Elements of Ecology, 8e **(Smith/Smith)**
Chapter 1   The Nature of Ecology

1.1   Short Answer Questions

1) _____ is activism with a stated aim of protecting the natural environment, particularly from the negative impacts of human activities.
Answer: Environmentalism
Topic: Section 1.1

2) _____ is the scientific study of the relationship between organisms and their environment.
Answer: Ecology
Topic: Section 1.1

3) The living, or _____, and nonliving, or _____, components of the environment interact within an ecosystem.
Answer: biotic; abiotic
Topic: Section 1.2

4) A group of individuals of the same species that occupy a given area is referred to as a(n) _____.
Answer: population
Topic: Section 1.3

5) All populations of different species living and interacting within an ecosystem are referred to collectively as a(n) _____.
Answer: community
Topic: Section 1.3

6) At the _____ level, an ecologist might focus on the factors that affect the relative abundance of various populations in the area.
Answer: community
Topic: Section 1.4

7) All science begins with _____, which is the first step in the process known as the scientific method.
Answer: observation
Topic: Section 1.5

Copyright © 2012 Pearson Education, Inc.

8) In a field experiment, an ecologist measures the effects of nitrogen on productivity, plotting data for nitrogen on the *x*-axis and productivity on the *y*-axis. In this experiment, the dependent variable is _____.
Answer: productivity
Topic: Section 1.5

9) A(n) _____ is an abstract, simplified representation of a real system, allowing us to predict some behavior or response using a set of explicit assumptions.
Answer: model
Topic: Section 1.6

10) The _____ forms the basic unit in ecology.
Answer: individual
Topic: Section 1.9

11) Qualitative observations that fall into separate and distinct categories are considered to be _____ data.
Answer: categorical
Topic: Quantifying Ecology 1.1: Classifying Ecological Data

12) An ecologist would probably produce a(n) _____ to illustrate whether a relationship exists between body length and body weight.
Answer: scatter plot
Topic: Quantifying Ecology 1.2: Displaying Ecological Data: Histograms and Scatter Plots

1.2 Multiple-Choice Questions

1) The term "ecology" is defined as the study of the
A) environment.
B) relationships between organisms.
C) relationships between organisms and their environment.
D) impact of humans on the environment.
Answer: C
Topic: Section 1.1

2) Moisture and concentration of oxygen
A) are parts of an organism's environment.
B) have no effect on the physiology of an organism.
C) are biological conditions that impact an organism's survival.
D) do not vary in the environment.
Answer: A
Topic: Section 1.2

3) The interaction of a biotic community and its abiotic environment is referred to as a(n)
A) biosphere.
B) ecosystem.
C) population.
D) biome.
Answer: B
Topic: Section 1.2

4) Which of the following is considered an abiotic component of the ecosystem?
A) temperature
B) microbes
C) plants
D) animals
Answer: A
Topic: Section 1.2

5) A biome is
A) the thin layer surrounding the Earth that supports all life.
B) all the populations of different species living and interacting within an ecosystem.
C) a broad-scale region dominated by similar types of ecosystems.
D) an area of land or water composed of a patchwork of communities and ecosystems.
Answer: C
Topic: Section 1.3

6) All populations of different species living and interacting within an ecosystem are referred to collectively as a(n)
A) community.
B) biome.
C) population.
D) ecosystem.
Answer: A
Topic: Section 1.3

7) Which of the following is the correct organization of ecological systems from the lowest to the highest level of organization?
A) individual, biome, biosphere, community, population, ecosystem
B) individual, community, population, ecosystem, biosphere, biome
C) individual, population, community, ecosystem, biome, biosphere
D) individual, population, community, biome, biosphere, ecosystem
Answer: C
Topic: Section 1.3

8) Which of the following questions is most appropriate to an investigation at the population level?
A) What is the effect of diminished resources on an individual's life span?
B) What is the relationship between resource availability and birthrate?
C) What factors influence the distribution of tropical forests?
D) How long does it take for carbon to be cycled from the atmosphere into living tissue?
Answer: B
Topic: Section 1.4

9) An ecologist who focuses on the individual could study all of the following, except
A) morphology.
B) physiology.
C) behavior.
D) death rate.
Answer: D
Topic: Section 1.4

10) A hypothesis refers to a(n)
A) phenomenon that is observed but is not yet understood.
B) testable explanation for an observed phenomenon.
C) untestable explanation for an observed phenomenon.
D) falsified explanation for an observed phenomenon.
Answer: B
Topic: Section 1.5

11) The correct sequence of the scientific method is
A) ask a question, observation, form a hypothesis, test a hypothesis, form a theory.
B) form a hypothesis, ask a question, observation, test a hypothesis, form a theory.
C) form a theory, ask a question, form a hypothesis, observation, test a hypothesis.
D) observation, ask a question, form a hypothesis, test a hypothesis, form a theory.
Answer: D
Topic: Section 1.5

12) An ecologist conducts a greenhouse experiment to study the effect of nitrogen concentration on the productivity of sunflower seedlings. What is the independent variable in this experiment?
A) productivity of sunflowers
B) concentration of nitrogen
C) the number of sunflower seeds planted
D) the daily amount of water given to each sunflower seed
Answer: B
Topic: Section 1.5

13) A model is used by ecologists to
A) prove how nature works by demonstrating cause-and-effect relationships.
B) analyze data that have been collected during an experiment.
C) make predictions about how nature works using a set of explicit assumptions.
D) observe how nature works in an experimental setting.
Answer: C
Topic: Section 1.6

14) The real goal of hypothesis testing is to
A) eliminate incorrect ideas.
B) form a theory.
C) fully explain observations.
D) understand why science never changes.
Answer: A
Topic: Section 1.7

15) Because ecology relies on many different branches of science (e.g., geology), it is considered
A) hypothetical.
B) unscientific.
C) permanent.
D) interdisciplinary.
Answer: D
Topic: Section 1.8

16) The basic unit in ecology is the
A) ecosystem.
B) gene.
C) individual.
D) species.
Answer: C
Topic: Section 1.9

17) An ecologist measured the length and weight of different individuals of a species of bird.
The most common method of graphically displaying the data is a
A) frequency distribution.
B) histogram.
C) pie chart.
D) scatter plot.
Answer: D
Topic: Quantifying Ecology 1.1: Classifying Ecological Data

18) If x and y have a positive relationship as shown by a scatter plot, then the value of y will
A) increase as the value of x decreases.
B) increase as the value of x increases.
C) decrease as the value of x increases.
D) stay the same as the value of x decreases.
Answer: B
Topic: Quantifying Ecology 1.2: Displaying Ecological Data: Histograms and Scatter Plots

1.3 True/False Questions

1) Ecology is the same as environmentalism.
Answer: FALSE
Topic: Section 1.1

2) A community includes both living and nonliving components.
Answer: FALSE
Topic: Section 1.2

3) Microbes are considered an abiotic factor within an ecosystem.
Answer: FALSE
Topic: Section 1.2

4) A population refers to all the individuals of the same species that occupy a given area.
Answer: TRUE
Topic: Section 1.3

5) A freshwater pond ecosystem includes only the living organisms within the pond.
Answer: FALSE
Topic: Section 1.3

6) The number of seeds produced by a single flower affects the birthrate of that population of flowers.
Answer: TRUE
Topic: Section 1.4

7) A valid scientific hypothesis must be testable.
Answer: TRUE
Topic: Section 1.5

8) A theory is an integrated set of hypotheses that explains a broad set of observations.
Answer: TRUE
Topic: Section 1.5

9) A field experiment gives the investigator much more control over the environmental conditions than does a laboratory experiment.
Answer: FALSE
Topic: Section 1.5

10) Ecological models can be mathematical or they can be verbally descriptive.
Answer: TRUE
Topic: Section 1.6

11) Science is a process of testing and correcting concepts in order to explain the world around us.
Answer: TRUE
Topic: Section 1.7

12) There is generally only one valid explanation for an observation.
Answer: FALSE
Topic: Section 1.7

13) When data are categorical, any value within an interval is possible.
Answer: FALSE
Topic: Quantifying Ecology 1.1: Classifying Ecological Data

14) The most common method for displaying a single data set is to construct a scatter plot.
Answer: FALSE
Topic: Quantifying Ecology 1.2: Displaying Ecological Data: Histograms and Scatter Plots

15) In a histogram, the *x*-axis represents the category intervals, whereas the *y*-axis represents the number of individuals with a particular characteristic.
Answer: TRUE
Topic: Quantifying Ecology 1.2: Displaying Ecological Data: Histograms and Scatter Plots

16) Population ecology studies the responses of individual organisms to temperature, moisture, light, and other environmental conditions.
Answer: FALSE
Topic: Ecological Issues: Ecology Has Complex Roots

1.4   Essay Questions

1) Explain the distinction between ecology and environmentalism.
Topic: Section 1.1

2) Using a real example, illustrate how an organism can both respond to and modify the abiotic conditions of its ecosystem.
Topic: Section 1.2

3) Explain the distinction between an ecosystem and a biome.
Topic: Section 1.3

4) Explain why ecology is inherently an interdisciplinary science. Give two examples of the ties between ecology and other branches of science.
Topic: Section 1.4

5) Describe a field experiment that you might use to test the hypothesis that water availability affects plant growth. Suggest one set of possible results and the implications of those results for the hypothesis.
Topic: Section 1.5

6) Explain why it is difficult for ecologists to give definitive answers.
Topic: Section 1.7

7) Explain why human population growth, biological diversity, sustainability, and global climate change are considered crucial environmental problems facing humans.
Topic: Section 1.8

8) Define five types of data that can be used for quantitative analyses and give an example of each.
Topic: Quantifying Ecology 1.1: Classifying Ecological Data

9) Choose a species of plant or animal and describe what aspects of its ecology would be studied by a population ecologist, an evolutionary ecologist, and a physiological ecologist.
Topic: Ecological Issues: Ecology Has Complex Roots