Chapter Review

Study Outline

7–1 Classification

■ All living things are classified according to an established, international classification system.

■ Linnaeus classified organisms with a genus name followed by a specific name. This system of binomial nomenclature is still in use.

■ Each species belongs to one genus, one family, one order, one class, one phylum, and one kingdom. Related species are grouped in a genus, related genera in a family, and so forth.

■ The theory of evolution is the basis of the modern taxonomy system in which species are defined in terms of interbreeding populations.

■ In addition to structural similarities, taxonomists base their classifications on similarities in biochemistry, cell structure, embryological development, behavior, and fossil evidence.

7–2 Major Taxonomic Groups

■ The kingdoms of the five-kingdom system of classification are **Monera, Protista, Fungi, Plantae,** and **Animalia.**

■ The monerans include all prokaryotic organisms, the bacteria.

■ The protists are simple eukaryotic organisms such as the protozoa and algae.

■ The fungi include molds, yeasts, and mushrooms.

■ The plant kingdom includes the mosses, ferns, and seed plants.

■ The animal kingdom is divided into vertebrates and invertebrates. Vertebrates are animals with backbones. Invertebrates are animals without backbones.

■ A taxonomic key is a tool used to identify and classify organisms.

■ The six representative organisms used to study the life processes in Unit 2 are the ameba, paramecium, hydra, earthworm, grasshopper, and human.

Vocabulary Review

taxonomy (125)	species (130)
genus (127)	phylogeny (130)
kingdom (128)	fossil (132)
phylum (128)	Monera (134)
class (128)	Protista (134)
order (128)	Fungi (135)
family (128)	Plantae (135)
nomenclature (129)	Animalia (135)
binomial nomenclature (129)	taxonomic key (136)
	heterotrophs (137)
theory of evolution (130)	autotrophs (137)

A. Sentence Completion—Fill in the vocabulary term that best completes each statement.

1. Most members of the kingdom _____ carry out photosynthesis and are not motile.

2. A(n) _____ is a group of related phyla.

3. A(n) _____ is an organism that must obtain its food from the environment.

4. The branch of biology called _____ deals with the classification and naming of organisms.

5. A(n) _____ is a group of similar organisms that can interbreed in nature.

6. _____ is a two-word system of naming each type of organism.

7. A(n) _____ is a group of closely related species.

8. A(n) _____ is a tool used to identify previously classified organisms.

B. Matching—Select the vocabulary term that best matches each definition.

9. The largest group within a phylum

10. A system for naming organisms

11. A group of related families

Chapter Review

36. Which of the six representative organisms are animals?

37. How does evolution act as a unifying theme in biology?

12. Organisms that make their own food

13. The kingdom that includes mushrooms, yeasts, and molds

14. The evolutionary history of a group of organisms

15. A group of related classes

16. Gradual change in a species over long periods of time

Content Review

17. On what basis did Aristotle classify animals?

18. How did Theophrastus classify plants?

19. How did John Ray define a species?

20. What was the basis that Carolus Linnaeus used to classify organisms?

21. To what order and family do humans belong?

22. Why is binomial nomenclature useful to biologists?

23. To what genus does *Canis familiaris* belong?

24. Name one organism with a common name that is misleading or inexact.

25. Give an example of cytological evidence used by modern taxonomists in classifying organisms.

26. Why have modern taxonomists added new kingdoms to their classification schemes?

27. What are the distinguishing basic characteristics of members of the kingdom Monera?

28. Describe the basic characteristics of the kingdom Protista.

29. How do fungi digest their food?

30. Describe the basic characteristics of plants.

31. Describe the basic characteristics of animals.

32. What is the major difference between vertebrates and invertebrates?

33. How do plants and animals differ?

34. Describe what a taxonomic key is, and explain how it is used.

35. Briefly describe each one of the six representative organisms.

Graphic Organizing

For information on graphic organizers, see Appendix G at the back of this text.

38. **Concept Map:** Copy the incomplete concept map that is shown below onto a separate sheet of paper. Then, fill in the missing terms. You may add additional concepts and relationships.
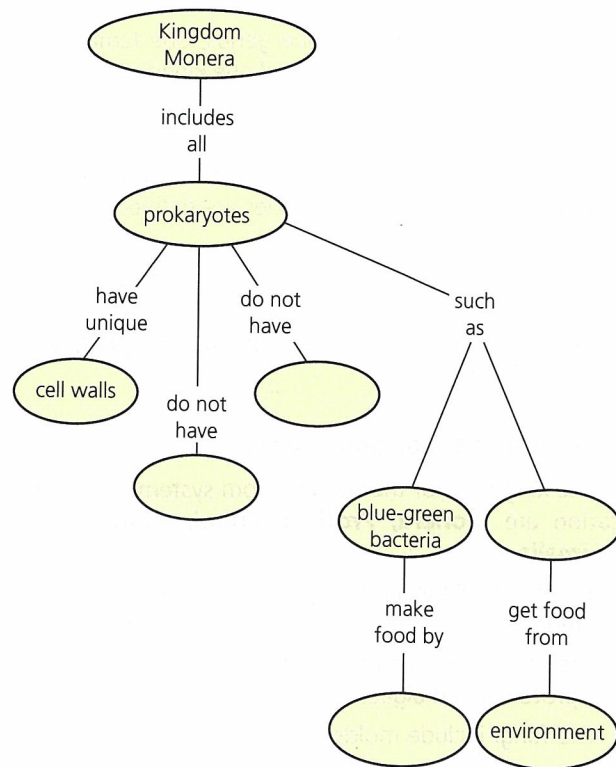
Critical Thinking

39. Place the following groups of classification in order, from the largest to the smallest: class, family, genus, kingdom, phylum, and species. (*Ordering*)

40. Why is it useful for a biologist to be able to place an unidentified organism in its proper group with related organisms? (*Judging Usefulness*)

41. *Homo erectus,* a species known only from fossils, is in the same genus as humans, *Homo sapiens.* What are the kingdom, class, and phylum of *Homo erectus?* Explain your answer. (*Reasoning Categorically*)

42. Two organisms can interbreed if they belong to the same species. Saint Bernards and Great Danes belong to the species, which is known as *Canis familiaris.* What can you conclude about Saint Bernards and Great Danes? What factors could make this conclusion incorrect? (*Reasoning Conditionally*)

43. The modern taxonomy's two-word system of identifying organisms is the same as Linnaeus's two-word system. Why do you think taxonomists have not changed this? (*Identifying Reasons*)

44. Suppose that you are given a jar containing hundreds of various organisms. After examining a dozen randomly picked specimens, you discover that each of the dozen belongs to the class Insecta. Make a generalization about the entire group of organisms in the jar. What could make this generalization invalid? What steps could you take to increase your confidence in your generalization? (*Generalizing*)

Creative Thinking

45. List 10 objects that are in the room you are now in. List some of the things that all these objects have in common. Name one thing for each object that makes it different from all of the others.

46. Based on any system or organizing principle you choose, divide the list of objects from question 45 into 3 groups. Give a title to each group and explain the value of your system. Then, classify the objects again, according to a different system or principle. How are your classifications alike? How are they different?

Problem Solving

47. Construct a taxonomic key that would help you to determine whether or not an organism is one of the following: monkey, elephant, earthworm, clam, swordfish, or robin.

48. You are a taxonomist interested in estimating how many new species of orchids exist in a tropical rain forest of 22 square kilometers. You randomly select five sites, each 0.1 square kilometer in area, and count the number of new species at each site. Once you identify a new species, it is no longer considered new. Based on the data in the table below, calculate the average number of new species of orchids present in a 0.1 square kilometer area. Then, when you have found the average, estimate how many new species of orchids are present in the forest.

Rain Forest Samples	
Site	**Number of New Species of Orchids**
A	3
B	2
C	0
D	8
E	1

Projects

49. Collect a variety of leaves, insects, or fungi. Use a local field guide to identify them. Prepare a display of your collection, labeling each item as accurately as possible.

50. Use a field guide and a microscope to identify protists found in a pond or fish tank. Write a report to the class on your findings.

51. Prepare a report for the class on one of the career opportunities listed below. If possible, interview someone who is working in the field. Be sure to prepare your questions in advance. You may wish to inquire about training, future opportunities, and the daily routine. A tape recorder will be helpful.
a. taxonomist   c. librarian
b. taxidermist

Biology and Problem Solving

How do homing pigeons find their way home?

Did you ever receive an important message delivered by a bird? Probably not. But for over 2000 years, homing pigeons have provided dependable message-carrying services. These pigeons carry messages across many miles and deliver them to their home lofts. People have long been puzzled about how homing pigeons, released at distant, unfamiliar places, find their way back home.

1. Before reading further, develop some hypotheses to explain how you think homing pigeons might find their way home.

Some biologists have hypothesized that homing pigeons use familiar landmarks to find their way. To test this hypothesis, the following experiments were conducted:

- Homing pigeons were taken in covered cages to places they had never seen. When released, these pigeons found their way home.

- Pigeons were taken under deep anesthesia to a release site. These pigeons also found their way home.

- Contact lenses were placed over the eyes of a group of homing pigeons. (The lenses would dissolve after the experiment.) Half the pigeons were given clear lenses. The other half were given frosted lenses through which they could not see objects more than a few yards away. When released 80 miles from home, both groups of pigeons flew home.

2. Which of the three experiments support the familiar landmark hypothesis? Which of them refute the hypothesis? Explain.

3. Why was it necessary to conduct the experiment with the contact lenses even after the two other experiments had been done?

A second hypothesis was proposed: homing pigeons use the sun to find their way. However, observers knew that pigeons find their way on cloudy, as well as sunny, days. Therefore, biologists decided to test yet another hypothesis: homing pigeons use the earth's magnetic field to help them find their way. An experiment was done: