Chapter 1: Introduction: Themes in the Study of Life

Begin your study of biology this year by reading Chapter 1. It will serve as a reminder about biological concepts that you may have learned in an earlier course and give you an overview of what you will study this year.

1. In the overview, Figure 1.3 recalls many of the properties of life. Label the seven properties illustrated here, and give a *different* example of each.



Concept 1.1 Themes connect the concepts of biology

2. What are **emergent properties?** Give two examples.

3. Life is organized on many scales. Figure 1.4 zooms you in from viewing Earth from space all the way to the level of molecules. As you study this figure, write in a brief definition of each level.

biosphere



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community

population

organism

organs/organ systems

tissues

cells

organelles

molecules

4. Our study of biology will be organized around recurring themes. Make a list here of the themes that are presented, and give an example that illustrates each theme. Watch for these themes throughout your study this entire year. This will help you see the big picture and organize your thinking. (Go to the *Summary of Key Concepts* at the end of the chapter for a concise look at the themes.)

Theme 1:	Example
Theme 2:	
Theme 3:	
Theme 4:	
Theme 5:	
Theme 6:	
Theme 7: (find it in 1.2)	

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5. As you read this section, you will be reminded of things you may have studied in an earlier course. Since this material will be presented in detail in future chapters, you will come back to these ideas, so don't fret if some of the concepts presented are unfamiliar. However, to guide your study, define each of the terms in bold as you come to them.

eukaryotic cell

prokaryotic cell

DNA

genes

genome

negative feedback/positive feedback

Concept 1.2 The Core Theme: Evolution accounts for the unity and diversity of life



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7. Taxonomy is the branch of biology that names and classifies organisms. Because of new molecular information, there have been many changes in placement of certain groups in recent years. Notice that all life is now organized in your text into 3 domains rather than the 5 kingdoms you may have learned earlier. Put the kingdoms mentioned in the text in the space above the proper domain names shown here.



8. What two main points were articulated in Darwin's The Origin of Species?

9. What did Darwin propose as the mechanism of evolution? Summarize this mechanism.

10. Study Figure 1.22, which shows an evolutionary "tree." What is indicated by each twig? What do the branch points represent? Where did the "common ancestor" of the Galápagos finches originate?



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Concept 1.3 Scientists use two main forms of inquiry in their study of nature

- 11. What are the two main types of scientific inquiry? Give an example of each.
- 12. What is data?
- 13. Distinguish between quantitative and qualitative data. Which type would be presented in a data chart and could be graphed? Which type is found in the field sketches made by Jane Goodall?
- 14. In science, how do we define hypothesis?
- 15. A scientific hypothesis has two important qualities. The first is that it is *testable*. What is the second?
- 16. Are scientific hypotheses proved? Explain your answer!
- 17. Look at Figure 1.24. Use it to write a hypothesis using the "If . . . then . . ." format.
- 18. What is a controlled experiment?
- 19. The text points out a common misconception about the term "controlled experiment". In the snake mimicry experiment, what factors were held *constant*?

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20. Why are supernatural explanations outside the bounds of science?

21. Explain what is meant by a scientific *theory* by giving the three ways your text separates a theory from a hypothesis or mere speculation.

1.

2.

3.

Testing your Knowledge:

1. All the organisms on your campus make up

- a. an ecosystem d. an experimental group
- b. a community e. a taxonomic domain
- c. a population

2. Which of the following is a correct sequence of levels in life's hierarchy, proceeding downward from an individual animal?

- a. brain, organ system, nerve cell, nervous tissue
- b. organ system, population of cells, nervous tissue, brain
- c. organism, organ system, tissue, cell, organ
- d. nervous system, brain, nervous tissue, nerve cell
- e. organ system, tissue, molecule, cell
- 3. Protists and bacteria are grouped into different domains because
 - a. protists eat bacteria
 - b. bacteria are not made of cells
 - c. bacterial cells lack a nucleus
- 4. Which of the following is an example of qualitative data?
 - a. the temperature decreased from 20°C to 15°C
 - b. the plant's height is 25 centimeters
 - c. the dish swam in a zig-zag motion
 - d. the six pairs of robins hatched an average of 3 chicks
 - e. the contents of the stomach are mixed every 20 seconds
- 5. A controlled experiment is one that
 - a. proceeds slowly enough that a scientist can make careful records of the results
 - b. may include experimental groups and control groups tested in parallel
 - c. is repeated many times to make sure the results are accurate
 - d. keeps all environmental variables constant
 - e. is supervised by an experienced scientist

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- d. bacteria decompose protists
- e. protists are photosynthetic