Classifying and Exploring Life

What are living things, and how can they be classified?

Before You Read

Before you read the chapter, think about what you know about how living things are classified. In the first column, share three things you already know about kinds of living things. In the second column, record three things that you would like to learn more about. When you have completed the chapter, think about what you have learned and complete the What I Learned column.

<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 Learn</td>
<td>What I Learned</td>
</tr>
</tbody>
</table>

Chapter Vocabulary

<table>
<thead>
<tr>
<th>Lesson 1</th>
<th>Lesson 2</th>
<th>Lesson 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEW organism cell unicellular multicellular homeostasis</td>
<td>NEW binomial nomenclature species genus dichotomous key cladogram</td>
<td>NEW light microscope compound microscope electron microscope</td>
</tr>
<tr>
<td>ACADEMIC identify</td>
<td>REVIEW atom</td>
<td></td>
</tr>
</tbody>
</table>

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

Organize information about living and nonliving things. Complete the word web with the 6 characteristics of life.

- maintain certain internal conditions
- respond
- organized
- use energy
- grow and develop
- reproduce

Describe the 2 types of organization in organisms.

1. Unicellular: one cell that includes structures with specialized functions

2. Multicellular: have few or many cells; cells organized into groups that have specialized functions

Compare growth and development of multicellular and unicellular organisms.

<table>
<thead>
<tr>
<th></th>
<th>Multicellular Organism</th>
<th>Unicellular Organism</th>
</tr>
</thead>
<tbody>
<tr>
<td>How the organism grows and develops</td>
<td>grows as the number of cells increases</td>
<td>grows as the size of the cell increases</td>
</tr>
</tbody>
</table>
Main Idea

Reproduction
I found this on page 11.

Define reproduction. Then identify 2 ways in which organisms reproduce.

Reproduction: the process by which one organism makes one or more new organisms.

Organisms reproduce by:
1. dividing and becoming new organisms
2. using specialized cells

Responses to Stimuli
I found this on page 12.

Identify 2 types of stimuli, and provide two examples of each.

Stimuli

- Internal
  - Description: response to internal change
  - Two examples:
    1. hunger
    2. thirst

- External
  - Description: response to environmental change
  - Two examples:
    1. light
    2. temperature
Lesson 1 | Characteristics of Life (continued)

Homeostasis
I found this on page 13.

Analyze the effect of homeostasis. Complete the cause-and-effect chart.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homeostasis maintained</td>
<td>Cells can function.</td>
</tr>
<tr>
<td>Homeostasis not maintained</td>
<td>Organism becomes sick or dies.</td>
</tr>
</tbody>
</table>

Energy
I found this on page 14.

Sequence how energy flows from the Sun to a mountain lion.

Analyzing It
Use the characteristics shared by all living things to explain why a clock is not a living thing.

Accept all reasonable responses. Sample answer: A clock uses energy, has internal conditions, and is organized. However, a clock does not grow and develop, reproduce, or respond to stimuli.
Lesson 2 Classifying Organisms

Scan Lesson 2 in your book. Record three questions you have about classifying living things in your Science Journal. Try to answer your questions as you read.

Main Idea

Classifying Living Things

I found this on page 19.

Details

Identify the ways Aristotle organized, or classified, living things.

<table>
<thead>
<tr>
<th>Plants</th>
<th>Animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>according to:</td>
<td>according to:</td>
</tr>
<tr>
<td>a. ______ structure ______ and</td>
<td>a. ______ presence of red blood</td>
</tr>
<tr>
<td>______ size ______</td>
<td>______ “red blood”</td>
</tr>
<tr>
<td>b. whether it is ______ tree</td>
<td>b. ______ shape and size</td>
</tr>
<tr>
<td>______ herb ______, ______ shrub</td>
<td>c. ______ environment</td>
</tr>
</tbody>
</table>

Determining Kingdoms

I found this on page 20.

Indicate the 5 kingdoms that Whittaker proposed for classifying organisms.

1. ______ Monera ______
2. ______ Protista ______
3. ______ Fungi ______
4. ______ Plantae ______
5. ______ Animalia ______

Determining Domains

I found this on page 20.

Classify groups of organisms into domains and kingdoms.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Kingdom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteria</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Archaea</td>
<td>Archaea</td>
</tr>
<tr>
<td></td>
<td>Protista</td>
</tr>
<tr>
<td></td>
<td>Fungi</td>
</tr>
<tr>
<td>Eukarya</td>
<td>Plantae</td>
</tr>
<tr>
<td></td>
<td>Animalia</td>
</tr>
</tbody>
</table>
Lesson 2 | Classifying Organisms (continued)

**Main Idea**

**Scientific Names**
I found this on page 21.

**Details**

- **Organize** information about binomial nomenclature by defining each part of a brown bear’s scientific name.  

  - **Ursus arctus**
    - **Level of classification:** genus
    - **Description:** group of similar species
    - **Level of classification:** species
    - **Description:** group of organisms that can produce fertile offspring

- **Summarize** why scientific names are important.
  
  Scientific names make communication about species more effective because several species or even several types of organisms might have the same common name.

- **Classification Tools**
  I found this on page 22.

**Details**

- **Compare** a dichotomous key and a cladogram.

  - **Dichotomous Key**
    - a series of questions, each with two possible answers, that can be used to identify an organism
  
  - **Cladogram**
    - branched diagram that shows the relationships among organisms

**Connect It**

Compare your first and last names with a scientific name.

Accept all reasonable responses. Sample answer: A person usually has a given (first) name and a last name, which identifies the father’s family. In binomial nomenclature, the genus corresponds to a person’s family name, and the species corresponds to the given name.
Predict three things that will be discussed in Lesson 3 after reading the headings. Record your predictions in your Science Journal.

Main Idea

The Development of Microscopes
I found this on page 27.

Details

Describe two ways that microscopes have changed people’s ideas about living things.

Microscopes help people
- see details
- make discoveries

Describe Anton van Leeuwenhoek’s microscope.
Anton van Leeuwenhoek’s microscope was made in the late 1600s. The microscope had one lens and could magnify an image 270 times. Leeuwenhoek observed pond water, blood cells, and insects with his microscope.

Explain what Hooke discovered with his microscope.
Hooke observed and studied plant cells.

Identify 2 characteristics of all microscopes.

- magnification
- resolution
Organize information about light microscopes by completing the graphic organizer.

Identify 3 techniques used to observe objects with a light microscope.

1. placed directly under a microscope
2. mounted to a slide
3. stained with dye
Compare and contrast electron microscopes and light microscopes.

<table>
<thead>
<tr>
<th>Electron Microscope</th>
<th>Light Microscope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnification</td>
<td>100,000 times</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.2 nanometers, or 2 billionths of a meter</td>
</tr>
<tr>
<td>Specimens</td>
<td>only nonliving specimens, which must be mounted in plastic and sliced very thin</td>
</tr>
</tbody>
</table>

Two Types
1. TEMs
2. SEMs
1. compound
2. simple

Summarize the use of microscopes.

In health care: doctors and lab technicians, surgery, blood and urine analysis

Other uses: forensic scientists, fossil study, steel and jewelry industries

Synthesize It
How could you use a light microscope to determine whether spilled crystals were salt or sugar?

Sample answer: A light microscope would enable a person to see the size and shape of the crystals. Sugar crystals have a different size and shape than salt crystals.
Chapter Wrap-Up

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

Use this checklist to help you study.

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

Summarize It  Review the chapter Big Idea and the lesson Key Concepts. Suppose that you have discovered a new organism. Describe your organism, including whether it is unicellular or multicellular. Tell how Aristotle and Whittaker would have classified the organism. Explain into which domain and kingdom you would place the organism, and why. Then hypothesize how the use of a microscope could help you further describe and classify your organism.

Accept all reasonable answers. Students should provide enough detail about their organisms to make their classifications reasonable. They might suggest that the use of a microscope would reveal information not visible to the unaided eye.

Challenge  Suppose that you found a rock that looks like wood. Describe the process and equipment you would use to determine if the rock was once wood.