Life’s Structure and Function
About the Consultant

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*Life's Structure and Function*  iii
Your notes are a reminder of what you learned in class. Taking good notes can help you succeed in science. These tips will help you take better notes.

- Be an active listener. 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>
</tr>
</thead>
<tbody>
<tr>
<td>for example</td>
<td>e.g.</td>
</tr>
<tr>
<td>such as</td>
<td>i.e.</td>
</tr>
<tr>
<td>with</td>
<td>w/</td>
</tr>
<tr>
<td>without</td>
<td>w/o</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Word or Phrase</th>
<th>Symbol or Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>and</td>
<td>+</td>
</tr>
<tr>
<td>approximately</td>
<td>≈</td>
</tr>
<tr>
<td>therefore</td>
<td>'.'</td>
</tr>
<tr>
<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.

**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.
Using Your Science Notebook

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

**Language-Based Activities**
Activities cover the content in your science book including vocabulary, writing, note-taking, and problem solving.

**Anticipation Guide/KWL Charts**
Think about what you already know before beginning a lesson and identify what you would like to learn from reading.

**Science Journal**
Write about what you know.

**Writing Activities**
These activities help you think about what you're learning and make connections to your life.

**Vocabulary Development**
Vocabulary words help you to better understand your science lessons. Learning the Academic Glossary can help you score higher on standardized tests.
### Note-Taking Based on the Cornell Two-Column Format
Practice effective note-taking through the use of graphic organizers, outlines, and written summaries.

#### Working in the Lab

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

#### Technology

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

### Chapter Wrap-Up
This brings the information together for you. Revisiting what you thought at the beginning of the chapter provides another opportunity for you to discuss what you have learned.

#### The Nature of Science

**After You Read**

<table>
<thead>
<tr>
<th>The Nature of Science</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• An important part of science is testing, or experimenting.</td>
<td></td>
</tr>
<tr>
<td>• Technology is useful only in the situation for which it was designed.</td>
<td></td>
</tr>
<tr>
<td>• People began studying weather in the 1800s.</td>
<td></td>
</tr>
<tr>
<td>• Science can answer all of the questions that can be asked.</td>
<td></td>
</tr>
</tbody>
</table>

### Review Checklist
This list helps you assess what you have learned and prepare for your chapter tests.

#### Review Checklist

- Review the information you included in your Foldable.
- Study your Science Notebook on this chapter.
- Study the definitions of vocabulary words.
- Review daily homework assignments.
- Re-read the chapter and review the charts, graphs, and illustrations.
- Review the Self-Check at the end of each section.
- Look over the Chapter Review at the end of the chapter.

### Graphic Organizers
A variety of visual organizers help you to analyze and summarize information and remember content.
Exploring and Classifying Life

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>Exploring and Classifying Life</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• All science takes place in laboratories.</td>
</tr>
<tr>
<td></td>
<td>• All of the changes that take place during an organism’s life are called responses.</td>
</tr>
<tr>
<td></td>
<td>• Spontaneous generation is the idea that living things come from nonliving things.</td>
</tr>
<tr>
<td></td>
<td>• Organisms are classified into groups based on their similarities.</td>
</tr>
</tbody>
</table>

**Foldables**

*Construct the Foldable as directed at the beginning of this chapter.*

**Science Journal**

*List three characteristics that you would use to classify underwater life.*

---

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Exploring and Classifying Life
Section 1 What is science?

Scan the list below to preview Section 1 of your book.

- Read all section headings.
- Read all bold words.
- Read all charts and graphs.
- Think about what you already know about how to solve problems.

Write three facts you discovered about scientific methods as you scanned the section.

1. _____________________________________________________________________
2. _____________________________________________________________________
3. _____________________________________________________________________

Write a paragraph describing scientific methods. Use all of the vocabulary words in your description. Underline each vocabulary word.

Scientific methods are procedures that scientists use to solve problems. There are many scientific methods, but they often follow these steps. A scientist proposes a hypothesis, which is a prediction that can be tested. The scientist tests the prediction using an experiment. He or she decides which variable to change. The scientist compares changes in the variable to a control, or standard. If the data support the hypothesis, the hypothesis is accepted. If the data do not support it, it is rejected. If the hypothesis is tested many times and is always accepted, it may become a scientific theory. Theories are more likely to change than scientific laws, but less likely to change than hypotheses.
Define science using information from this section.

Sequence the steps scientists use to solve problems. Study the figure in your book, then close your book and try to fill in the figure. Check your work by looking back at your book.

Analyze the role of controls and variables in an experiment. Fill in the missing words.

A control is the ______________ to which the ______________ of a test is ______________. A variable is ______________ that can be ______________. The number of variables that should be changed during an experiment is ______________.
**Main Idea**

**Developing Theories**

_I found this information on page ________._

**Details**

**Contrast** an opinion, a scientific theory, and a scientific law.

_Complete the table._

<table>
<thead>
<tr>
<th></th>
<th>Opinion</th>
<th>Scientific Theory</th>
<th>Scientific Law</th>
</tr>
</thead>
<tbody>
<tr>
<td>What it is</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What it is based on</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Summarize** the metric units for each quantity below by listing them.

**Length:** millimeter, centimeter, meter, kilometer

**Volume:** milliliter, liter

**Mass:** gram, kilogram, tonne

**Identify** two important safety practices to follow in a laboratory.

1. Wear eye protection.
2. Wash your hands after handling materials.

**SYNTHESIZE IT**

A scientist collects data about ducks’ migration patterns every year between November and April. After five years, she draws conclusions and publishes a scientific paper. Describe the scientific methods she might have used. State why it was important to wait five years before publishing her results.
Predict what you will learn in Section 2. Read the title and main headings. List three topics that you predict will be discussed in the section.

1. ____________________________________________
2. ____________________________________________
3. ____________________________________________

**Review Vocabulary**

Use raw materials in a sentence to show its scientific meaning.

raw materials

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

**New Vocabulary**

Find a sentence in Section 2 that uses each vocabulary term.

organism

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

cell

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

homeostasis

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

**Academic Vocabulary**

Use a dictionary to define chemical.

chemical

________________________________________________________________________
________________________________________________________________________
Main Idea

**What are living things like?**

I found this information on page __________.

Organize the characteristics that define living things. Complete the graphic organizer.

Describe the relationship between a stimulus and a response. Complete the table. Then complete the flowchart to describe homeostasis.

<table>
<thead>
<tr>
<th>What It Is</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stimulus</td>
<td></td>
</tr>
<tr>
<td>Response</td>
<td></td>
</tr>
</tbody>
</table>

Homeostasis

Stimulus

The conditions in an organism’s cells change.

Response

I found this information on page __________.
Main Idea

I found this information on page __________.

What do living things need?

I found this information on page __________.

Contrast the ways organisms obtain energy in the table.

<table>
<thead>
<tr>
<th>Organism</th>
<th>How It Obtains Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants</td>
<td></td>
</tr>
<tr>
<td>Animals</td>
<td></td>
</tr>
<tr>
<td>Bacteria in places sunlight cannot reach</td>
<td></td>
</tr>
</tbody>
</table>

Classify the needs of all living things. Complete the concept map.

Summarize It

Choose one living thing and one nonliving thing with which you are familiar. Use the five characteristics of living things to explain how you know that each is living or nonliving. Complete the chart to organize your information.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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</thead>
<tbody>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Exploring and Classifying Life
Section 3 Where does life come from?

**Skim** Section 3, and write three questions that you have.

1. __________________________________________
2. __________________________________________
3. __________________________________________

**Define** contaminate and use it in an original sentence.

_____________________________________________________
_____________________________________________________
_____________________________________________________

**Write the vocabulary term that matches each definition.**

________________________
the idea that living things come from nonliving things

________________________
the idea that living things come only from other living things

**Use a dictionary to define estimate as both a noun and a verb.**

noun: _______________________________________________
_____________________________________________________
_____________________________________________________

verb: _______________________________________________
_____________________________________________________
_____________________________________________________
Section 3 Where does life come from? (continued)

Main Idea

Life Comes from Life

I found this information on page __________.

Details

Contrast the theories of spontaneous generation and biogenesis. Complete the table.

<table>
<thead>
<tr>
<th>Source of life</th>
<th>Spontaneous Generation</th>
<th>Biogenesis</th>
</tr>
</thead>
</table>

Sequence experiments that were conducted about the theory of spontaneous generation. Complete the time line.

- 1800s
  - Who: Louis Pasteur

- 1700s
  - Who: John Needham and Lazaro Spallanzani
  - What: Experiments did not show spontaneous generation but also did not entirely disprove it.

- 1668
  - Who: Francesco Redi
  - What: Experiments showed that maggots hatched from fly eggs.

Life’s Origins

I found this information on page __________.

Complete key events in the evolution of life on Earth. Identify the event that scientists hypothesize occurred at each time.

about 5 billion years ago: ___________________________

about 4.6 billion years ago: __________________________

more than 3.5 billion years ago: __________________________
Main Idea

Life’s Origins
I found this information on page __________.

Details

Organize information about Oparin’s hypothesis. Complete the outline.

I. Oparin’s hypothesis of Earth’s early atmosphere composition
   A. ________________
   B. ________________
   C. ________________
   D. ________________

II. What happened in the atmosphere
   A. ________________
   B. ________________

Complete the graphic organizer summarizing Stanley Miller and Harold Urey’s experiment.

CONNECT IT

Scientists’ theories of the origin of life have changed over time. How do these changes show the use of scientific methods?

----------
Exploring and Classifying Life
Section 4 How are living things classified?

Read the What You’ll Learn statements for Section 4. Rewrite each statement as a question. As you read, look for the responses to your questions.

1. 
2. 
3. 
4. 

Describe how an organism’s common name is different from its scientific name.

Sample response: A common name is the name used in a particular place and language. A scientific name is the name used by all scientists.

Review Vocabulary

common name

New Vocabulary

Read the definitions below. Write the vocabulary term that matches each definition.

first and largest category used to classify organisms

evolutionary history of an organism

group of similar species

two-word scientific naming system

Academic Vocabulary

Define similar using a dictionary.


Section 4  How are living things classified? (continued)

**Main Idea**

**Classification**

I found this information on page __________.

**Details**

Contrast historic classification systems. Identify the categories or criteria used in each system.

<table>
<thead>
<tr>
<th>Early classification</th>
<th>Aristotle</th>
<th>Linnaeus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Categories or criteria</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summarize the 6 types of information that modern scientists use to determine an organism’s phylogeny.

1. ____________________________
2. ____________________________
3. ____________________________
4. ____________________________
5. ____________________________
6. ____________________________

Label the groups used to classify organisms from least specific to most specific. Use the word bank to complete the diagram.

race      genus    order      species
family    kingdom  phylum
**Main Idea**

**Scientific Names**

I found this information on page ___________.

**Details**

**Summarize** binomial nomenclature. *Complete the sentences.*

The first word of an organism’s scientific name is its _________.

The second word might ____________________________.

**Identify** four reasons the system of binomial nomenclature is useful.

1. ____________________________

2. ____________________________

3. ____________________________

4. ____________________________

**Distinguish** between a field guide and a dichotomous key.

*Complete the Venn diagram.*

Field Guide

Dichotomous Key

Both

**SYNTHESIZE IT**

Choose five similar plants or animals. Use what you know about their structures and features to develop your own dichotomous key to classify your choices. Use a dictionary to find the scientific name of each plant or animal to include in your key.
Exploring and Classifying Life
Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

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

<table>
<thead>
<tr>
<th>Exploring and Classifying Life</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• All science takes place in laboratories.</td>
<td></td>
</tr>
<tr>
<td>• All of the changes that take place during an organism’s life are called responses.</td>
<td></td>
</tr>
<tr>
<td>• Spontaneous generation is the idea that living things come from nonliving things.</td>
<td></td>
</tr>
<tr>
<td>• Organisms are classified into groups based on their similarities.</td>
<td></td>
</tr>
</tbody>
</table>

Review
Use this checklist to help you study.

☐ Review the information you included in your Foldable.
☐ Study your Science Notebook on this chapter.
☐ Study the definitions of vocabulary words.
☐ Review daily homework assignments.
☐ Re-read the chapter and review the charts, graphs, and illustrations.
☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT
List three important ideas you learned in Chapter 1.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Cells

Before You Read

Preview the chapter title, the section titles, and the section headings. List at least one idea for each section in each column.

<table>
<thead>
<tr>
<th>K What I know</th>
<th>W What I want to find out</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Write three questions that you would ask a scientist researching cancer cells.

_________________________

_________________________

_________________________

_________________________

_________________________
Cells
Section 1  Cell Structure

**Skim** Section 1. Write two questions that come to mind.
1. ____________________________________________
2. ____________________________________________

**Review Vocabulary**

Write sentences using the Review Vocabulary and New Vocabulary words. Use two or more of the vocabulary words in each sentence.

photosynthesis

_______________________________________________________________

**New Vocabulary**

- cell membrane
- cytoplasm
- cell wall
- organelle
- nucleus
- chloroplast
- mitochondrion
- ribosome
- endoplasmic reticulum
- Golgi body
- tissue
- organ

**Academic Vocabulary**

Write sentences using function as a noun and as a verb.

function

Noun: ____________________________________________
Verb: ____________________________________________

Noun: Each cell in the body has a specific function.
Verb: Chlorophyll functions to capture light energy.
Main Idea

Common Cell Traits

I found this information on page ________.

I found this information on page ________.

Cell Organization

I found this information on page ________.

Define cell by completing the following statement.

A cell is ____________________________________________________________

__________________________________________________________________

Model a prokaryotic cell and a eukaryotic cell. Show the difference between the two types.

<table>
<thead>
<tr>
<th>Prokaryotic Cell</th>
<th>Eukaryotic Cell</th>
</tr>
</thead>
</table>

Organize information about eukaryotic cell parts in the table.

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell wall</td>
<td></td>
</tr>
<tr>
<td>Nucleus</td>
<td></td>
</tr>
<tr>
<td>Chloroplast</td>
<td></td>
</tr>
<tr>
<td>Mitochondria</td>
<td></td>
</tr>
<tr>
<td>Ribosomes</td>
<td></td>
</tr>
<tr>
<td>Endoplasmic reticulum</td>
<td></td>
</tr>
<tr>
<td>Golgi bodies</td>
<td></td>
</tr>
<tr>
<td>Lysosomes</td>
<td></td>
</tr>
</tbody>
</table>
Sequence the following terms from simplest (at the top) to most complex in the chart below. Define each term and provide an example.

<table>
<thead>
<tr>
<th>tissue</th>
<th>organism</th>
<th>cell</th>
<th>organ system</th>
<th>organ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term:</td>
<td>Example:</td>
<td>Definition:</td>
<td>Term:</td>
<td>Example:</td>
</tr>
<tr>
<td>Term:</td>
<td>Example:</td>
<td>Definition:</td>
<td>Term:</td>
<td>Example:</td>
</tr>
<tr>
<td>Term:</td>
<td>Example:</td>
<td>Definition:</td>
<td>Term:</td>
<td>Example:</td>
</tr>
<tr>
<td>Term:</td>
<td>Example:</td>
<td>Definition:</td>
<td>Term:</td>
<td>Example:</td>
</tr>
</tbody>
</table>

From Cell to Organism

I found this information on page __________.

SYNTHESIZE IT

Compare and contrast animal and plant cells.
**Cells**

**Section 2  Viewing Cells**

**Predict** three things that might be discussed in this section after reading its headings.

1. ____________________________
2. ____________________________
3. ____________________________

**Use** magnify in a sentence.

magnify

________________________________________

________________________________________

________________________________________

**New Vocabulary**

Find a sentence in Section 2 in which cell theory is used and write it here.

cell theory

________________________________________

________________________________________

________________________________________

**Academic Vocabulary**

Define compound as an adjective. Use a dictionary if you need to.

________________________________________

________________________________________

________________________________________

Locate and write a sentence in Section 2 in which the word compound is used as an adjective.

________________________________________

________________________________________

________________________________________

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Section 2 Viewing Cells (continued)

Main Idea

Magnifying Cells

I found this information on page __________.

Details

Summarize information in your book to describe van Leeuwenhoek’s microscope.

Evaluate the total magnification of a microscope with a 10X eyepiece lens and a 43X objective lens. Write the equation for finding total magnification. Then use it to show your calculation.

\[
\text{total magnification} = \frac{\text{eyepiece lens magnification}}{\text{objective lens magnification}}
\]

\[
\text{total magnification} = \frac{10}{43} = \frac{10}{43}
\]

Compare compound microscopes with electron microscopes by completing the Venn diagram with at least seven facts.

![Venn diagram](image)

Cells
Summarize discoveries made by scientists that led to the cell theory.

Robert Hooke

Matthias Schleiden

Theodor Schwann

Rudolf Virchow

List the 3 main principles of the cell theory.

1. 

2. 

3. 

Describe how the development of the cell theory shows that scientific beliefs can change over time. Use specific examples.
Scan Section 3 of this chapter. Write three questions based on headings in the section. Answer the questions as you read.

1. ______________________________________
2. ______________________________________
3. ______________________________________

Define disease using your book or a dictionary.

disease

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Use your book to define each new vocabulary term.

virus

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

host cell

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Use a dictionary to define apparent.

apparent

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Explain what the following sentence means.

The virus is still in your body’s cells, but it is hiding and doing no apparent harm.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Main Idea

What are viruses?
*I found this information on page _________.

Details

Organize information about viruses by completing the outline.

Viruses
I. Definition: ____________________________

II. Description:
   A. Size: ____________________________
   B. Shapes: ____________________________

III. Diseases caused by viruses
   A. _________________ C. _________________
   B. _________________ D. _________________

Summarize what a virus needs to reproduce.

Distinguish between an active virus and a latent virus.

A(n) _________________ enters a host cell, immediately causes the cell to make new viruses, and destroys the cell.

A(n) _________________ enters a host cell, but does not immediately make new viruses or destroy the cell.

Sequence the events when an active virus enters a host cell.

1. Virus attaches to a specific host cell.
2. Virus’s hereditary material enters cell.
3. Cell makes viral hereditary material and proteins.
4. New viruses form inside the cell.
5. Viruses are released as cell bursts open.

I found this information on page _________.

Cells
Define bacteriophage and explain what it does to a bacterium. 

Sequence the steps by which interferons work.

Summarize how scientists use viruses in gene therapy.

Describe why it is not a good idea to take antibiotics for a cold.
A scientist is researching an unknown disease. After examining the disease-causing agent with a compound microscope and testing it in various ways, she has decided that the disease should be treated with an antibiotic drug to disrupt its membrane and prevent it from reproducing. Describe what is causing the disease and how you know.
Cells  Chapter Wrap-Up

Review the ideas you listed at the beginning of the chapter. Cross out any incorrect information in the first column. Then complete the table by filling in the third 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>

Review

*Use this checklist to help you study.*

- Review the information you included in your Foldable.
- Study your *Science Notebook* on this chapter.
- Study the definitions of vocabulary words.
- Review daily homework assignments.
- Re-read the chapter and review the charts, graphs, and illustrations.
- Review the Self Check at the end of each section.
- Look over the Chapter Review at the end of the chapter.

**SUMMARIZE IT**

What are the three most important ideas in the chapter?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

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Cell Processes

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>Cell Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Matter is made up of atoms.</td>
</tr>
<tr>
<td></td>
<td>• All substances chemically combine when they are mixed together.</td>
</tr>
<tr>
<td></td>
<td>• Energy is always needed to move material across a cell membrane.</td>
</tr>
<tr>
<td></td>
<td>• Plants can convert light energy into chemical energy.</td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Describe two ways in which you think plants get food and energy.
Cell Processes
Section 1 Chemistry of Life

Predict what you will learn in Section 1 after reading the headings and looking at the diagrams.

1. ____________________________________________
2. ____________________________________________
3. ____________________________________________

Review Vocabulary

Define cell to show its scientific meaning.

cell

New Vocabulary

Find each term in Section 1 and write the sentence where it is used.

mixture

organic compound

enzyme

inorganic compound

Academic Vocabulary

Use a dictionary to define chemical bond.

chemical bond


**Main Idea**

**The Nature of Matter**

Compare elements and compounds by completing the chart below.

<table>
<thead>
<tr>
<th></th>
<th>Elements</th>
<th>Compounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of types of atom</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Example</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Classify each characteristic of compounds as ionic, molecular, or both.

_________ has positively and negatively charged ions
_________ share outermost electrons to bond
_________ salt
_________ sugar
_________ involved in many life processes
_________ have different properties than the elements from which they are made

**Mixtures**

Compare mixtures, solutions, and suspensions. Complete the statements below.

A mixture is ________________________________________________________________________
__________________________________________________________________________________

Both solutions and suspensions ________________________________________________________________________
__________________________________________________________________________________

In a solution, ________________________________________________________________________
__________________________________________________________________________________

In a suspension, ________________________________________________________________________
__________________________________________________________________________________
Section 1  Chemistry of Life (continued)

Main Idea

Organic Compounds
I found this information on page __________.

Inorganic Compounds
I found this information on page __________.

Details

Summarize the functions of the 4 main organic compounds.

<table>
<thead>
<tr>
<th>Organic Compounds in Living Things</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compound</td>
</tr>
<tr>
<td>Carbohydrates</td>
</tr>
<tr>
<td>Lipids</td>
</tr>
<tr>
<td>Proteins</td>
</tr>
<tr>
<td>Nucleic acids</td>
</tr>
</tbody>
</table>

Compare and contrast characteristics of organic and inorganic compounds by completing the table below.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Organic</th>
<th>Inorganic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contains carbon?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Role in living things</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Identify three ways that water is important to living things.

1. ___________________________________________________________________

2. ___________________________________________________________________

3. ___________________________________________________________________
Cell Processes
Section 2 Moving Cellular Materials

**Skim** Section 2. List three headings you would use to make an outline of this section.

1. ____________________________
2. ____________________________
3. ____________________________

**Define** cytoplasm to show its scientific meaning.

*cytoplasm*

movement of substances through a cell membrane without the use of energy

occurs when molecules of one substance are spread evenly throughout another substance

energy-requiring process in which transport proteins bind with particles and move them through a cell membrane

process by which a cell takes in a substance by surrounding it with the cell membrane

process by which vesicles release their contents outside the cell

type of passive transport in which molecules move from where there are more of them to where there are fewer of them

type of passive transport that occurs when water diffuses through a cell membrane

**Use a dictionary to define the term facilitate.**

*facilitate*
Main Idea

I found this information on page __________.

Create a diagram that shows how oxygen diffuses from air sacs in the lungs to red blood cells.

Details

Write a short caption on how oxygen moves from the lungs to toe cells.

Complete the concept map of osmosis.

Osmosis

is a type of

do not require

involves the movement of __________ through the cell membrane.

occurs in both plant and animal __________.

List three facts about facilitated diffusion.

1. _________________________
2. _________________________
3. _________________________
Sequence the process of how active transport moves materials into the cell.

1. The transport protein binds to the needed particle.
2. Energy is used to move the particle through the cell membrane.
3. The particle is released by the transport protein.

Compare and contrast facilitated diffusion and active transport by writing yes or no in each box of the chart.

<table>
<thead>
<tr>
<th>Uses transport proteins?</th>
<th>Facilitated Diffusion</th>
<th>Active Transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transports materials across cell membrane?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requires energy?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Able to move materials from an area with less of the material to an area with more of the material?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Complete the table to identify the processes involved in moving very large particles in and out of cells.

<table>
<thead>
<tr>
<th>Process</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials entering cell</td>
<td></td>
</tr>
<tr>
<td>Materials being expelled from cell</td>
<td></td>
</tr>
</tbody>
</table>
Scan Section 3 of your book. Write three things you think you will learn about in this section.

1. _____________________________
2. _____________________________
3. _____________________________

Define **mitochondrion** to show its scientific meaning.

**mitochondrion**

__________________________________________

__________________________________________

Read the definitions below. Write the vocabulary term that matches the definition in the blank to the left.

**process by which producers and consumers release stored energy from food molecules**

**process by which oxygen-lacking cells and some one-celled organisms release small amounts of energy from glucose molecules and produce wastes such as alcohol, carbon dioxide, and lactic acid**

**process by which plants and many other producers use light energy to produce a simple sugar from carbon dioxide and water and give off oxygen**

**total of all chemical reactions in an organism**

Use a dictionary to define **obtain**.

__________________________________________

__________________________________________
Section 3 Energy for Life (continued)

Main Idea

Trapping and Using Energy

I found this information on page __________.

Details

Model a chemical reaction in which an enzyme changes two smaller molecules into one larger molecule.

Complete the table on the different materials and their roles in photosynthesis.

<table>
<thead>
<tr>
<th>Material</th>
<th>Role in Photosynthesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td></td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>products of photosynthesis</td>
</tr>
<tr>
<td>Chlorophyll</td>
<td></td>
</tr>
</tbody>
</table>

Analyze why photosynthesis is important to animals.

I found this information on page __________.
Summarize the process of respiration. State what is broken down and what the products are.

During respiration, food molecules are broken down to release stored energy. Oxygen is used to complete this process. The waste products carbon dioxide and water are produced.

Compare fermentation with respiration.

<table>
<thead>
<tr>
<th>Comparing Fermentation and Respiration</th>
<th>Fermentation</th>
<th>Respiration</th>
</tr>
</thead>
<tbody>
<tr>
<td>What gets broken down?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Where does breakdown occur?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is energy released?</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>What wastes are produced?</td>
<td>if insufficient O₂</td>
<td></td>
</tr>
<tr>
<td></td>
<td>in muscle cells:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>______________</td>
<td></td>
</tr>
<tr>
<td></td>
<td>in yeast cells:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>______________</td>
<td></td>
</tr>
</tbody>
</table>

Describe the relationship between plants and animals. Use the listed terms in your description.

carbon dioxide  consumer  energy  oxygen  photosynthesis  producer  respiration
Tie It Together

Suppose that you are small enough to be able to move around within the cytoplasm of a cell. Write a story about what it might be like to move through the cell membrane, including the method the cell would use to let you in. Explain why this is the best method.
Cell Processes  Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

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

<table>
<thead>
<tr>
<th>Cell Processes</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
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Review

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☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT

List three important ideas in the chapter.

________________________________________

________________________________________

________________________________________

________________________________________

________________________________________

________________________________________

________________________________________
Cell Reproduction

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>Cell Reproduction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• One-celled organisms reproduce through cell division.</td>
</tr>
<tr>
<td></td>
<td>• Every living organism has a life cycle.</td>
</tr>
<tr>
<td></td>
<td>• All organisms reproduce sexually.</td>
</tr>
<tr>
<td></td>
<td>• Most of the cells formed in your body do not contain genetic material.</td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Write three things that you know about how and why cells reproduce.

__________________________
__________________________
__________________________
__________________________
__________________________
__________________________
__________________________
Skim Section 1 of your book. Read the headings, illustrations, and captions. Write three questions that come to mind as you skim the section.

1. _________________________________
2. _________________________________
3. _________________________________

Define nucleus to show its scientific meaning.

nucleus

Locate sentences in your book that use each of the following terms. Write each sentence here, and give the page on which you found it.

mitosis

chromosome

asexual reproduction

Use a dictionary to write a scientific definition of the term cycle. Then find a sentence in this section that defines the cell cycle, and write it here.

cycle
Section 1 Cell Division and Mitosis (continued)

**Main Idea**

Why is cell division important?
I found this information on page ________.

**The Cell Cycle**
I found this information on page ________.

**Mitosis**
I found this information on page ________.

---

**Details**

Identify the 3 reasons cell division is important.

1. _____________________________
2. _____________________________
3. _____________________________

Summarize information about interphase in eukaryotic cells in the following paragraph.

Interphase is the ________ part of the cell cycle. During interphase, cells _________ and _________. During interphase, cells that are still dividing copy their ________ and prepare for _________. Cells no longer dividing are _________.

Sequence the steps of mitosis, and write a short description of what takes place in each phase.

1. _____________________________

2. _____________________________

3. _____________________________

4. _____________________________

5. _____________________________

6. _____________________________

---

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Compare mitosis in animals and plants. State if each feature exists in plant cells, animal cells, or both.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Cell Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centrioles</td>
<td>animal</td>
</tr>
<tr>
<td>Spindle fibers</td>
<td>both</td>
</tr>
<tr>
<td>Cell plate</td>
<td>plant</td>
</tr>
<tr>
<td>Cell wall</td>
<td></td>
</tr>
</tbody>
</table>

Organize important concepts about mitosis.
1. Mitosis is the division of a ________________.
2. Mitosis produces two new nuclei that are identical both to ________________ and to ________________.
3. A nucleus with 46 chromosomes that undergoes mitosis will produce _______ nuclei, each with _______ chromosomes.

Identify the 3 forms of asexual reproduction described below.
______________ the method by which bacteria reproduce
______________ new organism growing from body of the parent
______________ to regrow body parts that are lost or damaged

Connect It
A strawberry farmer wants to increase her crop without spending large amounts of money for new seeds. How can she take advantage of asexual reproduction to increase her crop?
Skim the headings and illustrations in Section 2. Write three things you think you will learn about in this section.

1. ____________________________________________________
2. ____________________________________________________
3. ____________________________________________________

Define organism to show its scientific meaning.

organism

________________________________________________________

________________________________________________________

________________________________________________________

Read the definitions below. Write the correct vocabulary term on the blank to the left.

in sexual reproduction, the joining of a sperm and egg

new diploid cell formed when a sperm fertilizes an egg; will divide by mitosis and develop into a new organism

sex cell formed in the female reproductive organs

cell whose similar chromosomes occur in pairs

reproductive process that produces haploid cells

haploid sex cell formed in the male reproductive organs

cells that have only half of each pair of chromosomes

type of reproduction in which two sex cells join to form a zygote

Use a dictionary to define process.

________________________________________________________

________________________________________________________

________________________________________________________
Sexual Reproduction

Compare characteristics of human diploid and haploid cells in the table below. Give examples of each type of cell.

<table>
<thead>
<tr>
<th>Types of Human Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Diploid</td>
</tr>
<tr>
<td>Haploid</td>
</tr>
<tr>
<td>Number of chromosomes</td>
</tr>
<tr>
<td>Process that produces them</td>
</tr>
<tr>
<td>Examples</td>
</tr>
</tbody>
</table>

Meiosis and Sex Cells

Model the 4 stages of meiosis I in the spaces below. Use the figure in your book to help you.

<table>
<thead>
<tr>
<th>Meiosis I</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Prophase I</td>
</tr>
<tr>
<td>Metaphase I</td>
</tr>
<tr>
<td>Anaphase I</td>
</tr>
<tr>
<td>Telophase I</td>
</tr>
</tbody>
</table>
Main Idea

Model what takes place inside a cell nucleus during meiosis II by drawing the 4 phases in the spaces below.

<table>
<thead>
<tr>
<th>Meiosis II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prophase II</td>
</tr>
<tr>
<td>Anaphase II</td>
</tr>
</tbody>
</table>

Summarize differences between meiosis I and meiosis II by writing a number, yes, or no in each box of the chart.

<table>
<thead>
<tr>
<th></th>
<th>Meiosis I</th>
<th>Meiosis II</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many cells result?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is a haploid cell formed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do chromatids separate?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SUSTHESIZE IT

Fruit flies have eight chromosomes in their body cells. Mice have 40. How many chromosomes are there in each sex cell of these organisms?
Cell Reproduction
Section 3 DNA

Scan the list below to preview Section 3.
- Read all section titles.
- Read all bold words.
- Look at all illustrations and their labels.
- Think about what you already know about DNA.

Define heredity to show its scientific meaning.

Write the correct vocabulary term next to each definition.

- deoxyribonucleic acid; a cell’s heredity material; made up of two strands, each consisting of a sugar-phosphate backbone and nitrogen bases: adenine, thymine, guanine, and cytosine
- section of DNA that contains instructions for making specific proteins
- ribonucleic acid; type of nucleic acid that contains the sugar ribose, phosphates, and bases adenine, guanine, cytosine, and uracil
- any permanent change in a gene or chromosome of a cell; may be beneficial, harmful, or have little effect on an organism

The word code can be used as a noun or as a verb. Write a definition for its use as a noun and as a verb.

Noun: __________________________________________
                  __________________________________________

Verb: __________________________________________
                  __________________________________________

46  Cell Reproduction
Main Idea

What is DNA?
I found this information on page __________.

Genes
I found this information on page __________.

Identify the 4 nitrogen bases found in DNA.
1. ________________ 3. ________________
2. ________________ 4. ________________

Model a section of a DNA molecule, showing its twisted-ladder structure. Label the nitrogen bases, sugar, and phosphates. Make sure the nitrogen bases in your drawing are correctly paired.

Summarize how DNA copies itself.

Complete the following paragraph on the relationship of proteins and genes.

Proteins are made up of long chains of ________________.
Genes determine the ________________ of ________________ in a protein. Changing the ________________ of the amino acids makes a ________________ protein.
A man has a discolored area on the back of his hand. The doctor has assured him it is a harmless body cell mutation. Explain why the mutation probably will not appear in his children.

This is a body cell mutation. If the mutation had appeared in an egg or sperm, a child that developed from the sex cell might show the mutation.

**Main Idea**

**Details**

Complete the table on the 3 main kinds of RNA.

<table>
<thead>
<tr>
<th>Type of RNA</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>mRNA</td>
<td>carries the code to make proteins from the nucleus to the cytoplasm</td>
</tr>
<tr>
<td>transfer RNA (tRNA)</td>
<td>type of RNA contained in ribosomes</td>
</tr>
</tbody>
</table>

Complete the steps of protein production within a cell.

1. mRNA moves into the cytoplasm.
2. A(n) attaches to it.
3. ______ molecules bring _________ to the ribosomes.
4. Nitrogen bases on the _______ temporarily _________ the nitrogen bases on the _________.
5. The same process occurs with another ________ molecule and the next portion of the _________ molecule.
6. The ________ attached to the two _________ molecules _________, beginning the formation of a protein.

Describe how mutations can affect an organism.

Mutations

Connect It

I found this information on page ___________.

I found this information on page ___________.

I found this information on page ___________.

I found this information on page ___________.

I found this information on page ___________.

I found this information on page ___________.

Name ____________________________ Date ________________

Section 3 DNA (continued)

**Complete the table on the 3 main kinds of RNA.**

<table>
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<tr>
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<th>Function</th>
</tr>
</thead>
<tbody>
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2. A(n) attaches to it.
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Describe how mutations can affect an organism.

**Mutations**

I found this information on page ___________.

I found this information on page ___________.

I found this information on page ___________.

I found this information on page ___________.

I found this information on page ___________.

I found this information on page ___________.

Name ____________________________ Date ________________

Section 3 DNA (continued)

**Details**

**Connect It**

A man has a discolored area on the back of his hand. The doctor has assured him it is a harmless body cell mutation. Explain why the mutation probably will not appear in his children.
Tie It Together

Draw an animal cell with six chromosomes.
Follow the chromosomes as they go through the steps of meiosis.
Show the chromosomes duplicating and separating, and describe the final end products.
Name each step in the process.
Show one way that a mutation might occur during the process.
Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

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

<table>
<thead>
<tr>
<th>Cell Reproduction</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• One-celled organisms reproduce through cell division.</td>
<td></td>
</tr>
<tr>
<td>• Every living organism has a life cycle.</td>
<td></td>
</tr>
<tr>
<td>• All organisms reproduce sexually.</td>
<td></td>
</tr>
<tr>
<td>• Most of the cells formed in your body do not contain genetic material.</td>
<td></td>
</tr>
</tbody>
</table>

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- Review the Self Check at the end of each section.
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**Summarize It**

List three important ideas from this chapter.
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>Heredity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Offspring of an organism always have the same traits as the parents.</td>
</tr>
<tr>
<td></td>
<td>• There may be more than two forms of a gene.</td>
</tr>
<tr>
<td></td>
<td>• Some traits are determined by more than one gene.</td>
</tr>
<tr>
<td></td>
<td>• Traits from one type of organism can be introduced into another type of organism.</td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of the chapter.

Write three traits that you have and how you would determine how those traits were passed to you.

---

Science Journal

Write three traits that you have and how you would determine how those traits were passed to you.

---

Name ___________________________ Date _____________
**Skim** Section 1 of the chapter. Write two questions that come to mind from reading the headings of this section.

1. ____________________________________________
2. ____________________________________________

**Define** meiosis.

**New Vocabulary**

Write a paragraph describing heredity. Use the five vocabulary terms from the left in your paragraph.

heredity

 genetics

 allele

 dominant

 recessive

Write a paragraph describing genotype. Use the five vocabulary terms from the left in your paragraph.

Punnett square

 genotype

 phenotype

 homozygous

 heterozygous

Use a dictionary to define physical.

physical
Summarize what alleles are and how they are inherited.

Identify three things Mendel did that made his work more useful than previous studies of heredity.

1. He was the first to trace one trait through many generations.
2. He was the first to record how traits pass from one generation to another.
3. He was the first to use the mathematics of probability to explain heredity.

Analyze one trait that Mendel studied.

- Identify the dominant and recessive forms of the trait.
- Predict how an organism would look if it had two dominant alleles, two recessive alleles, or one of each allele.

<table>
<thead>
<tr>
<th>Trait</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dominant form</td>
</tr>
<tr>
<td>Recessive form</td>
</tr>
<tr>
<td>Two dominant alleles</td>
</tr>
<tr>
<td>Two recessive alleles</td>
</tr>
<tr>
<td>One of each allele</td>
</tr>
</tbody>
</table>
Complete the Punnett square for black and blond fur in a dog.

<table>
<thead>
<tr>
<th>Black dog</th>
<th>B</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blond dog</td>
<td>b</td>
<td>b</td>
</tr>
</tbody>
</table>

Analyze the Punnett square to complete the sentences.

The black dog carries ___________ black-fur traits. The blond dog carries ___________ blond-fur traits. The chance that the offspring will have black fur is ___________, or ___________ in ___________.

Summarize Mendel’s 3 principles of heredity.

1. _________________________________________________________________________

2. _________________________________________________________________________

3. _________________________________________________________________________

CONNECT IT

A pea plant is heterozygous for purple flowers (Rr). A gardener crosses it with another pea plant with the same genotype. The recessive gene for this trait causes white flowers. Predict the possible genotypes and phenotypes for the offspring. Predict the percentage for each genotype and phenotype.
Heredity
Section 2 Genetics Since Mendel

Scan the headings and illustrations in Section 2. Write two facts you learned about genetics as you scanned the section.

1. ____________________________________________
2. ____________________________________________

Define gene to show its scientific meaning.

Gene

Define each vocabulary term.

Incomplete dominance

Polygenic inheritance

Sex-linked gene

Use a dictionary to define intermediate. Then rewrite the sentence below, using your definition.

When the allele for white four-o’clock flowers and the allele for red four-o’clock flowers combined, the result was an intermediate phenotype—pink flowers.

Intermediate
Draw a Punnett square for red and white four-o’clock flowers showing the possible offspring. Use R for the allele for red flowers and R’ for the allele for white flowers. In each section of the square, write the genotype and phenotype of the offspring.

<table>
<thead>
<tr>
<th>Red four-o’clock</th>
<th>White four-o’clock</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>R’</td>
<td>R</td>
</tr>
<tr>
<td>R’</td>
<td>R’</td>
</tr>
</tbody>
</table>

Summarize incomplete dominance.

Analyze how a gene with multiple alleles can produce more than three phenotypes. Use blood types as an example.

Identify how internal environment can affect the expression of a trait. Complete the flow chart.

Gene for bright plumage is present.

Gene expressed.

Chemicals activate gene.

Gene expressed.

Chemicals do not activate gene.

Gene is not expressed.

Chemicals do activate gene.

Gene is expressed.

I found this information on page ____________.

I found this information on page ____________.

I found this information on page ____________.

I found this information on page ____________.
Main Idea

Human Genes and Mutations

I found this information on page _________.

I found this information on page _________.

Sex-Linked Disorders

I found this information on page _________.

Pedigrees Trace Traits

I found this information on page _________.

Details

Analyze how chromosome disorders occur.

A chromosome disorder occurs as a result of a ___________ _________________ . It causes an organism to have ________________ chromosomes than normal.

Model how two heterozygous parents who do not have a recessive disorder can have a child with the disorder. Use C for a dominant allele and c for a recessive allele.

Mother's genotype: ________

Child's genotype: ________

Father's genotype: ________

Complete the statements about sex-linked traits.

Sex-linked disorders usually result from ________________ alleles on the ________ chromosome. A man will have the disorder when ________________ . A woman will have the disorder when ________________ .

Summarize why pedigrees are useful to geneticists.

Pedigrees allow a geneticist to trace a trait over several generations. Geneticists use them to predict the probability that a baby will have a certain trait and to breed animals.

Choose a trait described in Section 2, such as color-blindness, calico patterns in cats, or cystic fibrosis. Choose genotypes for two parents. Draw a pedigree starting with these parents. Continue your pedigree for two generations. Use Punnett squares to help you predict possible offspring.
Preview the section title and headings. Write three questions that you would ask a modern geneticist after your preview.

1. __________________________

2. __________________________

3. __________________________

Review Vocabulary

Use DNA in an original sentence to show its scientific meaning.

DNA

New Vocabulary

Define genetic engineering.

genetic engineering

Academic Vocabulary

Use a dictionary to define insert as a verb. Then find a sentence in Section 3 that uses the term or a form of the term.

insert
Main Idea

Genetic Engineering

I found this information on page _________.

Details

Distinguish three uses for genetic engineering.

1. ____________________________
2. ____________________________
3. ____________________________

Organize information about recombinant DNA. Complete the graphic organizer.

Summarize how gene therapy may be used in the future.

I found this information on page _________.

Recombinant DNA

Produced by: ____________________________

Used for: ____________________________

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Main Idea

Genetic Engineering

Create a flow chart about gene therapy. Show how the gene gets into the body and what happens when it reaches the cells.

Details

Summarize each step of gene therapy in your model above.

1. 
2. 
3. 

Evaluate the benefits and potential risks of genetic engineering of crop plants.

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

CONNECT IT

Describe how viruses are useful tools in genetic engineering.

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Tie It Together

Suppose that Gregor Mendel came to visit a modern genetics laboratory and you were asked to give him a tour. Write a report describing what you would show him and how you would explain modern genetics. Remember that he does not know the words gene or allele, although he described “factors” that controlled traits.
Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

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

<table>
<thead>
<tr>
<th>Heredity</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offspring of an organism always have the same traits as the parents.</td>
<td></td>
</tr>
<tr>
<td>There may be more than two forms of a gene.</td>
<td></td>
</tr>
<tr>
<td>Some traits are determined by more than one gene.</td>
<td></td>
</tr>
<tr>
<td>Traits from one type of organism can be introduced into another type of organism.</td>
<td></td>
</tr>
</tbody>
</table>

Review
Use this checklist to help you study.

☐ Review the information you included in your Foldable.
☐ Study your Science Notebook on this chapter.
☐ Study the definitions of vocabulary words.
☐ Review daily homework assignments.
☐ Re-read the chapter and review the charts, graphs, and illustrations.
☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT
Identify the three most important ideas in this chapter.
Adaptations over Time

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>Adaptations over Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Traits acquired by an organism during its life can be passed on to its offspring.</td>
</tr>
<tr>
<td></td>
<td>• Most evidence of evolution comes from fossils.</td>
</tr>
<tr>
<td></td>
<td>• Organisms with traits best suited to their environment are more likely to survive and reproduce.</td>
</tr>
<tr>
<td></td>
<td>• Humans share a common ancestor with other primates.</td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Pick a favorite plant or animal and list all the ways it is well-suited to its environment.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Adaptations over Time
Section 1 Ideas About Evolution

**Predict** three things that will be discussed in Section 1 as you scan the headings and illustrations.

1. ______________________________________
2. ______________________________________
3. ______________________________________

**Define** gene using your book.

- gene

**Write the correct term next to its definition.**

- species: group of organisms that share similar characteristics and can reproduce among themselves, producing fertile offspring
- evolution: change in inherited characteristics over time
- natural selection: process by which organisms with traits best suited to their environment are more likely to survive and reproduce
- adaptation: inherited trait that makes an individual different from other members of its species
- variation: any variation that makes an organism better suited to its environment

**Use your book or a dictionary to define hypothesis.**

- hypothesis: something that is suggested as being true for the purposes of argument or of further investigation
Section 1 Ideas About Evolution (continued)

Main Idea

Early Models of Evolution
I found this information on page ___________.

Darwin's Model of Evolution
I found this information on page ___________.

Natural Selection
I found this information on page ___________.

Variation and Adaptation
I found this information on page ___________.

Details

Identify why Lamarck’s theory of evolution was not accepted.

_________________________________________________________

_________________________________________________________

_________________________________________________________

_________________________________________________________

_________________________________________________________

Analyze Darwin’s explanation of the origins of the 13 species of Galápagos finches. Fill in the missing words.

The Galápagos finches ________________ for food. Those that had ________________, ________________ that allowed them to get food were able to ________________ longer and ________________ more.

Over time, groups of finches became separate ________________.

State 5 main principles of natural selection.

1. ________________

2. ________________

3. ________________

4. ________________

5. ________________

Compare and contrast variations and adaptations.

<table>
<thead>
<tr>
<th></th>
<th>Variation</th>
<th>Adaptation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Examples</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Variation and Adaptation

I found this information on page _________.

Complete the table explaining factors that can lead to changes in a population.

<table>
<thead>
<tr>
<th>What Happens</th>
<th>How It Leads to Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in Gene Sources</td>
<td></td>
</tr>
<tr>
<td>Geographic Isolation</td>
<td></td>
</tr>
</tbody>
</table>

Compare and contrast gradualism and punctuated equilibrium. Select ideas from your reading to fill in the Venn diagram.

Gradualism

Punctuated Equilibrium

Both

SYNTHESIZE IT

Describe how natural selection can lead to the formation of a new species. Include factors such as migration and geographic isolation.

Name ___________________________________________ Date ____________

Section 1 Ideas About Evolution (continued)
Adaptations over Time
Section 2 Clues About Evolution

Scan Section 2 of your book. Then write two items in each of the boxes below.

<table>
<thead>
<tr>
<th>What I know about fossils</th>
<th>What I want to know about fossils</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Review Vocabulary

Define epoch using your book.

epoch

New Vocabulary

Use your book to help you write the correct vocabulary term next to each definition.

- sedimentary rock: a type of rock made from pieces of other rocks, minerals deposited from a solution, or plant and animal matter
- radioactive element: element that gives off a steady amount of radiation as it slowly changes to a nonradioactive element
- embryology: study of embryos and their development
- homologous: similar in structure, origin, or function
- vestigial structure: structure that does not seem to have a function and that may once have functioned in the body of an ancestor

Academic Vocabulary

Use a dictionary to define method.

method

Name ____________________________ Date ____________
Create a concept map to summarize information about the Green River formation. Include information about
• where it is
• what it was in the past
• how fossils formed, and
• what scientists learn from the fossils there.

Summarize the types of rock in which fossils are commonly found.
Most fossils are found in ____________ rock. They are most often found in ____________.

Organize information about how scientists determine the age of fossils. Complete the outline.
I. Relative dating
   A. __________________________________________
   __________________________________________
   B. provides an estimate of a fossil’s age by
   __________________________________________
II. Radiometric dating
   A. __________________________________________
   B. Scientists estimate age by
   __________________________________________
Main Idea

Fossils and Evolution
I found this information on page __________.

More Clues About Evolution
I found this information on page __________.

Details

Create a graphic organizer to identify what scientists learn from fossils.

Organize information about other clues scientists use to study evolution.

Synthesize It

A scientist discovers a new species of mammal. How could the scientist determine its evolutionary relationships to other animals? Explain how the scientist could use each type of evidence discussed in the section.
Adaptations over Time
Section 3 The Evolution of Primates

Skim Section 3 of your book. Read the headings. Write three questions that come to mind.

1. ____________________________________________
2. ____________________________________________
3. ____________________________________________

Define opposable using your book.

opposable

________________________________________________
________________________________________________
________________________________________________

Use your book to define the following terms. Then use each term in a sentence.

primates

________________________________________________
________________________________________________
________________________________________________
________________________________________________

hominid

________________________________________________
________________________________________________
________________________________________________
________________________________________________

Homo sapiens

________________________________________________
________________________________________________
________________________________________________
________________________________________________

Use a dictionary to define similar.

similar

________________________________________________


Section 3 The Evolution of Primates (continued)

Main Idea

Primates
I found this information on page __________.

Distinguish three characteristics of hominids.
1. ____________________________
2. ____________________________
3. ____________________________

Sequence the ancestors of early humans. Create a timeline of hominids in the boxes below. Identify and describe the hominid that lived during each time period.

Time period: 4–6 million years ago
Hominid: ____________________________
Characteristics: ____________________________

Time period: 1.5–2 million years ago
Hominid: ____________________________
Characteristics: ____________________________

Time period: 1.6 million years ago
Hominid: ____________________________
Characteristics: ____________________________

Details

Analyze adaptations that are common among primates by completing the table below. List three primate adaptations and the functions each allows.

<table>
<thead>
<tr>
<th>Adaptation</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opposable thumb grasping and holding objects</td>
<td></td>
</tr>
<tr>
<td>Binocular vision judging depth and distances</td>
<td></td>
</tr>
<tr>
<td>Flexible shoulders moving from branch to branch</td>
<td></td>
</tr>
</tbody>
</table>

I found this information on page __________.

I found this information on page __________.

I found this information on page __________.
Organize information about the origins of modern humans. Complete the diagram.

Early *Homo sapiens* (about 400,000 years ago)

<table>
<thead>
<tr>
<th>Neanderthals</th>
<th>Cro-Magnon humans</th>
</tr>
</thead>
<tbody>
<tr>
<td>short, heavy bodies; thick bones; small chins; heavy brows; used stone tools to hunt; not direct ancestors of modern man</td>
<td>looked like modern humans; made stone carvings; buried their dead</td>
</tr>
</tbody>
</table>

(Homo *sapiens sapiens*)

Contrast Neanderthals and Cro-Magnon humans by completing the diagram.

Connect It

Hypothesize how scientists might determine whether Neanderthals are ancestors of modern humans.
Tie It Together

Make Fossils

With a partner, model a set of fossils that show how organisms can change over time. Draw or model three related organisms. One should be the original organism. The others should be descendants of the original organism. Record the adaptations shown by your fossils. What environmental changes might have led to the adaptations?

Trade fossils with another pair. Describe the fossils that you are given. What adaptations can you find?
Adaptations over Time  Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
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<table>
<thead>
<tr>
<th>Adaptations over Time</th>
<th>After You Read</th>
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<tbody>
<tr>
<td>• Traits acquired by an organism during its life can be passed on to its offspring.</td>
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SUMMARIZE IT

After reading this chapter, identify three things that you have learned about adaptations of organisms over time.

1. First thing learned:
2. Second thing learned:
3. Third thing learned:

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