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What is science?

Directions: Use the word bank provided to complete the summary paragraph.

critical thinking  scientific law  International System of Units  scientific methods  science  theory

(1)____________________ is an organized way of studying things and finding answers to questions. The way you use skills to solve problems is referred to as (2)____________________.

When scientists conduct experiments, they are careful to accurately measure temperature, mass, volume, and length using the (3)____________________, or SI. Scientists, and all problem solvers, may use organization that takes the form of a seven-step series of procedures called the (4)____________________. This method of study and experimentation allows scientists to propose hypotheses, test their ideas for many trials, and report their results. An explanation of things or events, based on scientific knowledge resulting from many observations and experiments may become a (5)____________________. A statement about how things work in nature that seem to be true all the time, that may tell you what will happen, but not necessarily why it happens, is considered a (6)____________________.

Directions: Identify the following symbols using information from the chart in the front of the textbook.

7. 8. 9. ____________________  ____________________  ____________________

10. 11. 12. ____________________  ____________________  ____________________

Directions: List in order the seven steps scientists use in the scientific method. The last step has been written for you. (Hint: Refer to Figure 2 in your text for additional help.)

13. The Scientific Method

_____________________________________  ___________________________________

_____________________________________  ___________________________________

_____________________________________  Report your results

Exploring and Classifying Life  1
Directions: After each statement, write the feature of life that is illustrated.

1. “That boy shot up five inches in only one year.”
2. “Our cat had a litter of kittens yesterday.”
3. “To win at that sport, her muscle cells need to be worked hard every day.”
4. “My dog has become much less clumsy now that he is a year old.”
5. “Eat a good breakfast and you’ll feel better through the morning.”
6. “When that car pulled into the driveway, my cat ran to hide under the porch.”
7. “The fish died after living in the aquarium for many years.”
8. “The bee collected nectar from the flowers.”

Directions: Answer the following questions on the lines provided.

9. In Figure A, the Sun is what to the plant?
10. In Figure B, the plant leans toward the Sun. What is this reaction an example of?
11. Your body normally maintains a temperature of 37° C. This is an example of what?
12. What are the smallest units that carry on the functions of life?

2 Exploring and Classifying Life
Where does life come from?

**Directions:** Describe what the following scientists showed by their experiments.
1. Francesco Redi
2. Lazzaro Spallanzani
3. Louis Pasteur

**Directions:** Answer the following questions on the lines provided.
4. What is the theory of spontaneous generation?
5. What is the theory of biogenesis?
6. What did Oparin believe caused the early gases of Earth to combine?
7. What did Oparin think happened to these compounds after they fell into the hot seas?
How are living things classified?

Directions: Answer the following questions using information from the textbook.

1. Why don’t scientists use common names to identify organisms?

2. Why are scientific names important? Give four functions for scientific names.
   a. ______________________________________________________
   b. ______________________________________________________
   c. ______________________________________________________
   d. ______________________________________________________

Directions: Use the key to species of birch trees below to answer the questions that follow.

Key to Species of Birch Trees

1. a. bark dark, reddish-brown, yellowish-brown to black, go to 2
   b. bark creamy white, pinkish, or gray, go to 6
2. a. bark and twigs with wintergreen fragrance when cut, go to 3
   b. bark and twigs without a fragrance when cut, go to 5
3. a. leaves with 8-12 pairs of veins, go to 4
   b. leaves with 4-6 pairs of veins, Betula uber
4. a. bark dark red to almost black; scales smooth, 6-12 mm long, Betula lenta
   b. bark reddish brown, peeling in loose, ragged sheets, scales hairy, 5-7 mm, Betula alleghaniensis
5. a. branchlets covered near tip with many small glands, Rocky Mountains or Western Canada, Betula occidentalis
   b. branchlets smooth, shiny, no glands present, eastern U.S., Betula nigra
6. a. leaves hairy on lower surface, go to 7
   b. leaves smooth, hairless underside, go to 8
7. a. leaves 5-13 cm long, pointed tip, Betula papyrifer
   b. leaves 3-7 cm long, pointed tip, winter buds shiny, Betula pendula
8. a. bark dull gray to grayish-white, smooth and not peeling, Betula populifolia
   b. bark white to pinkish-white, peeling, go to 9
9. a. leaves 6-10 cm, round base, Betula caerulea
   b. leaves 3-5 cm, squared base, Betula pubescens

3. Are the leaves of Betula populifolia hairy or smooth on the lower surface? ____________

4. How many pairs of veins are on the leaves of Betula lenta? ________________

5. What is a characteristic of the bark of Betula alleghaniensis? ________________

6. When a twig of Betula nigra is broken, does it give off a wintergreen fragrance? __________

4 Exploring and Classifying Life
**Cell Structure**

**Directions:** Use the word bank provided to complete the following section summary.

<table>
<thead>
<tr>
<th>cell</th>
<th>cell membrane</th>
<th>cell wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>circulatory system</td>
<td>cytoplasm</td>
<td>endoplasmic reticulum</td>
</tr>
<tr>
<td>eukaryotic</td>
<td>Golgi bodies</td>
<td>lysosome</td>
</tr>
<tr>
<td>mitochondria</td>
<td>nucleus</td>
<td>organ</td>
</tr>
<tr>
<td>organelles</td>
<td>prokaryotic</td>
<td>ribosomes</td>
</tr>
<tr>
<td>tissue</td>
<td>vacuoles</td>
<td>water</td>
</tr>
</tbody>
</table>

The smallest unit of an organism that can carry on life functions is a(n) (1) __________. All cells have a protective covering, called the (2) __________, that allows food particles, (3) __________, and wastes to move in and out of the cell. Many important chemical reactions take place in the gelatin-like substance within cells called (4) __________. To manufacture proteins all cells also contain (5) __________. The (6) __________ give some cells a tough, rigid outer covering to protect the cell and give it shape. Cells are separated into two groups. Cells without membrane-bound structures are (7) __________. Cells containing membrane-bound structures are (8) __________. These structures, called (9) __________, perform many different jobs. The (10) __________ directs all the activities. The (11) __________ breaks down food to release energy. A folded membrane, the (12) __________, processes and moves materials around in the cell. (13) __________ sort proteins, packaging them into vesicles for movement within the cell. Serving as temporary storage units for food, water, and wastes, (14) __________ may join with a(n) (15) __________ containing digestive chemicals.

A group of similar cells, such as muscle cells, works together in a(n) (16) __________. When two or more of these work together, it is a(n) (17) __________. An organ system, such as the (18) __________ works to perform a specific function—such as carrying blood to all parts of the body.
 Viewing Cells

**Directions:** In numbers 1–4 below, a code letter has been substituted for each letter of the alphabet. To find out what the sentence says, use the following key to decode it. In the key, the code letters are shown directly below the alphabet letter each stands for. Write the correct letter above each code letter, then read the sentence aloud.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
Z Y X W V U T S R Q P O N M L K J I H G F E D C B A

1. ZOO LITZMRHNH ZIV NZWV LU XVOOH
2. Z XVOO RH GSV YZHRX FMRG LU HGI FXGFIIV
   ZMW UFMXGRHM RM ZM LITZMRHN
3. VEVIB XVOO XLNVH UILN ZMLGSVI XVOO
4. GSRH RH XZOOW GSV XVOO GSVLIB

**Directions:** Answer the following questions on the lines provided.

5. Who was the first person to look at cells with a microscope?

6. In what material did he see cells?

7. What did Schleiden and Schwann conclude about cells?

8. What instrument uses light and one or more lenses to view cells?

9. What instrument uses a magnetic field to magnify images up to 1,000,000 times?
1. Listed below are the steps by which an active virus copies itself and destroys a cell. Number the steps in the correct order in the blanks provided at the left.

   _______  a. The cell bursts open and hundreds of new virus particles are released. These new virus particles go on to infect other cells.

   _______  b. A specific virus attaches to the surface of a specific host cell.

   _______  c. The viral hereditary material takes control of the host cell and the cell begins to make new virus particles.

   _______  d. The hereditary material of the virus entering the host cell.

Directions: Answer the following questions using complete sentences.

2. Explain what a latent virus does when it enters a cell.

3. Discuss several ways to prevent viral infections.

4. What are vaccines made from?

5. How does gene therapy work?
Directions: Write the correct term from the word bank on the line next to its definition.

- atom
- compounds
- electrons
- element
- ionic compounds
- ion
- mixture
- molecular compound
- molecule
- nucleus
- solution
- suspension

1. a group of atoms held together by the energy of chemical bonds
2. negatively charged particles moving around outside a nucleus
3. two or more substances dissolved evenly throughout another substance
4. smallest particle that makes up all matter solid, liquid, or gas; usually neutrally charged
5. made up of two or more elements in specific proportions
6. occur when different atoms share their outermost electrons
7. opposite charges attract to form an electrically neutral compound
8. two or more substances evenly spread throughout a solution, but will eventually settle out
9. combination of substances that retain their own properties
10. atoms of the same kind that are bonded together
11. center of an atom, that contains protons and neutrons
12. an electrically charged atom that has lost or gained an electron

Directions: Use the information in the textbook to complete the chart about organic and inorganic compounds.

<table>
<thead>
<tr>
<th>Type of Compound</th>
<th>Contains</th>
<th>Usually Found in</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.</td>
<td>elements other than carbon</td>
<td>living things</td>
</tr>
</tbody>
</table>

Directions: Explain three ways water is important to all living things.

15. 
16. 
17. 
Moving Cellular Materials

Directions: Answer the following questions on the lines provided.

1. What is osmosis?

2. How does osmosis explain the fact that a watery syrup forms when you put sugar on strawberries?

3. a. How are glucose molecules moved into a cell?

b. What type of transport is this?

4. a. What are vesicles?

b. What happens to a vesicle in exocytosis?

5. What is a selectively permeable membrane?

Directions: Label the diagrams of cells with the terms diffusion, active transport, osmosis, equilibrium, facilitated diffusion. The arrows show the direction of transport.

6. 

7. 

8. 

9. 

10.
1. How do producers make their own food?

2. Fill in the following equation for photosynthesis.
   \[ \text{[________]+ water + carbon dioxide + chlorophyll \rightarrow [________]+ [________]} \]

3. What are the end products of respiration?

4. How does yeast cause bread to rise?

5. How do your muscles continue to get energy during high levels of activity when there is not enough oxygen?

Directions: For each of the following, write the letter of the term that best completes each statement.

6. Fermentation releases energy without using ______.
   a. oxygen  
   b. glucose  
   c. energy  
   d. carbon dioxide

7. What process occurs in the mitochondria?
   a. fermentation  
   b. photosynthesis  
   c. respiration  
   d. metabolism

8. During respiration some energy is released as ______.
   a. chemical energy  
   b. light energy  
   c. heat  
   d. carbon dioxide

9. When muscles are overworked, soreness is caused by a buildup of ______.
   a. glucose  
   b. carbon dioxide  
   c. lactic acid  
   d. energy

10. The green plant pigment that traps light energy from the Sun is called ______.
   a. glucose  
   b. chlorophyll  
   c. oxygen  
   d. water

11. During photosynthesis, plants produce glucose and release ______.
   a. carbon dioxide  
   b. energy  
   c. oxygen  
   d. water

12. The energy used by all living things starts with ______.
   a. producers  
   b. consumers  
   c. respiration  
   d. sunlight

13. The total of all chemical reactions in an organism is called ______.
   a. metabolism  
   b. respiration  
   c. enzymes  
   d. photosynthesis
Directions: Use the information in the text, Figure 2, and Figure 5 to complete the animal cell division chart below.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Characteristics of the Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>growth and development of cell, prepare for mitosis,</td>
</tr>
<tr>
<td></td>
<td>chromosomes duplicate</td>
</tr>
<tr>
<td>2.</td>
<td>Prophase</td>
</tr>
<tr>
<td>3.</td>
<td>chromatid pairs line up in the center of the cell and</td>
</tr>
<tr>
<td></td>
<td>become attached to spindle fibers</td>
</tr>
<tr>
<td>4.</td>
<td>Anaphase</td>
</tr>
<tr>
<td>5.</td>
<td>Telophase</td>
</tr>
<tr>
<td>6.</td>
<td>23 pairs of chromosomes in the nucleus containing</td>
</tr>
<tr>
<td></td>
<td>hereditary material; cell grows and develops again</td>
</tr>
</tbody>
</table>

Directions: Use the word bank provided to complete the following paragraph on sexual and asexual reproduction.

asexual budding cell division fission identical regeneration reproduction sexual

Two types of (7)________________________ have been defined by scientists. During (8)________________________ reproduction, two sex cells join together to develop into a genetically unique individual. In contrast, during (9)________________________ reproduction, a new organism develops from only one organism. The new generation is genetically (10)________________________ to the original organism. This process can be accomplished three ways. (11)________________________ produces a small organism that breaks off from the original organism to live on its own. (12)________________________ uses cell division to regrow body parts. Eukaryotic cells may use (13)________________________ to reproduce. However, a special type of cell division, called (14)________________________, is used by prokaryotic bacteria cells.

Directions: Explain three reasons cell division is important to the survival of an organism.

15. __________________________________________
16. __________________________________________
17. __________________________________________
Directions: Study the following diagrams. Then label the appropriate steps of meiosis.

1. 
2. 
3. 
4. 

Directions: Answer the following questions on the lines provided.
5. In what way is meiosis II similar to mitosis?
6. What is a cell with pairs of chromosomes called? A cell with no pairs (single set) of chromosomes?
7. Do centromeres divide at anaphase I or II?
8. Starting with one diploid cell, how many haploid sperm cells have formed after both phases of meiosis have been completed?
9. How are sex cells different from other cells in the body?
10. What happens during fertilization?
Directions: Answer the following questions on the lines provided.

1. Write the letter of the DNA bases that pair with the following DNA strand.
   - T: 
   - G: 
   - A: 
   - T: 
   - C: 

2. Write the name of the RNA bases that pair with the following DNA strand.
   - A: 
   - C: 
   - T: 
   - G: 
   - A: 

3. What structure contains the instructions for making specific protein?

4. What makes up the sides of the “ladder” of a DNA molecule?

5. How is RNA different from DNA?

6. What role does RNA play in cell life?

7. What are the three kinds of RNA and what does each do?

8. What can cause mutations?
Directions: Use the word bank provided to complete the summary paragraph.

alleles  cross  dominant
father of genetics  genetics  genotype
Gregor Mendel  heredity  heterozygous
homozygous  hybrid  inherited
pea plants  phenotype  Punnett square
purebred  recessive

The study of how traits are (1)____________________ through the interactions of alleles, defined as genetics, began in the 1850s. (2)____________________ was the first scientist to study and record how traits pass from one generation to the next. He is considered the (3)____________________. Passing traits from parent to offspring is referred to as (4)____________________. Mendel studied how traits are inherited through the mixing of genetic material in (5)____________________. He studied offspring that were given different genetic material for a trait from each parent, called a(n) (6)____________________. These offspring expressed different traits that a gene may have, called (7)____________________. During his study, he discovered that the (8)____________________ trait on an allele seemed to disappear when the plants were cross-pollinated. At the same time, some traits seemed to cover up other traits and he labeled these as (9)____________________. Scientists now say when two alleles for a trait are the same, the organism is considered (10)____________________ for that trait. A (11)____________________ organism has inherited two different alleles for a trait, one trait is recessive, the other is dominant.

Scientists have designed a grid with letters to represent alleles, called a (12)____________________, that helps them predict the probability of certain traits in offspring. The different ways alleles can combine is referred to as the organism’s (13)____________________. How an organism looks or behaves is evidence of their (14)____________________. Some organisms are considered (15)____________________, as they produce the same traits generation after generation. Farmers and animal breeders genetically (16)____________________ their crops or animals to achieve specific traits. Selective breeding is part of the science of (17)____________________.
Directions: Answer the following questions on the lines provided.

1. There are four phenotypes of human blood.
   a. Is it possible for two alleles to produce four phenotypes?

   b. What phenotype is produced by each of the following genotypes?
      - AA _____  AO _____  OO _____
      - BB _____  BO _____  AB _____
   c. How many alleles are there for blood type?

   d. When a trait has more than two alleles, how is that trait inherited?

   e. Which blood type is inherited by codominance? Explain your answer.

2. This pedigree shows the inheritance pattern of a sex-linked disorder, such as color blindness. Is the father, A, affected or not affected by the disorder? Explain your answer.

3. Name a sex-linked genetic disorder.

4. Name a homozygous recessive genetic disorder.
Directions: For each of the following, write the letter of the term or phrase that best completes the sentence.

1. ______ uses biological and chemical methods to change the DNA sequence of genes.
   a. Recombinant DNA
   b. Genetic engineering
   c. Gene therapy
   d. Selective breeding

2. Genetic engineering can be accomplished in bacteria using ______.
   a. recombinant DNA
   b. genetic engineering
   c. gene therapy
   d. selective breeding

3. Gene therapy has shown promise in controlling ______.
   a. high blood pressure
   b. the common cold
   c. cystic fibrosis
   d. multiple sclerosis

4. Many stores ______ genetically engineered produce.
   a. provide pamphlets on
   b. refuse to sell
   c. label
   d. carry only

5. ______ involves placing a normal allele in a cell that has a mutation and hoping that the normal allele begins to function.
   a. Chemical engineering
   b. Selective breeding
   c. Recombinant DNA
   d. Gene therapy

Directions: Answer the following questions on the lines provided.

6. Explain how genetic engineering produces tomatoes that are ripe when they reach consumers?

7. How did knowledge of genotypes affect scientists’ efforts to improve plants used for food and clothing?

8. Identify a disease or disorder and explain how it might be controlled by genetic engineering.

9. Why do some people prefer to eat foods that are not genetically engineered?
Directions: Complete the chart below about evolution.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition of Term</th>
<th>Real-World Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. adaptation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. evolution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. geographic isolation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. gradualism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. mutation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. natural selection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. population</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. punctuated equilibrium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. variation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Directions: Discuss the scientific ideas of Jean Baptiste de Lamarck and Charles Darwin and the scientific evidence to support each hypothesis.

11. Lamarck: _____________________________________________________________

Scientific evidence: _____________________________________________________

12. Darwin: ______________________________________________________________

Scientific evidence: _____________________________________________________

Adaptations Over Time 21
Directions: Complete the following sentences using the correct terms.

1. Relative dating provides a(n) ________________________ of the age of a rock layer or fossil.
2. Fossils provide direct evidence that ________________________ has occurred on Earth.
3. Scientists find clues about evolution from studying ________________________, the molecule that controls heredity and directs the development of every organism.
4. The flipper of a whale, wing of a bat, leg of a frog, and arm of a human are all examples of ________________________ structures.
5. The human appendix, which seems to have no function, is a(n) ________________________ structure.

Directions: Answer the following questions on the lines provided.

6. In which type of rock are most fossils found?

7. What two methods are used to determine the age of a rock or fossil?

8. Why is the fossil record not complete?

9. List other evidence of evolution.

10. Does radiometric dating produce exact results? Why or why not?
The Evolution of Primates

Directions: In the table below list three physical characteristics that all primates share. Then describe how each of these characteristics functions or how each is adaptive.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Function/Adaptation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
</tbody>
</table>

Directions: Answer the following questions on the lines provided.

4. How do hominids differ from apes?

5. In what ways do *Australopithecus* and *Homo habilis* differ?

6. What traits did the early humans, Neanderthals, and Cro-Magnons share?

7. What social behaviors do we share with Cro-Magnon humans?
What are bacteria?

Directions: Write the correct term from the word bank on the line next to its definition.

aerobe  anaerobe  archaebacteria
bacteria  conjugation  fission
eubacteria  producer  van Leeuwenhoek
flagella  consumer

1. an organism that uses oxygen to break down food to obtain energy
2. an organism that makes its own food using energy from the Sun
3. whiplike tails that help bacteria move around in moist areas
4. one celled prokaryotic organisms that occur alone, in chains, or groups
5. kingdom of bacteria that lives in extreme environments—salty, acidic, or very hot
6. an organism that lives without oxygen
7. a type of asexual reproduction in which two new bacteria cells, identical to each other and the original cell, are produced
8. Dutch merchant who used a microscope to discover bacteria
9. an organism that breaks down and consumes other organisms for energy
10. a type of sexual reproduction in which bacteria exchange genetic material
11. the largest bacteria kingdom, classified into small groups by their shape, structure, how they obtain food, type of food, and the wastes they produce

Directions: Give the function of each of the following features found in a bacteria cell. (Hint: Refer to Figure 2 and your text for additional information.)

12. Cytoplasm: 
13. Flagellum: 
14. Capsule: 
15. Cell membrane: 
16. Cell wall: 
17. Ribosomes: 
18. Plasmid: 

Bacteria 25
**Bacteria in Your Life**

**Directions:** Answer the following questions on the lines provided.

1. What word on the milk carton tells you that the dairy eliminated pathogens when producing the milk?
2. What process kills harmful bacteria without much effect on the taste of the food? Describe the process.
3. In the illustration above, a change has taken place over time. What kind of bacteria caused the change?
4. How does this change help other organisms in the environment?
5. What kind of bacteria annually save farmers millions of dollars in fertilizer costs?
6. What two kinds of plants have these bacteria in their roots?
7. What can prevent some bacterial diseases?
8. What kind of drugs can kill bacteria?
9. What are poisons produced by pathogens called?
10. What are the thick-walled cells of botulism bacteria called?
Directions: Use the terms below to complete the summary paragraph about protists.

adaptations    algae    cell division    chloroplasts
  cilia    dead organisms    destructive    dinoflagellates
eukaryotic    eyespot    flagellum    funguslike
giant kelp    moist surroundings    nucleus    ocean
  oxygen    parasites    pests    protist
  protozoans    pseudopods    regeneration    sexually

The (1)____________________ kingdom is made of one- or many-celled organisms that live in (2)____________________. Unlike bacteria, protists have (3)____________________ cells with a (4)____________________ and membrane-bound structures. Animal-like protists, called (5)____________________, can move through the temporary extension of the cytoplasm, called (6)____________________, with a whiplike tail called a(n) (7)____________________, or with the threadlike structures that extend from the cell membrane, called (8)____________________. Relying on other animals for food and reproduction, (9)____________________ can’t move on their own. Protozoans can be helpful, or harmful, disease-carrying (10)____________________.

Water molds, slime molds, and downy mildew are included in the (11)____________________ protists. These organisms can be helpful to the environment by breaking down (12)____________________, or be (13)____________________ to farm crops. Plantlike protists have (14)____________________ and are called (15)____________________. Some algae have developed (16)____________________ for survival. (17)____________________ have two long, thin, whiplike tails for movement, and a chemical that causes them to glow at night. Some euglenoids have an additional adaptation, a(n) (18)____________________, that is sensitive to light. Algae living in the (19)____________________ can be green, brown, or red. Thick forests of (20)____________________ offer food and protection for animals, and additives for food and cosmetic products. Algae are helpful by producing (21)____________________ through photosynthesis.

Protists may reproduce using asexual reproduction, using (22)____________________ or (23)____________________. Most protists can also reproduce (24)____________________.
Directions: On the line below each diagram, write the name of the fungi division that is identified with the diagram.

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________

6. Why are saprophytes good for the environment? ______________________________________________________________________

7. In what conditions do fungi grow best? ______________________________________________________________________

8. If you find a mushroom in the wild, why shouldn’t you eat it? ______________________________________________________________________

9. What makes up a lichen? ______________________________________________________________________

10. What is an ascus? ______________________________________________________________________

11. What is a basidium? ______________________________________________________________________

12. What are sporangia? ______________________________________________________________________

13. How does yeast cause bread to rise? ______________________________________________________________________
Directions: Write the correct term from the word bank on the line next to its definition.

1. botanist who proposed classifying plants using many characteristics
2. coloring in a plant
3. chemical compound plants make out of sugars into fibers for structure and support
4. covering surrounds all cells and regulates the interaction between the cell and the environment
5. probably the ancient ancestor of all land plants
6. plants containing tubelike structures used to carry water and nutrients throughout the plant
7. process in which light energy is used to produce glucose and oxygen
8. plants without tubelike structures to move water and substances
9. a waxy, protective layer secreted by cells onto stems, leaves, and flowers to slow the loss of water
10. system of naming species using a unique two-word name
11. green pigment used to trap light used in photosynthesis
12. rigid structure that supports and protects plant cells

Directions: Complete the summary chart of plant adaptations for survival on land. (Hint: Refer to Figure 4 in the text for additional help.)

<table>
<thead>
<tr>
<th>Adaptation</th>
<th>Purpose of Adaptation</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. cellulose</td>
<td></td>
</tr>
<tr>
<td>14. cuticle</td>
<td></td>
</tr>
<tr>
<td>15. fruits and seed cones</td>
<td></td>
</tr>
<tr>
<td>16. vascular system</td>
<td></td>
</tr>
</tbody>
</table>
Seedless Plants

Directions: Complete the following sentences using the correct terms. Some of the terms may not be used.

- vascular
- nonvascular
- mosses
- liverworts
- rhizoids
- pioneer species

1. Organisms that are the first to grow in new or disturbed areas are called ______________________________.

2. Ground pines, spike mosses, horsetails, and ferns are all types of seedless ______________________________ plants.

3. Liverworts, hornworts, and ______________________________ are seedless nonvascular plants.

4. ______________________________ are the threadlike roots of nonvascular plants that absorb and distribute water directly through their cell walls.

Directions: Answer the following question on the lines provided.

5. What is the relationship between ferns and coal? ______________________________

Directions: Classify the following plants as vascular or nonvascular.

- Rose
- Corn
- Moss
- Daisy
- Liverwort
- Grass

6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________
11. ______________________________
Directions: Contrast the two major groups of seed plants by completing the table. Use information from your textbook.

Table 1

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Gymnosperms</th>
<th>Angiosperms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Examples</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Directions: Study the plants pictured below. On the line under each plant, write whether that plant is a monocot or a dicot.

3. 

4. 

5. 

6. 

7. 

Directions: Answer the following questions on the lines provided.

8. What is a seed plant?

9. What are the functions of xylem and phloem?

10. What are some economic uses of gymnosperms?
Introduction to Plant Reproduction

Directions: Write the correct term from the word bank on the line next to its definition.

- asexual reproduction
- diploid
- fertilization
- gametophyte stage
- egg
- haploid
- prothallus
- sexual reproduction
- sperm
- spore
- sporophyte stage
- stamen
- zygote

1. cells with a full set of chromosomes
2. haploid cell that can divide to form plant structures, an entire new plant, or develop into sex cells
3. two sex cells, usually an egg and a sperm, join and develop into a genetically unique organism
4. the process where a sperm and egg combine to produce the first cell of the new organism
5. the part of the plant life cycle that begins when an egg is fertilized by a sperm
6. sex cell from a female organism
7. production of offspring genetically identical to the original organism through cell division or regeneration
8. sex cell from a male organism
9. the part of the plant life cycle that begins when cells in reproductive organs undergo meiosis and produce haploid cells
10. cells with half a set of chromosomes; sex cells
11. first cell of a new organism
12. gametophyte plant form of a fern
13. male reproductive organ of the plant

Directions: List three ways plant sperm and eggs might travel to get together for fertilization.

14. ______________________ ______________________ ______________________
Seedless Reproduction

Directions: Label the structures related to moss reproduction.

1. 
2. 
3. 
4. 

Directions: Label the structures in the fern’s reproductive cycle.

5. 
6. 
7. 
8. 
9. 

Directions: Answer the following questions on the lines provided.

10. Why do mosses need water for fertilization?

________________________________________________________________________

11. Describe how ferns can reproduce asexually.

________________________________________________________________________
**Directions:** Use the illustrations above to answer the questions.

1. Which cone produces pollen grains?

2. Which cone produces seeds?

3. In which cone is the egg fertilized?

4. What type of seed plant produces the above cones?

**Directions:** Write the term that matches the following descriptions.

5. transfer of pollen from stamen to ovules: ________________________________

6. the male reproductive organ of angiosperms: ______________________________

7. the female reproductive organ of angiosperms: ____________________________

8. produces pollen grains: ________________________________________________

9. part of the flower in which sperm form: __________________________________

10. the top of the pistil that catches the pollen grains: _________________________

11. grows from the pollen grain to the ovule: _________________________________

12. a young plant growing within the seed: _________________________________

13. part of the flower that becomes part of the fruit: _________________________

14. a seed that does not germinate for a period of time: _______________________

15. organisms that aid in the pollination of flowers: ___________________________

16. ways that seeds get from the flower to the ground for germination: ______

17. the early growth of a plant from a seed: _________________________________
### Study Guide: Photosynthesis and Respiration

**Directions:** Write the correct term on the line in front of its definition.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>chlorophyll</td>
<td>1. important plant sugar made in the chloroplasts</td>
</tr>
<tr>
<td>chloroplast</td>
<td>2. chemical process breaking down food and releasing energy</td>
</tr>
<tr>
<td>glucose</td>
<td>3. green, light-trapping pigment in chloroplasts used to make food</td>
</tr>
<tr>
<td>respiration</td>
<td>4. process taking place in chloroplasts during which a plant’s chlorophyll</td>
</tr>
<tr>
<td></td>
<td>traps light energy and sugars are produced for food</td>
</tr>
<tr>
<td>guard cells</td>
<td>5. two cells that surround and control the opening size of the stomata</td>
</tr>
<tr>
<td>oxygen</td>
<td>6. nearly clear, outer cell layer of a leaf</td>
</tr>
<tr>
<td>photosynthesis</td>
<td>7. waste product of photosynthesis</td>
</tr>
<tr>
<td>epidermis</td>
<td>8. plant organelle containing chlorophyll used to make plant sugars</td>
</tr>
<tr>
<td>stomata</td>
<td>9. small opening in leaf or stems used to control the amount of water vapor</td>
</tr>
<tr>
<td></td>
<td>carbon dioxide, and waste that enters and exits a plant</td>
</tr>
<tr>
<td>cuticle</td>
<td>10. waxy covering over epidermis, helps protect plant from drying out</td>
</tr>
</tbody>
</table>

### Directions: Put these events in the order in which they happen. The first step has been numbered for you.

11. Fall leaf colors

   1. Leaves change color as the other pigments become visible.
   2. During spring and summer, light energy is reflected from the chlorophyll; while other pigments in the leaf are hidden.
   3. In autumn, the chlorophyll in some leaves breaks down.
   4. The leaves appear green to the human eye.

### Directions: List two reasons photosynthesis is important to organisms on Earth.

12. 
13. 

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Plant Responses

Directions: For each of the following, write the letter of the term or phrase that best completes the sentence.

1. A plant’s response to gravity is called ______.
   a. phototropism     b. gravitropism     c. photosynthesis     d. photoperiodism

2. The flowering of a plant in response to change of light or dark is called ______.
   a. photosynthesis     b. phototropism     c. gravitropism     d. photoperiodism

3. Anything in the environment that affects the behavior of an organism is called a ______.
   a. stimulus     b. positive tropism     c. response     d. hormone

4. Auxins cause cells to grow ______.
   a. longer on the sunny side of the stem     c. shorter on the shaded side of the stem
   b. shorter on the sunny side of the stem     d. longer on the shaded side of the stem

5. Ethylene gas is NOT ______.
   a. a plant hormone that affects ripening of fruit
   b. used by growers to cause stems to lengthen
   c. a stimulus
   d. a cause of leaves falling down from a plant

6. Because of the effect of auxins on cell growth, plant stems grow ______.
   a. away from gravity     c. toward touch
   b. toward light
   d. straight

7. The response of roots growing downward is an example of ______.
   a. negative phototropism     c. negative thigmotropism
   b. negative gravitropism
   d. positive gravitropism

Directions: Label the responses of the stems and roots in the following diagrams. Figure 1 shows a plant’s response after being tipped on its side for a few days. Figure 2 shows a plant’s response to sunlight. Include whether the response is positive or negative.

Figure 1

8. stem: ____________
9. roots: ____________

Figure 2

10. stem: ____________
## Is it an animal?

**Directions:** Use the information from your textbook to complete the summary chart below.

<table>
<thead>
<tr>
<th>Vocabulary</th>
<th>Definition</th>
<th>Two Real-World Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.  behavioral adaptation</td>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>2.  physical adaptation</td>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>3.  carnivore</td>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>4.  scavenger carnivore</td>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>5.  herbivore</td>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>6.  omnivore</td>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>7.  detritivore</td>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>8.  invertebrate</td>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>9.  vertebrate</td>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>10. asymmetry</td>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>11. bilateral symmetry</td>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>12. radial symmetry</td>
<td>a.</td>
<td></td>
</tr>
</tbody>
</table>
Sponges and Cnidarians

Directions: Label the figure of a sponge below. Then fill in the table with the name of each structure and its function.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>5.</td>
</tr>
<tr>
<td>2.</td>
<td>6.</td>
</tr>
<tr>
<td>3.</td>
<td>7.</td>
</tr>
<tr>
<td>4.</td>
<td>8.</td>
</tr>
</tbody>
</table>

9. What is spongin?

10. On what structure are the stinging cells of cnidarians located?

11. How do the stinging cells help the cnidarian ingest food?

12. Explain the differences between a polyp and a medusa.

13. Describe the two stages of reproduction of medusa body types.

14. How do coral reefs form?
Directions: Complete the paragraphs by filling in the blanks.

Worms are divided into two types, 1. ___________________ and 2. ___________________.

All worms are 3. ___________________ with three tissue layers. In addition, all worms have 4. ___________________ symmetry.

Flatworms were the first group of animals to evolve bilateral symmetry.

5. ___________________ and 6. ___________________ are types of parasite flatworms.

Parasites depend on a host organism to meet their needs. Planarians however, are 7. ___________________.

Roundworms were the first group of animals to evolve a digestive system with a 8. ___________________ and an 9. ___________________. Some, like the 10. ___________________, that attack dogs, are parasites. Most, however, are free-living.

Roundworms comprise a group of worms known as 11. ___________________.

Directions: Answer the following questions on the lines provided.

12. How does a tapeworm eat?

13. Describe the life cycle of a fluke.

14. What is the most widespread human disease caused by flukes?

15. List three ways roundworms are helpful to humans.
Directions: Write the correct term from the word bank on the line next to its definition.

1. predatory mollusks with large head and eyes, a foot with many tentacles, and a well-developed nervous system
2. tonguelike organ with rows of teeth used to scrape food
3. organs that exchange carbon dioxide from mollusks with oxygen from water
4. the thin layer of tissue covering the body organs that may secrete a shell or protective coating over soft bodies
5. system in which blood moves through the body in closed vessels
6. mollusks with hinged, two-part shells joined by strong muscles
7. system in which the heart moves blood out into open spaces, completely surrounding and nourishing the body organs
8. mollusks with no shells that live in moist land areas and eat plants
9. section of mollusk body that contains stomach and other organs
10. single- or no-shelled mollusks with radula, many have tentacles with eyes on the tips

Directions: List four ways that mollusks are helpful and harmful.

<table>
<thead>
<tr>
<th>11. Helpful</th>
<th>12. Harmful</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Directions: Study the following diagram of an earthworm. Then label the parts on the diagram and describe the function of each part on the lines below.

1. __________________________
2. __________________________
3. __________________________
4. __________________________
5. __________________________
6. __________________________

Directions: Answer the following questions on the lines provided.

7. When a leech attaches to another organism, what keeps the wound bleeding? __________________________

8. Why are segmented worms called “annelids”? __________________________

9. How do earthworms get oxygen to their cells? __________________________

10. Through what organs, and in what order, does soil pass between an earthworm’s mouth and anus? __________________________

Mollusks, Worms, Arthropods, Echinoderms
**Arthropods**

Directions: This drawing of an arthropod shows three distinct body regions. Label them with the correct terms.

1. 
2. 
3. 

Directions: Answer the following questions on the lines provided.

4. Why do scientists think arthropods and segmented worms have a common ancestor?

5. Why is molting necessary for arthropod growth?

6. If spiders cannot chew, how can they eat?

7. What is the main difference between the body plan of ticks and that of insects?

8. What is the main difference between centipedes and millipedes?

9. What is attached to an insect’s thorax?

10. What do some insects use for chewing plant tissue? For lapping up nectar?

11. What are the four stages of development in complete metamorphosis?

12. What is a nymph?


Echinoderms

Directions: Write the name of the echinoderm under each picture.

1. ____________  2. ____________  3. ____________

4. ____________  5. ____________

Directions: Answer the following questions on the lines provided.

6. Describe how a sea star feeds on a clam.

7. What evidence is there that echinoderms are the most advanced group of invertebrates?

8. How do the tube feet of an echinoderm help the animal?

9. What happens if a sea star loses an arm?

10. Why are echinoderms important to the marine environment?
**Directions:** Use the word bank provided to complete the following summary paragraph.

Vertebrates are animals with a (1) backbone. Vertebrates are considered to be (2) chordates because by definition, at some stage in their development, four basic structures are present. (3) Pharyngeal pouches are pairs of openings found between the mouth and digestive tube. In lancelets, these pouches are used for (4) filter feeding, in fish, they develop into (5) external gills, and in humans, they are present only during (6) embryonic development, after which they develop into tubes from the ears to the (7) throat.

As most chordates develop, the front end of the nerve chord enlarges to form the (8) brain and the remainder becomes the (9) spinal cord. These two structures become the (10) central nervous system, a complex system for sensory and motor responses. The muscular structure that extends at the end of the developing chordate is referred to as the (11) postanal tail. The (12) vertebrae, a flexible, but firm internal support, extends along the upper body and is made up of (13) vertebrae enclosed in a stiff covering. Chordates that develop backbones that partly or entirely replace the notochord are called (14) vertebrates. They also have other distinct characteristics. All vertebrates have an internal support structure made up of a stack of (15) vertebrae that surrounds and protects the spinal nerve chord. Vertebræ are separated by soft discs of (16) cartilage.

Some vertebrates are able to maintain a constant internal temperature and are considered (17) endotherms. Others, whose internal body temperature changes with the temperature of their surroundings, are called (18) ectotherms.
Fish

Directions: For each of the following fish, write the common name of the class to which it belongs.

1. shark: ________________________________
2. lungfish: ________________________________
3. perch: ________________________________
4. lamprey: ________________________________
5. ray: ________________________________

Directions: Name and describe the three adaptations that allow fish to live in water. Then label the figure with those terms.

6. ________________________________
7. ________________________________
8. ________________________________

Directions: Answer the following questions on the lines provided.

12. To which category do 95 percent of all fish belong?

13. Describe the lateral line system of fish and explain its purpose.

14. What happens to a fish when its swim bladder deflates?

15. What happens to a fish when its swim bladder inflates?
Directions: Listed below are some of the parts of a frog. Describe the structure and function of each part and label the figure.

1. skin: ____________________________
2. tongue: ____________________________
3. nostrils ________________
4. eyes: ____________________________
5. back legs: ____________________________

Directions: Answer the following questions on the lines provided.

11. Compare and contrast hibernation and estivation.

________________________________________

________________________________________

12. Name three amphibians. ____________________________

13. What is metamorphosis? ____________________________

14. What is a biological indicator? ____________________________

________________________________________
**Reptiles**

**Directions:** Answer the following questions on the lines provided.

1. What is the definition of a reptile?

2. How are reptiles related to amphibians?

3. What are the advantages of the amniotic egg?

**Directions:** Study the following diagram of a reptile egg. Then describe the function of each part.

4. Leathery shell: ________________

5. Yolk sac: ________________

6. Egg membrane: ________________

7. Pores: ________________

8. Embryo: ________________

**Directions:** Answer the following questions on the lines provided.

9. How does the three-chambered heart function for the reptile?

10. Name the three living groups of reptiles.
Directions: Describe how each adaptation and characteristic listed below is helpful to birds’ flight or survival.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Advantage to Flight or Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. wing shape</td>
<td></td>
</tr>
<tr>
<td>2. bone structure</td>
<td></td>
</tr>
<tr>
<td>3. contour feathers</td>
<td></td>
</tr>
<tr>
<td>4. down feathers</td>
<td></td>
</tr>
<tr>
<td>5. endothermic</td>
<td></td>
</tr>
<tr>
<td>6. circulatory system</td>
<td></td>
</tr>
<tr>
<td>7. digestive system</td>
<td></td>
</tr>
<tr>
<td>8. respiratory system</td>
<td></td>
</tr>
<tr>
<td>9. well-developed senses (eyes and ears)</td>
<td></td>
</tr>
</tbody>
</table>

Directions: Put these events in the order in which they happen.

10. Bird Digestion

   ____ The food moves to the stomach where it is partially digested.
   ____ The intestine completes the digestion and absorbs the nutrients.
   1. The bird eats nuts, seeds, nectar, insects, or meat.
   ____ The nutrients move throughout the blood stream and supply energy to organs.
   ____ The crop, a specialized digestive organ, adds moisture and stores the food.
   ____ The muscular gizzard grinds and crushes the food with small stones and grit.
Mammals

Directions: List three characteristics of mammals.
1. ____________________________
2. ____________________________
3. ____________________________

Directions: Name three glands that most mammals have.
4. ____________________________
5. ____________________________
6. ____________________________

Directions: Identify each mammal listed below by writing an H for herbivore, C for carnivore, or O for omnivore in the blanks provided.
7. 7. lion ______ 12. bear ______
8. 8. human ______ 13. beaver ______
9. 9. wolf ______ 14. giraffe ______
10. 10. zebra ______ 15. monkey ______
11. 11. panther ______

Directions: Answer the following questions on the lines provided.
16. Which kind of teeth would a carnivore use most often? ____________________________
17. Which kind of teeth would a herbivore use most often? ____________________________

Directions: Describe the three groups of mammals based on how their young develop, and give one example from each group on the lines provided.
18. placentals: ____________________________
19. marsupials: ____________________________
20. monotremes: ____________________________
Directions: Use the information from your textbook to complete the summary chart below.

<table>
<thead>
<tr>
<th>Vocabulary</th>
<th>Definition</th>
<th>Two Real-World Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. behavioral response</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>2. conditioning</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>3. imprinting</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>4. innate behavior</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>5. insight</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>6. instincts</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>7. learned behavior</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>8. reflex</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>9. external stimulus</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>10. internal stimulus</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>11. trial and error</td>
<td>a.</td>
<td>b.</td>
</tr>
</tbody>
</table>
Behavioral Interactions

Directions: Answer the following questions on the lines provided.
1. Why do some animals live in groups?

2. What are some examples of social behavior?

3. What purpose does aggression serve?

4. What is communication?

5. What is the purpose of courtship displays?

6. Why do animals use pheromones?

7. What is a circadian rhythm?

8. What happens to an animal when it hibernates?

9. What signals some animals to hibernate?

10. Why do some animals migrate?
The Skeletal System

**Directions:** Write the correct term on the line in front of its definition.

1. cartilage
2. joint
3. osteoblasts
4. rheumatoid arthritis
5. compact bone
6. ligament
7. osteoclasts
8. skeletal system
9. disks
10. movable joints
11. immovable joints
12. periosteum
13. osteoarthritis
14. red marrow

1. any place two or more bones come together
2. smooth, slippery tissue at the ends of bones to reduce friction
3. tough, fibrous, tight-fitting membrane surrounding the bones; contains blood vessels and nutrients used in bone growth and repair
4. tough band of tissue that holds joints together
5. contains all 206 bones in your body, and has five major functions
6. joints that do not move, including the skull and pelvis
7. joint disease in which the cartilage breaks down from years of use
8. bone-forming cells that deposit calcium and phosphorus in bones
9. joints that move; pivot, ball and socket, hinge, and gliding joints
10. joint disease; an ongoing condition in which the body’s immune system tries to destroy its own tissue, effects both children and adults
11. cells that break down bone to put calcium and phosphorus into the blood, as needed
12. hard, strong layer of bone containing bone cells, blood vessels, and Haversian system, giving strength to the bones
13. pads of cartilage between the vertebrae in the backbone
14. type of bone material at the end of long bones with small open spaces filled with marrow
15. type of bone material that produces red blood cells at the rate of 2-3 million cells per second

**Directions:** List the five major functions of the skeletal system.

16. __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________
The Muscular System

Directions: Think of the type of muscle associated with each of the following body parts. In the space provided, write the name of the type of muscle associated with that body part. Also tell whether that muscle is voluntary or involuntary.

1. thigh: ____________________ voluntary
2. upper arm: ____________________ voluntary
3. intestine: ____________________ involuntary
4. heart: ____________________ involuntary
5. calf: ____________________ voluntary
6. stomach: ____________________ involuntary
7. hand: ____________________ voluntary
8. blood vessels: ____________________ involuntary
9. uterus: ____________________ involuntary
10. neck: ____________________ voluntary

Directions: The two illustrations show an ankle bending. Label the second illustration, showing which muscle contracts and which muscle relaxes.

11a. Contracts
11b. Relaxes

About how many muscles are in the body? ____________________

How do muscles produce mechanical energy? ____________________

What happens when the supply of energy-rich molecules in a muscle is used up? ____________________
Directions: List the five functions of skin.

1. 
2. 
3. 
4. 
5. 

Directions: Answer the following questions on the lines provided.
6. How does sweating help a runner?
   
7. Name two waste products that sweat glands release.
   
8. Under what conditions is vitamin D produced by the body and where?
   
9. Why does the body require vitamin D?
   
10. Label the three layers on the illustration of the skin.

11. Why does a person’s skin usually get darker during the summer?

12. How does skin try to repair itself when the epidermis is slightly injured?
### Directions:
Use the information from your textbook to complete the summary chart below.

<table>
<thead>
<tr>
<th>Vocabulary</th>
<th>Definition/Use by Body</th>
<th>Two Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. amino acids</td>
<td></td>
<td>a. proline</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. cysteine</td>
</tr>
<tr>
<td>2. carbohydrates</td>
<td></td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b.</td>
</tr>
<tr>
<td>3. complex carbohydrates</td>
<td></td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b.</td>
</tr>
<tr>
<td>4. simple carbohydrates</td>
<td></td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b.</td>
</tr>
<tr>
<td>5. fats</td>
<td></td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b.</td>
</tr>
<tr>
<td>6. saturated fats</td>
<td></td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b.</td>
</tr>
<tr>
<td>7. unsaturated fats</td>
<td></td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b.</td>
</tr>
<tr>
<td>8. food group</td>
<td></td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b.</td>
</tr>
<tr>
<td>9. homeostasis</td>
<td></td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b.</td>
</tr>
<tr>
<td>10. minerals</td>
<td></td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b.</td>
</tr>
<tr>
<td>11. nutrients</td>
<td></td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b.</td>
</tr>
<tr>
<td>12. proteins</td>
<td></td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b.</td>
</tr>
<tr>
<td>13. complete proteins</td>
<td></td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b.</td>
</tr>
<tr>
<td>14. vitamins</td>
<td></td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b.</td>
</tr>
</tbody>
</table>
Directions: Listed below are organs that aid in the digestion of food. Describe the function of each organ and label the figure.

1. mouth: 

2. esophagus: 

3. stomach: 

4. small intestine: 

5. pancreas: 

6. large intestine: 

7. liver: 

8. gallbladder: 

9. rectum: 

10. 

11. 

12. 

13. 

14. 

15. 

16. 

17. 

18.
The Circulatory System

Directions: Write the correct term on the line next to its definition.

1. microscopic blood vessels that connect arteries and veins
2. the system whereby blood flows to and from the tissues of the heart
3. the two upper chambers of the heart
4. blood vessels that carry blood away from the heart
5. force of the blood on the walls of the blood vessels
6. system whereby blood flows through the heart to the lungs and back to the heart
7. blood vessels that carry blood back to the heart
8. system whereby oxygen-rich blood moves to all organs and body tissues (except the lungs), and oxygen-poor blood returns to the heart
9. largest artery in the body
10. the two lower chambers of the heart

Directions: Sequence the following events. (Hint: Refer to Figure 7 and your textbook for additional help.)

11. The Process of Atherosclerosis
   - blood flow is restricted, starving the heart muscles cells of oxygen and nutrients
   - heart muscle cells are greatly weakened; heart attack results
   - plaques build up and narrow the pathway through the arteries
   - eat foods high in cholesterol and saturated fats
   - blood flow is nearly blocked
   - fatty deposits, called plaques, form along the inner walls of the arteries

Directions: Describe three ways to help prevent cardiovascular disease.

12. 
13. 
14. 

Circulation 61
Directions: Fill in the missing words in the following statements to describe the four functions of blood.

1. carries _____________________ to all body cells and removes _____________________

2. carries _____________________ of cell activity to _____________________ to be removed

3. transports _____________________ from the digestive system to all cells

4. carries materials that fight _____________________ and heal wounds

Directions: The parts of human blood are shown below. Use the following phrases to write what each part does on the line below its picture: help clot blood; transport oxygen; contains nutrients and minerals; help fight infection.

A. White blood cells
B. Red blood cells
C. Platelets
D. Plasma

5. a. _____________________ c. _____________________

   b. _____________________ d. _____________________

Directions: Complete the following table. Possible blood types of the donor are listed horizontally. The possible blood types of the receiver are listed vertically. Make a check in the box if the receiver can receive blood from the donor directly above. Then answer the questions below the table.

<table>
<thead>
<tr>
<th>Receiver (can receive blood from)</th>
<th>Donor (can give blood to)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Blood type</td>
</tr>
<tr>
<td>6. O</td>
<td>6. O</td>
</tr>
<tr>
<td>7. A</td>
<td>7. A</td>
</tr>
<tr>
<td>8. B</td>
<td>8. B</td>
</tr>
<tr>
<td>9. AB</td>
<td>9. AB</td>
</tr>
</tbody>
</table>

10. Who can receive any blood type? _____________________________________________

11. Who can receive only O type blood? __________________________________________
The Lymphatic System

Directions: Label the drawing below of the lymphatic system. Include the terms lymph node, thymus, tonsil, and spleen.

1. 
2. 
3. 
4. 

Directions: Answer the questions on the lines provided.
5. What are three main functions of the lymphatic system? 

6. What do lymph nodes do? Why do they sometimes become large and tender?

7. What is the role of the thymus?

8. How is the spleen like a lymph node? How do their functions differ?

Directions: In the space below, write a paragraph to describe how HIV affects the lymphatic system when it enters a person’s body. Include a description of the function of the cells the virus attacks.

9. 

Circulation 63
The Respiratory System

**Directions:** Write the correct term on the line in front of its definition.

<table>
<thead>
<tr>
<th>alveoli</th>
<th>breathing</th>
<th>bronchi</th>
</tr>
</thead>
<tbody>
<tr>
<td>respiration</td>
<td>cilia</td>
<td>diaphragm</td>
</tr>
<tr>
<td>larynx</td>
<td>pharynx</td>
<td>trachea</td>
</tr>
</tbody>
</table>

1. 12 cm air tube containing mucus membranes and cilia to trap dust, pollen, and bacteria
2. tiny, thin-walled sacs at the end of bronchioles in grapelike clusters
3. the movement of the chest that brings air into the lungs and removes waste gases
4. tube-like passage used for food, liquid, and air exchange
5. process where by oxygen supplied from lungs and carried in the blood stream is used to release energy from glucose
6. the muscles beneath the lungs that contract and relax to help move gas in and out of lungs
7. the airway with two pairs of horizontal folds of tissue (vocal cords)
8. tiny, hair-like structures, move mucus and trapped material away
9. at the end of the trachea, smaller and smaller tubes that eventually become bronchioles

**Directions:** Complete the following summary chart on respiratory diseases and infections, and their causes.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Characteristics of Disease</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Emphysema</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Lung Cancer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Asthma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Colds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Influenza</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Pneumonia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Bronchitis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Respiration and Excretion 65
The Excretory System

Directions: Answer the following questions on the lines provided.

1. What functions do the organs of the urinary system perform?

2. What are three of the excretory organs of the body?

3. What happens when the kidneys don’t work?

4. Why is skin considered an excretory organ?

5. Why do you see your breath on a cold day?

6. Number the following events to place them in the correct order.
   
   ______ a. Urine flows from ureters to the bladder.
   ______ b. Blood enters the nephrons.
   ______ c. Blood enters the kidneys through the renal artery.
   ______ d. Urine drains from each collecting tubule into funnel-shaped areas of the kidney.
   ______ e. Capillaries reabsorb most of the water, sugar, and salt.
   ______ f. Water, sugar, salt, and wastes in the blood enter a cuplike structure.
   ______ g. The renal vein returns purified blood to be circulated.
   ______ h. Urine flows from the bladder through the urethra and out of the body.

7. Label the parts of the urinary system shown in the diagram below using the following terms: urethra, ureter, bladder, kidney, aorta, renal vein. (Arrows show the direction of blood flow.)

   a. 
   b. 
   c. 
   d. 
   e. 
   f. 

66 Respiration and Excretion
The Nervous System

Directions: Write the correct term on the line next to its definition.

- **axon**
- **brain stem**
- **central nervous system**
- **cerebellum**
- **cerebrum**
- **dendrite**
- **homeostasis**
- **impulse**
- **neuron**
- **peripheral nervous system**
- **reflex**
- **response**
- **spinal cord**
- **stimulus**
- **synapse**

1. the regulation of steady, life-maintaining conditions
2. impulses cross this small space between neurons
3. the part of the brain that coordinates voluntary muscles and balance
4. involuntary, automatic response controlled from the spinal cord
5. the part of the nervous system containing only the brain and spinal cord
6. the part of the brain that interprets impulses and stores memory
7. the message carried by a neuron
8. an internal or external change that brings about a response
9. nerves connecting the brain and spinal cord to other body parts
10. consists of the midbrain, the pons, and the medula
11. bundles of neurons, surrounded by vertebrae, that carry impulses between the brain and all other parts of the body
12. consists of a body cell, dendrites, and axons
13. receives impulses from other neurons and send them to the cell body
14. reaction to a specific stimulus
15. carries impulses away from the cell body

Directions: Complete the chart below on drugs and the nervous system.

<table>
<thead>
<tr>
<th>Type of Drug</th>
<th>Definition</th>
<th>Example of Drug</th>
<th>Effect on the Nervous System</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.</td>
<td>slows activities of the central nervous system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>speeds up the central nervous system</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Study Guide

The Senses

Directions: Study the following diagram. Then label the parts of the eye using the correct terms from the list.

retina   cornea   optic nerve   lens

1. 
2. 
3. 
4. 

Directions: Answer the following questions on the lines provided.

5. Using the terms with which you labeled the figure, describe how light entering your eye becomes an image you see.

6. What are the three main sections of the ear?

7. What is the cochlea and what does it do?

8. In what cells does a smell impulse begin?

9. What five basic taste sensations do the taste buds have?

10. How do your senses help you maintain homeostasis?

Chapter 21

68 Control and Coordination
**Gland** | **Location in Body** | **Hormone Produced** | **Function of Hormone**
--- | --- | --- | ---
1. Adrenal glands |  | epinephrine, norepinephrine |  
2. Ovaries |  | estrogen, progesterone |  
3. Pancreas |  | insulin, norepinephrine |  
4. Parathyroid gland |  | parathyroid hormone, norepinephrine |  
5. Pineal gland |  | melatonin, norepinephrine |  
6. Pituitary gland |  | hormones including, growth hormone, luteinizing hormone, |  
7. Testes |  | testosterone |  
8. Thymus |  | thymocin |  
9. Thyroid gland |  | triiodothyronine, thyroxine |  

**Directions:** List the four basic functions of the endocrine glands.

10. 
11. 
12. 
13. 
Directions: Answer the following questions on the lines provided.

1. a. How often does a female release an egg? __________________________
   b. What is the process of egg release called? __________________________
2. What happens inside the uterus as an egg matures in the ovary?

   ________________________________________________________________

3. a. If an egg isn’t fertilized, what happens to the egg and to the lining of the uterus?

   ________________________________________________________________

   b. What is this called, how often does this occur, and how long does it last?

   ________________________________________________________________

4. Why are the testes located outside the body rather than inside?

   ________________________________________________________________

5. a. What happens during menopause?

   ________________________________________________________________

   b. When does this occur?

   ________________________________________________________________

6. What does semen consist of?

   ________________________________________________________________

Directions: Label the following diagram of the male reproductive organs.

7. ______________________
8. ______________________
9. ______________________
10. _____________________
11. _____________________
12. _____________________
13. _____________________
14. _____________________
Directions: Answer the following questions on the lines provided.

1. Why can only one sperm fertilize an egg?

2. Where does fertilization usually occur?

3. Describe how the embryo receives oxygen and nutrients and how it gets rid of wastes.

4. At the time body organs are present, what is the developing baby called?

5. a. Explain how fraternal twins develop.

   b. Why do identical twins look exactly alike?

6. a. When does the adolescent growth spurt begin and end for girls?

   b. For boys?

7. a. What physical changes might you expect during the period from age 45 to age 60?

   b. What is this stage called?

8. What is labor?
Directions: Write the correct term on the line next to its definition.

1. molecule that is foreign to the body, may be attached to a pathogen
2. body system containing saliva, enzymes, hydrochloric acid, and mucus that kill bacteria and pathogens
3. body system containing cilia and mucus and has a cough and sneeze response to rid the body of bacteria and pathogens
4. body system where white blood cells surround and digest antigens and chemicals, and cause the body temperature to rise, killing bacteria
5. body system of defense that works against specific pathogens
6. type of immunity in which the body makes its own antibodies in response to an antigen
7. type of immunity in which antibodies are produced in another animal and then introduced into the body
8. form of an antigen that when introduced to the body, gives immunity against a specific disease, can only prevent, not cure, the disease
9. harmful substance or disease-causing organism
10. a protein made by the body in response to a specific antigen
11. process of giving immunity to an antigen through injection or by mouth
12. redness, temperature increase, swelling, and pain when capillary walls expand, provides more blood flow to damaged cells

Directions: Sequence the following events.

13. How a vaccine works
   ______ the same pathogen is encountered again
   ______ antibodies fight and destroy pathogen
   ______ some antibodies stay in the system
   ______ the body forms antibodies against the specific pathogen
   ______ a specific vaccine is introduced into your body
Infectious Diseases

Directions: Answer the following questions on the lines provided.

1. What causes most diseases?

2. What happens when milk is pasteurized?

3. What are some ways infectious diseases are spread?

4. What does the Center for Disease Control and Prevention (CDC) do?

5. What are some sexually transmitted diseases that are caused by viruses?

6. What kinds of STDs are treatable with antibiotics?

7. What does HIV do to the immune system?

Directions: Robert Koch developed a set of rules for figuring out which pathogen caused a particular disease. Use the following terms to complete his rules listed below.

disease original organism present host
suspected culture same

8. In every case of a particular disease, the organism thought to cause the ____________________
   must be ____________________.

9. The ____________________ pathogen must be separated from all other organisms and
   grown in a ____________________ with no other organisms present.

10. When the suspected pathogen from the pure culture is placed in a healthy
   ____________________, it must cause the same disease.

11. When the suspected pathogen is removed from the host and grown again, it must be compared
    with the ____________________ to see if they are the ____________________.
Directions: Write the letter of the term or phrase that best completes the sentence.

1. Diseases that are not caused by pathogens are _____.
   a. infectious  b. chronic  c. noninfectious  d. viral

2. A tumor is usually located _____.
   a. anywhere in the body  c. near the surface of the body
   b. deep inside the body  d. on the skin

3. Proven cancer treatments may involve _____.
   a. injections of megadoses of vitamins  c. physical therapy
   b. radiation  d. gene therapy

4. All of the following are noninfectious diseases EXCEPT _____.
   a. asthma  b. cancer  c. heart disease  d. AIDS

5. Substances that increase your chance of developing cancer are called _____.
   a. lymphocytes  b. carcinogens  c. allergens  d. antigens

6. When you come in contact with an allergen, your immune system forms _____.
   a. hormones  b. lymphocytes  c. antibodies  d. antigens

7. An allergy is a strong reaction of the _____.
   a. immune system  c. respiratory system
   b. circulatory system  d. digestive system

8. Some noninfectious diseases are called chronic diseases because _____.
   a. they are present at birth  c. they are short-lived
   b. they are inherited  d. they last a long time

9. Cigarette smoke has been linked with all of the following EXCEPT _____.
   a. cancer  b. lung diseases  c. heart disease  d. arthritis

10. Type 2 diabetes is a chronic disease more common in people who _____.
    a. have contact with harmful chemicals  c. have allergies
    b. are overweight  d. smoke cigarettes

Directions: Complete the following statements about cancer growth using the terms listed below.

normal  function  uncontrolled  large  travel

11. ________________ cell growth results in ________________ numbers of cells.

12. The large numbers of cells do not ________________ as part of the body.

13. The cells take up space and interfere with ________________ bodily functions.

14. The cells do not remain in one place, but ________________ all over the body.
## Directions:
*Use the information from your textbook to complete the summary chart below.*

<table>
<thead>
<tr>
<th>Vocabulary</th>
<th>Definition</th>
<th>Two Real-World Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. biosphere</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>2. community</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>3. ecology</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>4. ecosystem</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>5. habitat</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>6. organism</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>7. population</td>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>8. species</td>
<td>a.</td>
<td>b.</td>
</tr>
</tbody>
</table>

## Directions:
*Describe a part of the biosphere and a particular community, population, and habitat in that ecosystem.*

9. 

---

Interactions of Life  77
Directions: Answer the following questions on the lines provided.

1. How can competition limit a population’s growth?

2. How can a limiting factor affect a population’s growth?

3. Which has a higher biotic potential, a pumpkin or a peach?

4. If two squirrels live in one square m of a 50 square m park, what is the park’s estimated squirrel population?

5. What are some factors that might stop a population’s exponential growth?

6. What is carrying capacity?

7. Give an example of how migration affects population size.

8. Is it possible for a population with a high birth rate to decrease in size? Explain.

9. Describe how scientists measure wildlife populations such as rabbits.
Directions: Match the terms in Column II with the definitions in Column I. Write the letter of the correct term in the blank at the left.

Column I

1. plant eaters
2. consume wastes and dead organisms
3. a consumer captured and eaten by another consumer
4. use the Sun to make energy-rich molecules
5. animals that eat other animals
6. eat plants and other animals
7. consumers that capture and eat other consumers
8. cannot make their own energy-rich molecules

Column II

a. carnivores
b. consumers
c. omnivores
d. herbivores
e. predators
f. producers
g. decomposers
h. prey

Directions: Select the term from the following list that matches each example.

commensalism mutualism parasitism

9. A clown fish is protected by an anemone’s tentacles.
10. cyanobacteria, or alga, living in the tissues of a fungus
11. a roundworm that lives in a puppy

Directions: Label the examples below either habitat or niche.

12. A chameleon changes its colors to blend in with its surroundings.
13. Ducks and amphibians live in or near a pond.
15. A male lion’s mane attracts a mate.
16. Your cat’s sense of smell helps it find its way home.
17. Monarch butterflies eat milkweed, making them poisonous to other species.
18. Woodpeckers use their beaks to pry insects from trees.
Abiotic Factors

Directions: Write the correct term on the line in front of its definition.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>abiotic</td>
<td></td>
</tr>
<tr>
<td>atmosphere</td>
<td>layer of air that surrounds Earth</td>
</tr>
<tr>
<td>elevation</td>
<td>the elevation above which trees cannot grow</td>
</tr>
<tr>
<td>temperature</td>
<td>degree of hotness or coldness measured on a scale</td>
</tr>
<tr>
<td>humus</td>
<td>features of environment that are alive or were once alive</td>
</tr>
<tr>
<td>soil</td>
<td>inorganic compound needed for life processes</td>
</tr>
<tr>
<td>timberline</td>
<td>nonliving, physical features of an environment</td>
</tr>
<tr>
<td>water</td>
<td>air currents caused by heat from the Sun that warms the air</td>
</tr>
<tr>
<td>wind</td>
<td>distance above sea level</td>
</tr>
<tr>
<td>sunlight</td>
<td>energy source for almost all life on Earth</td>
</tr>
<tr>
<td>climate</td>
<td>average weather conditions in an area over time</td>
</tr>
<tr>
<td>biotic</td>
<td>mixture of mineral and rock particles, remains of dead organisms, water, air, bacteria, fungi, insects, and worms</td>
</tr>
</tbody>
</table>

Directions: List the six abiotic factors and how each affects the organisms that live in the environment.

<table>
<thead>
<tr>
<th>Abiotic Factor</th>
<th>Effect on Organisms in the Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td></td>
</tr>
</tbody>
</table>
Cycles in Nature

Directions: Match the term in Column II with the description in Column I. Write the letter of the correct term in the blank at the left. All terms may not be used.

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. photosynthesis is part of this continuous movement</td>
<td>a. nitrogen cycle</td>
</tr>
<tr>
<td>2. gas removed from the air during photosynthesis</td>
<td>b. evaporation</td>
</tr>
<tr>
<td>3. element that helps plants grow</td>
<td>c. carbon dioxide</td>
</tr>
<tr>
<td>4. process that changes nitrogen gas into compound plants can use</td>
<td>d. water cycle</td>
</tr>
<tr>
<td>5. process of water changing from a gas to a liquid</td>
<td>e. respiration</td>
</tr>
<tr>
<td>6. transfer of nitrogen from air to soil to organism, and back to air or soil</td>
<td>f. nitrogen</td>
</tr>
<tr>
<td>7. process of water changing from a liquid to a gas</td>
<td>g. condensation</td>
</tr>
<tr>
<td>8. continuous movement of water from Earth’s surface to the air, and back to Earth’s surface</td>
<td>h. carbon cycle</td>
</tr>
<tr>
<td></td>
<td>i. transpiration</td>
</tr>
<tr>
<td></td>
<td>j. nitrogen fixation</td>
</tr>
</tbody>
</table>

Directions: Match the cause in the first column with the effect in the second column. Write the letter of the correct effect in the blank at the left. An effect may have more than one cause.

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. water vapor condenses</td>
<td>a. soil infertility</td>
</tr>
<tr>
<td>10. fossil fuels burn</td>
<td>b. precipitation</td>
</tr>
<tr>
<td>11. forests are cut down</td>
<td>c. increase of carbon dioxide in the air</td>
</tr>
<tr>
<td>12. clouds become large and heavy</td>
<td></td>
</tr>
<tr>
<td>13. nitrogen removed when harvesting crops</td>
<td></td>
</tr>
</tbody>
</table>

Directions: Answer the following questions on the lines provided.

14. What are the three primary steps of the water cycle?

15. Explain the importance of nitrogen to living things.
Directions: Complete the following sentences using the terms listed below.

chemosynthesis producers energy pyramid
consumers photosynthesis food web

1. The production of energy-rich food molecules from chemicals is called ____________________.
2. A diagram that shows all the possible feeding, or energy transfer, relationships in a community is called a(n) ____________________.
3. A food chain begins with ____________________.
4. ________________ make up the second and higher steps in a food chain.
5. A diagram that shows the comparative amount of energy at each feeding level is called a(n) ____________________.
6. The production of energy-rich sugar molecules using light energy is called ____________________.

Directions: The steps in the following food chains are out of order. Put them in the correct order by numbering them using 1 as the producer level. Place the number of the step in the blank at the left.

7. ______ a. hawk 8. ______ a. tiger 9. ______ a. grasses 10. ______ a. marmot
   ______ b. grain  ______ b. grass  ______ b. hawk  ______ b. grass
   ______ c. mouse  ______ c. deer  ______ c. grouse  ______ c. bear
   ______ d. snake  ______ d. insects

Directions: Answer the following questions on the lines provided.

11. In the above food chains, what do all the first-step organisms have in common? Second-step organisms?

12. Explain why an energy pyramid is in the shape of a pyramid.
Gradual change in the types of species that live in an area is called (1) **climax community**. The first species to inhabit an area, the (2) **pioneer species**, must be able to survive (3) **drought**, extreme heat and cold, and other harsh conditions. These are usually (4) **lichens**. The succession that begins in a place previously without plants is referred to as (5) **primary succession**. As the first species of (6) **plants** arrive, and erosion takes place, the rock begins to break down into smaller pieces. As these organisms die, they add (7) **organic matter** to the rock. Plants, such as (8) **mosses** and ferns grow in the new soil. The soil layer thickens, and (9) **weeds** and wildflowers, and other plants take over. Eventually, the organic buildup is enough to support shrubs and (10) **trees**. At the same time, small birds, (11) **insects**, and (12) **mammals** have begun to move in.

Occasionally, natural or (13) **human** activity causes a change in the environment. These might include (14) **fires**, avalanche, lumbering, or construction. Succession that begins in a place that already has soil and was once the home of living organisms is called (15) **secondary succession**. After a fire, the bare soil is exposed, but it already contains the (16) **seeds** of weeds, grasses, and trees. Wind and (17) **seeds** deposit more seeds and growth begins very quickly. It may take hundreds or thousands of years for the community to become relatively stable and to develop into a (18) **climax community**.
Directions: Complete the table below using information in your textbook.

<table>
<thead>
<tr>
<th>Biome</th>
<th>Climate</th>
<th>Dominant plants</th>
<th>Characteristic animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tundra</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Taiga</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Temperate deciduous forest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Temperate rain forest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Tropical rain forest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Desert</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Grassland</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Directions: **Describe two life zones in the ocean and how organisms are affected by the conditions in each zone.**

1. 

2. 

Directions: **Answer the following questions on the lines provided.**

3. The illustrations above show two types of freshwater ecosystems. Which supports more species and why?

4. What is an estuary and why is it important to marine organisms?

5. Why are wetlands protected in most areas?

6. How do coral reefs form? What makes them vulnerable to environmental stress?
**Resources**

**Directions:** Write the correct term on the line next to its definition.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>fossil fuels</td>
<td>a mineral formed mostly from the remains of microscopic marine organisms buried in Earth’s crust</td>
</tr>
<tr>
<td>inexhaustible resources</td>
<td>natural resources that are recycled or replaced constantly by nature</td>
</tr>
<tr>
<td>nuclear solar cells</td>
<td>resources used up more quickly than they can be replaced by nature</td>
</tr>
<tr>
<td>geothermal</td>
<td>constant supplies of energy</td>
</tr>
<tr>
<td>natural resources</td>
<td>fuels formed in Earth’s crust over hundreds of millions of years</td>
</tr>
<tr>
<td>petroleum</td>
<td>energy released when billions of atomic nuclei from uranium are split apart in a nuclear fission reaction</td>
</tr>
<tr>
<td>solar</td>
<td>heat energy contained in Earth’s crust in molten rock</td>
</tr>
<tr>
<td>hydroelectric power</td>
<td>harnessed air currents traveling at 32 km/h</td>
</tr>
<tr>
<td>nonrenewable resources</td>
<td>electricity that is produced when the energy of falling water is used to turn the turbines of an electric generator</td>
</tr>
<tr>
<td>renewable resources</td>
<td>expensive photovoltaic cells that use sunlight to make energy</td>
</tr>
<tr>
<td>wind power</td>
<td>most inexhaustible source of energy</td>
</tr>
<tr>
<td></td>
<td>the parts of the environment that are useful or necessary for the survival of living organisms</td>
</tr>
</tbody>
</table>

**Directions:** List three examples of renewable energy resources.

13. [Example 1]
14. [Example 2]
15. [Example 3]

**Directions:** List three examples of nonrenewable resources.

16. [Example 4]
17. [Example 5]
18. [Example 6]
Directions: Answer the following questions on the lines provided.

1. What is smog?

2. What are some pollutants produced by the burning of fuels?

3. How does acid precipitation form?

4. Explain how ozone in the upper atmosphere is helpful to life on Earth.

5. What types of chemical pollutants are responsible for ozone depletion? Where do these chemicals come from?

6. Draw and label an illustration of the greenhouse effect.
The Three Rs of Conservation

Directions: What are the three Rs of conservation? Write your answers on the lines provided and give three examples of each.

1. ______________________________________________________
   Examples a. _____________________________________________
   b. _____________________________________________
   c. _____________________________________________

2. ______________________________________________________
   Examples a. _____________________________________________
   b. _____________________________________________
   c. _____________________________________________

3. ______________________________________________________
   Examples a. _____________________________________________
   b. _____________________________________________
   c. _____________________________________________

Directions: Answer the following question on the lines provided.
4. Why is conservation important?
   ______________________________________________________
   ______________________________________________________
   ______________________________________________________
   ______________________________________________________
   ______________________________________________________