H. habilis*  
- *H. erectus*  
- *H. heidelbergensis*  
- *H. ergaster*  
- *H. floresiensis*  
- *H. neanderthalensis*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th><em>Homo</em> Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence suggests they cared for their sick and buried their dead</td>
<td></td>
</tr>
<tr>
<td>More versatile than predecessors; adapted successfully to a variety of environments</td>
<td></td>
</tr>
<tr>
<td>First undisputed member of the <em>Homo</em> genus</td>
<td></td>
</tr>
<tr>
<td>Nicknamed “The Hobbit” because of its small size</td>
<td></td>
</tr>
<tr>
<td>Larger and more heavily muscled than modern humans</td>
<td></td>
</tr>
<tr>
<td>Believed to have had the first human nose (nostrils facing downward)</td>
<td></td>
</tr>
<tr>
<td>Classification for various transitional fossils that display a mosaic of <em>H. ergaster</em> and <em>H. sapiens</em> traits</td>
<td></td>
</tr>
<tr>
<td>Name means “handy man” because of association with primitive stone tools</td>
<td></td>
</tr>
<tr>
<td>Probably evolved from <em>H. erectus</em> or a <em>Homo</em> intermediary</td>
<td></td>
</tr>
<tr>
<td>First African <em>Homo</em> species to migrate in large numbers to Asia and Europe</td>
<td></td>
</tr>
<tr>
<td>Serves as evidence that <em>H. erectus</em> or some other ancient hominin species remained on Earth until 12,000 years ago</td>
<td></td>
</tr>
</tbody>
</table>

**Identify** a *Homo* species that scientists hypothesize to be a human ancestor, based on features shared with modern humans.

**Identify** a *Homo* species that scientists believe was not a human ancestor, based on DNA tests on fossil bones.
Emergence of Modern Humans

I found this information on page ________.

Rephrase two hypotheses proposed to explain the global dominance of modern humans.

Multiregional evolution model:

“Out of Africa” hypothesis:

Summarize a scientific study that supported the “Out of Africa” hypothesis by completing the paragraph.

- Africans have the most variation in mitochondrial DNA
- mitochondrial DNA is inherited only from the mother
- mitochondrial DNA changes very little over time
- the population with the most variation had the longest existence

Because ________________________________, scientists reasoned that ________________________________

______________________________. In studying the DNA of contemporary humans, scientists found that ________________________________

______________________________. Because ________________________________

______________________________, scientists concluded that H. sapiens emerged in Africa from a hypothetical “Mitochondrial Eve.”

Contrast Homo sapiens to all other Homo species.

__________________________________________________________

__________________________________________________________

__________________________________________________________

__________________________________________________________

__________________________________________________________

Primate Evolution
Organizing Life’s Diversity

Before You Read

Use the “What I Know” column to list the things you know about life’s diversity. Then list the questions you have about diversity in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I Know</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>W</th>
<th>What I Want to Find Out</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>L</th>
<th>What I Learned</th>
</tr>
</thead>
</table>

Science Journal

Consider several living organisms that you see around you. Describe some characteristics that biologists might use when trying to classify, or organize, them into similar species.

____

____

____

____

____

____

____

____

____

____

____

____

____
Organizing Life’s Diversity
Section 17.1 The History of Classification

Main Idea

Scan Section 1 of the chapter. Write three questions that come to mind from reading the headings and the illustration captions.

1. __________________________________________________________
2. __________________________________________________________
3. __________________________________________________________

Review Vocabulary

Use your book or dictionary to define morphology.

morphology

New Vocabulary

Classify each term at the left as being part of Linnaeus’ two-word naming system or a taxonomic group.

<table>
<thead>
<tr>
<th>Linnaeus’ System</th>
<th>Taxonomic Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>binomial</td>
<td></td>
</tr>
<tr>
<td>nomenclature</td>
<td></td>
</tr>
<tr>
<td>class</td>
<td></td>
</tr>
<tr>
<td>division</td>
<td></td>
</tr>
<tr>
<td>domain</td>
<td></td>
</tr>
<tr>
<td>family</td>
<td></td>
</tr>
<tr>
<td>genus</td>
<td></td>
</tr>
<tr>
<td>kingdom</td>
<td></td>
</tr>
<tr>
<td>order</td>
<td></td>
</tr>
<tr>
<td>phylum</td>
<td></td>
</tr>
</tbody>
</table>

Use your book to define each term.

classification

taxon

taxonomy
Section 17.1 The History of Classification (continued)

Main Idea

Early Systems of Classification

I found this information on page _________.

Details

Identify the parts of Linnaeus’ two-word naming system by completing the graphic organizer below.

Binomial Nomenclature:

first word identifies a

second word is called the

which is a

which often describes

Distinguish the genus and specific name, or epithet, for the species name of modern humans.

1. Compare data in the table below to determine which two animals are most closely related. Support your reasoning.

<table>
<thead>
<tr>
<th>Classification of Selected Mammals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kingdom</strong></td>
</tr>
<tr>
<td><strong>Phylum</strong></td>
</tr>
<tr>
<td><strong>Class</strong></td>
</tr>
<tr>
<td><strong>Order</strong></td>
</tr>
<tr>
<td><strong>Family</strong></td>
</tr>
<tr>
<td><strong>Genus</strong></td>
</tr>
<tr>
<td><strong>Species</strong></td>
</tr>
<tr>
<td><strong>Common name</strong></td>
</tr>
</tbody>
</table>

2. Analyze at which level the blue whale diverges from the other animals on the table.
Section 17.1 The History of Classification (continued)

Main Idea

I found this information on page __________.

Details

Organize the following taxa from most specific to least specific: family, genus, order, species. The first one has been done for you.

Systematics Applications

I found this information on page __________.

Analyze the figure of the taxonomic groups in your book. Then identify the domain, kingdom, phylum, and class for humans.

Domain: ____________________________

Kingdom: __________________________

Phylum: _____________________________

Class: ______________________________

Summarize how a dichotomous key works.

Summarize

Explain why a name such as catfish is not a good scientific name. Analyze why scientific names are better.
Scan the illustrations in Section 2 of the chapter and read the captions. Select one illustration and state why you think it will be important.

Illustration: ____________________________________________________________

Why it will be important: ________________________________________________

Use your book or dictionary to define each term.

**evolution**

**characters**

**cladistics**

**cladogram**

**molecular clock**

**phylogeny**

**corresponding**

Define corresponding to show its scientific meaning.
**Main Idea**

**Determining Species**

*I found this information on page ________.*

**Details**

**Compare** the four concepts that biologists have used or are using to classify organisms.

<table>
<thead>
<tr>
<th>Concept</th>
<th>Basis of Classification</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typological species concept</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>group of organisms that can interbreed and produce fertile offspring in a natural setting</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>unknown evolutionary histories for some species</td>
</tr>
</tbody>
</table>

**Section 17.2 Modern Classification** (continued)
Organizing Life’s Diversity

Identify and give examples of the two types of characters in the concept map.

Characters:

Morphological Characters:

Example:

Biochemical Characters:

Example:

Describe cladograms by completing the paragraph.

A ________ is a branching diagram that represents the proposed ________ or evolution of a ________ or group. The groups used in cladograms are called _________. To ________ a cladogram, _________ characters are identified. Then the _________ of various species is identified based on the _________ or _________ of the derived characters in the _________. In making a cladogram, _________ assume that groups that _________ more derived characters have a more _________ common ancestor.

Summarize

Describe a process scientists use to construct a cladogram that includes a new species of vascular plant that was recently discovered in the rainforest.
Organizing Life’s Diversity
Section 17.3 Domains and Kingdoms

Scan Section 3 of the chapter. Use the checklist as a guide.

☐ Read all section titles.
☐ Read all boldfaced words.
☐ Read all tables and graphs.
☐ Look at all pictures and read the captions.
☐ Think about what you already know about groups of organisms.

Write three facts you discovered as you scanned the section.

1. ______________________________________
2. ______________________________________
3. ______________________________________

Review Vocabulary
Use your book or dictionary to define eukaryote.

Eukaryote

New Vocabulary
Use your book or dictionary to define each term.

Archaea

eubacteria

fungus

protists
Section 17.3 Domains and Kingdoms (continued)

**Main Idea**

**Grouping Species**

I found this information on page __________.

**Domain Bacteria**

I found this information on page __________.

**Domain Archaea**

I found this information on page __________.

**Domain Eukarya**

I found this information on page __________.

**Details**

Rephrase why the members formerly in the Kingdom Monera were separated into the two new domains Bacteria and Archaea.

Model the cell walls of eubacteria. Label the features of eubacteria.

Analyze why archaebacteria are sometimes called extremophiles.

Organize the kingdoms in the Domain Eukarya and describe their cell structure. List each kingdom’s sources of energy and other important characteristics.

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Cell Structure</th>
<th>Energy Sources</th>
<th>Other Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eubacteria</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Archaebacteria</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Main Idea

I found this information on page 178.

### Details

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Cell Structure</th>
<th>Energy Sources</th>
<th>Other Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protists</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fungi</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animals</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Summarize

Model a diagram of the relationship between domains and kingdoms.
### Bacteria and Viruses

#### Before You Read

*Before you read the chapter, respond to these statements.*

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Bacteria and Viruses</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Bacteria can live in a thermal vent on the ocean floor, where temperatures top 80°C.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• If you have bacteria in your intestines, you will get sick.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Some viruses remain inactive for years inside human cells.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <em>Mad cow</em> disease is caused by a protein.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Science Journal

*Many viruses and bacteria can cause diseases in animals and plants. Write about a disease that you know of that is caused by a virus or a bacteria. Be sure to discuss how the disease is treated.*

---

---
Scan Section 1 of the chapter. Write two facts that you discovered as you scanned the section.

1. ________________________________
   ________________________________

2. ________________________________
   ________________________________

Use your book or dictionary to define prokaryotic cell.

Use your book or dictionary to define each term.

bacteria

binary fission

capsule

conjugation

endospore

nucleoid

pilus
Main Idea

Diversity of Prokaryotes

I found this information on page __________.

Details

Summarize three general environments where archaebacteria live, and give one example of each environment.

1. ____________________________________________________________

2. ____________________________________________________________

3. ____________________________________________________________

Prokaryote Structure

I found this information on page __________.

Model a prokaryotic cell and label its structures.

Identifying Prokaryotes

I found this information on page __________.

Identify each bacterial shape below with its scientific name.

Reproduction of Prokaryotes

I found this information on page __________.

Compare prokaryote reproduction by completing the table below.

<table>
<thead>
<tr>
<th>Reproduction Method</th>
<th>Process</th>
<th>Result</th>
</tr>
</thead>
</table>
Metabolism of Prokaryotes

Compare prokaryotes by describing how each group below obtains energy for cellular respiration.

- Saprotrophs: __________________________________________
- Photoautotrophs: ______________________________________
- Chemoautotrophs: ______________________________________

Survival of Bacteria

Identify two bacterial survival mechanisms and describe the advantages of each mechanism.

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Survival Advantages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ecology of Bacteria

List five ways that bacteria are helpful to humans.

- Bacteria are helpful
- __________________________________________
- __________________________________________
- __________________________________________
- __________________________________________
- __________________________________________

Assess whether bacteria are more harmful than helpful to humans. Defend your answer.

- ________________________________
- ________________________________
- ________________________________

Main Idea

Details

Summarize

Bacteria and Viruses
Bacteria and Viruses

Section 18.2 Viruses and Prions

Main Idea

Scan the table and time line in Section 2 of the chapter. Write three facts you discovered about viruses from these elements.

1. 
2. 
3. 

Details

Use your book or dictionary to define protein.

protein

Use the new vocabulary terms in the left column to complete the following paragraph.

A __________ is genetic material within a protein coat, but it has no organelles or other characteristics of life. The genetic material lies inside its __________, or outer layer of protein. In the __________, viral genes instruct the host cell to make many copies of the viral RNA or DNA. Some viruses replicate in a __________, in which the viral DNA integrates into a host chromosome and lies dormant for some time. A __________, such as the HIV virus, contains RNA instead of DNA. Mutation in the genes of a normal protein called a __________ is responsible for diseases such as “mad cow.”

Review Vocabulary

Use your book or dictionary to define protein.

New Vocabulary

Define widespread to show its scientific meaning.

Academic Vocabulary
Section 18.2 Viruses and Prions (continued)

**Main Idea**

**Viruses**

I found this information on page __________

**Viral Infection**

I found this information on page __________

**Details**

**Model of one type of virus. Label its parts.**

![Model of a virus]

**Synthesize** why many viruses cannot pass from one species to another.

---

**Label** steps A, B, C, D, and E of a lytic cycle in the figure below.

*Use the following terms.*

- Assembly
- Attachment
- Lysis and Release
- Replication
- Entry

![Lytic cycle diagram]

- The bacteriophage injects its nucleic acid into the bacterial cell.
- The host cell breaks open and releases new virus particles.
- The host's metabolic machinery makes viral nucleic acid and proteins.

---

**Bacteria and Viruses**

184
Section 18.2 Viruses and Prions (continued)

Main Idea

Details

Sequence the steps of a lysogenic cycle.

Viral DNA integrates into a chromosome of a host cell.

Evaluate and discuss the role of reverse transcriptase in the replication cycle of HIV.

Retroviruses

I found this information on page _________.

Prions

I found this information on page _________.

Summarize information about prions by completing the table.

<table>
<thead>
<tr>
<th>What is a prion?</th>
<th>What causes a prion to become harmful?</th>
</tr>
</thead>
<tbody>
<tr>
<td>What might humans contract a prion-caused disease?</td>
<td>What is the result of prion infection?</td>
</tr>
</tbody>
</table>

Conclude whether viruses that replicate by the lytic cycle or the lysogenic cycle are more dangerous. Explain your reasoning.
Create a quiz to help you review key topics in this chapter. Write one question with its answer for each major topic listed below.

<table>
<thead>
<tr>
<th>Topic: Diversity of Prokaryotes</th>
<th>Topic: Metabolism of Prokaryotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question:</td>
<td>Question:</td>
</tr>
<tr>
<td>Answer:</td>
<td>Answer:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic: Prokaryote Structure</th>
<th>Topic: Ecology of Bacteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question:</td>
<td>Question:</td>
</tr>
<tr>
<td>Answer:</td>
<td>Answer:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic: Identifying Prokaryotes</th>
<th>Topic: Viruses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question:</td>
<td>Question:</td>
</tr>
<tr>
<td>Answer:</td>
<td>Answer:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic: Reproduction of Prokaryotes</th>
<th>Topic: Retroviruses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question:</td>
<td>Question:</td>
</tr>
<tr>
<td>Answer:</td>
<td>Answer:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic: Survival of Bacteria</th>
<th>Topic: Prions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question:</td>
<td>Question:</td>
</tr>
<tr>
<td>Answer:</td>
<td>Answer:</td>
</tr>
</tbody>
</table>

*Bacteria and Viruses*
Protists

Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Protists</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Protists are not animals, plants, or fungi.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Some amoebas have a hard covering like a shell.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Protists cannot make their own food.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• A type of downy mildew was responsible for widespread starvation in 19th century Ireland.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Science Journal

Protists are the base for most food chains in aquatic environments. Describe how protists might contribute to an important food source—fish and other seafood.
Protists
Section 19.1 Introduction to Protists

Main Idea

Scan the table and pictures in Section 1 of the chapter. Read all captions. List three facts that you discovered about protists.

1. 

2. 

3. 

Details

Use your book or dictionary to define heterotroph. Then use the term in a sentence to show its scientific meaning.

heterotroph

Use your book or dictionary to define each vocabulary term. Then use each term in a sentence.

microsporidium

protozoan
Main Idea

Protists

I found this information on page _________.

Details

Organize information about how protists are classified.

All protists are

Protists can be classified as:

Type of Protist | Characteristic | Example
---|---|---
Animal-like | | |
Plantlike | | |
Funguslike | | |

Analyze the characteristics that are used to classify protists.

<table>
<thead>
<tr>
<th>Type of Protist</th>
<th>Characteristic</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal-like</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plantlike</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funguslike</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

List two characteristics that distinguish funguslike protists from fungi.

distinguishing characteristics of funguslike protists
Summarize the common habitats of protists by completing the graphic organizer.

Identify two examples of mutualistic relationships between protists and other organisms.

1. 

2. 

Summarize information about the origin of protists by completing the following paragraph.

The theory of ________________ suggests that ________________ became part of protist cells early in the evolutionary process. Later in the evolutionary process, ________________ appeared in cells, and ________________ evolved as the only protists that could photosynthesize.

Analyze why protists are difficult to classify and why the classification system is likely to change.

________________________________________________________________________________________________________________________________________________________________________________________________________________________

________________________________________________________________________________________________________________________________________________________________________________________________________________________

________________________________________________________________________________________________________________________________________________________________________________________________________________________
Protists

Section 19.2 Protozoans—Animal-like Protists

Main Idea

Details

Scan Section 2 of the chapter. Use the checklist as a guide.

☐ Read all section titles.

☐ Read all boldfaced words.

☐ Look at all illustrations and read the captions.

☐ Think about what you already know about protists.

Write two facts you discovered as you scanned the section.

1. __________________________________________

2. __________________________________________

Review Vocabulary

Use your book or dictionary to define hypotonic.

hypotonic

New Vocabulary

Use your book or dictionary to define each vocabulary term.

contractile vacuole

pellicle

pseudopod

test

trichocyst
Model and label a paramecium and its parts in the space below.

Label the following parts with a brief description of each part.

- anal pore
- cilia
- contractile vacuole
- ectoplasm
- gullet
- micronucleus
- macronucleus
- oral groove

Organize facts about amoebas in the table below.

<table>
<thead>
<tr>
<th>Phylum:</th>
<th>Excretion method:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Habitats:</th>
<th>Feeding method:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Body structures:</th>
<th>Reproduction method:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section 19.2 Protozoans—Animal-like Protists (continued)

Main Idea

Apicomplexa

I found this information on page ____________.

Details

Organize information about the members of the phylum Apicomplexa.

Members of phylum Apicomplexa

also called

because they produce

are

obtaining nutrients from

Zoomastigina

I found this information on page ____________.

Compare American and African sleeping sickness.

American

African

Host insect:

Passes to human from insect’s:

Can damage host’s:

Summarize

Compare the habitats and methods of movement among the three phyla of protozoans.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
## Protists

### Section 19.3 Algae—Plantlike Protists

**Main Idea**

**Details**

**Skim** Section 3 of the chapter. Write three questions that come to mind from reading the headings and illustration captions.

1. 
2. 
3. 

**Review Vocabulary**

*Use your book or dictionary to define chloroplasts.*

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>chloroplasts</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**New Vocabulary**

*Use your book or dictionary to define each vocabulary term. Then write a sentence for each term to show its scientific meaning.*

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>alternation of generations</td>
<td></td>
</tr>
<tr>
<td>bioluminescent</td>
<td></td>
</tr>
<tr>
<td>colony</td>
<td></td>
</tr>
</tbody>
</table>

**Academic Vocabulary**

*Define suspension, then write a sentence to show its scientific meaning.*

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>suspension</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section 19.3 Algae—Plantlike Protists (continued)

Main Idea

Characteristics of Algae

I found this information on page ____________.

Diversity of Algae

I found this information on page ____________.

Details

Organize information about algae by completing the chart.

<table>
<thead>
<tr>
<th>Algae</th>
<th>Like plants:</th>
<th>Unlike plants:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function of secondary pigments:</td>
<td>Found in many colors because:</td>
<td></td>
</tr>
</tbody>
</table>

Sequence the asexual and sexual reproductive cycles of diatoms by writing the letter for each step in the correct box.

a. fusion of gametes
d. gametes released
b. meiosis
e. wall formation around cell
c. mitosis
f. zygote

Compare the ways that euglenoids are like plants and like animals.

Like plants
1. ____________
   ____________
2. ____________
   ____________

Like animals
1. ____________
   ____________
2. ____________
   ____________
Section 19.3 Algae—Plantlike Protists (continued)

**Main Idea**

**Uses for Algae**

I found this information on page _________.

**Details**

Summarize the common uses for algae. Algae types may be used more than once.

<table>
<thead>
<tr>
<th>Common Uses</th>
<th>Type of Algae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used for filtering water supplies</td>
<td></td>
</tr>
<tr>
<td>Used to stabilize syrups</td>
<td></td>
</tr>
<tr>
<td>Used in the preparation of scientific gels</td>
<td></td>
</tr>
<tr>
<td>Used as abrasives</td>
<td></td>
</tr>
<tr>
<td>Used in salads</td>
<td></td>
</tr>
<tr>
<td>Used to thicken puddings and shampoos</td>
<td></td>
</tr>
<tr>
<td>Used to preserve canned meat and fish</td>
<td></td>
</tr>
</tbody>
</table>

**Life Cycle of Algae**

I found this information on page _________.

Summarize the alternation of generations.

The haploid form of the algae, ________________, produces ________________.

The gametes join to form a ________________.

From the zygote, the ____________ form of the algae will develop.

The diploid form is called a ________________.

Certain cells in the sporophyte undergo ________________.

These spores are ________________ that develop into new ________________.

**SUMMARIZE**

Use the terms meiosis, fertilization, diploid, and haploid in a sentence that demonstrates your understanding of alternation of generations in green algae.
Protists
Section 19.4  Funguslike Protists

Main Idea

Details

Scan  Section 4 of the chapter. Write three facts that you discovered about cellular and acellular slime molds.

1.

2.

3.

Review Vocabulary

Use your book or dictionary to define cellulose.

cellulose

New Vocabulary

Use your book or dictionary to define each vocabulary term.

acrasin

plasmodium

Academic Vocabulary

Define phase to show its scientific meaning. Then use the word in a sentence.

phase
Main Idea

Slime Molds

Details

Compare slime molds to fungi by completing the table below.

<table>
<thead>
<tr>
<th>Similarities in Slime Molds and Fungi</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reproduce using:</td>
<td></td>
</tr>
<tr>
<td>Feed on:</td>
<td></td>
</tr>
<tr>
<td>Absorb nutrients through:</td>
<td></td>
</tr>
</tbody>
</table>

Contrast slime molds and fungi by completing the following sentence.

The cell walls of fungi are composed of ____________, and cell walls in slime molds contain _________________.

Compare and contrast acellular and cellular slime molds by using the following phrases to complete the Venn diagram.

- move and surround food like amoebas
- flagellated during part of life cycle
- most of life cycle spent as single, amoeba-like cells
- form colonies when food is scarce
- mobile mass of cytoplasm with no separate cells
- make spores to reproduce
Section 19.4  Funguslike Protists (continued)

Main Idea

I found this information on page ____________.

Details

Analyze two ways in which the life cycles of acellular and cellular slime molds are similar and two ways in which they are different.

<table>
<thead>
<tr>
<th>Similarities in Life Cycle</th>
<th>Differences in Life Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
<td>2.</td>
</tr>
</tbody>
</table>

Organize information about water molds and downy mildews by completing the table below.

<table>
<thead>
<tr>
<th>Water Molds and Downy Mildews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habitat</td>
</tr>
<tr>
<td>Source of nutrition</td>
</tr>
<tr>
<td>Similarities to fungi</td>
</tr>
<tr>
<td>Differences from fungi</td>
</tr>
</tbody>
</table>
Malaria is a disease caused by sporozoans. It is spread by mosquitoes. Consider which would have a greater benefit—developing a drug that would cure malaria or developing an insecticide that would kill all mosquitoes. List the possible advantages and disadvantages of each approach. Then make a conclusion about which choice would be better.

<table>
<thead>
<tr>
<th>Malaria Drug</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insecticide</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusions

Tie It Together
Fungi

Before You Read

Use the “What I Know” column to list the things you know about fungi. Then list the questions you have about fungi in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>W</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>What I Know</td>
<td>What I Want to Find Out</td>
<td>What I Learned</td>
</tr>
</tbody>
</table>

Science Journal

Fungi can be both helpful and harmful to humans. On the lines below, write two things that you already know about fungi.

[Space for writing]
Fungi
Section 20.1 Introduction to Fungi

Scan the figures and read the figure captions in Section 1 of the chapter. Write two facts that you discovered about fungi.

1. __________________________
2. __________________________

Use your book or dictionary to define saprobe.

Use your book or dictionary to define each term.

chitin

frUITING body

haustoria

hyphae

mycelium

septa

sporangium

spore
Characteristics of Fungi/Major Features of Fungi

I found this information on page _________.

Describe the kingdom Fungi.

Most are ______________.

Unicellular fungi are known as ______________.

List three features of fungi that distinguish them from plants.

Features that distinguish fungi from plants

Organize information about the structure of multicellular fungi by completing the graphic organizer.

Nutrition in Fungi

I found this information on page _________.

Describe how fungi digest their food outside the body.

______________________________

______________________________

______________________________
Section 20.1 Introduction to Fungi (continued)

**Main Idea**

**Classify** types of fungi by writing how each obtains food.

- Saprophytes
- Mutualists
- Parasites

**Details**

**Distinguish** the 3 forms of asexual reproduction in fungi in the boxes below.

[Forms of asexual reproduction]

**Analyze** three ways that reproduction by spores gives fungi an adaptive advantage.

[Diagram: Adaptive advantage of reproduction by spores]

**Summarize**

Discuss why hyphae are an adaptive advantage in fungi.

[Blank lines for student response]
Fungi
Section 20.2 Diversity of Fungi

Main Idea

**Details**

**Skim** Section 2 of the chapter. Write two questions that come to mind from reading the headings and the illustration captions.

1. ____________________________________________

   ____________________________________________

2. ____________________________________________

   ____________________________________________

**Review Vocabulary**

*flagellated*

Use your book or dictionary to define flagellated.

   ____________________________________________

   ____________________________________________

**New Vocabulary**

Write the correct vocabulary term in the left column for each definition below.

- in molds, hyphae that spread across the surface of food
- in molds, hyphae that penetrate food and absorb nutrients
- a mold reproductive structure that contains a haploid nucleus
- in sac fungi, hyphae that produce spores on their tips for asexual reproduction
- in sac fungi, a reproductive structure where a zygote forms during sexual reproduction
- in sac fungi, a saclike structure where spores develop during sexual reproduction
- spores produced by the ascus in sac fungi
- fruiting body of club fungi
- club-shaped hyphae that produce spores in club fungi
- spores produced in basidia during sexual reproduction of club fungi
Section 20.2 Diversity of Fungi (continued)

Main Idea

Classification of Fungi
I found this information on page ____________

Details

Model a phylogenetic tree for fungi and label the major phyla.

Common Molds
I found this information on page ____________

Chytrids
I found this information on page ____________

Summarize the evidence supporting the initial classification of chytrids as protists and later reclassification as fungi.

Chytrids are like protists.  Chytrids are like fungi.

Sequence how zygomycetes reproduce sexually, by completing the graphic organizer.

Each hyphae produces a gametangium, which contains a haploid nucleus.
**Main Idea**

**Sac Fungi**
*I found this information on page ________.*

**Club Fungi**
*I found this information on page ________.*

**Other Fungi**
*I found this information on page ________.*

### Details

**Organize** information about where the spores of sac fungi form during reproduction.

- Where Spores Form
  - Asexual Reproduction
  - Sexual Reproduction

**Model** a club fungi. Label the basidiocarp and the basidia.

**Predict** what might happen to the phylum Deuteromycota as scientists continue to study its species. Explain your reasoning.

**Summarize**

Explain the adaptive advantages of zygospores that help ensure the survival of the species.
Fungi
Section 20.3 Ecology of Fungi

Main Idea

Scan Section 3 of the chapter. Use the checklist as a guide.

☐ Read all section titles.
☐ Read all boldfaced words.
☐ Read all tables.
☐ Look at all pictures and read the captions.

Write two facts you discovered about the ecology of fungi.
1. ______________________________________
2. ______________________________________

Review Vocabulary

Use your book or dictionary to define cyanobacterium.

cyanobacterium

New Vocabulary

Use your book or dictionary to define each term.

bioindicator

lichen

mycorrhiza

Academic Vocabulary

Define cooperate to show its scientific meaning.

cooperate
**Main Idea**

**Fungi and Photosynthesisers**

I found this information on page ________.

**Details**

**Identify** the symbiotic relationships formed by the partners in the graphic organizer.

- specialized fungus

- plant roots

- fungus

- green alga or cyanobacterium

**Complete** the paragraph below to describe mycorrhizal relationships.

Infection by a fungal partner helps orchid seeds to ____________. The fungal partner of a *Eucalyptus* tree absorbs ____________ for the tree. The tree can absorb more water because the ____________ of the fungus increase the ____________ of the tree’s roots. In return, the fungus receives ____________ from the tree.

**Analyze** the benefits of lichens as . . .

- food for animals

- pioneers

- bioindicators
**Main Idea**

**Fungi and Humans**

_I found this information on page _________._

**Details**

**Organize** the beneficial effects of fungi in the table below.

<table>
<thead>
<tr>
<th>Role of Fungi</th>
<th>Benefits to Humans</th>
</tr>
</thead>
<tbody>
<tr>
<td>as decomposers</td>
<td></td>
</tr>
<tr>
<td>in medicine</td>
<td></td>
</tr>
<tr>
<td>in foods</td>
<td></td>
</tr>
<tr>
<td>in bioremediation</td>
<td></td>
</tr>
</tbody>
</table>

**Describe** the harmful effects of fungi on each of the following.

<table>
<thead>
<tr>
<th>Plants</th>
<th>Humans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Summarize**

Compare and contrast mycorrhizae and lichens.
Introduction to Plants

Before You Read

Use the “What I Know” column to list the things you know about plants. Then list the questions you have about plants in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I Know</th>
<th>W</th>
<th>What I Want to Find Out</th>
<th>L</th>
<th>What I Learned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Science Journal

Plants are found in many different environments. Describe some of the plants with which you are familiar. Identify the environment in which each lives.

---

---

---

---

---

---

---

---

---
Main Idea

Scan Section 1 of the chapter. Write two questions that come to mind from reading the headings and the illustration captions.

1. ____________________________

2. ____________________________

Details

Review Vocabulary

Use your book or dictionary to define limiting factor.

limiting factor

New Vocabulary

Use your book or dictionary to define each term.

nonvascular plant

seed

stomata

vascular plant

vascular tissue

Academic Vocabulary

Define dominant to show its scientific meaning.

dominant
Section 21.1 Plant Evolution and Adaptations (continued)

Main Idea

Plant Evolution

I found this information on page __________.

Details

Sequence the evolution of plants by placing the following information in the correct boxes below:

- algae at edges of seas adapted to life on land
- algae in oceans
- no plants
- simple plants appear

1 billion years ago

400 million years ago

Identify the 6 characteristics of the present-day members of the algae and plant groups.

- ____________
- ____________
- ____________
- ____________

Organize the plant organs by completing the table below. The first row has been filled in for you.

<table>
<thead>
<tr>
<th>Location</th>
<th>Purpose</th>
<th>Plant organ?</th>
</tr>
</thead>
<tbody>
<tr>
<td>cuticle on stems and leaves</td>
<td>reduce water loss</td>
<td>no</td>
</tr>
<tr>
<td>leaf grows from stem</td>
<td>Protects embryo from drying</td>
<td>Root</td>
</tr>
<tr>
<td>stem</td>
<td></td>
<td></td>
</tr>
<tr>
<td>seed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section 21.1 Plant Evolution and Adaptations (continued)

Main Idea

Alternation of Generations

I found this information on page _________.

Details

Compare the gametophyte generation and the sporophyte generation of plants.

<table>
<thead>
<tr>
<th>Gametophyte Generation</th>
<th>Sporophyte Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Plant Classification

I found this information on page _________.

Classify the following plant categories by writing an NV in front of nonvascular plants, an NS in front of seedless vascular plants, and a VS in front of vascular plants with seeds.

- _____ cycadophytes
- _____ anthophytes
- _____ coniferophytes
- _____ pterophytes
- _____ hepaticophytes
- _____ anthocerophytes
- _____ bryophytes
- _____ ginkgophytes
- _____ gnetophytes
- _____ lycophytes

Summarize

Contrast how the sperm reaches the egg differently in seed plants than in non-seed plants.

- 
- 
- 

Introduction to Plants
Introduction to Plants
Section 21.2 Nonvascular Plants

Scan Section 2 of the chapter. Use the checklist as a guide.

☐ Read all section titles.
☐ Read all boldfaced words.
☐ Read all tables and graphs.
☐ Look at all pictures and read the captions.
☐ Think about what you already know about the diversity of plants.

Write three facts you discovered about the diversity of plants as you scanned the section.

1. ____________________________________________________________

2. ____________________________________________________________

3. ____________________________________________________________

Review Vocabulary
Use your book or dictionary to define symbiosis.

symbiosis

New Vocabulary
Use your book or dictionary to define the following term.

thallose
Section 21.2 Nonvascular Plants (continued)

Main Idea

Diversity of Nonvascular Plants

I found this information on page __________

Details

Analyze why nonvascular plants need to be near water.

Model and label an example of a sporophyte attached to a gametophyte.

Compare characteristics of bryophytes, hepaticophytes, and anthocerophytes by completing the table below.

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Environment</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bryophyta</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepaticophyta</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anthocerophyta</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Organize the following terms with the correct definition below: sporophyte, gametophyte, thallus, and rhizoid.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>sporophyte</td>
<td>colorless, multicellular structures found in nonvascular plants; used to help anchor the plants to the soil</td>
</tr>
<tr>
<td>gametophyte</td>
<td>broad shape resembling a fleshy lobed leaf</td>
</tr>
<tr>
<td>thallus</td>
<td>diploid generation; grow attached to gametophytes</td>
</tr>
<tr>
<td>rhizoid</td>
<td>haploid generation; dominant generation</td>
</tr>
</tbody>
</table>

Conclude how anthocerophytes became known as hornworts.

Create a graphic organizer that models the possible common ancestry of nonvascular and vascular plants.

Summarize: Classify each group of nonvascular plants by naming one species of the group and one identifiable structure on that species.

Bryophytes

Anthocerophytes

Hepaticophytes
Introduction to Plants
Section 21.3 Seedless Vascular Plants

Main Idea

Predict the primary difference between the plants you read about in Section 2 of the chapter and the seedless vascular plants that you will read about in Section 3.

Details

Review Vocabulary

Use your book or dictionary to define spore.

spore

New Vocabulary

Use your book or dictionary to define each term.

epiphyte

rhizome

sorus

sporangium

strobilus
Section 21.3 Seedless Vascular Plants (continued)

Main Idea

Diversity of Seedless Vascular Plants

I found this information on page ___________

Details

Compare present-day club mosses with their ancestors and describe the structures found in present-day plants.

Fossil Evidence

•

•

Present-day Plants

•

•

Club Mosses

Structures

•

•

Describe the structures and common locations of ferns and horsetails.

<table>
<thead>
<tr>
<th></th>
<th>Ferns</th>
<th>Horsetails</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locations</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section 21.3 Seedless Vascular Plants (continued)

Main Idea

Details

Compare the 2 divisions of non-seed vascular plants by completing the table below.

<table>
<thead>
<tr>
<th>Lycophyta</th>
<th>Pterophyta</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Identify each of the following plants or plant structures as lycophyte or pterophyte. Write L for lycophyte and P for pterophyte.

- ______ club moss  ______ strobilus
- ______ spike moss  ______ rhizome
- ______ tropical tree fern  ______ frond
- ______ sorus  ______ scouring rushes
- ______ epiphyte

Summarize

Model the two main groups of non-seed vascular plants. Label the important features of each group and give an example of each one.
## Introduction to Plants

### Section 21.4 Vascular Seed Plants

**Main Idea**

**Details**

Scan the illustrations and read the captions. List two conclusions that you can draw about seeds and cones.

1. 
   
2. 

**Review Vocabulary**

Use your book or dictionary to define parasite.

- **parasite**

**New Vocabulary**

Use your book or dictionary to define each term.

- **annual**
- **biennial**
- **cone**
- **cotyledon**
- **perennial**
Section 21.4 Vascular Seed Plants (continued)

**Main Idea**

Diversity of Seed Plants

*I found this information on page __________._

**Details**

Summarize *the information about the divisions of seed plants by writing one or two sentences about division.*

Division Cycadophyta: ____________________________

__________________________

__________________________

Division Gnetophyta: ____________________________

__________________________

__________________________

Division Ginkgophyta: ____________________________

__________________________

__________________________

Division Coniferophyta: ____________________________

__________________________

__________________________

Division Anthophyta: ____________________________

__________________________

__________________________

Identify *the life span of each of the following types of plants and list one example of each.*

<table>
<thead>
<tr>
<th>Annual:</th>
<th>Biennial:</th>
<th>Perennial:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

222 Introduction to Plants
**Section 21.4 Vascular Seed Plants** (continued)

**Main Idea**

**Details**

**Connect**

Suppose you want to plant a vegetable garden. Research the soil conditions and overall climate in your area. Then describe a plant that should be successful, and explain your reasoning.

<table>
<thead>
<tr>
<th>Reproduction</th>
<th>Environment</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycadophyta</td>
<td>males produce pollen grains from cones, pollen produce motile sperm</td>
<td>tropics and subtropics</td>
</tr>
<tr>
<td>Ginkgophyta</td>
<td>none given</td>
<td></td>
</tr>
<tr>
<td>Gnetophyta</td>
<td>none given</td>
<td></td>
</tr>
<tr>
<td>Coniferophyta</td>
<td>none given</td>
<td></td>
</tr>
<tr>
<td>Anthophyta</td>
<td>none given</td>
<td></td>
</tr>
</tbody>
</table>
Tie It Together

You have read about the three types of plants: nonvascular plants, non-seed vascular plants, and seed plants. Now create a quick identification guide to common plants in your area. Your plant guide should be easy to read, yet contain basic information about the reproduction, environment, general structure, and significant characteristics of each plant. Include one plant from each type. Remember that a good plant guide has well-labeled diagrams. When you are finished, share your plant guide with your class.
Plant Structure and Function

Before You Read

Use the “What I Know” column to list the things you know about plant structure and function. Then list the questions you have about plant structure and function in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I Know</th>
<th>W</th>
<th>What I Want to Find Out</th>
<th>L</th>
<th>What I Learned</th>
</tr>
</thead>
</table>

Science Journal

Describe some plants that you eat. Then describe some products that you use that come from plants.

______________________________
______________________________
______________________________
______________________________
______________________________
______________________________
______________________________

Scan Section 1 of the chapter. Write two questions that come to mind from reading the headings and illustration captions.

1. 

2. 

Use your book or dictionary to define adaptation.

Classify each vocabulary word in the list to the left as being a plant cell or a plant tissue. Then give a short description.

<table>
<thead>
<tr>
<th>Cells (8 terms)</th>
<th>Tissues (7 terms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>collenchyma cell</td>
<td></td>
</tr>
<tr>
<td>companion cell</td>
<td></td>
</tr>
<tr>
<td>cork cambium</td>
<td></td>
</tr>
<tr>
<td>epidermis</td>
<td></td>
</tr>
<tr>
<td>ground tissue</td>
<td></td>
</tr>
<tr>
<td>guard cell</td>
<td></td>
</tr>
<tr>
<td>meristem</td>
<td></td>
</tr>
<tr>
<td>parenchyma cell</td>
<td></td>
</tr>
<tr>
<td>phloem</td>
<td></td>
</tr>
<tr>
<td>sclerenchyma cell</td>
<td></td>
</tr>
<tr>
<td>sieve-tube member</td>
<td></td>
</tr>
<tr>
<td>tracheid</td>
<td></td>
</tr>
<tr>
<td>vascular cambium</td>
<td></td>
</tr>
<tr>
<td>vessel element</td>
<td></td>
</tr>
<tr>
<td>xylem</td>
<td></td>
</tr>
</tbody>
</table>
Main Idea

Plant Cells
I found this information on page _________.

Details

Point out three ways that plant cells differ from animal cells.

Model a plant cell. Label the cell wall, central vacuole, and chloroplast.

Compare the three types of plant cells by completing the table below. Describe one characteristic and one function for each type of cell.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Parenchyma</th>
<th>Collenchyma</th>
<th>Sclerenchyma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Plant Tissues
I found this information on page _________.

Summarize the function of each of the following.
epidermis: ______________________________________
stomata: ______________________________________
guard cells: _____________________________________
trichomes: ______________________________________
Model a sketch of phloem tissue. Label the following parts.
- companion cell
- sieve plate
- sieve tube member

Analyze ground tissue by completing the organizer below.

Made up of:
- cells
- cells
- cells

Functions include:
- support

Summarize: Model a plant. Include captions that explain the three types of cells as well as the four types of tissues.
Plant Structure and Function
Section 22.2 Roots, Stems, and Leaves

Main Idea

Skim Section 2 of the chapter. For each structure below, list two functions.

Roots:  

Stems:  

Leaves:  

Details

Review Vocabulary

Use your book or dictionary to define apical meristem.

apical meristem

New Vocabulary

Write the correct term in the left column for each definition below.

layer of cells just within the endodermis that gives rise to lateral roots

single layer of cells that forms a waterproof seal around a root’s vascular tissue

column-shaped cells that contain many chloroplasts; most photosynthesis takes place here

loss of water through stomata

tough, protective layer of parenchyma cells that covers the tip of a root

layer of ground tissue in the root that is involved in the transport of water

stalk that joins the leaf blade to the stem

layer of irregularly shaped, loosely packed cells through which oxygen, carbon dioxide, and water vapor move
Compare the two main types of root systems. Describe taproots and fibrous roots, then make a sketch of each type.

<table>
<thead>
<tr>
<th>Taproots</th>
<th>Fibrous Roots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition:</td>
<td>Definition:</td>
</tr>
<tr>
<td>Sketch:</td>
<td>Sketch:</td>
</tr>
</tbody>
</table>

Sequence the layers of cells of roots beginning with the outermost layer:

___ endodermis  ___ epidermis  ___ pericycle  ___ cortex

Distinguish among the three stems that store food:

__________________________________________________________

__________________________________________________________

__________________________________________________________

Summarize the information on stems in the blanks in the paragraph below.

Stems vary in their size and __________________. The main function of a plant’s stem is __________________ of the __________________ and __________________ structures. They also __________________ water and dissolved substances throughout the plant. The annual growth of bundles of __________________ and __________________ in the stem can lead to the formation of __________________ that reveal the __________________ of the plant. Some stems, such as ________________, bulbs, and ________________, store ________________.
**Main Idea**

Leaves

I found this information on page __________.

**Details**

Compare the shapes of leaves. Give a brief description of a simple and a compound leaf, and provide one example of each.

simple leaf: ______________________________________

compound leaf: __________________________________

Summarize the role of mesophyll by completing the organizer below.

**Analyze** two plants with leaves that have functions besides photosynthesis. Briefly describe these functions.

1. ______________________________________

2. ______________________________________

**Summarize**

Use an analogy to explain how plant structures are adapted to their functions.
Main Idea

Scan Section 3 of the chapter. Use the checklist as a guide.

- Read all section titles.
- Read all boldfaced words.
- Read all tables.
- Look at all pictures and read the captions.

Write two facts you discovered about plant hormones.

1. ___________________________________________________

2. ___________________________________________________

Review Vocabulary

Use your book or dictionary to define active transport.

active transport

New Vocabulary

Use your book or dictionary to define each term.

auxins

cytokinins

ethylene

gibberellins

nastic response

tropism
**Main Idea**

**Plant Hormones**

I found this information on page _________.

**Details**

Compare four plant hormones by completing the table below.

<table>
<thead>
<tr>
<th>Hormone</th>
<th>How This Hormone Regulates Growth</th>
<th>Characteristic of This Hormone</th>
<th>Another Benefit of This Hormone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auxin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gibberellin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cytokinin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethylene</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Plant Responses**

I found this information on page _________.

Summarize the two types of tropisms in the organizer below.

Tropism is a change in a plant’s ___________ due to an ___________ ____________.

The tropism is ___________ if the plant grows toward the stimulus.

The tropism is ___________ if the plant grows ___________ from the stimulus.

Plants respond to ___________ as they grow toward the ____________.

Stems respond to ___________ as they grow against ___________ away from the ____________.
Compare tropism and nastic movement. Place each characteristic in the correct location in the Venn diagram below.

- does not involve growth • is reversible
- involves growth • is not reversible
- involves plant response • response can be positive or negative

Classify each of the following as an example of tropism or nastic movement.

__________ Venus flytrap closes on an insect.
__________ Sweet pea tendrils climb a fence.
__________ Plant grows toward a lamp.
__________ Mimosa pudica leaflets become limp when touched.
__________ Plant roots grow into the soil.

CONNECT
Farmers often use hormones to improve their crop yield. Describe a hormone that a farmer might use and how the hormone can help increase crop output.
Reproduction in Plants

Before You Read

Use the “What I Know” column to list the things you know about plant reproduction. Then list the questions you have about reproduction in plants in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>What I Want to Find Out</td>
</tr>
<tr>
<td>L</td>
<td>What I Learned</td>
</tr>
</tbody>
</table>

Science Journal

Explain how you think life on Earth would be affected if plants were to stop reproducing.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Reproduction in Plants
Section 23.1 Introduction to Plant Reproduction

**Main Idea**

**Details**

**Skim** Section 1 of the chapter. Write two questions that come to mind from reading the headings and the illustration captions.

1. 
2. 

**Review Vocabulary**

*Use your book or dictionary to define flagellated.*

**New Vocabulary**

*Use your book or dictionary to define each term.*

- **flagellated**
- **chemotaxis**
- **heterosporous**
- **megaspore**
- **micropyle**
- **microspore**
- **prothallus**
- **protonema**
- **vegetative reproduction**
Section 23.1 Introduction to Plant Reproduction (continued)

**Main Idea**

**Vegetative Reproduction**
I found this information on page __________.

**Details**

**List** three examples of vegetative reproduction.

1. ______________________________________

2. ______________________________________

3. ______________________________________

**Alternation of Generations**
I found this information on page __________.

**Summarize** the alternation of generations in the flowchart below. Use the words eggs, diploid zygote, and haploid gametophyte.

**Moss Reproduction and Life Cycle**
I found this information on page __________.

**Model** the life cycle of mosses by completing the flowchart below.

A haploid cell can germinate to form a __________

If the spores land in a __________ environment, they can __________ and develop into a new __________

Cells in the sporophyte capsule undergo __________ producing __________ spores.

If fertilization occurs, a _______ _______ forms.

The zygote undergoes cell division to become the __________.
Fern Reproduction and Life Cycle

I found this information on page _________

Sequence the life cycle of ferns by numbering the following steps in the order that they occur. The first and last steps have been done for you.

1. A spore develops to form a prothallus.
2. If pieces of the rhizome break off, new fern plants can develop from the pieces by vegetative reproduction.
3. If fertilization occurs, the resulting diploid zygote develops into a sporophyte.
4. The prothallus dies and decomposes as the sporophyte matures.
5. The mature fern consists of rhizomes from which roots and fronds grow.
6. Sperm released by antheridia swim to eggs in archegonia.
7. As soon as the sporophyte produces green fronds, it can carry on photosynthesis and live on its own.
8. The prothallus produces archegonia and antheridia on its surface.
9. The cycle continues when sporangia develop on the fronds, and spores are released.

Conifer Reproduction and Life Cycle

I found this information on page _________

Compare female and male conifer cones in the table below. List two facts about each type of cone.

<table>
<thead>
<tr>
<th>Female Cones</th>
<th>Male Cones</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summarize

Create a graphic organizer to compare the reproductive structure of mosses, ferns, and conifers.
Reproduction in Plants
Section 23.2 Flowers

**Main Idea**

**Details**

**Skim** Section 2 of the chapter. Write two facts you discover about flower organs or adaptations.

1. 
2. 

**Review Vocabulary**

- **nocturnal**

**New Vocabulary**

- **photoperiodism**

**Classify** each term as being a type of plant or a part of a plant. Write a brief definition of each term.

<table>
<thead>
<tr>
<th>Type of Flowering Plant (4 terms)</th>
<th>Part of Flowering Plant (4 terms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>day-neutral plant</td>
<td></td>
</tr>
<tr>
<td>intermediate-day plant</td>
<td></td>
</tr>
<tr>
<td>long-day plant</td>
<td></td>
</tr>
<tr>
<td>petal</td>
<td></td>
</tr>
<tr>
<td>pistil</td>
<td></td>
</tr>
<tr>
<td>sepal</td>
<td></td>
</tr>
<tr>
<td>short-day plant</td>
<td></td>
</tr>
<tr>
<td>stamen</td>
<td></td>
</tr>
</tbody>
</table>
**Main Idea**

Flower Organs

* I found this information on page ________

**Details**

Compare the organs of a flower in the table below. Give the location and function for each organ.

<table>
<thead>
<tr>
<th>Organ</th>
<th>Location</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stamen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sepal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pistil</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model a complete flower and label the petals, sepals, stamen, and pistil.
Section 23.2 Flowers (continued)

**Main Idea**

**Flower Adaptations**

I found this information on page ________.

**Details**

Identify the three types of pollination.

Types of pollination

Compare the four types of plants based on their critical periods.

<table>
<thead>
<tr>
<th>Plant Type</th>
<th>Flowering Season</th>
<th>Characteristic</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-day plant</td>
<td></td>
<td>flower when the number of hours of darkness is greater than the critical period</td>
<td></td>
</tr>
<tr>
<td>Long-day plant</td>
<td></td>
<td>flower when the number of hours darkness is less than the critical period</td>
<td></td>
</tr>
<tr>
<td>Day-neutral plant</td>
<td></td>
<td>flower over a range in the number of hours of darkness</td>
<td></td>
</tr>
<tr>
<td>Intermediate-day plant</td>
<td></td>
<td>will flower if the number of hours of darkness is neither too great or too few</td>
<td></td>
</tr>
</tbody>
</table>

**Summarize**

Collect a flower from your home or neighborhood. On a separate sheet of paper, draw a diagram of the plant and label the major parts. List its critical period, flower adaptations, and methods of pollination.
Reproduction in Plants
Section 23.3 Flowering Plants

Main Idea

Scan the illustrations, and read the captions in Section 3 of the chapter. List two facts you learn about seeds.

1. 
2. 

Details

Review Vocabulary
Use your book or dictionary to define cytoskeleton.

cytoskeleton

New Vocabulary
Use your book or dictionary to define each term.

dormancy
endosperm

germination
hypocotyl
polar nuclei
radicle
seed coat

Academic Vocabulary
Define compatible to show its scientific meaning.

compatible
Summarize the development of the female gametophyte by completing the flowchart below.

- The ovule undergoes three times, producing haploid of the nuclei develop cell walls.
- One of the six becomes the cell.
- The two remaining nuclei become the of the gametophyte.

Compare how the two haploid nuclei are involved in fertilization.

<table>
<thead>
<tr>
<th>Tube Nucleus</th>
<th>Generative Nucleus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Main Idea

Life Cycle

I found this information on page _______.

Details
Section 23.3 Flowering Plants (continued)

Main Idea

Results of Reproduction

I found this information on page ____________.

Details

Compare the characteristics of seeds and fruits in the table below.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Formation</th>
<th>Benefit to Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analyze the specific conditions that the following seeds need to germinate.

some conifer and wildflower seeds: ____________________________

apple seeds: ____________________________

coconut seeds: ____________________________

Summarize

Create a flowchart to describe the life cycle of flowering plants.
# Introduction to Animals

## Before You Read

*Use the “What I Know” column to list the things you know about animals. Then list the questions you have about animals in the “What I Want to Find Out” column.*

<table>
<thead>
<tr>
<th>K</th>
<th>W</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>What I Know</td>
<td>What I Want to Find Out</td>
<td>What I Learned</td>
</tr>
</tbody>
</table>

---

### Science Journal

*Describe at least three characteristics that distinguish animals from plants.*

---

---
Scan the titles, boldfaced words, pictures, figures, and captions in Section 1 of the chapter. Write two facts you discovered about animals as you scanned the section.

1. 

2. 

Use your book or dictionary to define protist.

<table>
<thead>
<tr>
<th>protist</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

Compare the terms in the table by defining them side by side.

<table>
<thead>
<tr>
<th>blastula</th>
<th>vertebrae</th>
<th>invertebrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>endoskeleton</td>
<td>exoskeleton</td>
<td></td>
</tr>
<tr>
<td>internal fertilization</td>
<td>external fertilization</td>
<td></td>
</tr>
<tr>
<td>blastula</td>
<td>gastrula</td>
<td></td>
</tr>
</tbody>
</table>

List the cell layers from the most interior to the most exterior. Identify the tissues that develop from each layer.

<table>
<thead>
<tr>
<th>Layers of Cells in the Gastrula</th>
</tr>
</thead>
<tbody>
<tr>
<td>ectoderm</td>
</tr>
</tbody>
</table>
Section 24.1 Animal Characteristics (continued)

Main Idea

General Animal Features and Feeding and Digestion

I found this information on page _______.

Details

Identify the following facts about animals.

earliest true animals from which all others likely evolved

features that mark the branching points of the evolutionary tree

way that animals differ from plants in obtaining food

Support

I found this information on page _______.

Classify each animal below as having an endoskeleton or an exoskeleton.

beetle__________________ shark__________________

horse__________________ cicada__________________

Habits

I found this information on page _______.

Analyze each habitat below. Give an example of an adaptation that enables an animal to live in that habitat.

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Adaptation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polar region</td>
<td></td>
</tr>
<tr>
<td>Ocean</td>
<td></td>
</tr>
<tr>
<td>Rain forest</td>
<td></td>
</tr>
</tbody>
</table>

Summary

I found this information on page _______.

Summarize the important differences between animals and plants.

Introduction to Animals 247
Main Idea

Reproduction
I found this information on page ___________.

Details

Sequence the development of an animal from fertilization to birth by completing the following paragraph.

During ____________ reproduction, fertilization occurs when an ____________ is penetrated by a ____________, forming a ____________. After ____________ and cell division begin, the egg is called an embryo. The cells form a fluid-filled ball called a _____________. Some cells migrate inside, forming a cup-shaped structure called the ____________, which has two cell layers. The layer on the outside is the ____________ and will form the ____________. The inner layer is called the ____________, which will form ____________.

All animals retain the two embryonic cell layers throughout their lives, but others develop a third cell layer, the ____________, between the other layers. This layer forms ____________.

Identify the tissue types into which each layer develops.

<table>
<thead>
<tr>
<th>Cell Layer</th>
<th>Forms These Tissues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesoderm</td>
<td></td>
</tr>
<tr>
<td>Ectoderm</td>
<td></td>
</tr>
<tr>
<td>Endoderm</td>
<td></td>
</tr>
</tbody>
</table>

Summarize

Next to each prefix, write a vocabulary word from this section that uses this prefix. Then write what you think the prefix means.

endo- ____________

exo- ____________

meso- ____________
Introduction to Animals
Section 24.2 Animal Body Plans

Main Idea

Scan the figures and read the captions in Section 2 of the chapter.
Write two facts that you discovered about animal body plans.

1. 
2. 

Review Vocabulary

Use your book or dictionary to define phylogeny.

New Vocabulary

Compare the terms within each table by writing their definitions.

<table>
<thead>
<tr>
<th>acoelomate</th>
<th>anterior</th>
<th>posterior</th>
<th>dorsal</th>
<th>ventral</th>
</tr>
</thead>
<tbody>
<tr>
<td>anterior</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bilateral symmetry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cephalization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>coelom</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>deuterostome</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dorsal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>posterior</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>protostome</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pseudocoelom</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>radial symmetry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>symmetry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bilateral</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>radial</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>protostome</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>deuterostome</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>coelom</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>acoelomate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pseudocoelom</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ventral
Section 24.2 Animal Body Plans (continued)

**Main Idea**

Evolution of Animal Body Plans and Development of Tissues

I found this information on page ________

**Details**

Model an evolutionary tree, and show what the trunk, branches, and branching points represent.

**Symmetry**

I found this information on page ________

Analyze the evolutionary sequence by completing the sentences.

The earliest animals had ____________ body plans, as do their modern descendants, such as ____________.

Later, sea stars, hydras, and other animals appeared with _____________. They were able to detect and capture ____________ coming from any direction.

The last body plan to develop was ____________ with a head at the ____________ end of the body and a tail at the ____________ end of the body.

Model a bilaterally symmetrical being. Then create characters showing asymmetry and radial symmetry. Use your imagination. List the number of arms, legs, eyes, etc., that each character has.

<table>
<thead>
<tr>
<th>Bilateral Symmetry</th>
<th>Radial Symmetry</th>
<th>Asymmetry</th>
</tr>
</thead>
<tbody>
<tr>
<td>body parts: 2 eyes, 2 legs, 2 arms, 1 nose in center</td>
<td>body parts:</td>
<td>body parts:</td>
</tr>
</tbody>
</table>
Section 24.2 Animal Body Plans (continued)

**Main Idea**

**Body Cavities**

*I found this information on page __________.*

**Development in Coelomate Animals**

*I found this information on page __________.*

**Segmentation**

*I found this information on page __________.*

**Details**

**Model** *each type of body cavity labeled below.*

<table>
<thead>
<tr>
<th>Acoelomate</th>
<th>Pseudocoelomate</th>
<th>Coelomate</th>
</tr>
</thead>
</table>

**Compare** *mouth development in the two major lines of coelomates.*

<table>
<thead>
<tr>
<th>Coelomates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protostomes</td>
</tr>
</tbody>
</table>

**Analyze** *two advantages of segmentation.*

1. _____________________________
   _____________________________

2. _____________________________
   _____________________________

**Summarize**

Describe the general evolutionary trend of animal body parts.

______________________________

______________________________
Introduction to Animals
Section 24.3 Sponges and Cnidarians

Main Idea

Details

Skim Section 3 of the chapter. Write two questions that come to mind from reading the headings and the illustration captions.

1. ____________________________________________
2. ____________________________________________

Review Vocabulary

Use your book or dictionary to define diploid.

diploid

New Vocabulary

Use your book or dictionary to define each term.

cnidocyte

filter feeder

gastrovascular cavity

medusa

nematocyst

nerve net

polyp

sessile

Academic Vocabulary

Define survive to show its scientific meaning.

survive
**Main Idea**

Sponges

*I found this information on page ____________.*

---

**Details**

**Model** a sponge. *Use the figure in your book to help you. Label the six parts that are listed in the table below on your diagram. Then describe the function of each part in the table below.*

<table>
<thead>
<tr>
<th>Body Part</th>
<th>Function of Body Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osculum</td>
<td></td>
</tr>
<tr>
<td>Epithelial-like cells</td>
<td></td>
</tr>
<tr>
<td>Collar cells</td>
<td></td>
</tr>
<tr>
<td>Pores</td>
<td></td>
</tr>
<tr>
<td>Archaeocytes</td>
<td></td>
</tr>
<tr>
<td>Spicules</td>
<td></td>
</tr>
</tbody>
</table>
Section 24.3 Sponges and Cnidarians (continued)

**Main Idea**

Cnidarians

*I found this information on page ____________*

**Details**

Compare a polyp with a medusa by filling in the table.

<table>
<thead>
<tr>
<th></th>
<th>Polyp</th>
<th>Medusa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body shape</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position of mouth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position of tentacles</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model the complete life cycle of a jellyfish.

**SUMMARIZE**

Compare cnidarians and sponges.

__________________________

__________________________

__________________________

__________________________
Worms and Mollusks

Before You Read

Use the "What I Know" column to list the things you know about worms and mollusks. Then list the questions you have about these organisms in the "What I Want to Find Out" column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I Know</th>
<th>W</th>
<th>What I Want to Find Out</th>
<th>L</th>
<th>What I Learned</th>
</tr>
</thead>
</table>

**Science Journal**

Even the simplest organism has a role in the ecological community. Hypothesize the role of mollusks in their ecosystems. Why would people need to know about worms?

- Hypothesize the role of mollusks in their ecosystems.
- Why would people need to know about worms?
Scan the illustrations and read the captions in Section 1 of the chapter. List three characteristics of flatworms that you discovered.

1. 
2. 
3. 

Use your book or dictionary to define acoelomate.

acoelomate 

Use your book or dictionary to define each term.

flame cells 

 ganglion 

 pharynx 

 proglottid 

 regeneration 

 scolex
Section 25.1 Flatworms (continued)

**Main Idea**

**Body Structure**

I found this information on page _________.

**Details**

Summarize facts about flatworms in the table.

<table>
<thead>
<tr>
<th>Size Range</th>
<th>Number of Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred Environments</td>
<td>Adaptations for Movement of Free-living Flatworm</td>
</tr>
<tr>
<td>Diet of a Free-living Flatworm</td>
<td>Symmetry</td>
</tr>
<tr>
<td>What Happens When Free-living Flatworms Are Damaged</td>
<td>Adaptations for Parasitic Lifestyle</td>
</tr>
</tbody>
</table>

Model a flatworm. Label at least nine body parts.
Section 25.1 Flatworms (continued)

Main Idea

Diversity of Flatworms

I found this information on page __________.

Details

Identify the correct flatworm class for each characteristic below and write it in the appropriate box. Some characteristics may belong in more than one class.

- parasitic
- free-living
- scolex
- eyespots
- flukes
- auricles
- proglottids
- planaria

### Classes of Flatworms

<table>
<thead>
<tr>
<th>Trematodes</th>
<th>Cestodes</th>
<th>Turbellarians</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model the life cycle of a fluke.

Connect

Identify and describe a human disorder that tapeworms and flukes can cause.

<table>
<thead>
<tr>
<th>Group</th>
<th>Human Disorder Caused</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Worms and Mollusks
Section 25.2 Roundworms and Rotifers

Main Idea

Details

Scan Section 2 of the chapter. Use the checklist as a guide.

☐ Read all the section titles.
☐ Read all boldfaced words.
☐ Look at all illustrations and read the captions.
☐ Think about what you already know about worms.

Write three facts that you discovered about roundworms and rotifers.
1. ________________________________
2. ________________________________
3. ________________________________

Review Vocabulary

cilia

Use your book or dictionary to define cilia.

New Vocabulary

hydrostatic skeleton

Use your book or dictionary to define each term. Then write a sentence using the word to show its scientific meaning.

trichinosis

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Section 25.2 Roundworms and Rotifers (continued)

Main Idea

Body Structure of Roundworms

I found this information on page _____.

Details

Organize information about roundworms by filling in the chart below.

<table>
<thead>
<tr>
<th>Phylum:</th>
<th>Symmetry:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Habitats:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Body shape:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Food:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Digestive tract of free-living forms:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Circulatory and respiratory organs:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stimuli they can detect:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reproduction method:</th>
<th>Type of fertilization:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analyze the movement of roundworms.

Roundworm Movement

<table>
<thead>
<tr>
<th>Thrashing Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Role of Pseudocoelom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
Section 25.2 Roundworms and Rotifers (continued)

**Main Idea**

Diversity of Roundworms

I found this information on page __________.

**Details**

Identify the roundworm that matches each description.

<table>
<thead>
<tr>
<th>Animal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>most common roundworm parasite in the U.S.</td>
</tr>
<tr>
<td></td>
<td>enters the human body through bare feet</td>
</tr>
<tr>
<td></td>
<td>world’s most common roundworm infection</td>
</tr>
<tr>
<td></td>
<td>carried by infected, undercooked pork</td>
</tr>
<tr>
<td></td>
<td>causes plant diseases</td>
</tr>
<tr>
<td></td>
<td>mosquito acts as intermediate host</td>
</tr>
</tbody>
</table>

Identify a negative and a positive effect of nematodes on plants.

Negative: ___________________________________________

Positive: ___________________________________________

Analyze the cilia of rotifers by completing the graphic organizer below.

Locations:
1. 
2. 

Cilia

Uses:
1. 
2. 

CONNECT

Compare the digestive tracts of roundworms with those in free-living flatworms. What does the comparison suggest about the probable evolutionary history of roundworms?
Worms and Mollusks
Section 25.3 Mollusks

Main Idea

Skim Section 3 of the chapter. Write two questions that come to mind from reading the headings and illustration captions.

1. ________________________________________
2. ________________________________________

Review Vocabulary

Use your book or dictionary to define herbivore.

herbivore

New Vocabulary

Use your book or dictionary to define each term.

closed circulatory system

gills

mantle

nephridia

open circulatory system

radula

siphon
Section 25.3 Mollusks (continued)

Main Idea

Body Structure

I found this information on page __________.

Details

Model a snail and a squid. Label the body parts of each.

List the snail and squid structures that differ.

Distinguish two ways mollusks feed.

Radula: __________________________________________

Filter feeders: ______________________________________

Compare the way mollusks reproduce in water and on land.

in water: __________________________________________

on land: __________________________________________
Diversity of Mollusks, Ecology of Mollusks

I found this information on page _________.

**Main Idea**

**Details**

Analyze the three classes of mollusks and the meaning of each class name. Provide at least three examples of each class.

Mollusks

- **Bivalvia**
  - Examples: periwinkles

- **head-footed**

Classify each mollusk in the left column of the table. Place it in the proper class.

<table>
<thead>
<tr>
<th>Class</th>
<th>Mollusk Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>has a single shell and a large foot under the body</td>
</tr>
<tr>
<td></td>
<td>has no radula; has two shells connected with a ligament, and a large, muscular foot for digging in the sand</td>
</tr>
<tr>
<td></td>
<td>is brightly colored and has a layer of mucus covering its body; has a large foot under the body and no shell</td>
</tr>
<tr>
<td></td>
<td>has a radula and tentacles; has no shell; squirts ink at predators</td>
</tr>
</tbody>
</table>

**CONNECT**

Compare mollusks’ excretory structures with those of two or more groups that evolved earlier.

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Worms and Mollusks
Section 25.4 Segmented Worms

Main Idea

Details

Skim Section 4 of the chapter. Write three facts that you discovered about segmented worms.

1. 

2. 

3. 

Review Vocabulary

Use your book or dictionary to define protostome.

protostome

New Vocabulary

Use your book or dictionary to define each term.

clitellum

crop

gizzard

setae

Academic Vocabulary

Define convert to show its scientific meaning.

convert
Body Structure

I found this information on page _________.

Summarize the characteristics of segmentation.

- Segments separated by _________.
- Segments contain structures for ________, ________, and _________.
- A segment’s rigidity is created by _________.

Sequence the process of digestion in an earthworm.

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10.
Diversity of Annelids/Ecology of Annelids/Evolution of Mollusks and Annelids

I found this information on page _________.

Organize information about annelids. Identify two characteristics of each annelid. Then write the class to which they belong.

<table>
<thead>
<tr>
<th>fanworms</th>
<th>leeches</th>
<th>earthworms</th>
</tr>
</thead>
<tbody>
<tr>
<td>bristleworms</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Class: Class: Class:

Analyze two ways that each of these annelids benefit their ecosystem.

Earthworms

Marine Polychaetes

Sequence these developments in the evolution of annelids: body suckers, parapodia, clitella.

From earliest to latest: ____________________________

SUMMARIZE

Compare the type of circulatory system found in annelids with that found in some mollusks. State the advantage of the annelid type.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
Tie It Together

Create a mini poster that highlights the diversity of worms.
Before You Read

Before you read the chapter, respond to these statements.
1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Arthropods</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• A lobster’s hard covering cannot grow as the animal grows.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• A spider begins digesting its food while the food is outside its body.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• When you try to swat a fly, it often escapes because it can sense changes in airflow.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• A newly hatched butterfly looks like an adult butterfly only smaller.</td>
<td></td>
</tr>
</tbody>
</table>

Science Journal

Speculate about what would happen if cockroaches and other insects were to disappear.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
**Arthropods**

**Section 26.1 Arthropod Characteristics**

**Main Idea**

**Details**

**Skim** Section 1 of the chapter. Write two questions that come to mind from reading the headings and the illustration captions.

1. ____________________________

2. ____________________________

**Review Vocabulary**

**ganglion**

Use your book or dictionary to define ganglion.

**New Vocabulary**

Write the correct term in the left column for each definition below.

1. body structure consisting of fused thorax and head regions
2. opening from the tracheae or book lungs to the outside of an arthropod's body
3. tube that branches into smaller and smaller tubules to carry oxygen throughout the body
4. body region of fused segments at the posterior end of an arthropod that contains digestive structures and reproductive organs
5. in most arthropods, structure that removes cellular wastes from the blood and empties into the gut
6. saclike pocket with highly folded walls for respiration
7. in arthropods, process of shedding an exoskeleton
8. middle body region, consisting of three fused main segments to which, in many arthropods, legs and wings are attached
9. structure that grows and extends from an animal’s body
10. mouthpart in arthropods that can be adapted for biting and chewing
11. chemical secreted by many animal species that influences the behavior of other animals of the same species

**Define transport to show its scientific meaning.**
Section 26.1 Arthropod Characteristics (continued)

Main Idea

Arthropod Features
I found this information on page ____________.

Details

Compare arthropods to annelids by listing characteristics below.

Arthropods

Like annelids: 

Unlike annelids: 

Identify the structures attached to or contained in the main body regions of arthropods.

Anterior: 

Middle: 

Posterior: 

What regions are fused in a cephalothorax?________________________ 

________________________

Analyze the advantages and disadvantages of an exoskeleton.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Evaluate the role of the body functions below in the molting process.

Fluid secreted by skin glands: ____________________________

________________________

Increased blood circulation: ____________________________

________________________
Section 26.1 Arthropod Characteristics (continued)

**Main Idea**

**Body Structure of Arthropods**

I found this information on page _________.

**Details**

**Model** three types of arthropod respiratory structures. Identify the habitat—aquatic or terrestrial—of the arthropods with that type of respiratory system. Label the spiracles.

<table>
<thead>
<tr>
<th>Structure:</th>
<th>Habitat:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Rephrase** one key fact about arthropods for each function below.

Excretion:

Chemical communication:

Movement:

**SUMMARIZE**

Identify three structures that arthropods use to respond to their environments. Explain how each structure is helpful to the arthropods.

___

___

___

___

___

___

272  Arthropods
Arthropods
Section 26.2 Arthropod Diversity

Scan Section 2 of the chapter. Use the checklist as a guide.

☐ Read all section titles.
☐ Read all boldfaced words.
☐ Read all tables, figures, graphs, and captions.

Write two facts you discovered as you scanned the section.
1. __________________________________________
2. __________________________________________

Review Vocabulary
Use your book or dictionary to define sessile.

sessile

New Vocabulary
Use your book or dictionary to define each term.

chelicera

cheliped

pedipalp

spinneret

swimmeret
Section 26.2 Arthropod Diversity (continued)

**Main Idea**

**Arthropod Groups**

I found this information on page __________.

**Details**

Compare the common characteristics of the major arthropod groups.

**Arthropod Groups**

- Example: crab
  - Group: ________________
  - Antennae: ________________
  - Eyes: ________________
  - Body sections: ________________
  - Appendages: ________________

- Example: fly
  - Group: ________________
  - Antennae: ________________
  - Eyes: ________________
  - Body sections: ________________
  - Appendages: ________________

- Example: wolf spider
  - Group: ________________
  - Antennae: ________________
  - Body sections: ________________
  - Appendages: ________________

**Crustaceans**

I found this information on page __________.

**Model** a lobster and label its appendages.

---

274  *Arthropods*
Spiders and Their Relatives

Distinguish the arachnid appendage for each description below. Names will be used more than once.

<table>
<thead>
<tr>
<th>Appendage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>create silk from fluid protein</td>
<td></td>
</tr>
<tr>
<td>function as fangs or pincers</td>
<td></td>
</tr>
<tr>
<td>used for sensing and holding prey</td>
<td></td>
</tr>
<tr>
<td>often connected to a poison gland</td>
<td></td>
</tr>
<tr>
<td>located at the end of a spider’s abdomen</td>
<td></td>
</tr>
<tr>
<td>large pincers on scorpions</td>
<td></td>
</tr>
</tbody>
</table>

Analyze ways in which a spider uses the web it constructs.

- 
- 
- 
- 

Conclude why the leaflike plates on the posterior appendages are important to a female horseshoe crab during reproduction.

- 
- 
- 

Summarize

Create a concept web that you can use to identify arthropods.
Skim Section 3 of the chapter. Examine each illustration and read the caption. Write three facts that you learn about the structures of insects.

1. __________________________________________
   __________________________________________

2. __________________________________________
   __________________________________________

3. __________________________________________
   __________________________________________

Review Vocabulary

Use your book or dictionary to define subphylum.

subphylum

Use your book or dictionary to define each term.

caste

metamorphosis

nymph

pupa
Section 26.3 Insects and their Relatives (continued)

Main Idea

Diversity of Insects

I found this information on page _________.

Details

Conclude how insects can live in many habitats.
- ________
- ________
- ________
- ________
- ________

External Features

I found this information on page _________.

Insect Adaptations

I found this information on page _________.

Model a cricket and label its external features.

Sequence the stages in two types of metamorphosis by completing the flowcharts below. Identify each type of metamorphosis.

_________ metamorphosis

Egg

_________ metamorphosis

Molting
Section 26.3 Insects and their Relatives (continued)

**Main Idea**

I found this information on page _________.

**Details**

Model the honeybee’s waggle dance in the space below. Use labels to explain how the dance communicates where the food is.

Compare centipedes and millipedes by listing their characteristics in the Venn diagram.

Conclude in general how segmentation has evolved from ancestral arthropods to present-day arthropods.

Compare and contrast insect features to other arthropod groups.
Echinoderms and Invertebrate Chordates

Before You Read

Before you read the chapter, respond to these statements.
1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Echinoderms and Invertebrate Chordates</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A sea star can make its stomach come out of its mouth.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Many echinoderms can regrow lost body parts.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• A lancelet’s body organs are visible through its skin.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• A tunicate is called a sea squirt because it is the smallest creature in the sea.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Science Journal

Write what you know or stories you have heard about sea stars, sea urchins, and other spiny sea creatures.
Echinoderms and Invertebrate Chordates
Section 27.1 Echinoderm Characteristics

**Main Idea**

**Details**

*Skim Section 1 of the chapter. Write three questions that come to mind from reading the headings and illustration captions.*

1. 
2. 
3. 

**Review Vocabulary**

Use your book or dictionary to define endoskeleton.

-endoskeleton-

**New Vocabulary**

Use your book or dictionary to define each term.

- **ampulla**
- **madreporite**
- **pedicellaria**
- **tube foot**
- **water-vascular system**

**Academic Vocabulary**

Define aid to show its scientific meaning.

- **aid**
Main Idea

Echinoderms Are Deuterostomes

I found this information on page __________.

Details

Analyze the importance of deuterostome development.

Body Structure

I found this information on page __________.

Sequence the steps that occur in the water-vascular system to enable an echinoderm to move. Complete the flowchart by writing the letters of the scrambled steps in the proper boxes.

A. Water is forced into the tube foot.
B. Water moves through the stone canal to the ring canal.
C. Water is drawn into the madreporite.
D. The muscles of the ampulla contract.
E. With hydraulic suction, the tube foot attaches to a surface.
F. Water moves to the radial canals.

The echinoderm moves.

Identify the echinoderm that moves in the described way.

<table>
<thead>
<tr>
<th>Echinoderm</th>
<th>Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>burrows into rocky areas using movable spines</td>
<td></td>
</tr>
<tr>
<td>makes snakelike movements using tube feet and arms</td>
<td></td>
</tr>
<tr>
<td>uses cirri to grasp soft sediments on the seafloor</td>
<td></td>
</tr>
<tr>
<td>crawls using tube feet and body wall muscles</td>
<td></td>
</tr>
</tbody>
</table>
Main Idea

**Echinoderm Diversity**

I found this information on page ________.

Details

**Name the class of each echinoderm described below.**

<table>
<thead>
<tr>
<th>Echinoderm Class</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cucumber shape; leathery covering; tentacles near mouth</td>
</tr>
<tr>
<td></td>
<td>body encased in a test; burrows</td>
</tr>
<tr>
<td></td>
<td>often five arms; arms regenerate; no suction cups on tube feet</td>
</tr>
<tr>
<td></td>
<td>often five arms; tube feet used for feeding and movement</td>
</tr>
<tr>
<td></td>
<td>no arms; tube feet located around a central disk</td>
</tr>
<tr>
<td></td>
<td>sessile for some part of life</td>
</tr>
</tbody>
</table>

**List echinoderm strategies for coping with potential predators.**

- sea stars: ____________________________
- brittle stars: ________________________
- sea urchins: _________________________
- sea cucumbers: _______________________

**Analyze the effect of echinoderms on other organisms in the following situations.**

- Activity as bioturbators: ____________________________
  ____________________________

- Unexplained population explosions of crown-of-thorns sea stars: ____________________________
  ____________________________

Connect

Give an example of regeneration in humans. Then give an example of regeneration in echinoderms that is beyond the capability of humans.

__________________________

__________________________
### Main Idea

Scan the illustrations and read the captions in Section 2. Write two facts you discovered about invertebrate chordates.

1. 
2. 

### Details

**Review Vocabulary**

*Use your book or dictionary to define deuterostome.*

*deuterostome*  

**New Vocabulary**

*Use your book or dictionary to define each term.*

*chordate*  

*dorsal tubular nerve cord*  

*invertebrate chordate*  

*notochord*  

*pharyngeal pouch*  

*postanal tail*
### Identify the four distinctive features of chordates and their location on the animal. Describe how each feature benefits the animal.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Location</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>notochord</td>
<td>above the digestive organs</td>
<td>can propel an animal with more powerful movements than the body structure of invertebrates without a postanal tail</td>
</tr>
</tbody>
</table>

### Analyze the importance of an endostyle.

### Describe the following features of lancelets.

<table>
<thead>
<tr>
<th>Phylum:</th>
<th>Subphylum:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin:</td>
<td></td>
</tr>
<tr>
<td>Feeding method:</td>
<td></td>
</tr>
<tr>
<td>Movement:</td>
<td></td>
</tr>
<tr>
<td>Sensory structures:</td>
<td></td>
</tr>
<tr>
<td>Blood circulation:</td>
<td></td>
</tr>
</tbody>
</table>
Evolution of Echinoderms and Invertebrate Chordates

I found this information on page ____________.

Model a tunicate. Label its parts. Identify its subphylum.

Subphylum: ____________________

Analyze why tunicates are called sea squirts.

________________________________________________________

Identify key developments in the evolution of echinoderms and invertebrate chordates by completing the following paragraph.

Probably echinoderms evolved from ancestors with __________ symmetry because echinoderms have this kind of symmetry in the __________ stage. Echinoderms develop __________ symmetry in the adult stage. _____________ development links echinoderms to chordates. The key features of __________ shared by lancelets and tunicates show their close relationship, though __________ have these features only as larvae. A key development in the evolution of chordates was the __________, which provided support and a place for __________ to attach, leading to the first large animals.

Summarize

Why do lancelets excite the scientific community?

________________________________________________________

________________________________________________________

________________________________________________________
You plan to visit a large aquarium. You want to be able to identify specific echinoderms and invertebrate chordates among the many sea creatures on display. Create an identification guide by listing two observable features that distinguish each animal below. Features can be physical or behavioral.

<table>
<thead>
<tr>
<th>Sea Star:</th>
<th>Brittle Star:</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sea Urchin:</th>
<th>Sand Dollar:</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sea Lily:</th>
<th>Feather Star:</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sea Cucumber:</th>
<th>Lancelet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tunicate:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>
Fishes and Amphibians

Before You Read

Use the “What I Know” column to list the things you know about fishes and amphibians. Then list the questions you have about them in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>W</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>What I Know</td>
<td>What I Want to Find Out</td>
<td>What I Learned</td>
</tr>
</tbody>
</table>

Hypothesize what factors might be responsible for amphibian species becoming extinct.

---

---
Fishes and Amphibians
Section 28.1 Fishes

Main Idea

Skim Section 1 of the chapter. Write two questions that come to mind from reading the headings and the illustration captions.

1. _____________________________________________
2. _____________________________________________

Details

Use your book or dictionary to define notochord.

New Vocabulary

Write the correct term in the left column for each definition below.

- receptors that enable fishes to detect movement in the water and help keep them upright and balanced
- external fertilization in which male and female fishes release their gametes near each other in the water
- chamber of the heart that pumps blood to the gills
- in vertebrates, group of cells that develop from the nerve cord and contribute to the development of other important features
- chamber of the heart that receives blood from the body
- small, flat, platelike structure near the skin surface of most fishes
- gas-filled space in bony fishes that allows a fish to control its depth
- tough, flexible material making up the skeletons or parts of skeletons of vertebrates
- movable flap that covers the gills and protects them
- filtering unit within the kidney that helps maintain the salt and water balance of the body and remove cellular waste

Academic Vocabulary

Define these terms to show their scientific meaning.

- precision
- propulsion
Characteristics of Vertebrates

I found this information on page ________.

Characteristics of Fishes

I found this information on page ________.

Main Idea

**Characteristics of Vertebrates**

I found this information on page ________.

Details

**Summarize** information about two major characteristics of vertebrates.

<table>
<thead>
<tr>
<th>Vertebral Column</th>
<th>Neural Crest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Formation</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Functions</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Model** the flow of blood through the body of a fish by writing the following terms in the correct boxes in the flowchart.

- gills  - throughout body  - ventricle  - atrium

Blood enters heart

**Summarize** the reproduction method of most fishes.
**Main Idea**

I found this information on page __________.

**Details**

Organize facts about characteristics of fishes.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Facts</th>
</tr>
</thead>
<tbody>
<tr>
<td>habitats</td>
<td></td>
</tr>
<tr>
<td>adaptive advantages of jaws</td>
<td></td>
</tr>
<tr>
<td>benefits of paired fins</td>
<td></td>
</tr>
<tr>
<td>four types of scales and their composition</td>
<td></td>
</tr>
<tr>
<td>functions of gills</td>
<td></td>
</tr>
<tr>
<td>functions of pyloric ceca</td>
<td></td>
</tr>
<tr>
<td>functions of nephrons</td>
<td></td>
</tr>
<tr>
<td>sensory abilities</td>
<td></td>
</tr>
<tr>
<td>process for controlling depth in water</td>
<td></td>
</tr>
</tbody>
</table>

**CONNECT**

Design a graphic organizer to summarize the adaptations and functions of fish.
Fishes and Amphibians
Section 28.2 Diversity of Today’s Fishes

Main Idea

Scan Section 2 of the chapter. Use the checklist as a guide.

☐ Read all headings.
☐ Read all boldfaced words.
☐ Read all diagrams.
☐ Look at all pictures and read the captions.

Write three facts that you discovered about fishes.

1. ____________________________
2. ____________________________
3. ____________________________

Review
Vocabulary

adaptive radiation

Use your book or dictionary to define adaptive radiation.

Details

New
Vocabulary

tetrapod

Use your book or dictionary to define the following term.

Use tetrapod in a sentence describing its possible place in the evolution of fishes.
Section 28.2 Diversity of Today’s Fishes (continued)

**Main Idea** — **Details**

### Classes of Fishes
I found this information on page __________.

Classify fishes and provide an example in the organizer below.

- **Fishes**
  - Class:  
    - Examples: hagfishes
  - Class:  
  - Class:  
    - Examples:  
  - cartilaginous
    - Class:  
      - Examples:  
    - Subclass: ray-finned fishes
      - Class:  
  - Subclass:  
    - Examples:  

Compare and contrast how each pair of fishes are alike and how they differ.

- **Hagfish and lamprey**
  - Alike:  
  - Different:  

- **Great white shark and whale shark**
  - Alike:  
  - Different:  

- **Trout and lungfish**
  - Alike:  
  - Different:  

---

292 Fishes and Amphibians
Section 28.2 Diversity of Today’s Fishes (continued)

Main Idea

Evolution of Fishes

I found this information on page __________.

Details

Sequence the evolution of fishes by writing the letter of the following features on the cladogram in the order in which they appeared.

- a. jaws, bony skeleton, primitive lung
- b. jaws, paired fins, bony plates covering body
- c. jaws, placoid scales, cartilaginous skeleton

Ecology of Fishes

I found this information on page __________.

Analyze the effects of human activities on fishes.

- Damming rivers in Pacific Northwest: ____________________________
  ____________________________
- Polluting waterways: ____________________________
  ____________________________

Connect

Describe ways in which humans can use water resources with less impact on aquatic ecosystems. Identify how an individual could support this effort.

__________________________
__________________________
__________________________
__________________________
__________________________
__________________________
Skim Section 3 of the chapter. Name two characteristics of amphibians.

1. 

2. 

Use your book or dictionary to define **metamorphosis**.

**metamorphosis**

Use your book or dictionary to define each term.

- **cloaca**

- **ectotherm**

- **nictitating membrane**

- **tympanic membrane**

Define and use **diversify** in a sentence to show its scientific meaning.

- 

- 

- 

- 


Section 28.3 Amphibians (continued)

Main Idea

Evolution of Tetrapods

I found this information on page _________.

Characteristics of Amphibians

I found this information on page _________.

Amphibian Diversity

I found this information on page _________.

Details

Identify three adaptations that helped amphibians leave water for life on land.

1. 

2. 

3. 

Summarize the characteristics of amphibians.

<table>
<thead>
<tr>
<th>Characteristics of Amphibians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeding and digestion:</td>
</tr>
<tr>
<td>Excretion:</td>
</tr>
<tr>
<td>Respiration:</td>
</tr>
<tr>
<td>Circulation:</td>
</tr>
<tr>
<td>Brain and senses:</td>
</tr>
<tr>
<td>Reproduction:</td>
</tr>
</tbody>
</table>

Create a concept map to show characteristics and examples of each order of amphibians.
**Main Idea**

**Evolution of Amphibians**

I found this information on page ________.

**Details**

**Ecology of Amphibians**

I found this information on page ________.

---

**Identify** the evolutionary adaptations that make the branching points for each amphibian group.

<table>
<thead>
<tr>
<th>Amphibian Group</th>
<th>Evolutionary Branching Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhipidistians</td>
<td></td>
</tr>
<tr>
<td>Igthyostegans</td>
<td></td>
</tr>
<tr>
<td>Tetrapods</td>
<td></td>
</tr>
<tr>
<td>Caecilians</td>
<td></td>
</tr>
<tr>
<td>Salamanders</td>
<td></td>
</tr>
<tr>
<td>Frogs and toads</td>
<td></td>
</tr>
</tbody>
</table>

**Describe factors in the worldwide decline of amphibians and explain how each factor affects the ability of amphibians to survive.**

**Local factors:**

- _____________________________
  - Effects: ____________________
  - _____________________________
  - _____________________________

**Global factors:**

- _____________________________
  - Effects: ____________________
  - _____________________________
  - _____________________________

---

**Summarize**

Compare amphibians with fishes. List some important evolutionary advances seen in amphibians.

---

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Reptiles and Birds

Before You Read

Before you read the chapter, respond to these statements.
1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

Before You Read | Reptiles and Birds | After You Read
--- | --- | ---
• Snakes flick their tongue to smell odors.
• Some scientists hypothesize that a meteorite crashed to Earth, causing extinction of the dinosaurs.
• All birds have feathers.
• All birds can fly.

Science Journal

Think about the lives of fishes compared to the lives of reptiles and the lives of birds. What adaptations do birds and reptiles have to suit them to life on land and in the air?
**Main Idea**

**Details**

**Skim** Section 1 of the chapter. Read the headings and illustration captions. Write three questions that come to mind.

1. 
2. 
3. 

**Review Vocabulary**

*embryo*

Use your book or dictionary to define embryo.

**New Vocabulary**

*amnion*

*amniotic egg*

*carapace*

*Jacobson's organ*

*plastron*

**Academic Vocabulary**

*interpretation*

Define interpretation to show its scientific meaning.
Main Idea

Characteristics of Reptiles

I found this information on page ____________.

Details

Identify the adaptations reptiles made to survive on land.

<table>
<thead>
<tr>
<th>Needed for Life on Land</th>
<th>Adaptation</th>
</tr>
</thead>
<tbody>
<tr>
<td>protect embryo from drying out</td>
<td></td>
</tr>
<tr>
<td>prevent excessive loss of water and minerals from the body</td>
<td></td>
</tr>
<tr>
<td>exchange gases other than through skin</td>
<td></td>
</tr>
<tr>
<td>crocodile’s need for more oxygen delivered to cells to help move its large body</td>
<td></td>
</tr>
<tr>
<td>snake’s need to swallow prey larger than itself</td>
<td></td>
</tr>
<tr>
<td>complex vision and muscle function</td>
<td></td>
</tr>
<tr>
<td>move faster and bear more body weight</td>
<td></td>
</tr>
</tbody>
</table>

Model a reptilian egg. Label the amnion, embryo, allantois, yolk sac, chorion, and shell.
Diversity of Modern Reptiles

I found this information on page _________.

Evolution of Reptiles

I found this information on page _________.

Ecology of Reptiles

I found this information on page _________.

Contrast characteristics of each order in class Reptilia.

<table>
<thead>
<tr>
<th>Class</th>
<th>Examples</th>
<th>Key Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Squamata</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crocodilia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Testudinata</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphenodont</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Identify each animal’s ancestors as diapsids, anapsids, or synapsids.

diapsids → birds

anapsids → mammals

diapsids → lizards

diapsids → turtles

Analyze how loss of a reptile species could upset the balance of an ecosystem.

Evaluate whether a meteorite crashing to Earth could have doomed the dinosaurs. Discuss the catastrophic effects of such a crash and adaptations needed to survive the event.
Main Idea

Skim Section 2 of the chapter. Identify characteristics of birds that make them different from reptiles.

Details

Review Vocabulary

Use your book or dictionary to define terrestrial.

terrestrial

New Vocabulary

Use your book or dictionary to define each term.

air sac

contour feather

down feather

endotherm

feather

incubate

preen gland

sternum
Characteristics of Birds

I found this information on page _________.

Model a contour feather and a down feather. Label the structures. Write brief captions describing the characteristics or functions of each feather.

<table>
<thead>
<tr>
<th>Down feathers</th>
<th>Contour feathers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sequence the respiratory organs of a bird. Place the organs from the list below in the proper sequence. One organ appears more than once.

- lungs
- posterior air sacs
- anterior air sacs
- trachea

Air enters and exits

Analyze how eye position reflects a bird’s life habits.
### Diversity of Modern Birds

I found this information on page __________.

*Identify the order and one member of the order for each distinguishing characteristic listed below.*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Order/Member</th>
</tr>
</thead>
<tbody>
<tr>
<td>builds nests in cavities</td>
<td>Piciformes/woodpecker</td>
</tr>
<tr>
<td>flipper-like wings; solid bones</td>
<td></td>
</tr>
<tr>
<td>flightless; includes largest living birds</td>
<td></td>
</tr>
<tr>
<td>sing; feet adapted for perching</td>
<td></td>
</tr>
<tr>
<td>marine; tube-shaped nostrils</td>
<td></td>
</tr>
<tr>
<td>long legs for wading</td>
<td></td>
</tr>
<tr>
<td>nocturnal; large eyes; talons</td>
<td></td>
</tr>
<tr>
<td>aquatic; round beak</td>
<td></td>
</tr>
</tbody>
</table>

### Evolution of Birds

I found this information on page __________.

*Compare features of dinosaurs found in fossil records that are similar to features of present-day birds.*

### Ecology of Birds

I found this information on page __________.

*Analyze how birds are key to the survival of many plants.*

### SUMMARIZE

Compare and contrast ectothermy and endothermy.

---

Reptiles and Birds 303
Tie It Together

Create a profile of one bird and one reptile common to your area. Identify the animal’s order and species. Sketch each animal and label characteristics that distinguish it from other birds or reptiles. Write a brief summary of its life habits from your research. Point out characteristics on the sketches that are adapted for the animal’s life habits.

Reptile species:
Order:

Bird species:
Order:
Mammals

Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Mammals</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>If an animal has hair, it is a mammal.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mammals produce their body heat internally.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A duck-billed platypus is not a true mammal because it lays eggs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The first mammals probably evolved from reptiles.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mammals are one of the most successful groups of animals on Earth. Think about a specific mammal and some of its characteristics. Write about how you think some of these characteristics help the mammal to survive and be successful.
Skim Section 1 of the chapter. Write two questions that come to mind from reading the headings and the illustration captions.

1. 

2. 

Use your book or dictionary to define metabolic rate.

New Vocabulary

Write the correct vocabulary term in the left column for each definition below.

produces and secretes milk that nourishes developing young

sheet of muscle located beneath the lungs that separates the chest cavity from the abdominal cavity; its contraction and relaxation allows air to move into and out of the lungs

highly folded outer layer of the cerebrum; responsible for coordinating conscious activities, memory, and ability to learn

part of the brain responsible for balance and coordinating movement

group of cells that secretes fluid to be used elsewhere in the body

saclike muscular organ in which embryos develop

organ that provides food and oxygen to and removes waste from the developing young

amount of time the young stay in the uterus until they are born

Define retain to show its scientific meaning.

retain
Hair and Mammary Glands

I found this information on page __________.

### Main Idea

Analyze the importance of hair by identifying the six functions of hair and giving an example of each function.

<table>
<thead>
<tr>
<th>Functions</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Other Characteristics

Organize mammalian characteristics by completing the concept map.

Mammalian Characteristics
Classify each description below as a characteristic of insectivores, herbivores, carnivores, or omnivores.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>have longest digestive tract</td>
</tr>
<tr>
<td></td>
<td>feed on both plants and animals</td>
</tr>
<tr>
<td></td>
<td>have long, curved incisors to seize prey</td>
</tr>
<tr>
<td></td>
<td>have long, sharp canines to pierce prey</td>
</tr>
</tbody>
</table>

Sequence how the diaphragm works in respiration.

2. Diaphragm relaxes, making the chest cavity smaller.

Describe the functions of each type of gland listed below.

<table>
<thead>
<tr>
<th>Sweat glands:</th>
<th>Scent glands:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammary glands:</td>
<td>Oil glands:</td>
</tr>
</tbody>
</table>

Summarize Create a graphic organizer showing characteristics of mammals. The organizer should distinguish characteristics common to all mammals from characteristics common to only certain species.
Mammals

Section 30.2 Diversity of Mammals

Main Idea

Details

Scan Section 2 of the chapter. Use the checklist as a guide.

- Read all section titles.
- Read all boldfaced words.
- Read all tables and graphs.
- Look at all illustrations and read the captions.
- Think about what you already know about mammals.

Write two facts that you discovered about the subgroups of mammals.

1. 

2. 

Review Vocabulary

Use your book or dictionary to define chromosome.

chromosome

New Vocabulary

Use your book or dictionary to define the following terms.

marsupial

monotreme

placental mammal

therapsid
Organize information about the three subclasses of mammals by completing the concept map below.

Mammal Classification

I found this information on page __________

Mammal Subclasses

- have a
- have a
- lay

Analyze characteristics of monotremes by identifying their mammal-like and reptile-like features.

Monotremes

Mammalian features:

Reptilian features:

Compare and contrast the development of young in a placental mammal with the development of young in a marsupial.

<table>
<thead>
<tr>
<th>Marsupial</th>
<th>Placental Mammal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Contrast orders of placental mammals. List characteristics that distinguish each order.

<table>
<thead>
<tr>
<th>Order</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chiroptera</td>
<td></td>
</tr>
<tr>
<td>Xenarthra</td>
<td></td>
</tr>
<tr>
<td>Carnivora</td>
<td></td>
</tr>
<tr>
<td>Primates</td>
<td></td>
</tr>
<tr>
<td>Artiodactyla</td>
<td></td>
</tr>
<tr>
<td>Perissodactyla</td>
<td></td>
</tr>
<tr>
<td>Cetacea</td>
<td></td>
</tr>
</tbody>
</table>

Sequence the environmental developments that led to the expansion of mammalian diversity during the Cenozoic era.

Summarize Describe what the mammals of Australia might be like today if the movement of Earth’s plates had not separated Australia from other continents. Explain your reasoning.
Tie It Together

Describe the ideal adaptations that would be needed by a mammal who lived in a high desert with broad temperature ranges, limited food and water, and predatory birds and reptiles. Identify the likely distinguishing characteristics in the areas of hair functions, teeth, senses, limb types, movement, and metabolic rate.
Animal Behavior

Before You Read

Use the “What I Know” column to list the things you know about animal behavior. Then list the questions you have about animal behavior in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I Know</th>
<th>W</th>
<th>What I Want to Find Out</th>
<th>L</th>
<th>What I Learned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Science Journal

Describe two behavior patterns in humans.

____________________

____________________

____________________

____________________

____________________

____________________

____________________

____________________

____________________

____________________

____________________

____________________

____________________

____________________

____________________

____________________

____________________

____________________

____________________

____________________

____________________

____________________
Scan the titles, boldfaced words, illustrations, and captions in Section 1. Write two facts you discovered about animal behavior.

1. ____________________________________________________________
2. ____________________________________________________________

Use your book or dictionary to define natural selection.

natural selection

Use the new vocabulary words to complete the paragraph below.

Any way that an animal responds to a stimulus is _____________.

Some behaviors, such as ________________, are genetically based.

An animal that carries out a specific set of actions, in the same order, in response to a stimulus is exhibiting a _________________.

Behavior that results from an interaction between genetically based behaviors and past experiences is _________________. An example is ________________, in which the response decreases after repeated exposure to a stimulus that has no positive or negative effects. An animal can learn to associate two different kinds of stimuli through _________________. Learning through ________________ involves rewards and punishments. One type of permanent learning, called ________________, occurs only within a specific time period. When an animal solves a problem, it is exhibiting _________________.

Define inanimate to show its scientific meaning.

______________________________________________________________
I found this information on page _________.

**Behavior**

I found this information on page _________.

**Innate Behavior**

I found this information on page _________.

**Learned Behavior**

I found this information on page _________.

**Analyze the relationship of behavior and natural selection by completing the graphic organizer.**

Animals with ________, giving them a _______ over other animals without these, are more likely to ________, passing on their _______ to future generations.

**Complete the fixed action pattern by completing the diagram.**

Defined as

Fixed action pattern

Behavior based on

Effect of removal of stimulus

**Contrast learned behavior to innate behavior. Give an example of a behavior in response to a particular stimulus.**
**Main Idea**

I found this information on page __________.

**Details**

Organize information about the different kinds of learned behavior in the chart.

<table>
<thead>
<tr>
<th>Learned Behavior</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>a horse ignoring noisy cars that pass by its pasture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a cat rushing to its food bowl at the sound of a can opener because its food is opened with a can opener</td>
</tr>
<tr>
<td></td>
<td>learning to associate a response to a stimulus with a reward or punishment</td>
<td></td>
</tr>
<tr>
<td>Imprinting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive behavior</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SUMMARIZE**

Animals respond to both internal and external stimuli. Give an example of a response to an internal stimulus and a response to an external stimulus.

1. 
2. 
3. 
4. 
5.
Animal Behavior
Section 31.2 Ecological Behaviors

Skim Section 2 of the chapter. Write three questions that come to mind from reading the headings and illustration captions.

1. 
2. 
3. 

Use your book or dictionary to define colony.

colony

Write the correct vocabulary term in the left column for each definition below.

threatening or combative interaction between two individuals of the same species

ranking within a group, in which a top-ranked animal gets access to resources without conflict from others in the group

attempt to adopt and control a physical area over other animals of the same species

finding and eating food

moving long distances seasonally to new locations

cycle that occurs daily

auditory communication in which animals use vocal organs to produce groups of sounds that have shared meanings

behavior designed to attract a mate

parental care of offspring in early stages of development

action that benefits another individual at a cost to the actor
Section 31.2 Ecological Behaviors (continued)

**Main Idea**

**Types of Behaviors**

*I found this information on page ____________.*

**Details**

**Competitive Behaviors**

Analyze competitive behaviors by describing the survival benefits of each behavior.

- Behavior:
  - Survival benefit:

- Behavior:
  - Survival benefit:

- Behavior:
  - Survival benefit:

**Communication Behaviors**

Contrast language with communication. Give an example of communication and an example of language.

- __________________________________________________________________________

- __________________________________________________________________________

- __________________________________________________________________________

- __________________________________________________________________________

- __________________________________________________________________________

**Courting and Nurturing Behaviors**

Infer why a peacock fans and shakes his large, colorful tail in the presence of a pea hen during mating season.

- __________________________________________________________________________

- __________________________________________________________________________

- __________________________________________________________________________

- __________________________________________________________________________
Cooperative Behaviors

I found this information on page _________.

Advantages and Disadvantages

I found this information on page _________.

Connect

You have dominance hierarchies in your life similar to some animals. Although they function differently, some of the benefits are the same. Describe one of these hierarchies and its advantages.

Analyse why an animal might engage in altruistic behavior, even though the behavior does not promote its own reproductive success.

Organize the costs and benefits for survival and reproductive success of the behaviors listed below.

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geese fly south before winter in North America.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male lions fight to establish a territory.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hawk parents fly many kilometers daily to find food for their young.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Observe animal behaviors and take notes. Select two behaviors you observe, and analyze them, using the forms below. Conduct further research, as needed, to complete your behavior report thoroughly.

<table>
<thead>
<tr>
<th>Animal:</th>
<th>Description of behavior:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Innate or learned?</td>
</tr>
<tr>
<td></td>
<td>Type of behavior:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description of stimulus:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal or external?</td>
</tr>
</tbody>
</table>

| Advantages of behavior for survival or reproductive success: |

| Costs of behavior in terms of survival or reproductive success: |

---

<table>
<thead>
<tr>
<th>Animal:</th>
<th>Description of behavior:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Innate or learned?</td>
</tr>
<tr>
<td></td>
<td>Type of behavior:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description of stimulus:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal or external?</td>
</tr>
</tbody>
</table>

| Advantages of behavior for survival or reproductive success: |

| Costs of behavior in terms of survival or reproductive success: |
**Integumentary, Skeletal, and Muscular Systems**

**Before You Read**

*Before you read the chapter, respond to these statements.*

1. Write an **A** if you agree with the statement.
2. Write a **D** if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Integumentary, Skeletal, and Muscular Systems</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Skin is an organ.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Use of a tanning bed will not put you at risk for skin cancer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• All joints of the skeleton allow the bones to move.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Some muscles in your body are not under your conscious control.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Science Journal**

Think about a sport you or someone you know plays. Describe how your skin, skeleton, and muscles help you play that sport.

---

Integumentary, Skeletal, and Muscular Systems 321
Integumentary, Skeletal, and Muscular Systems
Section 32.1 The Integumentary System

Main Idea

Scan Use the checklist below to preview Section 1 of the chapter.

☐ Read all section titles.
☐ Read all boldfaced words.
☐ Look at all pictures and read the captions.
☐ Think about what you already know about skin.

Write two facts you discovered about skin as you scanned the section.
1. _____________________________________________
2. _____________________________________________

Review Vocabulary

Use your book or dictionary to define integument.

New Vocabulary

Write the correct vocabulary term in the left column for each definition below.

__________ a pigment manufactured by cells in the inner layer of epidermis that protects from ultraviolet radiation
__________ structure that produces oil that lubricates skin and hair
__________ protein found in the outer layers of epidermal cells that waterproofs and protects the cells and tissues underneath
__________ narrow cavity in the dermis from which hair cells grow
__________ the outer superficial layer of skin
__________ the inner, thicker layer of skin

Academic Vocabulary

Define function, then write a sentence to show its scientific meaning.

__________
The Structure of Skin

I found this information on page __________.

Analyze the four types of body tissues in the integumentary system, and give the function of each one.

1. ___________________________________________________________
2. ___________________________________________________________
3. ___________________________________________________________
4. ___________________________________________________________

Classify each phrase as describing the dermis or epidermis. Write each phrase under the correct skin layer.

- contains muscle fibers, nerve cells, sweat glands, and oil glands
- outer layer of skin
- inner, thicker portion of skin

- contains keratin
- contains melanin

- consists of connective tissue
- has inner and outer portions
- contains dead cells that shed

Main Layers of Skin

<table>
<thead>
<tr>
<th>Dermis</th>
<th>Epidermis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summarize the diagram of the integumentary system in your book.
Functions of the Integumentary System

I found this information on page ________.

Damage to the Skin

I found this information on page ________.

Organize information about the four functions of skin.

Functions of Skin

Main Idea

Details

Sequence the steps that occur during skin healing.

A scab forms on the skin to close the wound.

The skin receives a cut that bleeds.

White blood cells move in to fight infection.

Cells beneath the scab multiply and fill the wound.

Blood flows out of the wound and a clot forms.

CONNECT

Your skin changes as you age. Describe some things you can do to protect your skin so that it can better protect your body.
Integumentary, Skeletal, and Muscular Systems

Section 32.2 The Skeletal System

Main Idea

Skim Section 2 of the chapter. Write two questions that come to mind from reading the headings and the illustration captions.

1. ________________________________

2. ________________________________

Details

Review Vocabulary

Use your book or dictionary to define cartilage.

cartilage

New Vocabulary

Use your book or dictionary to define each term.

compact bone

osteocyte

spongy bone

red bone marrow

yellow bone marrow

osteoblast

ossification

osteoclast

ligament
Identify the two main divisions of the human skeleton and the bones each includes.

Create a sketch of a bone. Show and label compact bone, spongy bone, and the location of osteons. Use the figure in your book to help you.

Sequence the steps in the repair of fractured bone. The first step has been completed for you.

1. Endorphins flood the area of injury.
Joints
I found this information on page _________.

Function of the Skeletal System
I found this information on page _________.

Classify each bone joint listed below as one or more of the following types:
- gliding
- suture
- hinge
- pivot
- ball-and-socket

knee joint ____________ skull bone joint ____________
elbow joint ____________ shoulder joint ____________
hip joint ____________ wrist joint ____________
ankle joint ____________ vertebral joint ____________

Complete the concept map about the skeletal system functions.

Skeletal System Functions

SUMMARIZE
Compare yellow bone marrow and red bone marrow.

______

______

______
Integumentary, Skeletal, and Muscular Systems
Section 32.3 The Muscular System

**Main Idea**

**Details**

Skim Section 3 of the chapter. Write two facts you discovered about muscles.

1. 
2. 

**Review Vocabulary**

Use your book or dictionary to define anaerobic.

- anaerobic

**New Vocabulary**

Use your book or dictionary to define each term.

- actin
- cardiac muscle
- involuntary muscle
- myofibril
- myosin
- sarcomere
- skeletal muscle
- smooth muscle
- tendon
- voluntary muscle
Three Types of Muscle

Identify the three types of muscles. Classify each as voluntary or involuntary.

1. 

2. 

3. 

Distinguish between voluntary muscles and involuntary muscles.

Model the structure and appearance of each type of muscle. Label the nucleus and striation if the muscle is striated. Next to each muscle, describe its function.

<table>
<thead>
<tr>
<th>Muscle Model</th>
<th>Muscle Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smooth Muscle</td>
<td></td>
</tr>
<tr>
<td>Cardiac Muscle</td>
<td></td>
</tr>
<tr>
<td>Skeletal Muscle</td>
<td></td>
</tr>
</tbody>
</table>
Section 32.3 The Muscular System (continued)

Main Idea

Skeletal Muscle Contraction

I found this information on page _________.

Details

Analyze muscle tissue by completing the graphic organizer.

Skeletal muscle is arranged in made up of containing protein filaments
arranged in sections called

Summarize the sliding filament theory.

Contrast the abilities of slow-twitch and fast-twitch muscles.

<table>
<thead>
<tr>
<th>Slow-twitch</th>
<th>Fast-twitch</th>
</tr>
</thead>
</table>

Connect

Contract your biceps muscle. Describe what you did to contract the muscle and which muscle is relaxed. Try the opposite and contract the muscle that was relaxed and describe what happens.
Think about a time you have been frightened. Describe how you felt and how your body responded.
Nervous System
Section 33.1 Structure of the Nervous System

Main Idea

**Skim** Section 1 of the chapter. Focus on the headings, subheadings, boldfaced words, and main ideas. Write two facts you discovered about the structure of the nervous system.

1. 
2. 

Details

**Use your book or dictionary to define diffusion.**

**diffusion**

Write the correct vocabulary term in the left column for each definition below.

- region of a neuron that receives impulses from other neurons and conducts them to the cell body
- gap in the myelin sheath along the length of an axon
- nerve impulse
- nerve pathway that consists of a sensory neuron, an interneuron, and a motor neuron; the basic structure of the nervous system
- minimum stimulus to cause an action potential to be produced
- contains the nucleus of a neuron and many of the cell organelles
- chemical that diffuses across a synapse and binds to receptors on the dendrite of a neighboring cell
- region of a neuron that carries the nerve impulse from the cell body to other neurons and muscles
- small gap between the axon of one neuron and the dendrite of another neuron
- specialized cell that helps you gather, interpret, and react to information about your environment
Section 33.1 Structure of the Nervous System (continued)

Main Idea

Neurons
I found this information on page _________.

Details

Label the neuron. Include the axon, axon endings, cell body, dendrites, nucleus, and myelin sheath. Draw arrows to show the direction that impulses move through the neuron.

A Nerve Impulse
I found this information on page _________.

Analyze how the myelin sheath increases the speed at which impulses move.

_____________________________________

_____________________________________

_____________________________________

_____________________________________

Evaluate how neurotransmitters move across synapses. Write one question and answer about the diagram above.

Question: ________________________________

Answer: _________________________________

_______________________________
Section 33.1 Structure of the Nervous System (continued)

**Main Idea**

I found this information on page ___________.

**Details**

Sequence the steps in how a nerve impulse moves from one neuron to another neuron, by writing the numbers 1 to 5 in the squares to the left of the steps.

1. The neurotransmitter drifts across the synapse and binds to receptors on the dendrite of a neighboring neuron.

2. An electrical impulse is sent along an axon, jumping from node to node in axons covered with myelin.

3. The neuron is at rest, with more sodium ions outside the cell and more potassium ions inside the cell.

4. The impulse reaches the synapse, where channels again open. Vesicles fuse with the plasma membrane and release a neurotransmitter by exocytosis.

5. The threshold for an action potential is reached at a dendrite, opening channels in the plasma membrane and causing a reversal in electrical charge.

**SUMMARIZE**

Give an example of an impulse that would be carried by a neuron with myelin and by a neuron without myelin.

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________
Nervous System

Section 33.2 Organization of the Nervous System

Main Idea

Details

Skim Section 2 of the chapter, taking note of headings, illustrations, photos, and captions. Then identify two facts that drew your interest.

Fact 1: __________________________________________________________

Fact 2: __________________________________________________________

Review Vocabulary

sensory

New Vocabulary

Use your book or dictionary to define sensory.

Classify each term in the left column as being part of the nervous system or part of the brain. Write a brief definition of each term.

<table>
<thead>
<tr>
<th>Part of Nervous System (4 terms)</th>
<th>Part of Brain (4 terms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>autonomic nervous system</td>
<td></td>
</tr>
<tr>
<td>cerebrum</td>
<td></td>
</tr>
<tr>
<td>hypothalamus</td>
<td></td>
</tr>
<tr>
<td>medulla oblongata</td>
<td></td>
</tr>
<tr>
<td>parasympathetic nervous system</td>
<td></td>
</tr>
<tr>
<td>pons</td>
<td></td>
</tr>
<tr>
<td>somatic nervous system</td>
<td></td>
</tr>
<tr>
<td>sympathetic nervous system</td>
<td></td>
</tr>
</tbody>
</table>
Section 33.2 Organization of the Nervous System (continued)

**Main Idea**

The Central Nervous System

I found this information on page ________.

**Details**

Identify two body parts that make up the central nervous system.

1. __________________ 2. __________________

Compare and contrast the central nervous system and the peripheral nervous system.

Organize the information about three main sections of the brain in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Cerebrum</th>
<th>Cerebellum</th>
<th>Medulla Oblongata</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Function</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Peripheral Nervous System

Organize and summarize each division of the nervous system and its function.

- autonomic
- central
- parasympathetic
- peripheral
- somatic
- sympathetic

**SUMMARIZE**

Compare and contrast a voluntary response of the somatic nervous system and a reflex.
Skim Section 3 of the chapter. Write two questions that come to mind from reading the headings and illustration captions.

1. 
2. 

Review Vocabulary

Use your book or dictionary to define stimulus.

stimulus

New Vocabulary

Use your book or dictionary to define each term.

cochlea

lens

retina

rod

semicircular canal

taste bud

Academic Vocabulary

Define interpret to show its scientific meaning.

interpret
Section 33.3 The Senses (continued)

**Main Idea**

**Taste and Smell**

I found this information on page _______.

**Details**

**Identify** the sensory receptors in the mouth and nasal cavity.

Sensory receptors

**Compare** the steps in smelling and tasting. Write the steps for smelling on the left. Write the steps for tasting on the right. Some steps have been completed for you.

1. Chemical molecules touch receptors in your nose.
2. The cells of taste buds are depolarized.
3. The olfactory nerve sends the impulses to the brain.

**Sight**

I found this information on page ________.

**Compare** how rods and cones in your eyes help you to sense light.
Sequence the steps in how your sense of hearing works, by writing the numbers 1 to 5 in the squares to the left of the steps.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sound waves enter your ear and travel down to the end of the ear canal.</td>
</tr>
<tr>
<td>2.</td>
<td>Sound waves strike the eardrum and cause it to vibrate. The vibrations pass to the bones in the middle ear.</td>
</tr>
<tr>
<td>3.</td>
<td>The hairs produce electric impulses that travel to the cerebrum, where they are interpreted as sound.</td>
</tr>
<tr>
<td>4.</td>
<td>The stapes causes the membrane of the oval window to move back and forth.</td>
</tr>
<tr>
<td>5.</td>
<td>Fluid in the cochlea moves, causing the hair cells to bend.</td>
</tr>
</tbody>
</table>

Identify three stimuli to which receptors in the dermis of the skin respond.

1. 
2. 
3. 

Connect Predict how damage to the semicircular canals in the ears would affect balance. Support your reasoning.
Nervous System
Section 33.4 Effects of Drugs

Scan Section 3 of the chapter and identify two legal and two illegal drugs.

<table>
<thead>
<tr>
<th>Legal Drugs</th>
<th>Illegal Drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
<td>2.</td>
</tr>
</tbody>
</table>

Review Vocabulary

Use your book or dictionary to define threshold.

threshold

New Vocabulary

Use your book or dictionary to define the following terms.

addiction

depressant

dopamine

drug

stimulant

tolerance
Section 33.4 Effects of Drugs (continued)

Main Idea

How Drugs Work
I found this information on page __________

Details

Summarize four ways drugs can act on the body.

Ways Drugs Act on the Body

Compare the three main classes of commonly abused drugs. Identify each class, how it works in the body, and common examples.

Classes of Commonly Abused Drugs
I found this information on page __________
Analyze the short-term and long-term risks of smoking marijuana.

Short-term risks: 

- 

- 

- 

Long-term risks: 

- 

- 

- 

Identify the following scenarios as tolerance, physiological dependence, or psychological dependence.

- “I just can’t go to that party without having some alcohol. I need it to feel like I fit in.”

- “I used to take two painkillers a day, but lately I have to take three or four pills to get the same effect as before.”

- “When I try to go for a day without my caffeine, I get a terrible headache and nausea.”

Connect

Analyze why some stimulants are illegal and others are not.
You have read about the structures and functions of the human nervous system, as well as the effects of drugs on it. Create a mini poster that informs readers of the importance of the nervous system to the body's health.
Circulatory, Respiratory, and Excretory Systems

Before You Read

Before you read the chapter, respond to these statements.
1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Circulatory, Respiratory, and Excretory Systems</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Your pulse rate is the number of times your heart beats each minute.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• If you need a blood transfusion, the donated blood must be the same type as yours.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Breathing and respiration are two names for the same process.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The components of the excretory system are the lungs, skin, and kidneys.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Science Journal

When you breathe in, oxygen enters your lungs. Describe what you understand about how oxygen from the air reaches the cells in your body.

________

________

________

________

________

________

________

________

________

________

________

________

________
Scan  Section 1 of the chapter. Identify and list the functions of blood.

- 
- 
- 
- 
- 
- 
- 

Use your book or dictionary to define muscle contraction.

Use the new vocabulary terms to complete the paragraph below.

Large blood vessels called ______ carry oxygenated blood away from the heart. The blood flows into microscopic ______, where the blood exchanges oxygen and wastes with body cells. Then ______ carry deoxygenated blood back to the heart. In these large vessels, flaps of tissue called ______ prevent blood from flowing backward. The hollow, muscular ______ pumps blood throughout the body. A ______ in the right atrium sends out signals that tell the heart muscle to contract. Over half of blood is made up of a clear, yellowish fluid called ______. The function of ______ is to carry oxygen to all body cells. The ______ are the body’s disease fighters. Cell fragments called ______ help to form blood clots at a wound site. Blood clots, fat deposits, or other materials can block the flow of blood through the arteries, resulting in a condition called ______.
Section 34.1 Circulatory System (continued)

**Main Idea**

Functions of the Circulatory System

I found this information on page __________.

**Details**

Analyze how the circulatory system functions as the body's transport system.

Sequence the path blood takes through the human body by completing the flowchart below.

Blood Vessels and The Heart

I found this information on page __________.

Enters

- vena cavae
  - pulmonary artery
    - arteries
      - tissue
  - left ventricle

---

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Identify the components of blood, and list the characteristics of each.

<table>
<thead>
<tr>
<th>Blood Component</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Distinguish between blood type, by putting checks in the boxes to show which marker molecules and antibodies it contains.

<table>
<thead>
<tr>
<th>Blood Type</th>
<th>Marker A</th>
<th>Marker B</th>
<th>Anti-A Antibody</th>
<th>Anti-B Antibody</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Compare heart attacks to strokes.

<table>
<thead>
<tr>
<th></th>
<th>Heart Attack</th>
<th>Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Causes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effects</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Create an analogy that explains the one way flow of blood through the circulatory system.
Circulatory, Respiratory, and Excretory Systems

Section 34.2 Respiratory System

**Main Idea**

**Details**

Skim Section 2 of the chapter. Read the headings and illustration captions. Write three questions that come to mind.

1. 

2. 

3. 

**Review Vocabulary**

Use your book or dictionary to define ATP.

ATP

**New Vocabulary**

Use your book or dictionary to define each term.

alveolus

breathing

bronchus

external respiration

internal respiration

lung

trachea
**Main Idea**

The Importance of Respiration

Contrast breathing and respiration.

- __________
- __________
- __________

**The Path of Air**

I found this information on page ________

Identify three structures that filter air as it enters through the nose on its way to the lungs.

1. __________
2. __________
3. __________

Sequence the process of gas exchange by completing the sentences in the flow chart below.

- __________ enters the lungs from the atmosphere through the process of __________.
- __________ diffuses into capillaries through the __________ and then into __________ blood cells.
- The blood carries the __________ for release to the body's __________.
- The blood transports the __________ waste to the __________ to be returned to the __________.
- Meanwhile, __________ moves in the opposite direction, crossing __________ walls and diffusing into the __________.
**Main Idea**

**Breathing**

*Model the lungs during inhalation and exhalation. Label and describe the position of the diaphragm during each process.*

<table>
<thead>
<tr>
<th>Inhalation</th>
<th>Exhalation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Respiratory Disorders**

*Summarize each of the following common respiratory disorders.*

<table>
<thead>
<tr>
<th>Respiratory Disorder</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td></td>
</tr>
<tr>
<td>Emphysema</td>
<td></td>
</tr>
<tr>
<td>Lung cancer</td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td></td>
</tr>
<tr>
<td>Bronchitis</td>
<td></td>
</tr>
<tr>
<td>Pulmonary tuberculosis</td>
<td></td>
</tr>
</tbody>
</table>

**SUMMARIZE**

Discuss the importance of respiration to the body.

* Name ___________________________  Date ________________

* Section 34.2 Respiratory System (continued)
Circulatory, Respiratory, and Excretory Systems

Section 34.3 Excretory System

Scan Section 3 of the chapter. Use the checklist as a guide.

- Read all section titles.
- Read all boldfaced words.
- Read all tables, figures, and graphs.
- Look at all pictures and read the captions.
- Think about what you already know about the excretory system.

Write three facts you discovered as you scanned the section.

1. 
2. 
3. 

Use your book or dictionary to define pH.

pH

Use your book or dictionary to define each term.

kidney

urea

Define inhibit to show its scientific meaning.

inhibit
Main Idea

Parts of the Excretory System

I found this information on page __________.

Describe three functions of the excretory system that help maintain homeostasis of the body.

1. ____________________________

2. ____________________________

3. ____________________________

Identify the main waste products secreted by the following components of the excretory system.

lungs: ____________________________

skin: ____________________________

Model the structure of a kidney, including a diagram of a nephron. Label each major component.

The Kidneys

I found this information on page __________.
### Kidney Disorders

I found this information on page ____________.

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Symptoms</th>
<th>Common Causes</th>
<th>Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney infection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nephritis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kidney stones</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Kidney Treatments

I found this information on page ____________.

### Summary

Summarize information about kidney disorders in the table below.

- **Kidney Infection**
- **Nephritis**
- **Kidney Stones**

### Contrast

Contrast the two types of dialysis by explaining how they differ in the following areas.

- **Filtering device:**
  - ____________________________

  - ____________________________

- **Frequency and duration of treatment:**
  - ____________________________

  - ____________________________

### Summarize

Analyze the path wastes take from the kidney out of the body by making a list of the order of the structures through which wastes flow.

1. kidneys
2. ____________________________
3. ____________________________
4. ____________________________
5. ____________________________
6. ____________________________
7. ____________________________
8. ____________________________
Digestive and Endocrine Systems

Before You Read

Use the “What I Know” column to list the things you know about the digestive and endocrine systems. Then list the questions you have about these systems in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>What I Want to Find Out</td>
</tr>
<tr>
<td>L</td>
<td>What I Learned</td>
</tr>
</tbody>
</table>

**Science Journal**

What can go wrong with your digestive and endocrine systems? Describe your own experience, that of someone you know, or items you have heard about in the media.
Digestive and Endocrine Systems

Section 35.1 The Digestive System

Main Idea

Skim Section 1 of the chapter. Write two questions that come to mind from reading the headings and the illustration captions.

1. 

2. 

Review Vocabulary

Use your book or dictionary to define nutrients.

Vocabulary

New Vocabulary

Write the correct vocabulary term in the left column for each definition below.

- process that breaks food into smaller pieces by chewing and by the churning action of smooth muscles in the stomach and small intestine
- longest part of the digestive tract, which connects the stomach and the large intestine and where digestion is completed
- muscular tube that connects the pharynx to the stomach
- enzyme found in saliva that begins chemical digestion by breaking down starches into sugars
- fingerlike structures in the small intestine through which chemical digestion is completed and most nutrients from food are absorbed
- enzyme in the stomach that helps digest proteins
- largest internal organ of the body; produces bile, which helps to break down fats
- action of digestive enzymes in breaking down large molecules of food into smaller molecules that can be absorbed by cells
- rhythmic contraction of smooth muscles that moves food through the digestive tract
- end portion of the digestive tract, which includes the colon, rectum, and appendix
Section 35.1 The Digestive System (continued)

Functions of the Digestive System

I found this information on page __________.

Label the parts of the digestive system in the figure below.

Summarize how each organ below mechanically and chemically digests food.

<table>
<thead>
<tr>
<th>Organ</th>
<th>Mechanical Digestion</th>
<th>Chemical Digestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mouth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stomach</td>
<td>churning of the smooth muscles breaks food into smaller pieces</td>
<td></td>
</tr>
<tr>
<td>Small intestine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pancreas</td>
<td>does not apply</td>
<td>produces enzymes that digest carbohydrates, proteins, and fats; secretes alkaline fluid that aids enzyme action</td>
</tr>
<tr>
<td>Liver</td>
<td>does not apply</td>
<td></td>
</tr>
</tbody>
</table>
Main Idea
I found this information on page __________.

Details
Sequence the path of food through the digestive tract by placing the terms from the following list in the proper order on the flowchart.

- mouth
- anus
- stomach
- rectum
- small intestine
- colon
- esophagus

Analyze why a sandwich would progress through your digestive tract, even if you ate it while standing on your head.

Contrast the digestive functions of the small intestine with those of the large intestine.

<table>
<thead>
<tr>
<th>Small Intestine</th>
<th>Large Intestine</th>
</tr>
</thead>
</table>

Connect
Describe how your body’s ability to benefit from food would change if your small intestine did not have villi. Explain why.
Main Idea

Scan Section 2 of the chapter. Use the checklist as a guide.

- Read all section titles.
- Read all boldfaced words.
- Read all tables, figures, and graphs.
- Look at all pictures and read the captions.
- Think about what you already know about nutrition.

Write three facts you discovered as you scanned the section.

1. 

2. 

3. 

Details

New Vocabulary

Use your book or dictionary to define each term.

Calorie

mineral

nutrition

vitamin

Review Vocabulary

amino acids

Use your book or dictionary to define amino acids.
Evaluate Assume that playing soccer requires 540 Calories per hour. On a particular day, you ate 2,000 Calories in food. You played soccer for 2.5 hours. Your body used 800 Calories in other activities. Did you use more energy than you consumed on this day? Show your work.

Summarize information about carbohydrates, fats, and proteins by completing the table below.

<table>
<thead>
<tr>
<th>Break Down Into</th>
<th>Importance to the Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates</td>
<td>provide energy; building blocks for body; protect some internal organs; store and transport some vitamins</td>
</tr>
<tr>
<td>Fats</td>
<td></td>
</tr>
<tr>
<td>Proteins</td>
<td></td>
</tr>
</tbody>
</table>

Classify all the foods you ate yesterday in the appropriate food groups.

<table>
<thead>
<tr>
<th>Grains</th>
<th>Fruits</th>
<th>Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetables</td>
<td>Oils</td>
<td>Meat and Beans</td>
</tr>
</tbody>
</table>

Carbohydrates and Fats and Proteins

Food Pyramid

Main Idea

Calories

I found this information on page ________
Vitamins and Minerals and Nutrition Labels

Examining the food label below, and complete the table below assuming you ate the contents of the entire container.

<table>
<thead>
<tr>
<th>NUTRITION FACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serving Size: 1 cup (237 g)</td>
</tr>
<tr>
<td>Servings Per Container: 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Amount Per Serving</th>
<th>Calories 100</th>
<th>Calories from Fat 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Daily Value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Fat</td>
<td>2 g</td>
<td>3%</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>0.5 g</td>
<td>3%</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>20 mg</td>
<td>7%</td>
</tr>
<tr>
<td>Sodium</td>
<td>960 mg</td>
<td>40%</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
<td>13 g</td>
<td>4%</td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>1 g</td>
<td>5%</td>
</tr>
<tr>
<td>Sugars</td>
<td>1 g</td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>9 g</td>
<td></td>
</tr>
<tr>
<td>Vitamin A</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Vitamin C</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td>2%</td>
<td>Iron 4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Calories Consumed</th>
<th>Grams of Saturated Fat</th>
<th>Grams of Protein</th>
<th>Percent of Daily Value of Calcium</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summarize

Typically men need more Calories per day than women, and teenagers need more Calories than adults. Analyze why Calorie needs differ between these groups.

Name __________________ Date __________
Digestive and Endocrine Systems

Section 35.3 The Endocrine System

Main Idea

Scan the titles, boldfaced words, figures, and captions in Section 3. Write two facts you discovered as you scanned the section.

1. 
2. 

Details

Use your book or dictionary to define homeostasis.

New Vocabulary

Write the correct term in the left column for each definition below.

- acts on target cells and tissues to produce a specific response
- hormone that causes cells to have a higher rate of metabolism
- any gland that produces hormones, which are released into the bloodstream and distributed to body cells
- thyroid hormone that is partly responsible for the regulation of calcium, blood clotting, nerve function, and muscle contraction
- increases blood calcium by stimulating the bones to release calcium
- steroid hormone secreted by the adrenal glands that primarily affects the kidneys and is important for reabsorbing sodium
- steroid hormone secreted by the adrenal glands that raises blood glucose levels and also reduces inflammation
- secretes hormones that regulate many body functions as well as other endocrine glands
- pancreatic hormone that signals liver cells to convert glycogen to glucose and release the glucose into the blood
- pancreatic hormone that signals liver and muscle cells to accelerate the conversion of glucose to glycogen, which is stored in the liver
- hormone produced by the hypothalamus, regulates water balance
### Main Idea

#### Action of Hormones

*I found this information on page _________.

#### Negative Feedback

*I found this information on page _________.

### Details

#### Contrast the action of steroid hormones and amino acid hormones.

<table>
<thead>
<tr>
<th>Steroid Hormones</th>
<th>Amino Acid Hormones</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Sequence the steps in a portion of the negative feedback system.

*Steps in the regulation of calcium are written in scrambled order at right. Write the steps in the correct order in the boxes.*

- Kidneys excrete less calcium.
- Parathyroid glands detect calcium deficiency.
- Bones release more calcium.
- Blood calcium drops too low.
- Parathyroid glands release more parathyroid hormone.

#### Explain how the endocrine system functions as a communication system.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Serves as messengers</td>
<td></td>
</tr>
<tr>
<td>Produces messengers</td>
<td></td>
</tr>
<tr>
<td>Receives the messages</td>
<td></td>
</tr>
</tbody>
</table>

---

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Section 35.3 The Endocrine System (continued)

**Main Idea**

Links to the Endocrine/Nervous System

I found this information on page ________

**Details**

Compare the hormone functions of the glands listed below.

<table>
<thead>
<tr>
<th>Gland/Location</th>
<th>Hormones Produced</th>
<th>Body Functions Regulated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pituitary Location:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thyroid Location:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parathyroid Location:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pancreas Location:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adrenal Location:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Identify the key link in the diagram below.

Nervous System  →  Endocrine System

**Summarize**

Create a concept map showing two pairs of hormones that work together and the effect of their cooperation on homeostasis.
Human Reproduction and Development

Before You Read

Use the “What I Know” column to list the things you know about reproduction and development. Then list the questions you have about these topics in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>W</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>What I Know</td>
<td>What I Want to Find Out</td>
<td>What I Learned</td>
</tr>
</tbody>
</table>

As you have grown and developed since birth, you have gone through many changes. Write about some of the physical changes you have experienced since you were born.

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
Human Reproduction and Development

Section 36.1 Reproductive Systems

Main Idea

Skim Section 1 of the chapter. Read the headings and illustration captions. Write three questions that come to mind.

1. ____________________________
2. ____________________________
3. ____________________________

Details

Review Vocabulary

Use your book or dictionary to define hypothalamus.

hypothalamus

New Vocabulary

Classify each vocabulary term. Give a brief description of each. One term fits in both categories.

<table>
<thead>
<tr>
<th>Male Reproductive System</th>
<th>Female Reproductive System</th>
</tr>
</thead>
<tbody>
<tr>
<td>epididymis</td>
<td></td>
</tr>
<tr>
<td>menstrual cycle</td>
<td></td>
</tr>
<tr>
<td>oocyte</td>
<td></td>
</tr>
<tr>
<td>oviduct</td>
<td></td>
</tr>
<tr>
<td>polar body</td>
<td></td>
</tr>
<tr>
<td>puberty</td>
<td></td>
</tr>
<tr>
<td>semen</td>
<td></td>
</tr>
<tr>
<td>seminiferous tubule</td>
<td></td>
</tr>
<tr>
<td>urethra</td>
<td></td>
</tr>
<tr>
<td>vas deferens</td>
<td></td>
</tr>
</tbody>
</table>
Human Male Reproductive System

I found this information on page ___________.

Model the structures of the male reproductive system below. Label the testes, epididymus, vas deferens, and urethra. Describe the function of each.

Create a diagram to show how the negative feedback system works to control FSH and LH in the male body.

Human Female Reproductive System

I found this information on page ___________.

Identify the three main functions of the female reproductive system.

Model the structures of the human female reproductive system below. Label the oviduct, cervix, ovary, and uterus. Describe the function of each.
**Main Idea**

**Sex Cell Production**

I found this information on page ________

**The Menstrual Cycle**

I found this information on page ________

---

**Details**

Summarize the results of each meiotic division in the production of eggs.

<table>
<thead>
<tr>
<th>First Meiotic Division</th>
<th>Second Meiotic Division</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sequence the steps in the menstrual cycle. Describe the changes in hormones, the uterus, and the ovary at each stage.

1. | Hormone Changes | Uterine Changes | Ovary Changes |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. | Hormone Changes | Uterine Changes | Ovary Changes |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. | Hormone Changes | Uterine Changes | Ovary Changes |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Summarize

Draw a concept web that shows sex cell production in males and females.

---

**Section 36.1 Reproductive Systems** (continued)
Section 36.2 Human Development Before Birth

**Main Idea**

**Details**

Skim Section 2 of the chapter. Write two questions that come to mind from reading the heading and illustration captions.

1. 

2. 

**Review Vocabulary**

Use your book or dictionary to define lysosome.

**New Vocabulary**

Use your book or dictionary to define each term. Then make a sketch of each to help you remember.

- amniotic fluid
- blastocyst
- morula

**Academic Vocabulary**

Define enable to show its scientific meaning. Write a sentence using the term.

- enable
Sequence the steps of fertilization of an egg and implantation of a blastocyst. The steps are written in scrambled order at right. Write the steps in the correct order in the boxes.

1. The zygote moves into the uterus and becomes a blastocyst.
2. 300 million to 500 million sperm are released in the female's vagina.
3. The zygote moves down the oviduct and begins to divide by mitosis.
4. The nucleus of the sperm and the nucleus of the egg unite, forming a zygote.
5. A few hundred sperm make it into the two oviducts.
6. The blastocyst attaches to the uterine lining.
7. The sperm that survive the acidic vagina swim through the vagina into the uterus.
8. One sperm penetrates the egg, which changes the electrical charge of the egg's membrane so other sperm cannot enter.
Section 36.2 Human Development Before Birth (continued)

**Main Idea**

I found this information on page _________.

**Details**

Model a placenta and umbilical cord attached to an embryo. Draw arrows to show the route oxygen and nutrients take from the mother’s blood to the embryo and how wastes are removed.

**Three Trimesters of Development**

I found this information on page _________.

**Compare** development of an embryo into a fetus during each trimester. Describe the changes that occur.

<table>
<thead>
<tr>
<th>First Trimester</th>
<th>Second Trimester</th>
<th>Third Trimester</th>
</tr>
</thead>
</table>

**Diagnosis in the Fetus**

I found this information on page _________.

**Analyze** one of the methods of diagnosis in the fetus and describe its benefits and risks.

**SUMMARIZE**

Use the analogy of plant growth to compare to the growth and development of a fetus over nine months.
Scan the illustrations and read the captions in Section 3 of the chapter. Predict two things you will read about birth and growth.

1. 

2. 

Use your book or dictionary to define growth.

Use your book or dictionary to define the following terms.

- adolescence

- adulthood

- dilation

- expulsion stage

- infancy

- labor

- placental stage
Section 36.3 Birth, Growth, and Aging (continued)

Main Idea

Birth

Identify and describe the three stages of birth in the graphic organizer below.

Growth and Aging

Analyze the primary way the following hormones affect human growth.

<table>
<thead>
<tr>
<th>Hormone</th>
<th>Effect on Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human growth hormone</td>
<td></td>
</tr>
<tr>
<td>Thyroxine</td>
<td></td>
</tr>
<tr>
<td>Steroids</td>
<td></td>
</tr>
</tbody>
</table>
Section 36.3 Birth, Growth, and Aging (continued)

Main Idea

I found this information on page __________.

Details

Describe the changes that occur at each stage of growth and development.

1. Infancy

2. Childhood

3. Adolescence

4. Adulthood

Summarize

Create a flowchart of the stages of human development from newborn to adulthood. Write the approximate age when an individual moves from one stage to the next.
The Immune System

Before You Read

Use the “What I Know” column to list the things you know about disease and immunity. Then list the questions you have about disease and immunity in the “What I Want to Find Out” column.

<table>
<thead>
<tr>
<th>K</th>
<th>W</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>What I Know</td>
<td>What I Want to Find Out</td>
<td>What I Learned</td>
</tr>
</tbody>
</table>

Science Journal

When you get a cold, your immune system fights it and you eventually feel better. Hypothesize how people with weakened immune systems might need to live their lives differently to stay healthy.

---

---

---

---

---

---

---

---

---
The Immune System
Section 37.1 Infectious Diseases

Main Idea

Skim Section 1 of the chapter and list three ways that diseases spread from person to person.

1. __________________________________________
2. __________________________________________
3. __________________________________________

Details

Review Vocabulary
Use your book or dictionary to define protozoan.
protozoan _______________________________________

New Vocabulary
Use your book or dictionary to define each term.

antibiotic ______________________________________

endemic disease ________________________________

epidemic ______________________________________

infectious disease ______________________________

Koch’s postulates ______________________________

pandemic ______________________________________

pathogen ______________________________________

reservoir ______________________________________

Main Idea

Details

Review Vocabulary
Use your book or dictionary to define protozoan.
protozoan ______________________________________

New Vocabulary
Use your book or dictionary to define each term.

antibiotic ______________________________________

endemic disease ________________________________

epidemic ______________________________________

infectious disease ______________________________

Koch’s postulates ______________________________

pandemic ______________________________________

pathogen ______________________________________

reservoir ______________________________________
Section 37.1 Infectious Diseases (continued)

Main Idea

Pathogens Cause Infectious Disease

I found this information on page ____________.

Details

Identify facts about harmful and helpful microorganisms.

<table>
<thead>
<tr>
<th>Five types of pathogens:</th>
<th>Four places that helpful microorganisms live in your body:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
<td>3.</td>
</tr>
<tr>
<td>4.</td>
<td>4.</td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
</tbody>
</table>

Germ Theory and Koch's Experiments

I found this information on page ____________.

Design the experimental steps you would use to identify the virus that caused bird flu in a flock of chickens using Koch's postulates.

<table>
<thead>
<tr>
<th>1.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>2.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>3.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>4.</th>
</tr>
</thead>
</table>

Analyze how diseases spread.

<table>
<thead>
<tr>
<th>Three disease reservoirs:</th>
<th>Four main ways diseases are transmitted to humans:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
<td>3.</td>
</tr>
<tr>
<td>4.</td>
<td>4.</td>
</tr>
</tbody>
</table>
Section 37.1 Infectious Diseases (continued)

**Main Idea**

**Symptoms of Disease**
Contrast how viruses and bacteria cause symptoms of disease.

**Details**

<table>
<thead>
<tr>
<th>Viruses:</th>
<th>Bacteria:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Disease Patterns**

Compare endemic, epidemic, and pandemic disease by using different colors or patterns to represent each disease pattern. Add a key to explain your map.

**Treating and Fighting Diseases**

Analyze the relationship between natural selection and the increase in antibiotic-resistant bacteria.

**Summarize**

Critique what people can do to help keep antibiotics effective in disease fighting.

---

378  The Immune System
The Immune System
Section 37.2 The Immune System

Skim Section 2 of the chapter. Identify the system responsible for the body’s specific immunity.

Use your book or dictionary to define white blood cells.

type of white blood cell that is produced in red bone marrow and plays a role in specific immunity

Write the correct vocabulary term in the left column for each definition below.

lymphocyte that destroys pathogens and releases cytokines
long-living cell that is exposed to an antigen during the primary immune response and will respond rapidly if the body encounters the same pathogen later
protein produced by B lymphocytes that specifically reacts to a foreign pathogen
deliberate exposure of the body to an antigen so that a primary response and immune memory will develop
protein secreted by virus-infected cells that binds to neighboring cells and stimulates these cells to produce antiviral proteins
protein that enhances phagocytosis by helping the phagocytic cells bind better to pathogens, activating the phagocytes, and enhancing the destruction of the pathogen’s membrane
lymphocyte that activates antibody secretion in B cells and another type of T cell that aids in killing microorganisms
type of white blood cell that is produced in red bone marrow and plays a role in specific immunity
antibody-producing cell that is present in all lymphatic tissues
### Main Idea

**Nonspecific Immunity**

_I found this information on page _________._

### Details

#### Summarize nonspecific immune defenses by completing the table.

<table>
<thead>
<tr>
<th>Defense</th>
<th>How it Works</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin</td>
<td></td>
</tr>
<tr>
<td>Saliva, tears, and nasal secretions</td>
<td></td>
</tr>
<tr>
<td>Mucus</td>
<td>blocks bacteria from sticking to inner epithelial cells; inner surfaces secrete extra mucus when infected, triggering coughing that helps move infected mucus out of the body</td>
</tr>
<tr>
<td>Stomach acid</td>
<td></td>
</tr>
<tr>
<td>Phagocytosis</td>
<td></td>
</tr>
<tr>
<td>Interferon</td>
<td></td>
</tr>
<tr>
<td>Inflammatory response</td>
<td>chemicals released by invaders and body cells attract phagocytes, increase blood flow to area, and make blood vessels more permeable to allow white blood cells to escape; result is more white blood cells in the area</td>
</tr>
</tbody>
</table>

#### Compare the functions of these organs of the lymphatic system.

<table>
<thead>
<tr>
<th>Lymph Nodes</th>
<th>Tonsils</th>
<th>Spleen</th>
<th>Thymus Gland</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sequence B cell and T cell responses. Write the numbers 1–5 next to the activities below to show the order in which they occur.

1. A processed antigen is displayed on the membrane of the macrophage.
2. The activated helper T cell reproduces and attaches to a B cell or cytotoxic T cell.
3. A macrophage digests a pathogen.
4. The B cell begins to make antibodies and the cytotoxic T cell releases cytokines.
5. The macrophage binds with a helper T cell.

Passive and Active Immunity

Contrast passive immunity and active immunity.

Immune System Failure

Analyze why AIDS patients often die from a secondary infection caused by a different pathogen.

Summarize

Classify AIDS as an endemic, an epidemic, or a pandemic disease. Explain your reasoning.
The Immune System
Section 37.3 Noninfectious Disorders

Main Idea

Scan Section 3 of the chapter. Use the checklist as a guide.

- [ ] Read all section titles.
- [ ] Read all boldfaced words.
- [ ] Read all tables, figures, and graphs.
- [ ] Look at all pictures and read the captions.
- [ ] Think about what you already know about noninfectious disorders.

Write three facts you discovered as you scanned the section.

1. 
2. 
3. 

Review Vocabulary

cancer

Use your book or dictionary to define cancer.

New Vocabulary

Write the correct vocabulary term in the left column for each definition below.

severe allergic reaction to particular allergens, which causes a massive release of histamine; smooth muscles in the bronchioles contract, restricting air flow into and out of the lungs
disease that results from an error in a biochemical pathway
diseases that result when a part of the body wears out
a response to environmental antigens

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Classify each noninfectious disorder according to whether it is caused strictly by a person’s genes, or by genes combined with environmental factors.

- arteriosclerosis
- Down syndrome
- coronary artery disease
- hemophilia
- sickle cell anemia
- Type 1 diabetes
- leukemia
- albinism

Evaluate ways that an individual can increase his or her chance of surviving one of the noninfectious diseases that are partly caused by environmental factors.

Identify the causes of noninfectious disorders.

<table>
<thead>
<tr>
<th>Noninfectious Disorders</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>genetic disorders</td>
<td></td>
</tr>
<tr>
<td>degenerative diseases</td>
<td></td>
</tr>
<tr>
<td>metabolic diseases</td>
<td></td>
</tr>
<tr>
<td>cancer</td>
<td></td>
</tr>
</tbody>
</table>
Section 37.3 Noninfectious Disorders (continued)

Main Idea

Inflammatory Diseases

I found this information on page _________.

Details

Compare and contrast the pairs of disorders in the table below.

<table>
<thead>
<tr>
<th>Inflammatory response to infectious disease and inflammatory disease:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple allergic reaction and anaphylactic shock:</td>
</tr>
<tr>
<td>Degenerative arthritis and rheumatoid arthritis:</td>
</tr>
</tbody>
</table>

Identify the parts of the body attacked by antibodies in each of the following autoimmune disorders.

<table>
<thead>
<tr>
<th>Rheumatic fever</th>
<th>Lupus</th>
<th>Rheumatoid arthritis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summarize

Make a table of the types of noninfectious disorders, listing one cause and one example of each disorder.