CONTENTS:
Unit Experiment Logs
School-Home Connection Letter
Activities for Home or School
Student Workbook
Standardized Test Preparation
Selected Teaching Resources

Living Systems:
From Single Cells to Body Systems

UNIT A, CHAPTER 1
Plants and Light

1 Observe and Ask Questions
How do plants respond to light? For example, does a plant grow toward a light source? Make a list of questions you have about plants and light. Then circle a question you want to investigate.

2 Form a Hypothesis
Write a hypothesis. A hypothesis is a suggested answer to the question you are investigating. You must be able to test the hypothesis.

3 Plan an Experiment
To plan your experiment, you must first identify the important variables. Complete the statements below.

Identify and Control Variables
The variable I will change is ________________________________
The variable I will observe or measure is ________________________________
The variables I will keep the same, or control, are ________________________________
Develop a Procedure and Gather Materials

Write the steps you will follow to set up an experiment and collect data.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Use extra sheets of blank paper if you need to write down more steps.

Materials List Look carefully at all the steps of your procedure, and list all the materials you will use. Be sure that your teacher approves your plan and your materials list before you begin. ____________________________________

________________________________________________________________________
________________________________________________________________________
## Conduct the Experiment

**Gather and Record Data** Follow your plan and collect data. Use the chart below or a chart you design to record your data. **Observe** carefully. **Record** your observations and be sure to note anything unusual or unexpected.

### Observation Log

<table>
<thead>
<tr>
<th>Plant</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
<th>Day 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Box</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plant</th>
<th>Day 8</th>
<th>Day 9</th>
<th>Day 10</th>
<th>Day 11</th>
<th>Day 12</th>
<th>Day 13</th>
<th>Day 14</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Box</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Interpret Data

Make sketches that illustrate the appearance of both plants on Day 14. Use the sketches to compare and contrast the growth of the plants.

5 Draw Conclusions and Communicate Results

Compare the hypothesis with the data and chart, then answer these questions.

1. Given the results of the experiment, do you think the hypothesis is true? Explain.

2. How would you revise the hypothesis? Explain.

3. What else did you observe during the experiment?

Prepare a presentation for your classmates in which you communicate what you have learned. Display your data table and diagram.

Investigate Further

Write another hypothesis that you might investigate.
Use these pages to plan and conduct a science experiment to answer a question you may have.

1 Observe and Ask Questions

Make a list of questions you have about a topic. Then circle a question you want to investigate.

2 Form a Hypothesis

Write a hypothesis. A hypothesis is a suggested answer to the question you are investigating. You must be able to test the hypothesis.

3 Plan an Experiment

Identify and Control Variables

To plan your experiment, you must first identify the important variables. Complete the statements below.

The variable I will change is ____________________________

The variable I will observe or measure is ____________________________

The variables I will keep the same, or control, are ____________________________
Develop a Procedure and Gather Materials

Write the steps you will follow to set up an experiment and collect data.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Materials List

Look carefully at all the steps of your procedure and list all the materials you will use. Be sure that your teacher approves your plan and your materials list before you begin.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
4 Conduct the Experiment

Gather and Record Data Follow your plan and collect data. Make a table or chart to record your data. Observe carefully. Record your observations and be sure to note anything unusual or unexpected. Use the space below and additional paper, if necessary.

Interpret Data

Make a graph of the data you have collected. Plot the data on a sheet of graph paper or use a software program.

5 Draw Conclusions and Communicate Results

Compare the hypothesis with the data and the graph. Then answer these questions.

Do the results of the experiment make you think that the hypothesis is true? Explain.

How would you revise the hypothesis? Explain.

What else did you observe during the experiment?

Prepare a presentation for your classmates to communicate what you have learned. Display your data table and graph.
Chapter Content

Our science class is beginning a chapter about cells, tissues, and body systems. We will learn that cells are the building blocks for all forms of life. Ask your child to tell you the major differences between plant and animal cells. (Plant cells have cell walls and chloroplasts.) Can these two types of cells be distinguished by sight under a microscope? (yes)

Science Fun

Discuss with your child all the things the body does to work properly. For example, your child may think of breathing, converting food to energy, and moving blood throughout the body. As you compile your list, fill in the chart below. An example is shown.

<table>
<thead>
<tr>
<th>What My Body Does</th>
<th>Parts of My Body Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>breathing to get oxygen</td>
<td>nose, mouth, throat, lungs</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>

Science Process Skills

The skill of comparing allows students to identify common and distinguishing characteristics among objects or events.

Talk together about a system you are both familiar with. A system could be a public transportation system, a highway system, or the heating or plumbing system of your home. Ask your child to identify the parts of the system with which he or she is familiar. Encourage your child to draw a diagram of the system, using arrows or other symbols to show how things move around the system. Then compare the system you have been discussing to a body system such as the circulatory system. Make a two-part list detailing how the systems are similar and how they are different.

Activity Materials from Home

Dear Family Member:

To do the activities in this chapter, we will need some materials that you may have around your home. Please note the items at the right. If possible, please send these things to school with your child.

Your help and support are appreciated!
How do lungs work?

**Materials**
- 2 balloons
- scissors
- plastic soda bottle

**Procedure**
1. Remove the cap and cut the bottom off the bottle.
2. Put one balloon into the bottle. Secure the lip of the balloon to the top of the bottle.
3. Cut the lip off the second balloon. Stretch the large part of the second balloon over the bottom of the bottle.
4. With your fingers, pull down on the second balloon and then release it. Observe what happens to the first balloon.

**Draw Conclusions**
When you pull on the second balloon, what happens inside the bottle? What part of the respiratory system does each part of your model represent?

What adaptations do skeletons show?

**Materials**
- butcher paper
- meterstick
- marker
- 5 people

**Procedure**
1. Measure out about 7 m of butcher paper.
2. Have one person lie in the center of the paper. This person should stretch out his or her arms as shown.
3. Have two other people lie end-to-end on each side of the first person.
4. Use the marker to draw around the first person, including the top edge of his or her outstretched arms and thumbs.
5. To complete the top edge, draw a sloping line the lengths of the people on both sides as shown. Draw the lower edge with four points and four scallops as shown.

**Draw Conclusions**
While the skeletal systems of all mammals are similar, there are differences due to various adaptations. The skeletons of bats show adaptations for flight. If humans could fly, how many times longer than their bodies would their wings need to be? What other skeletal adaptations of mammals can you think of?
# Chapter 1 • Graphic Organizer for Chapter Concepts

## From Single Cells to Body Systems

### Cells

All living things are made up of one or more cells.

<table>
<thead>
<tr>
<th>Plant</th>
<th>Animal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. nucleus</td>
<td>1. nucleus</td>
</tr>
<tr>
<td>2.</td>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
<td>3.</td>
</tr>
</tbody>
</table>

### LESSON 1

Cell Structures

<table>
<thead>
<tr>
<th>1. nucleus</th>
<th>2. nucleus</th>
<th>3. nucleus</th>
<th>4. nucleus</th>
<th>5. nucleus</th>
<th>6. nucleus</th>
<th>7. nucleus</th>
<th>8. nucleus</th>
</tr>
</thead>
</table>

### LESSON 2

**BODY TRANSPORT SYSTEMS**

**Circulatory System Parts**

<table>
<thead>
<tr>
<th>1. heart</th>
<th>2. blood vessels</th>
<th>3. blood</th>
</tr>
</thead>
</table>

**Respiratory System Organs**

<table>
<thead>
<tr>
<th>1. trachea</th>
<th>2. bronchi</th>
<th>3. lungs</th>
</tr>
</thead>
</table>

**Excretory System Organs**

<table>
<thead>
<tr>
<th>1. kidneys</th>
<th>2. ureters</th>
<th>3. bladder</th>
</tr>
</thead>
</table>

### LESSON 3

**BODY MOVEMENT SYSTEMS**

**Skeletal System Organs**

<table>
<thead>
<tr>
<th>1. bones</th>
<th>2. tendons</th>
<th>3. ligaments</th>
</tr>
</thead>
</table>

**Muscular System**

<table>
<thead>
<tr>
<th>1. voluntary muscles</th>
<th>2. smooth muscles</th>
<th>3. cardiac muscle</th>
</tr>
</thead>
</table>

**Nervous System Parts**

<table>
<thead>
<tr>
<th>1. brain</th>
<th>2. spinal cord</th>
<th>3. neurons</th>
</tr>
</thead>
</table>

---

**Unit A • Chapter 1 Workbook**

---

**Harcourt**
Observing Cells

**Materials**

- Microslide Viewer
- colored pencils
- Microslide of cell structure

**Alternate Materials**

- slice of onion
- coverslip
- red food coloring
- colored pencils
- microscope slide
- dropper
- microscope

**Activity Procedure**

1. Insert the Cell Structure Microslide in the slot on the Microslide Viewer. Turn the focus knob until you can see the cells clearly.

2. **Observe** the onion skin cells and the human cheek cells. **Record** your observations by using the colored pencils to make drawings.

3. Now **observe** the green leaf cells and the nerve cells. Again, **record** your observations by making drawings.

4. Now **compare** your drawings. Make a Venn diagram with two large, overlapping circles. Label the circles *Plant Cells* and *Animal Cells*. Label the area where the circles overlap *Both Cells*. Draw the cell parts that you **observed** in the proper circles. Leave enough room to label the parts as you read about them in this lesson.
Draw Conclusions

1. Compare the outer layers of plant and animal cells. ________________

2. In the centers of most cells are structures that control the cells’ activities. How many of these structures are there in each of the cells you observed?

3. Scientists at Work Scientists often infer characteristics of a group of objects by observing just a few of the objects. From your observations, what do you infer about the number of controlling structures in a cell? ________________

Investigate Further Now that you have observed photomicrographs of cells, what questions do you have about living cells? Use the materials in the Alternate Materials list to plan and conduct a simple experiment based on this hypothesis: All cells have certain parts in common. See page R3 for tips on using a microscope. ________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Observe and Infer

Observing is the most basic science skill. Making good observations will allow you to develop other important science skills, like inferring, comparing, classifying, and measuring. Inferring involves the use of logical reasoning to make conclusions based on observations. Inferences are explanations for events, are based on judgments, and are not always correct.

Think About Observing and Inferring

You looked at cells during the investigation for this lesson. Imagine you come to class and find that all the microscope slides have been removed from their holders and had their labels removed. Use your observations and your knowledge of cells to answer the following questions and make inferences.

1. Your teacher asks you and other students to help relabel the slides by separating the cell slides from the other slides. What do you need to look for to decide whether or not you are looking at a cell slide? _________________

2. Next your teacher asks you to separate the plant cell slides from the animal cell slides. What do you need to look for to decide whether or not you are looking at a plant cell slide or an animal cell slide? _________________

3. What would you look for to decide whether you were seeing that structure? _________________

4. What inference could you make about why such a difference is found in plant and animal cells? _________________
# Use Context to Determine/Confirm Word Meaning

Read the selection. Use context clues to decide the meaning of each italicized term. Then check each meaning in a dictionary.

## Sickle-Cell Disease

Sickle-cell disease, often known as sickle-cell anemia, is an illness affecting the red blood cells. It is a genetic disorder that a person inherits from his or her parents. People with sickle-cell anemia have an abnormal form of hemoglobin in their red blood cells, making the cells sickle-shaped (curved). This abnormality causes the blood to flow more slowly and the blood cells to carry less oxygen than normal cells. Sickle-cell disease eventually causes infection and damages internal organs. It is painful and is treated with pain relievers and antibiotics. People with this disease sometimes require blood transfusions to replenish red blood cells. A bone-marrow transplant can help treat the disease, but it is a risky procedure.

<table>
<thead>
<tr>
<th>Term</th>
<th>Possible Meaning</th>
<th>Dictionary Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>anemia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>abnormality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>transfusions (See transfuse.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What Are Cells, and What Do They Do?

Lesson Concept

Living things are made of one or more cells, each able to support the functions of life. Plant cells differ from animal cells in that they have cell walls and chloroplasts.

Vocabulary

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>cell (A6)</td>
<td></td>
</tr>
<tr>
<td>cytoplasm (A9)</td>
<td></td>
</tr>
<tr>
<td>tissue (A12)</td>
<td></td>
</tr>
<tr>
<td>cell membrane (A8)</td>
<td></td>
</tr>
<tr>
<td>diffusion (A10)</td>
<td></td>
</tr>
<tr>
<td>organ (A12)</td>
<td></td>
</tr>
<tr>
<td>nucleus (A8)</td>
<td></td>
</tr>
<tr>
<td>osmosis (A10)</td>
<td></td>
</tr>
</tbody>
</table>

Match the name of each structure or process with its function.

1. muscle tissue  
2. chromosomes  
3. diffusion  
4. nervous tissue  
5. chloroplasts  
6. cell membrane  
7. nucleus  
8. vacuoles  

A make food in plant cells  
B store food, water, and waste materials for the cell  
C can move an animal’s skeleton by contracting and relaxing  
D holds parts of the cell together and separates the cell from its surroundings  
E the way most materials move in and out of cells  
F threadlike structures that contain information about the characteristics of the organism  
G carries electrical signals that affect muscle tissue  
H controls the cell’s activities
Cells and Tissues

Materials

- Microslide Viewer
- colored pencils
- Microslide of animal tissues

Alternate Materials

- prepared slides of epithelial, connective, and nervous tissues
- microscope

Activity Procedure

1. Insert the Animal Tissues Microslide in the slot of the Microslide Viewer. Turn the focus knob until you can see the cells and tissues clearly.

2. Observe the voluntary muscle cells. Record your observations by using the colored pencils to make a drawing. Label your drawing with the name of the tissue. Then describe the tissue. You may use the Microslide text folder to help you write your description.

3. Repeat Step 2 for the smooth muscle cells and the heart muscle.

4. Compare the three kinds of muscle tissue.
Draw Conclusions

1. How are the three kinds of muscle tissue alike? How are they different?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2. The dark-stained organelles you observed in the muscle tissues are mitochondria. Which kind of muscle tissue has the most mitochondria?

________________________________________________________________________

3. Scientists at Work When scientists compare objects, they often infer reasons for any differences. What do you infer about why one kind of muscle tissue has more mitochondria than the others?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Investigate Further Now that you have observed several kinds of tissues, develop a testable question about differences among tissues. Use the materials in the Alternate Materials list to study other kinds of tissue. Observe the tissues under the microscope, and draw and label any differences you see. Form a hypothesis about how these tissues are different from the muscle tissues you observed. See page R3 for tips on using a microscope.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Investigate Log
Compare and Infer

When you compare data, you arrange your information so that you can see similarities and differences. Inferring involves the use of logical reasoning to make conclusions based on observations.

Think About Comparing and Inferring

Rajean was doing a comparative study to test a new preservative. She made a nutrient solution for microorganisms from beef broth. Then she put 100 mL of the broth in three different beakers. She put 0.1 mL of the preservative in Beaker A, 0.01 mL in Beaker B, and 0.001 mL in Beaker C. The next day Rajean checked the beakers and found the broth discolored and cloudy in two of them. So, she used a microscope to check a sample from each of the three beakers. She recorded what she observed.

<table>
<thead>
<tr>
<th>Amount of preservative added to beaker</th>
<th>Beaker A</th>
<th>Beaker B</th>
<th>Beaker C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 mL</td>
<td>0.01 mL</td>
<td>0.001 mL</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Appearance of broth</th>
<th>Clear</th>
<th>Somewhat cloudy</th>
<th>Very cloudy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microorganisms seen under microscope</td>
<td>None</td>
<td>Yeast cells</td>
<td>Yeast and bacteria</td>
</tr>
</tbody>
</table>

1. Compare the mixtures in each beaker. How are they different?

2. How are they alike? They each contain the same amount of the same nutrient solution. All other conditions except the preservative added were the same.

3. After 24 hours, how do the beakers compare? Two of them are cloudy.

4. What can you infer about how effective the preservative is in keeping yeast from growing in the solution? It is not as good at keeping yeast from growing as it is at keeping bacteria from growing.
Arrange Events in Sequence

Read the selection on page A18 about the respiratory system. Then number the steps below according to the order in which they occur.

1. When you inhale, air is pulled into your body.
2. The air is filtered by tiny hairs in your nose and warmed by capillaries.
3. Warm, clean air travels down your trachea.
4. Air travels through bronchial tubes into your lungs.
5. Carbon dioxide diffuses out of the blood through the thin walls of the capillaries, into the alveoli.
6. At the same time, oxygen from inhaled air diffuses through the thin walls of the alveoli and into the capillaries.
7. The oxygen-rich blood then flows from the capillaries into the pulmonary veins and back to the heart.
8. From the heart, oxygen-rich blood is pumped to other parts of the body.
How Do Body Systems Transport Materials?

Lesson Concept

Body cells are organized into tissues, organs, and systems that work together to keep the body alive. Four of the major systems are the circulatory, the respiratory, the digestive, and the excretory.

Vocabulary

<table>
<thead>
<tr>
<th>capillaries</th>
<th>alveoli</th>
<th>villi</th>
<th>nephrons</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A17)</td>
<td>(A18)</td>
<td>(A19)</td>
<td>(A20)</td>
</tr>
</tbody>
</table>

Match the name of each structure or process with its function.

1. circulatory system   A  blood vessels so small that blood cells have to move through them in single file
2. platelets             B  a long tube that leads to the stomach
3. alveoli               C  transports oxygen, nutrients, and wastes through the body in the blood
4. esophagus              D  tubes that empty wastes into the bladder from the kidneys
5. capillaries           E  vessels through which blood leaves the heart
6. ureters                F  moistens food and begins to break down starchy foods
7. trachea                G  pumps blood through blood vessels
8. arteries               H  cause blood to clot when a blood vessel is cut
9. heart                  I  eliminates excess body heat
10. saliva                J  sometimes called the windpipe
11. pancreas              K  tiny air sacs in the lungs
12. sweating              L  produces a fluid that neutralizes stomach acid

Use with page A21.
How Muscles Cause Movement

**Materials**
- tape measure

**Activity Procedure**

1. Place your left hand on top of your right arm, between the shoulder and elbow. Bend and straighten your right arm at the elbow. **Observe** the movement by feeling the muscles in your right arm.

2. The muscle on the front of the upper arm is called the *biceps*. The muscle on the back of the upper arm is called the *triceps*. **Compare** the biceps and the triceps as you bend and straighten your arm. **Infer** which muscle controls the bending movement and which controls the straightening movement.

3. Have a partner use the tape measure to **measure** the distance around your upper arm when it is straight and when it is bent. **Record** the measurements.

4. Repeat Steps 2 and 3, using your right hand and your left arm.

5. **Compare** the sets of measurements.
1. What did you infer about the muscles controlling the bending and the straightening of your upper arm? ________________________________________________
_______________________________________________________________

2. Why are two muscles needed to bend and straighten your arm? Why can’t one muscle do it? ________________________________________________
_______________________________________________________________

3. Scientists at Work  Scientists often hypothesize about things they observe. Hypothesize about any differences between the measurements of your right arm and the measurements of your left arm. ________________________________________________
_______________________________________________________________

Investigate Further  Plan and conduct an experiment with different pairs of muscles. For example, try bending your leg at the knee while observing the muscles in your thigh. See if these measurements also support your hypothesis. Draw conclusions about differences in muscle sizes from the data you collected. Decide whether more data is needed to support your conclusions. ________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________
Hypothesize

When you hypothesize, you make an educated guess about the results of an experiment you plan to do. A hypothesis is based upon observation, prior knowledge, and prior experimental outcomes. A hypothesis is often altered based on the outcome of experiments that test it.

Think About Hypothesizing

A group of students decided to test the effect of sleep on reaction time. Their hypothesis was that reaction time would improve with more sleep. Each student in the test was asked to push a button as soon as he or she heard the sound of a bell. The amount of time between the sound of the bell and the pushing of the button was recorded as the reaction time.

The table below lists reaction times for three students on different days after receiving different amounts of sleep the night before. Each student underwent two trials on each day of testing.

<table>
<thead>
<tr>
<th>Amount of Sleep</th>
<th>Reaction Time in Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Student A</td>
</tr>
<tr>
<td></td>
<td>Trial 1</td>
</tr>
<tr>
<td>8 hours</td>
<td>0.20</td>
</tr>
<tr>
<td>6 hours</td>
<td>0.17</td>
</tr>
<tr>
<td>4 hours</td>
<td>0.30</td>
</tr>
<tr>
<td>2 hours</td>
<td>0.82</td>
</tr>
</tbody>
</table>

1. Was the hypothesis correct? ____________________________

2. Use the data to form a hypothesis about the effect of sleeping less than eight hours a night on reaction time. ________________________________________________________________

3. How would you test this hypothesis? ____________________________
Compare and Contrast

Read the selection. Then complete the chart by comparing and contrasting the three kinds of muscles.

There are three types of muscles in the human body—voluntary, smooth, and cardiac. All of the body’s more than 600 muscles are made of cells called muscle fibers. All the muscles contract, depending on the body’s movements and functions. Voluntary muscles move bones and support the skeleton. They range in size from those in the eye to those in the thigh. Smooth muscles are in the body’s organs and move slowly, controlling bodily functions. The cardiac muscles make up the walls of the heart and pump blood to the rest of the body. Some cardiac muscles work together to set the pace of the heartbeat.

<table>
<thead>
<tr>
<th>Type of Muscle</th>
<th>Compare</th>
<th>Contrast</th>
</tr>
</thead>
<tbody>
<tr>
<td>voluntary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>smooth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cardiac</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How Do Bones, Muscles, and Nerves Work Together?

Lesson Concept

Skeletal bones move because of the action of pairs of voluntary muscles. Smooth muscles line digestive organs and blood vessels. The walls of the heart are made of cardiac muscle. Nerves carry signals from sensory organs to the brain and from the brain to the muscles.

Vocabulary

<table>
<thead>
<tr>
<th>bone marrow (A24)</th>
<th>joints (A24)</th>
<th>tendons (A25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ligaments (A25)</td>
<td>neuron (A26)</td>
<td>receptors (A26)</td>
</tr>
</tbody>
</table>

Match the term in the left column with its description in the right column.

____ 1. bone marrow
____ 2. ligaments
____ 3. tendons
____ 4. smooth muscles
____ 5. cardiac muscles
____ 6. joints
____ 7. central nervous system
____ 8. receptors
____ 9. neurons
____ 10. synapse

A  line digestive organs and blood vessels
B  is made up of the brain and the spinal cord
C  are nerve cells that detect conditions in the body’s environment
D  attach bones to muscles
E  produces red and white blood cells
F  make up the walls of the heart
G  is a gap between the axon of one neuron and the dendrite of the next neuron
H  attach bones to each other
I  are the cells that nerves are made of
J  are where the bones meet to attach to each other and to muscles
Recognize Vocabulary

Listed below are scrambled vocabulary terms from Chapter 1. Use the clues to unscramble the terms. Write the unscrambled terms on the lines provided.

1. S M O O S S I  _______________________
   the movement of water and dissolved materials through cell membranes

2. L L R C A S E I A P I  _______________________
   blood vessels so small that blood cells move through them in single file

3. R U N N E O  _______________________
   a specialized cell that can receive and transmit signals to other cells like it

4. L Y M O C P S T A  _______________________
   a jellylike substance containing chemicals that keep the cell functioning

5. G R O A N  _______________________
   tissues that work together form this

6. L C L E  _______________________
   the basic unit of structure and function of all living things

7. J S T O N I  _______________________
   where bones meet and are attached to each other and to muscles

8. P R E E T O C R S  _______________________
   nerve cells that detect conditions in the body’s environment

9. I I L V L  _______________________
   tiny tubes sticking out from the walls of the small intestine

10. O M N O E A W B R R (2 words)  _______________________
    connective tissue that produces red and white blood cells

11. F D N I U F I O S  _______________________
    the way most materials move in and out of cells

12. M C L N E E M E R L B A (2 words)  _______________________
    a thin covering that encloses a cell

13. I G L E S A N T M  _______________________
    bands of connective tissue that hold the skeleton together

14. V I O A L E L  _______________________
    tiny air sacs at the end of the smallest tubes in the lungs

Use with pages A4–A27.
Write a Sensory Poem

Expressive Writing—Poem

Think of one of your favorite places to be. Write a poem about how you experience that place through your sensory organs. Use vivid, descriptive words. Complete the concept web below to help you generate ideas for your poem.

Place

Eyes (Sight)

Nose (Smell)

Mouth (Taste)

Skin (Touch)

Ears (Hearing)
What Are Cells, and What Do They Do?

Read pages A6 to A13 in your textbook. Then read each question that follows. Decide which is the best answer to each question. Mark the letter for that answer.

1. What do scientists call the basic unit of life?
   - A vessel
   - B cell
   - C bacteria
   - D a nucleus

2. Which one is NOT a function of every cell in the body?
   - A getting rid of cell wastes
   - B making new cells for growth and repair
   - C carrying signals from the brain to the muscles
   - D releasing energy from food

3. Why might a scientist examine a person’s chromosomes?
   - A to count how many cells are in the person’s body
   - B to see if the person’s cells are functioning normally
   - C to see whether there are bacteria in a cell
   - D to get information about a person’s characteristics

4. What is the purpose of the illustration on page A10?
   - A to show how osmosis works
   - B to show bacteria in a cell
   - C to show how plants get rid of wastes
   - D to show how mitochondria produce energy

5. Read this sentence from the lesson.
   The loss of water from the plant’s vacuoles causes cytoplasm to shrink away from cell walls.
   What does the word shrink mean?
   - A get larger
   - B move toward
   - C expand
   - D pull away from

6. Which kind of tissue forms the body covering of an animal?
   - A connective tissue
   - B epithelial tissue
   - C nervous tissue
   - D muscle tissue
How Do Body Systems Transport Materials?

Read pages A16 to A21 in your textbook. Then read each question that follows. Decide which is the best answer to each question. Mark the letter for that answer.

7. Which of the following famous lines best describes what the section headed “From Cells to Systems” is about?
   A One for all and all for one.
   B Every man for himself.
   C The bigger they are, the harder they fall.
   D Experience is the best teacher.

8. Where is your liver located?
   A on the left side of your body behind your stomach
   B on the right side of your body in front of your gall bladder
   C on the left side of your body above your small intestine
   D on the right side of your body in front of your stomach

9. A urological disease affects the —
   A digestive system
   B excretory system
   C respiratory system
   D circulatory system

10. Which of the following is part of both your digestive and respiratory systems?
    A nose
    B stomach
    C trachea
    D mouth

11. This lesson gives you information on all of the following EXCEPT —
    A how waste products are removed from the body
    B the functions of the blood
    C how the heart and lungs are related
    D how the brain affects appetite

12. Food never passes through the —
    A pancreas
    B small intestine
    C esophagus
    D large intestine
How Do Bones, Muscles, and Nerves Work Together?

Read pages A24 to A27 in your textbook. Then read each question that follows. Decide which is the best answer to each question. Mark the letter for that answer.

13. What is the difference between tendons and ligaments?
   A Tendons attach muscles to bones. Ligaments are a kind of soft bone.
   B Tendons attach bones to each other. Ligaments attach tendons to each other.
   C Tendons attach bones to muscles. Ligaments attach bones to each other.
   D Tendons attach joints to muscles. Ligaments attach bones to muscles.

14. Which is a reflex?
   A blinking
   B chewing
   C running
   D yelling

15. A synapse is —
   A the gap between two neurons
   B a bundle of nerve cells
   C the signal that travels along nerve cells
   D an automatic response to a situation

16. The author compares the motion of a ball and socket joint to the motion of a —
   A door hinge
   B wheel
   C joystick
   D on-off switch

17. A cardiologist is a doctor who specializes in —
   A bones
   B the brain
   C athletic injuries
   D the heart

18. Which sentence states the main idea of the section headed “The Muscular System”?
   A Muscles contract to bend and straighten joints.
   B There are three kinds of muscles — voluntary muscles, smooth muscles, and cardiac muscles.
   C Digestive organs have muscles that help them move substances.
   D The function of cardiac muscles is to move blood.
Unit A, Chapter 1

Base your answers on the information in this chapter. Read all parts to each question before you begin.

The blood transports materials throughout the body. Why does the body need both red blood cells and white blood cells?

**HINT** What job does each type of blood cell perform?

Your body uses energy to grow and carry out life functions. How do the body’s cells get the energy they need?

**HINT** Reread the passages headed “The Respiratory System” and “The Digestive System” on pages A18 and A19 to find the answer.
Muscle Types

One of the body systems you rely on is your muscular system. This system works with your skeletal and nervous systems so that you can walk, breathe, or move your eyes as you are reading this sentence. In this chapter you learned about different kinds of muscles and what each does in the body. Below are three types of muscles.

  voluntary muscles   smooth muscles   cardiac muscles

Write an article for your school newspaper explaining about the muscles in the body. Explain what each type does and where each can be found.

Use this page for prewriting or planning activities. Then write your response on a separate sheet of paper.

<table>
<thead>
<tr>
<th>Writer’s Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IDEAS</strong></td>
</tr>
<tr>
<td>• Is my message clear?</td>
</tr>
<tr>
<td>• Do I know enough about my topic?</td>
</tr>
<tr>
<td>• Have I included interesting details?</td>
</tr>
<tr>
<td><strong>ORGANIZATION</strong></td>
</tr>
<tr>
<td>• Does my paper start out with a bang?</td>
</tr>
<tr>
<td>• Did I tell things in the best order?</td>
</tr>
<tr>
<td>• At the end does it feel finished and make you think?</td>
</tr>
<tr>
<td><strong>VOICE</strong></td>
</tr>
<tr>
<td>• Does this writing really sound like me?</td>
</tr>
<tr>
<td>• Did I say what I was thinking?</td>
</tr>
<tr>
<td>• Did I express how I feel?</td>
</tr>
<tr>
<td><strong>WORD CHOICE</strong></td>
</tr>
<tr>
<td>• Will my reader understand my words?</td>
</tr>
<tr>
<td>• Did I use words I love?</td>
</tr>
<tr>
<td>• Are my words interesting?</td>
</tr>
<tr>
<td>• Can I picture it?</td>
</tr>
<tr>
<td><strong>SENTENCE FLUENCY</strong></td>
</tr>
<tr>
<td>• Is my paper easy to read out loud?</td>
</tr>
<tr>
<td>• Do my sentences begin in different ways?</td>
</tr>
<tr>
<td>• Are some sentences long and some short?</td>
</tr>
<tr>
<td><strong>CONVENTIONS</strong></td>
</tr>
<tr>
<td>• Did I use paragraphs?</td>
</tr>
<tr>
<td>• Is it easy to read my spelling?</td>
</tr>
<tr>
<td>• Did I use capital letters in the right place?</td>
</tr>
<tr>
<td>• Are periods, commas, exclamation marks, and quotation marks in the right places?</td>
</tr>
</tbody>
</table>
Unit A, Chapter 1

Read each question and choose the best answer. Mark the letter for that answer.

1. A plant cell has 10 molecules of water. After the plant is watered, the molecules of water in the plant cell increase to 22 molecules of water through osmosis. How many more molecules of water does the plant cell have after osmosis?
   A 12 molecules
   B 14 molecules
   C 20 molecules
   D 22 molecules

2. The above picture shows water molecules that will move through a plant cell wall by osmosis. How many water molecules will be in the plant cell after osmosis?
   A 0 molecules
   B 7 molecules
   C 14 molecules
   D cannot be determined

3. Juanita's heart beats 20 times in 15 seconds. How many times will it beat in one minute?
   A 15
   B 80
   C 300
   D 1200

4. If Jose gains 3000 milliliters in fluids in a day, how many liters did he gain?
   A 0.03 L
   B 0.3 L
   C 3 L
   D 30 L

Refer to the table below for problems 5 and 6.

<table>
<thead>
<tr>
<th>Name</th>
<th>Straight Arm</th>
<th>Bent Arm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randy</td>
<td>5 in.</td>
<td>7 in.</td>
</tr>
<tr>
<td>William</td>
<td>4 in.</td>
<td>5 1/2 in.</td>
</tr>
<tr>
<td>Eleanor</td>
<td>6 1/2 in.</td>
<td>8 1/4 in.</td>
</tr>
<tr>
<td>Anthony</td>
<td>4 1/2 in.</td>
<td>6 1/4 in.</td>
</tr>
</tbody>
</table>

5. Which person showed the least increase in distance around upper arm after the arm is bent?
   A Randy
   B William
   C Eleanor
   D Anthony

6. How many inches did most of the students' arms increase when their arms went from straight to bent?
   A 1 3/4 in.
   B 1 7/8 in.
   C 2 in.
   D 2 1/2 in.
North American Climate Zones

1

2

3

4

5

6
# Distances to Scale

## How Far Is Pluto?

<table>
<thead>
<tr>
<th>Planet</th>
<th>Distance from the Sun</th>
<th>Distance to nearest million km</th>
<th>Number of toilet paper squares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>57,910,000</td>
<td>58</td>
<td>1</td>
</tr>
<tr>
<td>Venus</td>
<td>108,200,000</td>
<td>108</td>
<td>2</td>
</tr>
<tr>
<td>Earth</td>
<td>149,600,000</td>
<td>150</td>
<td>2.6</td>
</tr>
<tr>
<td>Mars</td>
<td>227,940,000</td>
<td>228</td>
<td>4</td>
</tr>
<tr>
<td>Jupiter</td>
<td>778,330,000</td>
<td>778</td>
<td>13.4</td>
</tr>
<tr>
<td>Saturn</td>
<td>886,708,500</td>
<td>887</td>
<td>15.2</td>
</tr>
<tr>
<td>Uranus</td>
<td>2,870,990,000</td>
<td>2,871</td>
<td>50</td>
</tr>
<tr>
<td>Neptune</td>
<td>4,497,070,000</td>
<td>4,497</td>
<td>77.5</td>
</tr>
<tr>
<td>Pluto</td>
<td>5,913,520,000</td>
<td>5,914</td>
<td>101</td>
</tr>
</tbody>
</table>
The Periodic Table

<table>
<thead>
<tr>
<th>Atomic Number</th>
<th>Chemical Symbol</th>
<th>Element Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>H</td>
<td>Hydrogen</td>
</tr>
<tr>
<td>3</td>
<td>Li</td>
<td>Lithium</td>
</tr>
<tr>
<td>4</td>
<td>Be</td>
<td>Beryllium</td>
</tr>
<tr>
<td>11</td>
<td>Na</td>
<td>Sodium</td>
</tr>
<tr>
<td>12</td>
<td>Mg</td>
<td>Magnesium</td>
</tr>
<tr>
<td>19</td>
<td>K</td>
<td>Potassium</td>
</tr>
<tr>
<td>20</td>
<td>Ca</td>
<td>Calcium</td>
</tr>
<tr>
<td>21</td>
<td>Sc</td>
<td>Scandium</td>
</tr>
<tr>
<td>22</td>
<td>Ti</td>
<td>Titanium</td>
</tr>
<tr>
<td>23</td>
<td>V</td>
<td>Vanadium</td>
</tr>
<tr>
<td>24</td>
<td>Cr</td>
<td>Chromium</td>
</tr>
<tr>
<td>25</td>
<td>Mn</td>
<td>Manganese</td>
</tr>
<tr>
<td>26</td>
<td>Fe</td>
<td>Iron</td>
</tr>
<tr>
<td>27</td>
<td>Co</td>
<td>Cobalt</td>
</tr>
<tr>
<td>37</td>
<td>Rb</td>
<td>Rubidium</td>
</tr>
<tr>
<td>38</td>
<td>Sr</td>
<td>Strontium</td>
</tr>
<tr>
<td>39</td>
<td>Y</td>
<td>Yttrium</td>
</tr>
<tr>
<td>40</td>
<td>Zr</td>
<td>Zirconium</td>
</tr>
<tr>
<td>41</td>
<td>Nb</td>
<td>Niobium</td>
</tr>
<tr>
<td>42</td>
<td>Mo</td>
<td>Molybdenum</td>
</tr>
<tr>
<td>43</td>
<td>Tc</td>
<td>Technetium</td>
</tr>
<tr>
<td>44</td>
<td>Ru</td>
<td>Ruthenium</td>
</tr>
<tr>
<td>45</td>
<td>Rh</td>
<td>Rhodium</td>
</tr>
<tr>
<td>55</td>
<td>Cs</td>
<td>Cesium</td>
</tr>
<tr>
<td>56</td>
<td>Ba</td>
<td>Barium</td>
</tr>
<tr>
<td>57–71</td>
<td>Lu</td>
<td>Lanthanide Series</td>
</tr>
<tr>
<td>72</td>
<td>Hf</td>
<td>Hafnium</td>
</tr>
<tr>
<td>73</td>
<td>Ta</td>
<td>Tantalum</td>
</tr>
<tr>
<td>74</td>
<td>W</td>
<td>Tungsten</td>
</tr>
<tr>
<td>75</td>
<td>Re</td>
<td>Rhenium</td>
</tr>
<tr>
<td>76</td>
<td>Os</td>
<td>Osmium</td>
</tr>
<tr>
<td>77</td>
<td>Ir</td>
<td>Iridium</td>
</tr>
<tr>
<td>87</td>
<td>Fr</td>
<td>Francium</td>
</tr>
<tr>
<td>88</td>
<td>Ra</td>
<td>Radium</td>
</tr>
<tr>
<td>89–103</td>
<td>Lanthanide Series</td>
<td></td>
</tr>
<tr>
<td>104</td>
<td>Rf</td>
<td>Rutherfordium</td>
</tr>
<tr>
<td>105</td>
<td>Db</td>
<td>Dubnium</td>
</tr>
<tr>
<td>106</td>
<td>Sg</td>
<td>Seaborgium</td>
</tr>
<tr>
<td>107</td>
<td>Bh</td>
<td>Bohrium</td>
</tr>
<tr>
<td>108</td>
<td>Hs</td>
<td>Hassium</td>
</tr>
<tr>
<td>109</td>
<td>Mt</td>
<td>Meitnerium</td>
</tr>
<tr>
<td>57</td>
<td>La</td>
<td>Lanthanum</td>
</tr>
<tr>
<td>58</td>
<td>Ce</td>
<td>Cerium</td>
</tr>
<tr>
<td>59</td>
<td>Pr</td>
<td>Praseodymium</td>
</tr>
<tr>
<td>60</td>
<td>Nd</td>
<td>Neodymium</td>
</tr>
<tr>
<td>61</td>
<td>Pm</td>
<td>Promethium</td>
</tr>
<tr>
<td>62</td>
<td>Sm</td>
<td>Samarium</td>
</tr>
<tr>
<td>89</td>
<td>Ac</td>
<td>Actinium</td>
</tr>
<tr>
<td>90</td>
<td>Th</td>
<td>Thorium</td>
</tr>
<tr>
<td>91</td>
<td>Pa</td>
<td>Protactinium</td>
</tr>
<tr>
<td>92</td>
<td>U</td>
<td>Uranium</td>
</tr>
<tr>
<td>93</td>
<td>Np</td>
<td>Neptunium</td>
</tr>
<tr>
<td>94</td>
<td>Pu</td>
<td>Plutonium</td>
</tr>
</tbody>
</table>

**Lanthanide Series**

**Actinide Series**

atomic number | chemical symbol | element name
---|-----------------|--------------
made artificially
metal | nonmetal | metalloid

Use with page E55.
<table>
<thead>
<tr>
<th>What I Know</th>
<th>What I Want to Know</th>
<th>What I Learned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior Knowledge About___</td>
<td>New Knowledge About___</td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>7.</td>
<td></td>
</tr>
</tbody>
</table>
## Prediction Chart

<table>
<thead>
<tr>
<th>What I Predict Will Happen</th>
<th>What Actually Happened</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Project Plan

What We Want to Find Out

1.

How We Can Find Out

2.

What We Need to Do

3. Materials

How We Can Share Information

4.