В.

Lesson Outline

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LESSON 3

Exploring Life

A.	Th	e Development of Microscopes
	1.	The invention of allowed people to see details of living things that cannot be seen with the unaided eye.
	2.	Two inventors of early microscopes were Anton van Leeuwenhoek and
		Robert
	3.	Before microscopes, people did not know that living things are made
		of
В.	Тур	pes of Microscopes
	1.	One characteristic of all microscopes is that they
		images. Magnification makes an image appear than it really is.
	2.	Another characteristic of microscopes ishow clearly
		the magnified image can be seen.
	3.	microscopes use light and lenses to enlarge an image of an object.
		a. A light microscope that uses more than one lens to magnify an image is called
		a(n) microscope.
		b. Light microscopes can be used to view or nonliving things.
		c. Light microscopes can enlarge images up to times their original size.
	4.	microscopes use a magnetic field to focus a beam of
		electrons through an object or onto an object's surface.
		a. Because objects must be mounted in plastic and then sliced very thin, only
		organisms can be viewed with an electron
		microscope.
		b. microscopes usually are used to study extremely
		small things, such as the structures inside a cell.
		c microscopes usually are used to study the surface of
		an object

Lesson Outline continued

C. Using Microscopes

1.	People in	, such as doctors and laboratory technicians,
	often use microscopes. Micr	oscopes are used in surgery, such as cataract surgery and
		surgery.
2.		scientists use microscopes to study evidence from crime
	scenes.	
-	mi	

3. The steel industry examines steel for ______ with the use of microscopes.

Exploring Life

Directions: *Use the clues and the terms listed below to complete the puzzle. NOTE: There is no empty square in the puzzle between the words of two-word terms.*

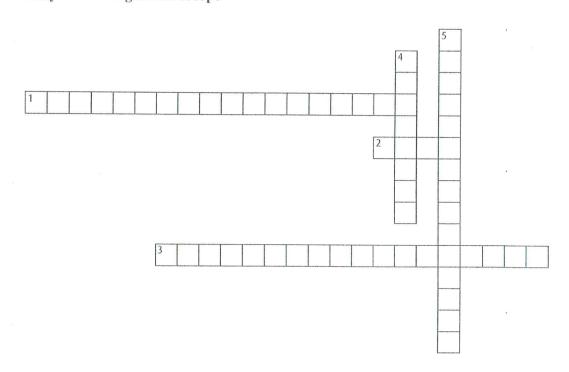
atom

compound microscope

electron microscope

identify

light microscope



Clues

Across

- **1.** a tool that uses a magnetic field to focus a beam of electrons
- 2. the building block of matter
- **3.** a tool with more than one lens that is used to enlarge an image of an object

Down

- **4.** to determine the characteristics of a person or thing
- **5.** a tool that uses light and lenses to enlarge an image of an object

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Name	Date	Class
Content Practice A		LESSON 3
Exploring Life		
Directions: Circle the term in parent	theses that correctly completes each	sentence.
1. All microscopes (magnify/p	photograph) images.	
2. How clearly an image can	be seen depends on a micros	scope's
(magnification/resolution).		
3. Using a microscope, (Hook	e/Leeuwenhoek) observed ar	nd named cells.
Directions: Write the name of the m microscope will be used more than once	nicroscope that goes with each clue o e. Some lines will be filled in with n	on the line provided. Each type of nore than one type of microscope.
compound microscope	electron microscope	light microscope
4. uses light and one lens to e	enlarge an image of an objec	t
5. uses light and more than o		
6. has an ocular lens and an o	objective iens	
7. can be used to view living o	organisms	
8. uses a magnetic field to foc	us a beam of tiny particles th	nrough or onto an object
9. has the highest magnification	on	

10. has the lowest resolution

Language Arts Support

LESSON 3

Reading Comprehension Activity

Directions: After you have read the Characteristics of Life section of your textbook, complete the multiple-choice exercise below. On the line before each question, write the letter of the correct answer.

- ___ **1.** What is an organism?
 - A. a part of the microscope
 - **B.** a structure that pumps water out of a cell
 - C. a thing that has all the characteristics of life
- **2.** What is the smallest unit of life?
 - **A.** the cell
 - **B.** the atom
 - C. the species
- **3.** Which object describes a multicellular organism?
 - **A.** a paramecium
 - **B.** a living thing made of one cell
 - **C.** a living thing made of two or more cells
- **4.** Which situation describes a response to an external stimulus?
 - **A.** a person getting thirsty
 - **B.** a person getting hungry
 - C. a plant growing toward light
- **5.** What is homeostasis?
 - **A.** a multicellular organism
 - **B.** a characteristic of a nonliving thing
 - C. an organism's ability to maintain steady internal conditions

Math Skills 🗲

LESSON 3

Use Multiplication

The magnifying power of a lens is expressed by a number and a multiplication symbol (\times). For example, a lens that makes an object look ten times larger has a power of $10\times$. To determine a microscope's magnification, multiply the power of the ocular lens by the power of the objective lens.

Find the total magnification of an object viewed under a microscope with a $10\times$ ocular lens and a $10\times$ objective lens.

Step 1 Identify the magnification power of each lens.

Ocular lens: 10× Objective lens: 10×

Step 2 Multiply the power of the ocular lens by the power of the objective lens.

 $10 \times 10 = 100 \times$

Practice

- 1. If the ocular lens of a microscope has $10 \times$ magnification and the objective lens has $40 \times$ magnification, what is the total magnification?
- **4.** A student observes a sample of onion root cells under a microscope with a 10× ocular lens and a 50× objective lens. How much larger do the cells appear under the microscope?
- 2. A microscope has an ocular lens with a power of 5× and an objective lens with a power of 20×. What is the total magnification of the microscope?
- **3.** A student observes a sample of pond water under a microscope. The ocular lens has a 2× magnification, and the objective lens has a 40× magnification. How much larger do the pond water organisms appear under the microscope?
- 5. One microscope has a 5× ocular lens and a 50× objective lens. Another microscope has a 10× ocular lens and a 40× objective lens. Which microscope has the greater magnification power? Explain.

Key Concept Builder



LESSON 3

Exploring Life

Key Concept What are the types of microscopes, and how do they compare?

Directions: On each line, write the term from the word bank that correctly completes each sentence. Some terms may be used more than once.

	compound microscope	electron microscope	light microscope
	scanning electron microscope	transmission electron n	nicroscope
1.	A simpleimage.		uses one lens to magnify an
2.	The magnification of a(n) multiplying the magnification o objective lens.		
3.	A(n)	is a	type of light microscope.
4.	A TEM is one type of		
5.	In a(n)	, e	lectrons bounce off an object.
6.	In a(n)	, e	lectrons pass through an object.
7.	A(n)image of a cell's surface.	proc	luces a three-dimensional
8.	A(n)structures inside a cell.	proc	luces an image of the tiny
	The two main types of microsco		

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LESSON 3

Exploring Life

Key Concept What are the types of microscopes, and how do they compare?

Directions: Complete the table by writing the correct terms on the lines provided.

Two Main Types of Microscopes	Specific Types
Light microscopes	1
	2
Electron microscopes	3
	4

Directions: Write the types of microscopes you would use for the following on the lines provided. Be as specific as possible. Discuss your answers with a partner.

- **5.** You want to view a white blood cell magnified 100,000 times.
- **6.** You want to view living yeast cells.
- **7.** You want to view the detail of a three-dimensional image of the outside of a cell.
- **8.** You want to view a white blood cell magnified 1,000 times.
- **9.** You want to view the detail of the tiny structures inside a cell.