

Human Biology, 7e (Johnson)

Chapter 1 Human Biology, Science, and Society

1.1 Multiple Choice Questions

1) The branch of science that studies living organisms and their life processes is

- A) biology
- B) geology
- C) chemistry
- D) physics

Answer: A

Topic: Sec. 1.0

Skill: Knowledge/Comprehension

2) The process by which living organisms maintain a fairly constant internal environment despite changes in the external environment is known as

- A) metabolism
- B) biology
- C) homeostasis
- D) evolution
- E) chemistry

Answer: C

Topic: Sec. 1.1

Skill: Knowledge/Comprehension

3) *Molecules of life* include which one of the following?

- A) water, proteins, lipids, nucleic acids, carbohydrates
- B) proteins, saturated fats, monosaccharides, but not polysaccharides
- C) lipids and proteins only
- D) any noncarbon base molecule
- E) nonsugar carbohydrates, proteins, lipids, water

Answer: A

Topic: Sec. 1.1

Skill: Knowledge/Comprehension

4) Which one of the following is a TRUE statement?

- A) Molecules are considered to be the smallest unit capable of exhibiting all the characteristics of life.
- B) Cells arise spontaneously from nonliving chemical elements.
- C) All living things are made up of at least one cell.
- D) Cells are incapable of maintaining homeostasis because they are too small.
- E) Complex organisms can be unicellular.

Answer: C

Topic: Sec. 1.1

Skill: Knowledge/Comprehension

5) All of these criteria are used to classify an organism as a member of the plant, animal, or fungi kingdom EXCEPT which one?

- A) the organism's life cycle
- B) the means by which the organism transports itself
- C) the structure or body plan of the organism
- D) the mode of nutrition of the organism

Answer: B

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

6) Which one of the following is a CORRECT statement regarding metabolism?

- A) Few living organisms require raw materials and a constant source of energy.
- B) Plants get the raw materials they need for life processes entirely from the air.
- C) Cells maintain life through the breakdown of molecules and energy by chemical and physical processes.
- D) Cells do not require energy to change molecules from one form to another.
- E) Animals use energy obtained directly from the sun and chemicals obtained from plants, other animals, air, and water.

Answer: C

Topic: Sec. 1.1

Skill: Knowledge/Comprehension

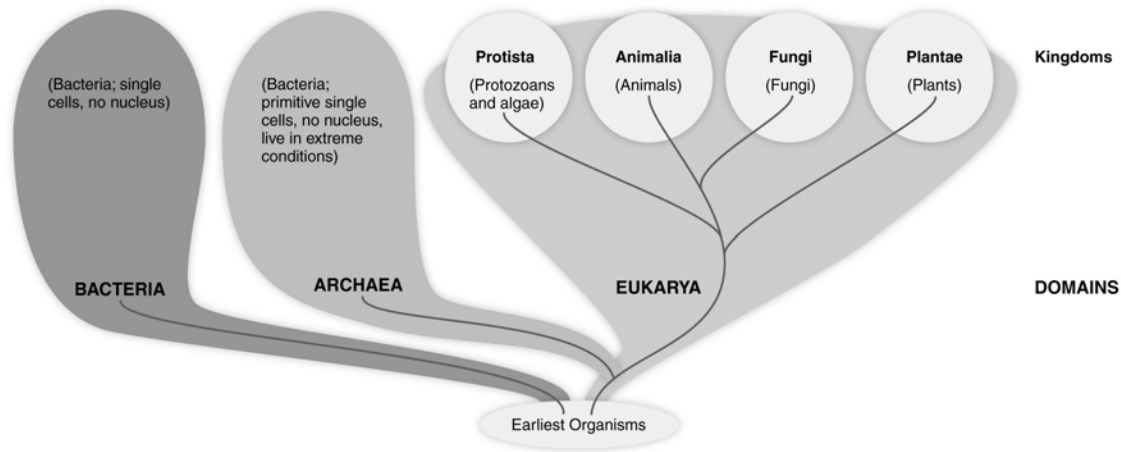
7) Which one of the following is a kingdom?

- A) Eukarya
- B) Primates
- C) Archaea
- D) Animalia
- E) Bacteria

Answer: D

Topic: Sec. 1.2

Skill: Knowledge/Comprehension



8) Based on the figure above, which group of organisms is most closely related to members of the Kingdom Animalia?

- A) Protista
- B) Fungi
- C) Plantae
- D) Bacteria
- E) Archaea

Answer: B

Topic: Sec. 1.2

Skill: Application/Analysis

9) Which kingdom in the Domain Eukarya contains multicellular photosynthesizers?

- A) Plantae
- B) Bacteria
- C) Fungi
- D) Archaea
- E) Animalia

Answer: A

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

10) Which one of the following taxa (subgroups used in classification) applies to humans?

- A) Mammals
- B) Protista
- C) Invertebrates
- D) Prokarya
- E) Bacteria

Answer: A

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

11) Which one of the following sequences represents taxa arranged in order from largest, most all inclusive, to smallest?

- A) kingdom, domain, phylum, order, class, genus, species, family
- B) domain, kingdom, phylum, class, order, family, genus, species
- C) domain, kingdom, phylum, class, order, genus, species, family
- D) species, genus, family, order, class, phylum, kingdom, domain
- E) kingdom, phylum, domain, class, order, genus, species, family

Answer: B

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

12) Humans possess several characteristics that, when taken together, differentiate them from other organisms. These characteristics include all of the following EXCEPT which one?

- A) opposable thumbs
- B) capacity for complex language
- C) bipedalism
- D) large brain relative to body mass
- E) the inability to maintain a constant internal body temperature

Answer: E

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

13) Which one of the following best describes the evolutionary advantage of bipedalism?

- A) allows an organism to have precise control over the action of the thumb and fingers
- B) frees the hands for carrying objects
- C) results in improved eye-hand coordination
- D) in early humans, allowed for complex motions associated with the use of tools
- E) increases the chance that an organism can communicate through the written word

Answer: B

Topic: Sec. 1.2

Skill: Application/Analysis

14) Which one of the following sequences is CORRECT in terms of level of organization from least to most complex?

- A) cells, tissues, organs, organ systems, organism
- B) atoms, cells, organs, community, population
- C) atoms, cells, organism, organ systems, ecosystem
- D) tissues, organ systems, population, cells, organism

Answer: A

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

15) Which one of the following is the lowest level of biological organization in which evolutionary change can occur?

- A) cell
- B) organism
- C) community
- D) population

Answer: D

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

16) Which one of the following of the following statements is FALSE?

- A) Science is a process.
- B) Scientists use the scientific method to gain knowledge about the natural world.
- C) Because scientific knowledge is empirical, it cannot be tested.
- D) Knowledge gained through the scientific method can be used to predict the natural world.
- E) The scientific method involves many different ways of obtaining information.

Answer: C

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

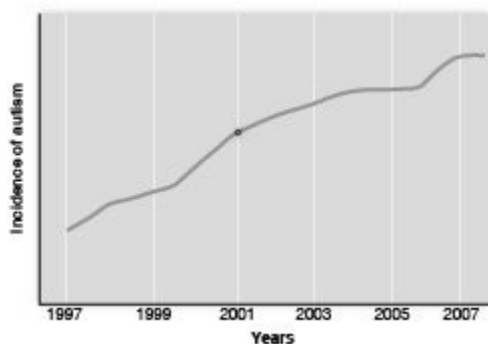
17) Which one of the following best describes the proper sequence of steps involved in the scientific method?

- a. state hypothesis
 - b. observe
 - c. experiment
 - d. support or disprove hypothesis
 - e. form a prediction
- A) b, a, d, e, c
 - B) a, b, c, d, e
 - C) b, a, e, c, d
 - D) a, b, c, e, d
 - E) e, b, a, c, d

Answer: C

Topic: Sec. 1.3

Skill: Knowledge/Comprehension



18) The graph above depicts the relative increase in autism in children from 1997 to 2007 living in California. In 2001, the additive thimerosal was removed from most childhood vaccines. Based on the information presented in the graph, what can be concluded about the hypothesis that thimerosal causes autism?

- A) Thimerosal, at the very least, contributes to the occurrence of autism as evidenced by the almost logarithmic increase in children with autism from 2001 to 2007.
- B) Prior to 2001, thimerosal clearly influenced the cases of autism in California.
- C) A sharp decrease in the cases of autism would be expected after 2001 if thimerosal was the causative agent of autism.
- D) The results of the study are inclusive.
- E) Thimerosal requires some other agent to help induce autism.

Answer: C

Topic: Current Issue

Skill: Application/Analysis

19) Which one of the following statements regarding scientific theory is FALSE?

- A) A scientific theory is a speculation as to the possible outcome of an experiment.
- B) A hypothesis that has been repeatedly tested over time, and found to be true, usually becomes a scientific theory.
- C) A scientific theory explains scientific facts with a high degree of reliability.
- D) As new information is gained over time, scientific theories can be modified.
- E) The highest status that a hypothesis can achieve is becoming a scientific theory.

Answer: A

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

20) Peer review is essential to the scientific process because

- A) it ensures that the findings from experimentation are modified prior to publication
- B) the process immediately validates any hypotheses tested in the experiments
- C) the process can lead to improvements in articles prior to being published
- D) it is the primary means for informing other scientists about new information in the field
- E) it tests hypotheses proposed by investigators

Answer: A

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

21) A farmer wants to improve crop yield in his fields by testing the effectiveness of a new pesticide available on the market. Which one of the following is the best control for this experiment?

- A) a higher concentration of new pesticide used on the control field than the experimental field
- B) more shade on the control field than on the experimental field
- C) a lower concentration of new pesticide used on the control field than on the experimental field
- D) more water on the control field than on the experimental field
- E) no new pesticide used on the control field; new pesticide used only on the experimental field

Answer: E

Topic: Sec. 1.3

Skill: Synthesis/Evaluation

22) According to a recent study of nearly 140,000 women who were enrolled in the Women's Health Initiative, women who breast-fed their babies had a lower risk of developing heart disease and diabetes later in life than women who did not breast-feed their babies. These research findings are an example of

- A) causation
- B) skepticism
- C) hypothesis testing
- D) correlation
- E) deductive reasoning

Answer: D

Topic: Sec. 1.5

Skill: Application/Analysis

23) How does scientific information in peer-reviewed journals differ from that in newspapers?

- A) Information is more technical; readers usually require a background in the field in order to understand the article.
- B) The article is written by a reporter, not a researcher.
- C) Articles often include political, ethical, and economic ramifications of the scientific findings.
- D) Information is less in-depth and easily understood by the average reader.
- E) Information is not approved by other scientists before its publication.

Answer: A

Topic: Sec. 1.4

Skill: Knowledge/Comprehension

24) One of the most common ways to get information out to a wide audience in the least amount of time regarding hot topics in science is by using

- A) peer-reviewed journals
- B) science magazines
- C) the Discovery Channel on television
- D) general interest news magazines or newspapers
- E) books

Answer: D

Topic: Sec. 1.4

Skill: Knowledge/Comprehension

25) A student needs information from the National Institutes of Health, a government agency. Which one of the following endings should he or she look for in the Internet address?

- A) edu
- B) com
- C) gov
- D) nih
- E) org

Answer: C

Topic: Sec. 1.4

Skill: Knowledge/Comprehension

26) The Internet has been used as a rapid means to obtain information, including scientific ideas. Which one of the following statements about the Internet as a source of scientific information is FALSE?

- A) At present, the Internet is less regulated than broadcast and print media.
- B) Anyone can post "scientific" information, regardless of whether the information is misleading or not true.
- C) Information on the Internet is generally very reliable because inaccurate information is quickly removed or corrected.
- D) Individuals and/or groups may post information to promote their own personal interests rather than ideas that have been tested through the scientific process.

Answer: C

Topic: Sec. 1.4

Skill: Knowledge/Comprehension

27) Approaching new information with a questioning attitude and looking for evidence to support the claim involves

- A) inductive reasoning
- B) the process of predicting an outcome
- C) deductive reasoning
- D) curiosity
- E) skepticism

Answer: E

Topic: Sec. 1.5

Skill: Knowledge/Comprehension

28) The mathematics of interpreting and organizing data is known as

- A) algebra
- B) differential equations
- C) statistics
- D) graphing
- E) correlation and causation

Answer: C

Topic: Sec. 1.5

Skill: Knowledge/Comprehension

29) In science, graphs are often used to display data collected from an experiment. Which one of the following is TRUE regarding a graph?

- A) Most graphs are plotted on three axes.
- B) The dependent variable is plotted on the y-axis.
- C) Independent variables are generally not included on a graph.
- D) The horizontal axis is known as the ordinate.
- E) Graphs always involve plots of individual data points.

Answer: B

Topic: Sec. 1.5

Skill: Knowledge/Comprehension

30) Which one of the following is TRUE regarding knowledge gained through scientific investigation?

- A) The knowledge can be used to prove or disprove religious beliefs.
- B) Scientific knowledge cannot be used to improve human life through technology.
- C) The information can be used to detect problems at an early stage and correct mistakes.
- D) Society as a whole generally ignores scientific information.
- E) The knowledge has resulted in less-efficient sources of energy yet better health care.

Answer: C

Topic: Sec. 1.6

Skill: Knowledge/Comprehension

31) According to the Health & Wellness essay, *The Growing Threat of Antibiotic-Resistant Bacteria*, which one of the following is TRUE?

- A) The more we use antibiotics, the more we encourage the rise of antibiotic-resistant bacterial strains.
- B) Antibiotics should be prescribed to treat viral infections, such as the common cold.
- C) Consumers should support the use of antibiotics in livestock feeds and on fruit trees to decrease the incidence of food-borne infections.
- D) Antibiotics kill only harmful bacteria.
- E) Because of the indiscriminate use of antibiotics in medicine and society, some bacterial strains have now become less resistant to almost all currently existing antibiotics.

Answer: A

Topic: Health & Wellness

Skill: Understanding

32) Which one of the following experiments would be considered acceptable in our society?

- A) Determining the effects of cocaine use on babies born to cocaine-using mothers.
- B) Determining the response of a patient's "incurable" cancer to a newly developed cancer drug.
- C) Testing the effects of radiation exposure on volunteers.
- D) Testing the effectiveness of a new AIDS vaccine using deliberate exposure of human volunteers to HIV.
- E) Testing the effectiveness of a newly developed antibiotic using deliberate exposure of humans to antibiotic-resistant bacteria.

Answer: B

Topic: Sec. 1.6

Skill: Application/Analysis

1.2 True/False Questions

1) Because the natural world includes all energy and matter, it also includes all living organisms.

Answer: TRUE

Topic: Sec. 1.0

Skill: Knowledge/Comprehension

2) Plants obtain their energy directly from the sun and their raw materials from the soil, air, and water in their environment.

Answer: TRUE

Topic: Sec. 1.1

Skill: Knowledge/Comprehension

3) Human are only one species of many different primates that prefer to walk upright on two legs.

Answer: FALSE

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

4) The kingdom Protista primarily includes multicellular eukaryotic organisms.

Answer: FALSE

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

5) The validity of a prediction in the scientific method is determined by experimentation or observation.

Answer: TRUE

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

6) "Blind" experiments are designed to reduce the possibility that the outcome of an experiment might be affected by the power of suggestion.

Answer: TRUE

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

7) After years of experimentation and testing, it is possible to prove that a hypothesis is true, at which point it becomes absolute truth.

Answer: FALSE

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

8) Not only does science involve gaining knowledge about the natural world, it also involves the process of obtaining that knowledge.

Answer: TRUE

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

9) Special-interest groups are not permitted to post information as science on the Internet unless it has undergone peer review.

Answer: FALSE

Topic: Sec. 1.4

Skill: Knowledge/Comprehension

10) Scientific knowledge cannot prove or disprove the existence, or importance to us, of issues that fall outside of the natural world.

Answer: TRUE

Topic: Sec. 1.6

Skill: Knowledge/Comprehension

11) The pertussis (whooping cough) vaccine has virtually eliminated whooping cough in the United States.

Answer: FALSE

Topic: Current Issue

Skill: Knowledge/Comprehension

12) The available evidence suggests that the measles vaccine may cause autism.

Answer: FALSE

Topic: Current Issue

Skill: Knowledge/Comprehension

1.3 Matching Questions

Match each criterion that defines living organisms to its example.

- A) Living things require energy and raw materials.
- B) Living things grow and reproduce.
- C) Living things have a different molecular composition than nonliving things.
- D) Populations of living things evolve.
- E) Living things respond to their external environment.
- F) Living things maintain homeostasis.

1) Many species of fish increase swimming activity when moving into colder waters.

Topic: Sec. 1.1

Skill: Application/Analysis

2) All animals consume plants, animals, or other organisms in their environment.

Topic: Sec. 1.1

Skill: Application/Analysis

3) Plants growing in flower beds around a house close leaf pores during the hot hours of the day.

Topic: Sec. 1.1

Skill: Application/Analysis

4) Through years of exposure, many insects have become resistant to insecticides used in agriculture.

Topic: Sec. 1.1

Skill: Application/Analysis

5) Chemical analysis of a plant indicates that it is primarily composed of carbon, hydrogen, nitrogen, oxygen, sulfur, and phosphorous; these elements are generally lacking in most rocks.

Topic: Sec. 1.1

Skill: Application/Analysis

6) Skin cells, like the bacteria living on human skin, give rise to new individual cells.

Topic: Sec. 1.1

Skill: Application/Analysis

7) Certain blood vessels in humans constrict or dilate in during intense exercise.

Topic: Sec. 1.1

Skill: Application/Analysis

Answers: 1) E 2) A 3) E 4) C 5) D 6) B 7) F

Match each domain or kingdom to its description.

- A) Animalia
- B) Protista
- C) Plantae
- D) Archaea
- E) Fungi
- F) Bacteria

8) All consume other organisms for energy and are multicellular eukaryotes; members range from simple sponges to complex primates like humans.

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

9) Some members are unicellular, while others are multicellular eukaryotes; some, but not all, undergo photosynthesis; protozoa and algae are common examples of the kingdom.

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

10) Members of this group are responsible for breaking down the bodies of dead organisms, thereby releasing nutrients back into the environment.

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

11) Organisms are single celled, lack membrane-bound nuclei or other cellular components, and are found everywhere on the planet.

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

12) This group includes multicellular, eukaryotic organisms that convert energy from the sun into food; tallest organisms on the planet.

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

13) This group includes unicellular prokaryotes that tend to live in extreme environments such as hot springs.

Topic: Sec. 1.2

Skill: Understanding

Answers: 8) A 9) B 10) E 11) F 12) C 13) D

Each of the following terms is related to the scientific process. Match each to its description.

- A) controlled experiment
- B) theory
- C) hypothesis
- D) scientific method
- E) deductive reasoning
- F) inductive reasoning

14) a possible explanation to a proposed problem

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

15) making a generalization from knowledge gained from specific cases

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

16) a hypothesis that has been repeatedly tested and found to be true

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

17) the process of testing ideas and gaining information about the natural world

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

18) the application of general principles to specific cases

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

19) when testing a prediction, this accounts for all possible variables except the variable being considered

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

Answers: 14) C 15) F 16) B 17) D 18) E 19) A

1.4 Short Answer Questions

1) The four organic molecules found in all living systems are carbohydrates, nucleic acids, lipids, and _____.

Answer: proteins

Topic: Sec. 1.1

Skill: Knowledge/Comprehension

2) A(n) _____ is a higher classification system of organisms that encompasses kingdoms.

Answer: domain

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

3) The chemical and physical processes that are involved in energy and molecular transformations in living organisms are collectively termed _____.

Answer: metabolism

Topic: Sec. 1.1

Skill: Knowledge/Comprehension

4) Organisms made up of one cell are said to be _____.

Answer: unicellular

Topic: Sec. 1.1

Skill: Knowledge/Comprehension

5) Unicellular microorganisms that lack a membrane-bound nucleus and other membranous organelles are classified into two domains: _____ and _____.

Answer: Bacteria, Archaea

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

6) A group of similar organisms capable of interbreeding and producing fertile offspring is a(n) _____.

Answer: species

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

7) The ability to stand upright and walk on two legs is termed _____.

Answer: bipedalism

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

8) Humans can grasp objects between their thumbs and fingers because the thumb is _____.

Answer: opposable

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

9) A group of tissues working together for a common purpose is known as a(n) _____.

Answer: organ

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

10) Factors that are manipulated during an experimental procedure are called _____.

Answer: variables

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

11) The process by which an individual makes a generalization after examining specific cases is termed _____ reasoning.

Answer: inductive

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

12) A(n) _____ is a tentative statement about the natural world that can lead to a testable deduction.

Answer: hypothesis

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

13) A carefully planned and executed manipulation of the natural world used to test a prediction in the scientific method is a(n) _____.

Answer: experiment

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

14) The first step of the scientific method is _____.

Answer: observation

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

15) A properly designed controlled experiment should include both a(n) _____ group and a(n) _____ group.

Answer: experimental, control

Topic: Sec. 1.3

Skill: Knowledge/Comprehension

16) Data obtained from scientific experiments can best be displayed in a(n) _____, which can be used to explain the results of an experiment as well.

Answer: graph

Topic: Sec. 1.5

Skill: Knowledge/Comprehension

17) When data are presented in a graph, independent variables such as time or age should be plotted on the _____ (abscissa/ordinate).

Answer: abscissa

Topic: Sec. 1.5

Skill: Knowledge/Comprehension

18) Information that takes the form of a testimonial is considered to be _____, not scientific.

Answer: anecdotal

Topic: Sec. 1.5

Skill: Knowledge/Comprehension

19) The application of scientific knowledge to improve the condition of humans is known as _____.

Answer: technology

Topic: Sec. 1.6

Skill: Knowledge/Comprehension

1.5 Essay Questions

1) Explain how the characteristics of bipedalism and opposable thumbs are advantageous to humans.

Answer: Bipedalism frees the hands and forearms for carrying items, tools, food, and even children. Coupled with opposable thumbs, these features have undoubtedly contributed to better defense against predators, increased utilization of resources, and even advanced communication through gesturing and written symbols.

Topic: Sec. 1.2

Skill: Knowledge/Comprehension

2) You have been asked to test the effectiveness of drug X in preventing the growth of certain types of cancerous cells. Your responsibilities include designing and executing the experimental approach. After completing the study, you realize that no control variables were defined. How will this impact your drug study?

Answer: Failure to define the control variables implies that many unintended factors were left to change with the application of the drug. This would prevent you from determining whether any inhibition of the cancerous cells was due to drug X or some other factor that you did not control. The result is the study would have to be repeated using appropriate controlled variables.

Topic: Sec. 1.3

Skill: Synthesis/Evaluation

3) While out on a trip to a remote location in South America, you discovered an organism on a beautiful tropical flower. You have no idea about the classification of this organism. What features or characteristics of the new organism should you look for to at least be able to determine the kingdom it belongs to?

Answer: By observing whether the creature feeds on other organisms, you can potentially determine if it is an animal. Typically organisms that have a green appearance contain chlorophyll, which suggests that it undergoes photosynthesis, a feature of Plants and Protists.

Topic: Sec. 1.2

Skill: Application/Analysis