Name_____ Class_____ Date_____

Chapter 1

The Science of Biology

Section 1–1 What Is Science? (pages 3–7)

This section explains what the goal of science is and describes a scientific view of the world.

What Science Is and Is Not (page 3)

1. What is the goal of science? _____

_____

_____

2. What is science? _____

_____

Evidence Based on Observation (page 4)

3. What does observation involve? _____

_____

4. The information gathered from observation is called evidence, or _____.

5. Complete the table about types of observations.

TYPES OF OBSERVATIONS

Type of Observations	Observations Involve	Example
	Numbers	
	Characteristics that cannot be easily measured or counted	

Interpreting the Evidence (page 4)

6. What is an inference? _____

_____

Explaining the Evidence (page 5)

7. What is a hypothesis? _____

_____

8. In science, a hypothesis is useful only if it can be _____.

9. Is the following sentence true or false? A hypothesis should be stated in such a way that it can never be proved wrong.

_____

10. What are three ways from which hypotheses may arise?

a. _____

b. _____

c. _____

11. Circle the letter of each of the following that may be an outcome of testing a hypothesis.

a. The hypothesis is partly true but needs to be revised.

b. The hypothesis is wrong.

c. The hypothesis is supported.

d. The hypothesis is of no value.

A Scientific View of the World (page 6)

12. What do scientists assume can be discovered through scientific inquiry? _____

_____

13. What are some qualities that are desirable in a scientist? _____

_____

Science and Human Values (page 7)

14. Is the following sentence true or false? A community must use its shared values to make decisions about scientific issues.

_____

Section 1–2 How Scientists Work (pages 8–15)

This section explains how scientists test hypotheses. It also describes how a scientific theory develops.

Designing an Experiment (pages 8–10)

1. The idea that life can arise from nonliving matter is called _____.

2. What was Francesco Redi's hypothesis about the appearance of maggots? _____

3. What are variables in an experiment? _____

4. Ideally, how many variables should an experiment test? _____

_____

5. When a variable is kept unchanged in an experiment, it is said to be _____.

6. What is a controlled experiment? _____

_____

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7. Complete the table about variables.

VARIABLES

Type of Variable	Definition
Manipulated variable	
Responding variable	

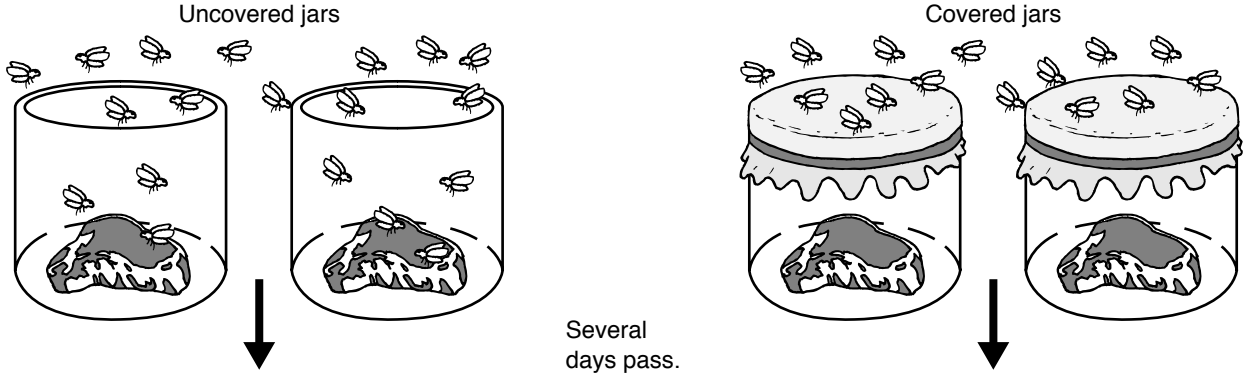
8. In Redi's experiment, what were the manipulated variable and the responding variable? _____

_____

_____

9. The illustration below shows the beginning of Redi's experiment. Complete the illustration by showing the outcome.

Redi's Experiment on Spontaneous Generation



10. For what do scientists use the data from a controlled experiment? _____

_____

11. When scientists look for explanations for specific observations, what do they assume about nature? _____

_____

Publishing and Repeating Investigations (pages 10–13)

12. Why do scientists assume that experimental results can be reproduced? _____

_____

13. What did Anton van Leeuwenhoek discover? _____

_____

_____

14. What did John Needham conclude from his test of Redi's findings? _____

_____

_____

15. What did Spallanzani do to improve upon Redi's and Needham's work? _____

_____

16. How did Pasteur settle the spontaneous generation argument? _____

_____

_____

When Experiments Are Not Possible (page 14)

17. In animal field studies, why do scientists usually try to work without making the animals aware that humans are present? _____

_____

_____

18. When a controlled experiment is not possible, why do scientists try to identify as many relevant variables as possible? _____

_____

How a Theory Develops (pages 14–15)

19. The theory that new organisms come from existing organisms is called _____.

20. In science, what is a theory? _____

_____

21. Is the following sentence true or false? A theory may be revised or replaced by a more useful explanation. _____

Reading Skill Practice

A flowchart can help you remember the order in which a set of events has occurred or should occur. On a separate sheet of paper, create a flowchart that represents the process that Redi carried out in his investigation of spontaneous generation. This process is explained under the heading *Designing an Experiment* on pages 8–10. For more information about flowcharts, see Organizing Information in Appendix A of your textbook.

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Section 1–3 Studying Life (pages 16–22)

This section describes some characteristics of living things. It also explains how life can be studied at different levels.

Introduction (page 16)

1. What is biology? _____

_____

Characteristics of Living Things (pages 16–20)

2. What is a cell? _____

_____

_____

3. Circle the letter of each sentence that is true about cells.

a. A cell is the smallest unit of an organism that can be considered alive.

b. A multicellular organism may contain trillions of cells.

c. A living thing that consists of a single cell is a multicellular organism.

d. Organisms are made up of cells.

4. What are two types of asexual reproduction?

a. _____

b. _____

5. Living things are based on a universal _____ _____.

6. Circle the letter of each sentence that is true about living things.

a. The life cycle of many organisms involves development.

b. All living things grow during at least part of their lives.

c. Each type of organism has a distinctive life cycle.

d. Cells may change in number but never differentiate.

7. Why does an organism need energy and a constant supply of materials? _____

_____

8. What is metabolism? _____

_____

_____

9. Is the following sentence true or false? All organisms respond to the environment in exactly the same ways. _____

10. What is homeostasis? _____

_____

_____

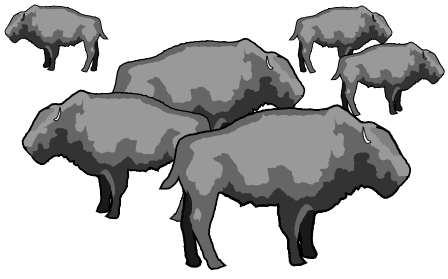
11. A group of organisms that changes over time is said to _____.

Branches of Biology (pages 20–21)

Match the different kinds of biologists with the focus of their study.

	Kinds of Biologists	Focus of Study
_____	**12.** Zoologist	**a.** Animal behavior
_____	**13.** Botanist	**b.** Plants
_____	**14.** Ethologist	**c.** Ancient life
_____	**15.** Paleontologist	**d.** Animals

16. Label each of the illustrations below according to the level of study represented.



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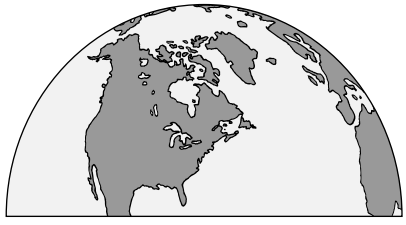

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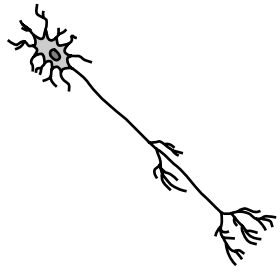

_____

17. The largest level of biological study is the _____.

Biology in Everyday Life (page 22)

18. What can the study of biology provide to the decision makers about matters affecting human society? _____

_____

_____

Section 1–4 Tools and Procedures (pages 24–28)

This section describes the measurement system that most scientists use. It also describes light microscopes, electron microscopes, and laboratory techniques.

A Common Measurement System (page 24)

1. Why do scientists need a common system of measurement? _____

_____

_____

2. When collecting data and doing experiments, what system of measurement do most scientists use? _____

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3. What is the metric system? _____

4. Complete each equation by writing the correct number or metric unit.
   a. 1000 meters = 1 _____
   b. 1 liter = _____ milliliters
   c. 1 gram = _____ milligrams
   d. 1000 kilograms = 1 _____

Analyzing Biological Data (page 25)

5. When scientists collect data, what are they often trying to find out? _____

6. What does a graph of data make easier to recognize and understand than a table of data? _____

Microscopes (pages 25–26)

7. What are microscopes? _____

8. What are compound light microscopes? _____

9. How do chemical stains make light microscopes more useful? _____

10. What are the two main types of electron microscopes?
    a. _____
    b. _____

11. Compare how a TEM and an SEM produce images. _____

12. How must samples be prepared for observation by an electron microscope? _____

Laboratory Techniques (page 27)

13. A group of cells grown in a nutrient solution from a single original cell is called a(an) _____.

14. What technique do biologists use to separate one part of a cell from the rest of the cell? _____

Working Safely in Biology (page 28)

15. What is the single most important rule for your safety while working in a laboratory? _____

_____

WordWise

The block of letters below contains six vocabulary terms from Chapter 1. Use the clues to identify the words you need to find. Then, find the words across, down, or on the diagonal. Circle each word in the hidden-word puzzle.

Clues	Vocabulary Terms
A device that produces magnified images of structures that are too small to see with the unaided eye	_____
A well-tested explanation that unifies a broad range of observations	_____
Change over time	_____
The process by which organisms keep their internal conditions relatively stable	_____
An organized way of using evidence to learn about the natural world	_____
Evidence gathered from observations	_____
The chemical reactions through which an organism builds up or breaks down materials	_____
A collection of living matter enclosed by a barrier that separates it from the surroundings	_____

h o m e o s t a s i s

h n s q a a l e s n m

m t c e l l s v m s s

h y i d o s z o u p b

t m e t a b o l i s m

r w n l s t x v m s s

m i c l s v a e d a h

t h e o r y l m e a n

m m i c r o s c o p e