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CK-12 Life Science For Middle School Workbook

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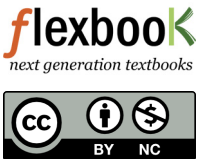

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CHAPTER 1

MS Studying Life Worksheets

Chapter Outline

1.1 Scientific Ways of Thinking

Lesson 1.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____A scientific law is a broad explanation that is supported by a great deal of evidence.
2. _____Scientists use the term theory in a different way than the term is used in everyday language.
3. _____Once an idea becomes a scientific theory, it can never be rejected or changed.
4. _____Scientists explain the world based on their observations.
5. _____A scientific theory becomes a scientific law if more evidence is found to support it.
6. _____Science is best defined as a collection of facts about the natural world.
7. _____A questioning attitude is part of what it means to think like a scientist.

Lesson 1.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Most people think of science as a collection of facts or a body of knowledge. For example, you may have memorized the processes of the water cycle. The processes include evaporation and precipitation. Such knowledge of the natural world is only part of what science is.

Science is as much about doing as knowing. Science is a way of learning about the natural world that depends on evidence, reasoning, and repeated testing. Scientists explain the world based on their observations. If they develop new ideas about the way the world works, they set up ways to test these new ideas. Scientific knowledge keeps changing because scientists are always "doing science."

Questions

1. What is science?
2. Why is science as much about doing as knowing?
3. Why does scientific knowledge keep changing?

Lesson 1.1: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. Science is a process that includes

a. collecting evidence.
b. doing tests.
c. applying logic.
d. all of the above

2. To gain the status of a scientific theory, an idea must be

a. first given the status of a scientific law.
b. tested and confirmed repeatedly.
c. voted on at a scientific convention.
d. two of the above

3. Which of the following is the best example of "doing science?"

a. memorizing the processes of the water cycle
b. learning how to identify trees from their leaves
c. learning the names of all the bones in the human body
d. making observations of wildlife while hiking in the woods

4. To think like a scientist, you should be

a. observant.
b. skeptical.
c. open minded.
d. all of the above

5. A scientist develops a new idea based on her observations of nature. What should she do next?

a. think of a way to test the idea
b. claim that she has discovered a new theory
c. reject any evidence that conflicts with the idea
d. look only for evidence that supports the idea

6. Why would a scientist repeat the same experiment?

a. to try to get different results
b. to prove a scientific law
c. to make sure the results are reliable
d. none of the above

7. If there is no way to test a new idea in science, what is the best way for a scientist to respond?

a. accept the idea as true as long as it is logical
b. reject the idea as false because there is no evidence to support it
c. put the idea aside until it can be tested or replace it with an idea that can be tested
d. consider the idea to be just a theory until proven otherwise

Lesson 1.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____way of learning about the natural world that depends on evidence, reasoning, and repeated testing
2. _____using logical thought processes
3. _____broad explanation that is widely accepted because it is supported by a great deal of evidence

4. _____individual engaged in making discoveries about the natural world through observation and testing
5. _____data or other facts gathered to test an idea
6. _____description of what always occurs under certain conditions in nature
7. _____attitude of doubt about ideas unless they are backed by adequate evidence

Terms

a. scientific law
b. evidence
c. scientist
d. science
e. skepticism
f. scientific theory
g. reasoning

Lesson 1.1: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. A scientist should have an open mind because scientific knowledge is always _____.
2. Evolution by natural selection is an example of a scientific _____.
3. A scientist learns about the natural world through evidence, reasoning, and repeated _____-___.
4. A scientific explanation that is tested and confirmed repeatedly may gain the status of a scientific_____-_____.
5. Mendel's descriptions of how traits are passed from parents to their offspring are examples of scientific ____-_____.
6. A scientific theory is widely accepted because it is supported by a great deal of_____.
7. A scientific law answers "how" questions, whereas a scientific theory answers _____-questions.

Lesson 1.1: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Why is reading about the research of other scientists an important part of "doing science?"

1.2 What is Life Science?

Lesson 1.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____Life scientists work only in labs or natural habitats.
2. _____Fewer species have gone extinct than are alive today.
3. _____Life science is defined as the science of cells.
4. _____Physiology is the study of the interactions of organisms with each other and their environment.
5. _____Some life scientists study genes and inheritance.
6. _____All life processes take place inside cells.
7. _____The traits of organisms change over time because of natural selection.

Lesson 1.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Life science is the study of life and living things. Living things are also called organisms. Life science is often referred to as biology.

Life is complex, and there are millions of species alive today. Many millions more lived in the past and then went extinct. Organisms include microscopic, single-celled organisms such as bacteria. They also include complex, multicellular organisms such as plants and animals. Given the diversity of life, life science is a huge science. That's why a life scientist usually specializes in just one field within life science. For example, some life scientists specialize in ecology. Ecologists study the interactions of organisms with each other and their environment. Life scientists also work in many different settings, from classrooms to labs to natural habitats.

Questions

1. What is the focus of life science?
2. Why is life science divided into many different fields?
3. Identify the life science field of ecology.

Lesson 1.2: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. How many species of living things are alive on Earth today?

a. 100 –500
b. 1,000 –500,000
c. 500,000 –1,000,000
d. more than 1,000,000

2. All organisms have

a. at least one cell.
b. multiple cells.
c. red blood cells.
d. white blood cells.

3. The type of life scientist who studies fossils and evolution is a(n)

a. entomologist.
b. epidemiologist.
c. paleontologist.
d. none of the above

4. Microbiology is the study of organisms such as

a. plants.
b. animals.
c. bacteria.
d. insects.

5. Theories basic to all of the life sciences include the

a. cell theory.
b. theory of evolution by natural selection.
c. germ theory of disease.
d. two of the above

6. An example of basic science research is

a. studying yeast cells to learn how they divide.
b. researching materials to make stronger cars.
c. studying rain forest plants to find medical drugs.
d. developing artificial drugs to treat cancer.

7. The aim of applied scientific research is best stated as

a. finding solutions to practical problems.
b. discovering new scientific knowledge.
c. developing a better understanding of the natural world.
d. providing knowledge for basic science research.

Lesson 1.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____basic building block of all living things
2. _____science with the aim of discovering solutions to practical problems
3. _____individual living thing

4. _____science with the aim of discovering new knowledge for its own sake
5. _____study of the interactions or organisms with each other and their environment
6. _____study of life and living things
7. _____change in the traits of organisms over time

Terms

a. basic science
b. ecology
c. applied science
d. evolution
e. life science
f. cell
g. organism

Lesson 1.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Life science is also called _____.
2. A life scientist who focuses on plants is in the field of _____.
3. _____is the field of life science that focuses on animals.
4. The _____ theory states that all organisms are made up of one or more cells.
5. The theory of _____ explains how populations of living things change over time.
6. Science that does not necessarily have any practical use is known as _____ science.
7. Most cells are too small to see except with a(n)_____.

Lesson 1.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain why the theory of evolution by natural selection is basic to all of the fields of life science.

1.3 The Scientific Method

Lesson 1.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____An experiment investigates the effects of the dependent variable on the independent variable.
2. _____Only conclusions that support the hypothesis should be reported in scientific research.
3. _____The steps of the scientific method must always be followed in a certain sequence.
4. _____A scientific investigation is generally undertaken to answer a question.
5. _____A testable hypothesis can be proven true if it really is false.
6. _____Results of an investigation are more reliable if they have been replicated.
7. _____You could apply the scientific method to answering a question in your daily life.

Lesson 1.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Scientists carry out scientific investigations to try to answer questions. A scientific investigation follows a general plan called the scientific method. The scientific method is a series of logical steps for testing a possible answer to a question.

The steps of the scientific method are described in greater detail below. Note that these steps are meant as a guide, not a rigid sequence.

1. Make observations. Observations refer to anything detected with one or more senses.
2. Ask a question raised by the observations.
3. Form a hypothesis. A hypothesis is a potential, testable answer to a scientific question.
4. Test the hypothesis. Make predictions based on the hypothesis and then determine if they are correct. This may involve carrying out an experiment.
5. Analyze the results of the test and draw a conclusion. Do the results agree with the predictions? If so, they provide support for the hypothesis. If not, they disprove the hypothesis.
6. Communicate the results. This can be done in posters, papers, or publications. Communicating the results allows other scientists to try to replicate them.

Questions

1. Give examples of scientific observations.
2. Is the following hypothesis testable? Explain your answer. "If I study, I will get a better grade on a test than if I don't study."
3. Do you think it is as valuable to disprove as to support a hypothesis? Why or why not?

Lesson 1.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. What do you call a series of logical steps for testing a hypothesis?
    a. scientific theory
    b. scientific law
    c. scientific method
    d. scientific flow chart
2. Observations can be made with the sense(s) of
    a. sight
    b. hearing
    c. touch
    d. all of the above
3. A hypothesis is testable if you can find evidence to prove that it is
    a. false when it really is false
    b. false when it really is true
    c. true when it really is false
    d. none of the above
4. Steps of the scientific method may be
    a. repeated
    b. skipped
    c. followed in a different order
    d. all of the above
5. The independent variable in a scientific experiment is tested to see how it affects the
    a. controls.
    b. dependent variable.
    c. hypothesis.
    d. prediction.
6. If the results of an experiment agree with the predicted outcome, they
    a. prove that the hypothesis is a theory.
    b. provide support for the hypothesis.
    c. prove that the hypothesis is false.
    d. two of the above
7. Methods used by scientists to communicate the results of their research include
    a. presenting posters.
    b. reading papers.
    c. publishing papers.
    d. all of the above

Lesson 1.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____factor that is held constant in an experiment
2. _____anything detected with the senses
3. _____variable in an experiment that is tested for its effects on another variable
4. _____potential, testable answer to a scientific question
5. _____repeating a scientific investigation and getting the same results
6. _____variable in an experiment that is measured to see if it is affected by another variable
7. _____controlled scientific test of a hypothesis that often takes place in lab

Terms

a. hypothesis
b. control
c. experiment
d. observation
e. dependent variable
f. replication
g. independent variable

Lesson 1.3: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. A scientific investigation follows a general plan called the scientific _____.
2. In a scientific investigation, a prediction is made based on a(n) _____.
3. Controls in an experiment are factors that might affect the _____ variable.
4. The scientific method generally begins when a scientist makes _____.
5. The last step of the scientific method is to _____ results.
6. Experimental results are more likely to be valid if they can be _____.
7. A scientific hypothesis must be _____.

Lesson 1.3: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

How would you apply the scientific method to the question, "Which type of shampoo, Shampoo A or Shampoo B, makes my hair look shinier?"

1.4 The Microscope

Lesson 1.4: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____The microscope was invented in the late 1800s.
2. _____The earliest microscopes were light microscopes.
3. _____An individual bacterial cell is invisible without a microscope.
4. _____Many life science discoveries would not have been possible without the microscope.
5. _____An electron microscope magnifies objects up to 2 billion times larger than their actual size.
6. _____The first microscope was made by Anton van Leeuwenhoek.
7. _____The Jansens discovered that one lens magnified objects more than several lenses.

Lesson 1.4: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

The microscope was invented more than four centuries ago. In the late 1500s, two Dutch eyeglass makers, Zacharias Jansen and his father Hans Jansen, built the first microscope. They put several magnifying lenses in a tube. They discovered that using more than one lens magnified objects more than a single lens. Their simple microscope could make small objects appear nine times bigger than they really were.

In the mid-1600s, English scientist Robert Hooke was one of the first scientists to observe living things with a microscope. He published the first book of microscopic studies, called Micrographia. It includes wonderful drawings of microscopic organisms and other tiny objects. One of Hooke's most important discoveries came when he viewed thin slices of cork under a microscope. Cork is made from the bark of a tree. When Hooke viewed it under a microscope, he saw many tiny compartments that he called cells. Hooke was the first person to observe cells from an organism.

In the late 1600s, Anton van Leeuwenhoek, a Dutch lens maker and scientist, started making much stronger microscopes. His microscopes could magnify objects as much as 270 times their actual size. Van Leeuwenhoek made many scientific discoveries using his microscopes. He was the first to see and describe bacteria. He observed them in a sample of plaque that he had scraped off his own teeth. He also saw yeast cells, human sperm cells, and the microscopic life teeming in a drop of pond water. He called the microscopic living organisms he observed animalcules.

Questions

1. Describe the invention of the earliest microscope.
2. What contributions did Robert Hooke make with his microscopic studies?
3. Explain this statement: Anton van Leeuwenhoek made both technological and scientific discoveries.

Lesson 1.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The invention of the microscope allowed scientists to see
    a. cells
    b. bacteria
    c. human sperm
    d. all of the above
2. A microscope is an instrument that makes
    a. tiny objects look bigger
    b. distant objects look closer
    c. distant objects look bigger
    d. large objects look smaller
3. The inventors of the microscope were
    a. English
    b. Dutch
    c. German
    d. American
4. Van Leeuwenhoek's microscopes could magnify objects as much as
    a. 270 times their actual size
    b. 550 times their actual size
    c. 1,000 times their actual size
    d. none of the above
5. Light microscopes refract visible light and form images with
    a. electrons
    b. lenses
    c. slides
    d. bulbs
6. What is the magnification of the most powerful light microscope?
    a. 20 times
    b. 200 times
    c. 2,000 times
    d. 2,000,000 times
7. The wavelength of visible light is
    a. 5 nanometers
    b. 55 nanometers
    c. 550 nanometers
    d. 5,500 nanometers

Lesson 1.4: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____first scientist to observe bacteria with a microscope
2. _____microscopic building block of all living things
3. _____scientist who discovered cells
4. _____type of microscope that uses lenses to refract visible light
5. _____general term for an instrument that makes magnified images of very small objects
6. _____name associated with the invention of the microscope
7. _____type of microscope that passes electrons over or through objects

Terms

a. microscope
b. van Leeuwenhoek
c. cell
d. Jansen
e. electron microscope
f. Hooke
g. light microscope

Lesson 1.4: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Cells could not be discovered until an instrument called the _____ was invented.
2. The discovery of cells led to the _____ theory.
3. Van Leeuwenhoek coined the word _____ for the tiny organisms he saw with his microscope.
4. The first book of microscopic studies, called Micrographia, was published by the English scientist _____-_____.
5. To be seen with a light microscope, an object cannot be smaller than the _____ of visible light.
6. Robert Hooke viewed cells in thin slices of _____.
7. The type of microscope you might use in science class is a(n) _____ microscope.

Lesson 1.4: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain the role of the microscope in life science.

1.5 Safety in Life Science Research

Lesson 1.5: True or False

Name_____ Class_____ Date_____

Write true if the statement is true or false if the statement is false.

1. _____Science research is potentially dangerous only if it is done in a lab.
2. _____Fieldwork is any research that is carried out in an open field.
3. _____Long hair is a potential danger in a lab unless it is tied back or covered.
4. _____A science lab is a good place to eat because it has counters and sinks like a kitchen.
5. _____Bunsen burners should not be used around flammable materials such as paper.
6. _____Water should never be added to acid.
7. _____The safety symbol with a mouse icon represents a biohazard.

Lesson 1.5: Critical Reading

Name_____ Class_____ Date_____

Read this passage based on the text and answer the questions that follow.

A science lab has many potential dangers. The best way to avoid lab dangers is to follow the lab safety rules listed below. Following the rules can help prevent accidents.

- Wear long sleeves and shoes that completely cover your feet.
- If your hair is long, tie it back or cover it with a hair net.
- Protect your eyes, skin, and clothing by wearing safety goggles, gloves, and an apron.
- Use hot mitts to handle hot objects.
- Never work alone in the lab.
- Never engage in horseplay in the lab.
- Never eat or drink in the lab.
- Never do experiments without your teacher's approval.
- Always add acid to water, never the other way around. Add the acid slowly to avoid splashing.
- Take care to avoid knocking over Bunsen burners. Keep them away from flammable materials such as paper.
- Use your hand to fan vapors toward your nose rather than smelling substances directly.
- Never point the open end of a test tube toward anyone—including you!
- Clean up any spills immediately.
- Dispose of lab wastes according to your teacher's instructions.
- Wash glassware and counters when you finish your work.
- Wash your hands with soap and water before leaving the lab.

Questions

1. List five things you should never do in a science lab.

2. Why do you think the open end of a test tube should not be pointed toward anyone? Why might doing so be dangerous?
3. Explain how wearing goggles might protect your eyes in a science experiment. What lab activities might put your eyes at risk?

Lesson 1.5: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Possible settings for life science research include
    a. labs.
    b. the field.
    c. natural settings.
    d. all of the above
2. Which safety symbol warns of a radioactive hazard?

a. 

b. 

d. none of the above

3. Which hazard does this safety symbol represent?

4. 

    a. poisonous chemical
    b. strong acid
    c. hot object
    d. broken glass

5. Which of the following is not a proper lab safety rule?
    a. Clean up any spills immediately.
    b. If you work in the lab alone, let someone know where you are.
    c. Fan vapors toward your nose rather than smelling them directly.
    d. Always add acid to water, never the other way around.
6. When you finish a lab project, what should you do with any glassware you used?
    a. leave it on the counter
    b. place it in the sink
    c. throw it in the trash
    d. wash it
7. What should you always wear to stay safe in a science lab?

c. 

FIGURE 1.1

a. open-toed shoes
b. long sleeves
c. a hazmat suit
d. hot mitts

8. What is the last thing you should do before leaving a science lab?

a. wash your hands
b. take a drink of water
c. toss the remains of your experiment in the trash
d. wipe down the lab counter where you worked

Lesson 1.5: Matching

Name_____ **Class**_____ **Date**_____

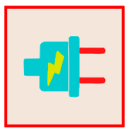
Match each safety symbol with the potential hazard it represents.

Safety Symbols

1. _____

2. _____

3. _____



4. _____

5. _____

6. _____

7. _____

Potential Hazards

a. electrical hazard
b. biohazard
c. sharp instrument
d. explosive substance
e. high heat
f. chemical hazard
g. laser radiation

Lesson 1.5: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. A device with a flame that is used as a heat source in a lab is a(n) _____ burner.

2. A(n) _____ is a special room equipped for science experiments.
3. A(n) _____ is basic safety gear worn to protect clothing.
4. A regulation that should be followed to prevent accidents is called a safety _____.
5. Scientific research that takes place in a natural setting is known as _____.
6. _____are commonly worn in a lab to protect the eyes.
7. An icon that warns of a specific lab danger is called a safety_____.

Lesson 1.5: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Assume you are a scientist doing fieldwork along a river. You are studying trash that pollutes the river bank and water. You are collecting water samples, samples of mud from the bank, and samples of trash. Identify risks you might face while doing the research and how you could reduce the risks.

1.6 References

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CHAPTER 2

MS What is a Living Organism? Worksheets

Chapter Outline

2.1 Characteristics of Living Organisms

Lesson 2.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ All organisms respond to their environment.
2. _____ Some living things do not need energy.
3. _____ All living things get food by eating other organisms.
4. _____ Some organisms consume dead organic matter such as dead leaves.
5. _____ Cells are the basic units of structure and function of all living things.
6. _____ All organisms grow by increasing the number of their cells.
7. _____ All organisms must mate to produce offspring.

Lesson 2.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

When you exercise on a hot day, you are likely to work up a sweat. Do you know why we sweat? Sweating helps to keep us cool. When sweat evaporates from the skin, it uses some of the body's heat energy. Sweating is one of the ways that the body maintains a stable internal environment. It helps keep the body's internal temperature constant. When the body's internal environment is stable, the condition is called homeostasis.

All living organisms have ways of maintaining homeostasis. They have mechanisms for controlling such factors as their internal temperature, water balance, and acidity. Homeostasis is necessary for normal life processes that take place inside cells. If an organism can't maintain homeostasis, normal life processes are disrupted. Disease or even death may result.

Questions

1. What is homeostasis? How is sweating related to homeostasis?
2. What are some factors for which the body maintains homeostasis?
3. What might happen if the body did not maintain homeostasis?

Lesson 2.1: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. Microscopic organisms include

a. bacteria
b. archaea
c. protists
d. all of the above

2. Which of the following is a characteristic of all organisms?

a. multiple cells
b. need for energy
c. sexual reproduction
d. all of the above

3. Living things can do all of the following except

a. grow
b. create energy
c. respond to stimuli
d. maintain homeostasis

4. How many cells make up your body?

a. hundreds
b. thousands
c. millions
d. trillions

5. An example of a producer is a(n)

a. tree
b. raccoon
c. mushroom
d. earthworm

6. Multicellular organisms include

a. algae
b. plants
c. bacteria
d. two of the above

7. Which statement is true about sexual reproduction?

a. It involves just one parent
b. Offspring are identical to the parent
c. Offspring of both sexes are always produced
d. none of the above

Lesson 2.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____organism that eats other organisms for food
2. _____condition in which an organism has a stable internal environment
3. _____something in the environment that causes a reaction in an organism

4. _____organism that uses energy to make food
5. _____reaction produced by a stimulus
6. _____production of offspring
7. _____ability to change or move matter

Terms

a. reproduction
b. response
c. producer
d. homeostasis
e. energy
f. stimulus
g. consumer

Lesson 2.1: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. All living things consist of one or more _____.
2. Human beings get energy from _____.
3. Plants get energy from _____.
4. Algae produce food by the process of _____.
5. The cells of all organisms are enclosed by a(n) _____.
6. Single-celled organisms grow only by increasing the _____ of their cells.
7. Reproduction that occurs with just one parent is called _____ reproduction.

Lesson 2.1: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how organisms are grouped based on the source of energy they use. Give an example of an organism in each group.

2.2 Chemistry of Living Things

Lesson 2.2: True or False

Name_____ Class_____ Date_____

Write true if the statement is true or false if the statement is false.

1. _____Atoms can be observed only with an electron microscope.
2. _____Glycogen is a complex carbohydrate found in animals.
3. _____Glucose is a polymer of starch.
4. _____Saturated fatty acids are found in oils
5. _____The genetic code tells cells how to make proteins.
6. _____The substances that start a chemical reaction are called products.
7. _____Cellular respiration involves catabolic reactions.

Lesson 2.2: Critical Reading

Name_____ Class_____ Date_____

Read this passage based on the text and answer the questions that follow.

All living things need a continuous supply of energy just to stay alive. The energy is produced in chemical reactions. A chemical reaction is a process in which some substances, called reactants, change chemically into different substances, called products. Reactants and products may be elements or compounds.

Chemical reactions that take place inside living things are called biochemical reactions. Living things depend on biochemical reactions for more than just energy. Every function and structure of a living organism depends on thousands of biochemical reactions taking place in each cell. Some biochemical reactions are anabolic reactions. In these reactions, smaller molecules combine to form larger molecules. Anabolic reactions form chemical bonds and need energy. Other biochemical reactions are catabolic reactions. In these reactions large molecules break down to form smaller ones. Catabolic reactions break chemical bonds and release energy.

Some of the most important biochemical reactions are the reactions involved in photosynthesis and cellular respiration. Together they provide energy to almost all living cells.

- Photosynthesis is the process in which producers capture light energy from the sun and use it to make food. This involves anabolic reactions. The reactants of photosynthesis are carbon dioxide and water. The products of photosynthesis are oxygen and glucose.
- Cellular respiration is the process in which energy is released from glucose and stored in smaller amounts in other molecules that cells can use for energy. This involves catabolic reactions. The reactants of cellular respiration are oxygen and glucose. The products of cellular respiration are carbon dioxide and water.

Questions

1. What are biochemical reactions? Why are they important?

2. What are the differences between anabolic and catabolic reactions?
3. Compare and contrast photosynthesis and cellular respiration.

Lesson 2.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Major elements in the human body include
    a. hydrogen.
    b. carbon dioxide.
    c. water.
    d. all of the above
2. Which of the following is one of the four main classes of biochemical compounds?
    a. carbohydrates
    b. sugars
    c. fats
    d. DNA.
3. Uses of lipids include
    a. storing energy.
    b. making proteins.
    c. making up cell walls.
    d. regulating life processes.
4. Functions of proteins include
    a. making up muscles.
    b. fighting infections.
    c. transporting materials.
    d. all of the above
5. How does RNA differ from DNA?
    a. RNA consists of one chain of nucleotides rather than two chains.
    b. RNA has the nitrogen base thymine instead of uracil.
    c. RNA is a fatty acid rather than a nucleic acid.
    d. all of the above
6. Anabolic reactions are biochemical reactions in which
    a. chemical bonds are broken.
    b. chemical bonds are formed.
    c. energy is released.
    d. two of the above
7. Which statement about enzymes is true?
    a. Enzymes are products in biochemical reactions.
    b. Enzymes speed up biochemical reactions.
    c. Enzymes are used up in biochemical reactions.
    d. Enzymes are reactants in biochemical reactions.

Lesson 2.2: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____smallest particle of an element that still has the properties of that element
2. _____carbohydrate that makes up the cell walls of plants
3. _____biochemical compound that consists of nucleotides
4. _____smallest particle of a compound that still has the properties of that compound
5. _____class of biochemical compound that consists of amino acids
6. _____class of biochemical compound that consists of fatty acids
7. _____protein that speeds up biochemical reactions

Terms

a. enzyme
b. protein
c. molecule
d. cellulose
e. atom
f. lipid
g. nucleic acid

Lesson 2.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. A(n) _____ is a pure substance that cannot be broken down into other substances.
2. Anything that has mass and takes up space is _____.
3. A unique type of matter in which two or more elements are combined chemically in a certain ratio is called a(n) _____.
4. A chemical_____is a process in which some substances change chemically into different substances.
5. The sharing of electrons between atoms is a chemical _____.
6. The class of biochemical compounds that includes starch is called _____.
7. The sum of all of an organism's biochemical reactions is called _____.

Lesson 2.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain the significance of carbon to living things.

2.3 Classification of Living Things

Lesson 2.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____Linnaean classification has been completely replaced by modern classification systems.
2. _____Modern scientists classify organisms on the basis of molecular similarities.
3. _____The name of the human family is the Chordates.
4. _____Each genus is divided into one or more families.
5. _____Organisms that lack cell walls include plants and animals.
6. _____The cells of all Eukarya have a nucleus and other organelles.
7. _____All scientists agree that viruses should be considered living things.

Lesson 2.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

When Linnaeus was naming and classifying organisms in the 1700s, almost nothing was known of microorganisms. With the development of powerful microscopes, scientists discovered many single-celled organisms that didn't fit into any of Linnaeus' kingdoms. As a result, a new taxon, called the domain, was eventually added to the classification system. The domain is even broader than the kingdom. Biological classification now includes the domain in addition to all the taxa used by Linnaeus.

Most scientists think that all living things can be classified in three domains: Archaea, Bacteria, and Eukarya. The domains can be compared in terms of their number of cells, presence of a cell wall, and presence of a cell nucleus and other organelles.

- The Archaea and Bacteria Domains contain only single-celled organisms. The Eukarya Domain contains both single-celled and multicellular organisms, but multicellular organisms are more numerous in this domain.
- Both Archaea and Bacteria have cells walls, although their cell walls are made of different materials. Some Eukarya, including plants, also have cell walls. Other Eukarya, including animals, do not have cell walls.
- The cells of Archaea and Bacteria lack a nucleus. A nucleus is membrane-enclosed structure for holding a cell's DNA. The cells of Archaea and Bacteria also lack other membrane-enclosed cell structures called organelles. The cells of all Eukarya, in contrast, have a nucleus and other organelles.

Archaea and Bacteria may seem more similar to each other than either is to Eukarya. However, scientists think that Archaea may actually be more closely related to Eukarya than Bacteria are. This view is based on similarities in their DNA.

Questions

1. Why was the domain added to Linnaeus' classification system?
2. Identify traits that are found in at least some organisms in all three domains. Which traits are found only in Eukarya?
3. Why do scientists think that Archaea may be more closely related to Eukarya than bacteria are?

Lesson 2.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The human order is the
   a. animals.
   b. chordates.
   c. mammals.
   d. primates.
2. Which of the following is not a kingdom in the Linnaean system of classification?
   a. Archaea
   b. Protist
   c. Plant
   d. Fungus
3. The second word in an organism's two-word Latin name is the name of its
   a. species.
   b. genus.
   c. domain.
   d. family.
4. The domains of life include
   a. Bacteria.
   b. Archaea.
   c. Eukarya.
   d. all of the above
5. Which of the following statements about viruses is true?
   a. A virus belongs to the Archaea Domain.
   b. A virus is a single-celled organism.
   c. A virus has a cell membrane made of proteins.
   d. A virus can evolve.
6. What is the name of the domain that contains four kingdoms?
   a. Animal
   b. Plant
   c. Bacteria
   d. Eukarya
7. Which trait is found in bacteria?
   a. multiple cells
   b. cell wall
   c. cell nucleus
   d. cell organelles

Lesson 2.3: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____broadest taxon in the Linnaean classification system
2. _____science of classifying living things
3. _____taxon that includes one or more classes
4. _____taxon that includes one or more families
5. _____group of organisms that can breed and produce fertile offspring together
6. _____taxon broader than the kingdom in a modern taxonomic system
7. _____method of naming organisms introduced by Linnaeus

Terms

a. species
b. binomial nomenclature
c. order
d. domain
e. taxonomy
f. phylum
g. kingdom

Lesson 2.3: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. _____ is called the "father of taxonomy."
2. The only multicellular domain of life is the _____ Domain.
3. Human beings belong to the _____ Kingdom.
4. The human genus name is _____ .
5. The narrowest taxon in the Linnaean system is the_____ .
6. The taxon that consists of one or more orders is the _____ .
7. The taxon that consists of one or more genera is the_____ .

Lesson 2.3: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain why binomial nomenclature was such an important contribution to life science.

CHAPTER 3

MS Cells and Their Structures Worksheets

Chapter Outline

3.1 Life's Building Blocks

Lesson 3.1: True or False

Name_____ Class_____ Date_____

Write true if the statement is true or false if the statement is false.

1. _____Only eukaryotic cells contain DNA.
2. _____Cell theory was introduced as soon as cells were discovered.
3. _____All cells contain cytoplasm.
4. _____Prokaryotic cells lack ribosomes.
5. _____Cells are classified in two major groups based on whether or not they have a cell membrane.
6. _____All single-celled organisms have prokaryotic cells.
7. _____All living cells can reproduce.

Lesson 3.1: Critical Reading

Name_____ Class_____ Date_____

Read this passage based on the text and answer the questions that follow.

British scientist Robert Hooke first discovered cells in 1665. He was one of the earliest scientists to study living things under a microscope. He saw that cork was divided into many tiny compartments, like little rooms. He called the tiny compartments cells. Cork comes from trees, so what Hooke observed was dead plant cells.

Over the next century and a half, microscopes improved, and scientists observed cells in many different organisms. In fact, every organism that was examined microscopically was found to consist of cells. These observations led German scientists Theodor Schwann and Matthias Schleiden to conclude in the early 1800s that cells are alive and that all living things are made of cells.

Around 1850, a German doctor named Rudolf Virchow was observing living cells under a microscope. As he was watching, one of the cells happened to divide. Virchow realized that living cells produce new cells by dividing. He concluded that living cells arise from other cells.

The work of Schwann, Schleiden, and Virchow led to the cell theory. This is one of the most important theories in life science. The cell theory can be summed up as follows:

- All organisms consist of one or more cells.
- Cells are alive and the site of all life processes.
- All cells come from pre-existing cells.

Questions

1. Describe the discovery of cells.
2. What contributions to the cell theory were made by Schwann and Schleiden?
3. Why did Virchow conclude that cells come from pre-existing cells?

Lesson 3.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The smallest unit of living things that can carry out the chemical reactions of life is the
    a. organ system
    b. organ
    c. tissue
    d. cell
2. Cells were first discovered in the
    a. 1500s
    b. 1600s
    c. 1700s
    d. 1800s
3. Scientists who contributed to the development of the cell theory included
    a. Virchow
    b. Schleiden
    c. Schwann
    d. all of the above
4. The cell theory includes all of the following ideas except
    a. all cells contain a nucleus
    b. all organisms consist of one or more cells
    c. all cells come from pre-existing cells
    d. cells are alive
5. Which parts do all cells have in common?
    a. cell walls
    b. ribosomes
    c. mitochondria
    d. all of the above
6. What can all cells do?
    a. carry messages
    b. transport oxygen
    c. use energy
    d. make food
7. Which level of organization is found in prokaryotes?
    a. tissue
    b. molecule
    c. organelle
    d. organ

Lesson 3.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____cell structure where proteins are made
2. _____cell that contains a nucleus
3. _____any structure inside a cell that is enclosed by a membrane
4. _____thin coating of phospholipids that surrounds a cell
5. _____membrane enclosed structure in a cell that contains most of the cell's DNA
6. _____structure composed of two or more types of tissues that work together to do a specific task
7. _____cell that lacks a nucleus

Terms

a. cell membrane
b. organ
c. prokaryotic cell
d. organelle
e. eukaryotic cell
f. ribosome
g. nucleus

Lesson 3.1: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. The scientist who first observed that cells produce new cells by dividing was _____.
2. All of the material inside the cell membrane is referred to as _____.
3. Prokaryotes include only organisms in the Archaea and_____ Domains.
4. A(n) _____is a group of cells of the same kind that perform the same function.
5. The organelle that provides energy to the cell is called the_____.
6. Any organism whose cells have a nucleus is called a(n) _____.
7. _____was the first scientist to observe cells under a microscope.

Lesson 3.1: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Why must all living cells be very small?

3.2 Cell Structures

Lesson 3.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____Each phospholipid molecule in the cell membrane has two heads and a tail.
2. _____Hydrophobic molecules are "water fearing."
3. _____Hydrophilic molecules "like" the interior of the cell membrane.
4. _____Water makes up about two thirds of a cell's weight.
5. _____The cytoskeleton holds organelles in place inside the cytoplasm.
6. _____Ribosomes are made of folded membranes.
7. _____The large central vacuole of a plant cell is where photosynthesis occurs.

Lesson 3.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

The cell membrane encloses the cytoplasm of a cell. It forms a barrier between the cytoplasm and the environment outside the cell. Its function is to protect and support the cell. It also controls what enters or leaves the cell. It allows only certain substances to pass through. It keeps other substances inside or outside the cell.

The structure of the cell membrane explains how it can control what enters and leaves the cell. The membrane is composed mainly of two layers of phospholipids. Each phospholipid molecule has a head and two tails. The heads are "water loving" (hydrophilic), and the tails are "water fearing" (hydrophobic). The water-loving heads are on the outer surfaces of the cell membrane. They point toward the watery cytoplasm within the cell or the watery fluid that surrounds the cell. The water-fearing tails are in the middle of the cell membrane.

Hydrophobic molecules "like" to be near other hydrophobic molecules. They "fear" being near hydrophilic molecules. The opposite is true of hydrophilic molecules. They "like" to be near other hydrophilic molecules. They "fear" being near hydrophobic molecules. These "likes" and "fears" explain why some molecules can pass through the cell membrane while others cannot. Hydrophobic molecules can pass through the cell membrane. That's because they like the hydrophobic interior of the membrane and fear the hydrophilic exterior of the membrane. Hydrophilic molecules can't pass through the cell membrane. That's because they like the hydrophilic exterior of the membrane and fear the hydrophobic interior of the membrane.

Questions

1. What is the cell membrane? Besides controlling what enters or leaves the cells, what are its functions?
2. Describe the structure of the cell membrane.
3. Relate the structure of the cell membrane to its function of controlling what enters or leaves the cell.

Lesson 3.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Which statement about the cell membrane is false?
    a. It encloses the cytoplasm
    b. It protects and supports the cell
    c. It keeps all external substances out of the cell
    d. none of the above
2. The tails of phospholipid molecules in the cell membrane
    a. are on the outside of the membrane
    b. "love" water
    c. are hydrophobic
    d. two of the above
3. Functions of cytoplasm include
    a. suspending cell organelles
    b. helping the cell keep its shape
    c. providing a site for biochemical reactions
    d. all of the above
4. Which type of organelle is not surrounded by a membrane?
    a. mitochondrion
    b. ribosome
    c. centriole
    d. Golgi apparatus
5. Organelles used for storage include
    a. vesicles
    b. vacuoles
    c. leucoplasts
    d. all of the above
6. The nuclear envelope contains
    a. pores
    b. ribosomes
    c. SER
    d. ATP
7. All of the following are found in plant cells except
    a. chromoplasts
    b. cell walls
    c. centrioles
    d. RER

Lesson 3.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____threadlike filaments and tubules that crisscross the cytoplasm
2. _____organelle that helps organize DNA in the nucleus so it divides correctly during cell division
3. _____organelle that helps make and transport proteins and lipids
4. _____sac-like organelle used for storage, transport, or biochemical reactions
5. _____large organelle that sends proteins and lipids where they need to go
6. _____type of organelle found only in plant cells
7. _____organelle that recycles unneeded molecules

Terms

a. lysosome
b. vesicle
c. cytoskeleton
d. plastid
e. centriole
f. endoplasmic reticulum
g. Golgi apparatus

Lesson 3.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. The watery, gel-like substance that makes up cytoplasm is called _____.
2. The largest organelle in a eukaryotic cell is the _____.
3. The function of the nucleolus is to form_____.
4. Mitochondria use energy in glucose to make _____.
5. Rough ER is rough because it is studded with _____.
6. The type of plastid where photosynthesis occurs is called a(n) _____.
7. The membrane enclosing the nucleus of a eukaryotic cell is called the nuclear_____.

Lesson 3.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Identify structures in a eukaryotic cell that are involved directly or indirectly in the job of making proteins. Explain how each structure is involved in this job.

CHAPTER 4

MS Cell Functions Worksheets

Chapter Outline

4.1 Transport

Lesson 4.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____A substance naturally moves from an area of lower to higher concentration.
2. _____The two basic ways transport can occur are passive transport and diffusion.
3. _____Only very small molecules can move through a cell membrane by simple diffusion.
4. _____The interior of a cell membrane is hydrophobic.
5. _____Facilitated diffusion moves molecules across a cell membrane from an area of lower to higher concentration.
6. _____Active transport occurs when a substance moves up the concentration gradient to cross a cell membrane.
7. _____Exocytosis releases substances outside the cell.

Lesson 4.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Transport across cell membranes may be either passive transport or active transport. Passive transport does not require energy. Active transport does require energy.

Passive transport takes place when a substance moves from an area where it is more concentrated to an area where it is less concentrated. This movement is called diffusion. Passive transport requires no energy because a substance naturally moves from an area of higher to lower concentration. This is known as moving down the concentration gradient. It's like rolling a ball downhill. Types of passive transport are simple diffusion and facilitated diffusion.

- Simple diffusion occurs when a substance diffuses through a cell membrane without any help from other molecules.
- Facilitated diffusion occurs when a substance diffuses through a cell membrane with the help of transport proteins.

Active transport occurs when a substance moves from an area where it is less concentrated to an area where it is more concentrated. The substance is moving up, instead of down, the concentration gradient, and this takes energy. The energy comes from the molecule ATP. Types of active transport include pumps and vesicle transport.

- Pumps are transport proteins that move certain substances to areas of higher concentration. An example is the sodium-potassium pump.
- Vesicles are membrane-enclosed "containers." They move substances into or out of the cell by fusing with the cell membrane.

Questions

1. What is the major difference between passive and active transport?
2. Compare and contrast simple and facilitated diffusion.
3. Explain why pumps and vesicle transport require energy.

Lesson 4.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. When substances cross cell membranes by simple diffusion, they
    a. squeeze between phospholipid molecules.
    b. have help from channel proteins.
    c. move from a higher to lower concentration.
    d. two of the above
2. Molecules that pass through cell membranes by facilitated diffusion include
    a. large molecules.
    b. hydrophobic molecules.
    c. oxygen molecules.
    d. two of the above
3. The sodium-potassium pump is an example of
    a. simple diffusion.
    b. passive transport.
    c. facilitated diffusion.
    d. none of the above
4. Which statement about endocytosis is false?
    a. It is a form of active transport.
    b. It requires the formation of a vesicle.
    c. It moves a substance out of a cell.
    d. It requires energy.
5. Examples of molecules that can cross cell membranes by simple diffusion include
    a. water.
    b. oxygen.
    c. carbon dioxide.
    d. all of the above
6. The sodium-potassium pump involves
    a. carrier proteins.
    b. channel proteins.
    c. vesicles.
    d. all of the above
7. Types of active transport include
    a. exocytosis.
    b. facilitated diffusion.
    c. osmosis.
    d. all of the above

Lesson 4.1: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____passage of a substance through a cell membrane from an area of higher to lower concentration that does not require help from other molecules
2. _____transport molecule that forms a tiny pore in a cell membrane so another substance can pass through
3. _____type of molecule that is the main component of a cell membrane
4. _____passage of a substance through a cell membrane from an area of higher to lower concentration that requires help from other molecules
5. _____any type of transport through a cell membrane that requires energy
6. _____general term for the passage of a substance through a cell membrane by endocytosis or exocytosis
7. _____transport molecule that binds with a diffusing substance to carry it across a cell membrane

Terms

a. facilitated diffusion
b. vesicle transport
c. channel protein
d. phospholipid
e. simple diffusion
f. carrier protein
g. active transport

Lesson 4.1: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Any protein that helps other substances diffuse across a cell membrane is called a(n) _____-protein.
2. _____ refers to the number of particles of a substance in a given volume.
3. The energy needed for active transport comes from _____ .
4. The passage of a substance through a cell membrane is called _____ .
5. A sodium-potassium pump moves _____ ions out of a cell.
6. The movement of a substance from an area of higher to lower concentration is known as _____.
7. The diffusion of water is termed _____ .

Lesson 4.1: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

How is a cell membrane like a window screen?

4.2 Photosynthesis

Lesson 4.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____Only heterotrophs need food for energy.
2. _____ATP is the concentrated form of energy that is carried by the blood and taken up by cells.
3. _____Producing one molecule of glucose requires six molecules of water.
4. _____Some protists can carry out photosynthesis.
5. _____Thylakoids are stacks of flattened sacs in a chloroplast.
6. _____All photosynthesis takes place in chloroplasts.
7. _____Each chloroplast is surrounded by two membranes.

Lesson 4.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

In plants and algae, photosynthesis takes place in chloroplasts. A chloroplast is a type of plastid, or plant organelle. It contains the green pigment chlorophyll. The presence of chloroplasts in plant cells is one of the major ways they differ from animal cells.

A chloroplast is surrounded by two membranes. Inside the membranes is a fluid-filled space called stroma. Within the stroma are structures called thylakoids. The thylakoids are stacks of flattened sacs made of membrane. The sacs contain chlorophyll.

The first stage of photosynthesis takes place in the thylakoids. In the first stage, light energy is absorbed by chlorophyll and stored temporarily as chemical energy in molecules of ATP and NADPH. The second stage of photosynthesis takes place in the stroma. In the second stage, the energy in ATP and NADPH is released and used to make glucose.

Questions

1. What is a chloroplast?
2. Describe the structure of a chloroplast.
3. Identify where the two stages of photosynthesis take place.

Lesson 4.2: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. The chemical formula for glucose is
    a. $C_6H_{12}O_6$.
    b. $C_{12}H_6O_{12}$.
    c. $C_6H_6O_{12}$.
    d. none of the above
2. In the reactions of photosynthesis, how many molecules of carbon dioxide are needed to produce one molecule of glucose?
    a. one
    b. six
    c. nine
    d. twelve
3. Types of organisms that carry out photosynthesis include
    a. bacteria.
    b. algae.
    c. plants.
    d. all of the above
4. The function of thylakoids is to
    a. capture light energy.
    b. produce glucose molecules.
    c. release energy from ATP and NADPH.
    d. all of the above
5. The first stage of photosynthesis requires
    a. carbon dioxide.
    b. water.
    c. oxygen.
    d. none of the above
6. The second stage of photosynthesis requires
    a. light.
    b. oxygen.
    c. water.
    d. carbon dioxide.
7. What is the function of stomata in plant leaves?
    a. They let leaves exchange gases with the air.
    b. They absorb light from the sun.
    c. They allow water to enter the leaves.
    d. none of the above

Lesson 4.2: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____any organism that uses energy to make glucose
2. _____second stage of photosynthesis
3. _____form of energy needed to fuel life processes in all living things
4. _____plant organelle where photosynthesis takes place
5. _____form of energy needed for photosynthesis
6. _____any organism that obtains energy from other living things
7. _____first stage of photosynthesis

Terms

a. light reactions
b. heterotroph
c. Calvin cycle
d. light
e. chloroplast
f. autotroph
g. chemical

Lesson 4.2: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The nearly universal food for living things is the sugar _____.
2. _____is the green pigment in plants and algae that absorbs light.
3. The substances needed for photosynthesis are carbon dioxide and _____.
4. The products of photosynthesis are glucose and _____.
5. The fluid-filled space surrounding thylakoids is called the _____.
6. The first stage of photosynthesis takes place in the _____ of chloroplasts.
7. The second stage of photosynthesis takes place in the _____ of chloroplasts.

Lesson 4.2: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast the first and second stages of photosynthesis.

4.3 Cellular Respiration

Lesson 4.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____Cellular respiration uses oxygen in addition to glucose.
2. _____Cellular respiration takes place in the cells of all aerobic organisms.
3. _____Glycolysis takes place in the matrix of a mitochondrion.
4. _____The second stage of cellular respiration produces four molecules of ATP.
5. _____A waste product of electron transport is water.
6. _____The products of photosynthesis are the reactants of cellular respiration.
7. _____Fermentation produces ATP from lactic acid or alcohol.

Lesson 4.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Glucose is the simple sugar that living things use to store and transport energy. Glucose is taken up by all of your cells. However, cells don't use the energy in glucose directly. They first need to release the energy and store it in ATP, or adenosine triphosphate. The smaller amount of energy stored in ATP is just right for fueling cell processes.

The process in which your cells break down glucose, release the stored energy, and use the energy to make ATP is called cellular respiration. Each ATP molecule forms when a phosphate is added to ADP, or adenosine diphosphate. This requires energy, which is stored in the ATP molecule. When cells need energy, a phosphate can be removed from ATP. This releases the energy and forms ADP again.

Cellular respiration involves many biochemical reactions. The overall process uses oxygen in addition to glucose. It releases carbon dioxide and water as waste products. Cellular respiration actually "burns" glucose for energy. However, it doesn't produce light or intense heat like burning a candle or log. Instead, it releases the energy slowly, in many small steps. The energy is used to form dozens of molecules of ATP.

Cellular respiration begins in the cytoplasm of cells and is completed in a mitochondrion. A mitochondrion is a membrane-enclosed organelle in the cytoplasm. It is sometimes called the "powerhouse" of the cell because of its role in cellular respiration.

Questions

1. Why don't cells use glucose directly for energy? Why do they first break down the glucose to form ATP?
2. Identify the reactants and products of cellular respiration.
3. How does ATP form, and how is its energy released?

Lesson 4.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. For each glucose molecule that undergoes cellular respiration, what is the maximum number of ATP molecules that are produced?

    a. 2
    b. 4
    c. 34
    d. 38

2. During cellular respiration, each ATP molecule forms when a phosphate is added to

    a. alcohol.
    b. glucose.
    c. pyruvate.
    d. ADP.

3. Which stage of cellular respiration is anaerobic?

    a. glycolysis
    b. electron transport
    c. Krebs cycle
    d. none of the above

4. The stage of cellular respiration that also occurs in fermentation is

    a. glycolysis.
    b. electron transport.
    c. Krebs cycle.
    d. none of the above

5. When your muscle cells are working too hard for cellular respiration to keep them supplied with energy, they start producing ATP by

    a. lactic acid fermentation.
    b. alcoholic fermentation.
    c. aerobic respiration.
    d. aerobic fermentation.

6. Molecules that form during glycolysis include

    a. pyruvate.
    b. carbon dioxide.
    c. ATP.
    d. two of the above

7. Which waste product is produced during the Krebs cycle?

    a. water
    b. alcohol
    c. carbon dioxide
    d. lactic acid

Lesson 4.3: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____second stage of cellular respiration
2. _____organelle that is called the "powerhouse" of the cell
3. _____process in which cells "burn" glucose for energy
4. _____process in which yeasts in bread produce ATP from glucose
5. _____process in which bacteria in yogurt produce ATP from glucose
6. _____first stage of cellular respiration
7. _____final stage of cellular respiration

Terms

a. glycolysis
b. electron transport
c. cellular respiration
d. lactic acid fermentation
e. Krebs cycle
f. alcoholic fermentation
g. mitochondrion

Lesson 4.3: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Cellular respiration uses the energy in glucose to produce smaller energy molecules called _____.
2. Cellular respiration requires oxygen, so it is a(n) _____ process.
3. Any process in which cells produce ATP from glucose in the absence of oxygen is called _____.
4. Waste products of cellular respiration include carbon dioxide and _____.
5. The first stage of cellular respiration takes places in the _____ of cells.
6. The_____ stage of cellular respiration produces the greatest amount of ATP.
7. Fermentation does not require oxygen, so it is a(n)_____ process.

Lesson 4.3: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Identify pros and cons of aerobic and anaerobic respiration.

CHAPTER 5 MS Cell Division, Reproduction, and Protein Synthesis Worksheets

Chapter Outline

5.1 Cell Division

Lesson 5.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ A eukaryotic cell generally spends most of its lifetime in the mitotic phase.
2. _____ The mitotic phase includes mitosis and cytokinesis.
3. _____ The cell cycle is more complicated in prokaryotic than eukaryotic cells.
4. _____ In mitosis, new nuclear membranes form during metaphase.
5. _____ The first phase of mitosis is anaphase.
6. _____ Mitosis occurs only in eukaryotic cells.
7. _____ Sister chromatids are two identical copies of the same chromosome.

Lesson 5.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

How cell division proceeds depends on whether a cell has a nucleus. Prokaryotic cells lack a nucleus. Their DNA is in the cytoplasm. It forms just one circular chromosome. Eukaryotic cells have a nucleus holding their DNA. Their DNA forms multiple rodlike chromosomes.

In a prokaryotic cell, cell division occurs by the process of binary fission. The cell simply splits into two equal halves. This occurs in three steps:

1. The cell's single chromosome is copied to form two identical chromosomes. This is called DNA replication.
2. The two copies of the chromosome separate from each other. They move to opposite poles, or ends, of the cell. This is called chromosome segregation.
3. The cell wall grows toward the center of the cell. The cytoplasm splits apart, and the cell pinches in two, forming two daughter cells. This is called cytokinesis.

In a eukaryotic cell, cell division includes the process of mitosis, in which the nucleus of the cell divides. Cell division in a eukaryotic cell occurs in these three steps:

1. The cell's chromosomes are copied in the process of DNA replication. Each chromosome undergoes replication to form two identical copies. The two copies are called sister chromatids. They are joined together at a point called the centromere.
2. The cell's nucleus divides. This includes separation of the sister chromatids. This step is called mitosis. It is a complex process that occurs in four phases called prophase, metaphase, anaphase, and telophase.
3. The rest of the cell divides by cytokinesis. The cell membrane grows toward the center of the cell and the cytoplasm divides, forming two daughter cells.

Questions

1. Why is the process of cell division different in prokaryotes and eukaryotes?
2. List and describe the three stages of prokaryotic cell division in the order in which they occur.
3. How does cell division in eukaryotes differ from the process you outlined in your answer to question 2? How is eukaryotic cell division the same as the process in question 2?

Lesson 5.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The smaller, repeating molecules that make up a DNA or RNA molecule are called
    a. amino acids.
    b. fatty acids.
    c. deoxyriboses.
    d. nucleotides.
2. The two strands of DNA are held together by chemical bonds between the
    a. sugars.
    b. phosphates.
    c. nitrogen bases.
    d. none of the above
3. After DNA is copied, each new DNA molecule contains
    a. two new strands.
    b. two original strands.
    c. one new strand and one original strand.
    d. two original strands and one new strand.
4. Which organisms have circular chromosomes?
    a. plants
    b. protists
    c. animals
    d. none of the above
5. Which of the following is an example of a complementary base pair in DNA?
    a. adenine and guanine
    b. cytosine and thymine
    c. adenine and cytosine
    d. cytosine and guanine
6. In prokaryotes, cell division occurs by
    a. mitosis.
    b. mitotic division.
    c. binary fission.
    d. cell replication.
7. What is the first step in the division of both prokaryotic and eukaryotic cells?
    a. mitosis

b. interphase
c. cytokinesis
d. DNA replication

Lesson 5.1: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ phase of the cell cycle in which the cytoplasm splits apart and the cell pinches in two
2. _____ stage of mitosis in which chromosomes form and the nuclear membrane breaks down
3. _____ stage of mitosis in which chromosomes uncoil and spindle fibers break down
4. _____ phase of the cell cycle in which a eukaryotic cell divides
5. _____ stage of mitosis in which spindle fibers attach to the centromeres of sister chromatids
6. _____ phase of the cell cycle in which the cell grows, DNA replicates, and the cell prepares to divide
7. _____ stage of mitosis in which sister chromatids move toward opposite poles of the cell

Terms

a. telophase
b. prophase
c. cytokinesis
d. interphase
e. mitotic phase
f. metaphase
g. anaphase

Lesson 5.1: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. All of the stages that a cell goes through in its lifetime make up the cell _____.
2. _____ refers to the division of the nucleus of a eukaryotic cell.
3. The process in which DNA is copied is called DNA_____.
4. A(n)_____ is a structure that consists of DNA and protein molecules coiled into a definite shape.
5. In a DNA molecule, the nitrogen base adenine always bonds with the nitrogen base_____.
6. Each nucleotide in a nucleic acid includes a phosphate, a nitrogen base, and a(n) _____.
7. When a cell divides, the two new cells that form are called _____ cells.

Lesson 5.1: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain when, why, and how DNA replication occurs in cells.

5.2 Reproduction

Lesson 5.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Crossing over occurs during prophase I.
2. _____ Meiosis II is followed by cytokinesis.
3. _____ Bacteria produce gametes by binary fission.
4. _____ Independent assortment occurs during meiosis II.
5. _____ A new sea star can form from a single arm.
6. _____ Sexual reproduction can occur more quickly than asexual reproduction.
7. _____ Fertilization results in a haploid zygote.

Lesson 5.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Reproduction is how organisms produce offspring. The ability to reproduce is a characteristic of all living things. In some species, all the offspring are genetically identical to the parent. In other species, each offspring is genetically unique. Why does this happen in some species but not others? It's because there are two types of reproduction. Reproduction can be sexual or asexual.

Asexual reproduction is simpler than sexual reproduction. It involves just one parent. The offspring are genetically identical to each other and to the parent. All prokaryotes and some eukaryotes reproduce this way. There are several different methods of asexual reproduction, including binary fission, fragmentation, and budding.

Sexual reproduction is more complicated. It involves two parents. Special cells called gametes are produced by the parents. A female parent produces gametes called eggs, and a male parent produces gametes called sperm. An offspring forms when an egg and a sperm unite, a process that is called fertilization. The initial cell that forms when the egg and sperm unite is called a zygote.

Unlike other body cells, gametes are haploid cells. They have only one copy of each type of chromosome. Gametes are produced in a special type of cell division called meiosis. Meiosis is basically mitosis times two. During meiosis, an original diploid cell divides twice (meiosis I and meiosis II). However, the DNA in the cell replicates just once (only before meiosis I). The result is four genetically different daughter cells, each with the haploid number of chromosomes.

Questions

1. Describe asexual reproduction, and identify three ways it can occur.
2. How does sexual reproduction occur?
3. Explain how meiosis results in four haploid daughter cells.

Lesson 5.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Asexual reproduction
    a. is simpler than sexual reproduction.
    b. occurs only in prokaryotes.
    c. includes the union of gametes.
    d. two of the above
2. The diploid number of chromosomes in a species is always
    a. half the haploid number.
    b. twice the haploid number.
    c. 46.
    d. two of the above
3. How many chromosomes does a human individual normally inherit from each parent?
    a. 23
    b. 46
    c. the diploid number
    d. two of the above
4. Methods of asexual reproduction include all of the following except
    a. budding.
    b. fertilization.
    c. fragmentation.
    d. binary fission.
5. Which stage of meiosis occurs first?
    a. anaphase I
    b. prophase I
    c. telophase I
    d. metaphase I
6. Which phase directly follows meiosis I?
    a. interphase
    b. cytokinesis
    c. prophase II
    d. telophase II
7. How does genetic variation arise during sexual reproduction?
    a. crossing over
    b. random union of gametes
    c. independent assortment
    d. all of the above

Lesson 5.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ type of asexual reproduction that occurs in yeasts
2. _____ process in which two gametes unite to form a single cell
3. _____ type of cell division that produces two identical daughter cells
4. _____ type of cell division that produces four gametes
5. _____ number of chromosomes in a gamete
6. _____ type of asexual reproduction that occurs in sea stars
7. _____ number of chromosomes in a normal body cell

Terms

a. meiosis
b. fragmentation
c. diploid number
d. budding
e. binary fission
f. fertilization
g. haploid number

Lesson 5.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Reproduction that involves just one parent is called_____reproduction.
2. The diploid number in human beings is_____.
3. Gametes produced by a female parent are called _____.
4. The two members of a given pair of chromosomes are called_____ chromosomes.
5. The initial cell that forms when two gametes unit is called a(n)_____.
6. _____are gametes produced by a male parent.
7. The number of daughter cells that result from meiosis I is _____.

Lesson 5.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

How unlikely would it be to find someone else just like you anywhere in the world (assuming you do not have an identical twin)? Explain.

5.3 Protein Synthesis

Lesson 5.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ A nonsense mutation is caused by a premature stop codon.
2. _____ The function of RNA is to help build proteins.
3. _____ The genetic code is the sequence of nitrogen bases in DNA.
4. _____ Down syndrome is caused by a point mutation.
5. _____ The codon AUG is the start codon.
6. _____ A mutated codon always codes for a different amino acid.
7. _____ RNA contains the sugar deoxyribose.

Lesson 5.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

The genetic code is based on the sequence of nitrogen bases in DNA. The four bases make up the "letters" of the code. Groups of three bases each make up code "words" called codons. Each codon stands for one amino acid or for a start or stop signal.

There are 20 amino acids that make up proteins. With three bases per codon, there are 64 possible codons. This is more than enough to code for the 20 amino acids plus start and stop signals.

The codon AUG is the start signal. It also codes for the amino acid methionine. After a start signal, all the following codons are read in sequence until a stop codon is reached. The codons UAG, UGA, and UAA are all stop codons. They don't code for any amino acids.

The genetic code has three important characteristics.

1. The genetic code is the same in all living things. This shows that all organisms are related by descent from a common ancestor.
2. Each codon codes for just one amino acid. This is necessary so the correct amino acid is always selected.
3. Most amino acids are encoded by more than one codon. This is helpful. It increases the chances that the correct amino acid will still be selected even if there is a mistake in the code.

Questions

1. Describe the genetic code and how it is read.
2. What might happen if one codon coded for more than one amino acid?
3. How does the genetic code provide evidence for evolution?

Lesson 5.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. A section of DNA that codes for a protein is called a
    a. base.
    b. codon.
    c. gene.
    d. chromosome.
2. Which statement about RNA is false?
    a. RNA stands for ribonucleic acid.
    b. RNA is smaller than DNA.
    c. RNA can cross the nuclear membrane.
    d. none of the above
3. Each codon in the genetic code
    a. consists of three nitrogen bases.
    b. codes for three amino acids.
    c. represents start and stop.
    d. none of the above
4. During the transcription step of protein synthesis
    a. DNA unwinds.
    b. DNA is copied to form rRNA.
    c. tRNA leaves the nucleus.
    d. amino acids are assembled at a ribosome.
5. Mutations may be
    a. beneficial.
    b. neutral.
    c. harmful.
    d. any of the above
6. Which type of mutation has no effect on the organism?
    a. silent
    b. missense
    c. nonsense
    d. frameshift
7. What happens during the translation step of protein synthesis?
    a. Amino acids are joined together.
    b. The genetic code is carried to the nucleus.
    c. A molecule of mRNA forms.
    d. DNA moves to a ribosome.

Lesson 5.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ nitrogen base found only in DNA
2. _____ type of RNA that copies DNA in the nucleus
3. _____ double-stranded nucleic acid
4. _____ nitrogen base found only in RNA
5. _____ type of RNA that helps form a ribosome
6. _____ any single-stranded nucleic acid
7. _____ type of RNA that brings amino acids to a ribosome

Terms

a. uracil
b. rRNA
c. RNA
d. mRNA
e. thymine
f. DNA
g. tRNA

Lesson 5.3: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. The _____in DNA make up the "letters" of the genetic code.
2. A random change in the base sequence of DNA is a(n)_____.
3. The first step in protein synthesis is called _____.
4. A(n)_____ is a three-letter code word in the genetic code.
5. A mutation in just one base in DNA is called a(n)_____mutation.
6. The second step in protein synthesis is called _____.
7. Anything in the environment that causes a mutation is a known as a(n) _____.

Lesson 5.3: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast the effects of mutations that occur in gametes with the effects of mutations that occur in body cells.

CHAPTER 6 MS Genetics Worksheets

Chapter Outline

6.1 Mendel's Discoveries

Lesson 6.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Mendel's discoveries made him a well-known scientist in his own lifetime.
2. _____ Mendel's laws form the basis of the science of genetics.
3. _____ In Mendel's second set of experiments, the F2 generation always had traits in the ratio 9:3:3:1.
4. _____ In Mendel's first set of experiments, both forms of a trait always showed up in the F1 plants.
5. _____ Mendel chose pea plants to study because they have asexual reproduction.
6. _____ Mendel determined that one out of four F2 plants inherits two recessive factors for a given trait.
7. _____ If you were to cross a violet-flowered pea plant with a white-flowered pea plant, the first generation of offspring would all have white flowers.

Lesson 6.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

In Mendel's first set of experiments on flower color, he transferred pollen from a plant with white flowers to a plant with violet flowers. This is called cross-pollination. Then Mendel observed flower color in their offspring. The offspring formed the first generation (F1). All of the F1 plants had violet flowers. Mendel wondered what had happened to the white form of the trait. If it had disappeared, then the F1 plants should have only violet-flowered offspring. Mendel let the FI plants pollinate themselves. This is called self-pollination. Then he observed flower color in their offspring. These offspring formed the second generation (F2). He found that one out of every four F2 plants had white flowers. The other three out of four had violet flowers. In other words, F2 plants with violet flowers and F2 plants with white flowers had a 3:1 ratio.

Mendel repeated this experiment with other traits. For each trait, he got the same results. One form of the trait seemed to disappear in the F1 plants. Then it showed up again in the F2 plants. Moreover, the two forms of the trait always showed up a 3:1 ratio in F2 plants.

Based on these results, Mendel concluded that each trait is controlled by two factors. He also concluded that one of the factors for each trait dominates the other. He described the dominating factor by the term dominant. He used the term recessive to describe the other factor. If both factors are present in an individual, only the dominant factor is expressed. This explains why one form of a trait always seems to disappear in the F1 plants. These plants inherit both factors for the trait, but only the dominant factor shows up. The recessive factor is hidden.

When F1 plants reproduce, the two factors separate and go to different gametes. This is Mendel's first law, the law of segregation. It explains why both forms of the trait show up again in the F2 plants. One out of four F2 plants inherits two of the recessive factors for the trait. In these plants, the recessive form of the trait is expressed.

Questions

1. Define the terms cross-pollination and self-pollination. When did Mendel use each type of pollination in his first set of experiments?
2. Describe the outcome of Mendel's first set of experiments on flower color.
3. Mendel concluded that each trait is controlled by two factors and that one of the factors for each trait dominates the other. Explain his reasoning.

Lesson 6.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Mendel made his discoveries in the
    a. 1600s
    b. 1700s
    c. 1800s
    d. 1900s
2. Reasons that pea plants were a good choice for Mendel to study include that
    a. they are easy to grow
    b. they have just two traits
    c. each trait exists in many different forms
    d. all of the above
3. Mendel arrived at his second law of inheritance when he studied
    a. one trait at a time
    b. one generation at a time
    c. two traits at a time
    d. two generations at a time
4. Traits Mendel studied in pea plants included
    a. flower color
    b. stem length
    c. seed color
    d. all of the above
5. An example of a dominant trait in pea plants is
    a. white flower color
    b. wrinkled seed form
    c. round seed form
    d. two of the above
6. If you cross a purebred pea plant with green seeds and a purebred pea plant with yellow seeds, what percent of their offspring will have green seeds?
    a. 100 percent
    b. 75 percent
    c. 25 percent
    d. 0 percent
7. Which plants were allowed to self-pollinate in Mendel's experiments?
    a. P

b. F1
c. F2
d. all of the above

Lesson 6.1: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ law describing how factors for different traits combine in gametes
2. _____ symbol for the parental generation in genetics experiments
3. _____ Mendel's term describing a factor that may be hidden in an individual
4. _____ law describing how factors for the same trait go to gametes
5. _____ symbol for the second offspring generation in genetics experiments
6. _____ symbol for the first offspring generation in genetics experiments
7. _____ Mendel's term describing a factor that is always expressed in an individual

Terms

a. F1
b. law of independent assortment
c. F2
d. dominant
e. P
f. law of segregation
g. recessive

Lesson 6.1: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. The scientist known as the "father of genetics" is _____.
2. _____ refers to the process in which pollen is transferred to female gametes.
3. In garden pea plants, violet flower color is _____to white flower color.
4. Mendel's first law is called the law of_____.
5. In Mendel's first set of experiments, the two forms of a trait always showed up in the F2 plants in a(n) _____ ratio.
6. In sexually reproducing plants, male gametes are released by tiny grains of_____.
7. _____is the science of heredity.

Lesson 6.1: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast Mendel's two laws of inheritance.

6.2 Introduction to Genetics

Lesson 6.2: True or False

Name_____ Class_____ Date_____

Write true if the statement is true or false if the statement is false.

1. _____ Mendel's laws were rediscovered in 1990.
2. _____ Within a species, most variation in traits is due to different alleles.
3. _____ If a gene has two alleles, there are two possible genotypes.
4. _____ If a parent has the genotype Bb, you would expect all of the parent's gametes to contain the B allele.
5. _____ You could use a Punnett square to predict the most likely ratio of daughters to sons in a given family.
6. _____ A person with type A blood could have the genotype AA, AO, or AB.
7. _____ Adult height is an example of a sex-linked trait.

Lesson 6.2: Critical Reading

Name_____ Class_____ Date_____

Read this passage based on the text and answer the questions that follow.

The traits of organisms are controlled by genes on chromosomes. A gene is the part of a chromosome that contains the genetic code for a particular protein. The position of a gene on a chromosome is called its locus. Each gene may have different versions, called alleles.

In sexually reproducing species, chromosomes are present in cells in pairs. Chromosomes in the same pair are called homologous chromosomes. They have the same genes at the same loci. The genes may be present as the same or different alleles. During meiosis, when gametes are produced, homologous chromosomes separate and go to different gametes. Thus, the two alleles for each gene also go to different gametes.

When gametes unite during fertilization, the resulting zygote inherits two alleles for each gene. One allele comes from each parent. The two alleles that an individual inherits make up the individual's genotype. The two alleles may be the same or different. An individual with two alleles of the same type is called a homozygote. An individual with two alleles of different types is called a heterozygote.

The expression of an individual's genotype is called its phenotype. The phenotype refers to the individual's traits. Different genotypes may produce the same phenotype. This will be the case if one allele is dominant to the other. For example, if B is dominant to b, only the B allele will be expressed in a Bb heterozygote. The recessive b allele will be expressed only in a bb genotype.

Questions

1. Explain how the following concepts are related: gene, locus, and allele.
2. In a sexually reproducing species, what determines an individual's genotype?

3. Explain the difference between genotype and phenotype.

Lesson 6.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. At a given locus on homologous chromosomes, you would always find the same
   a. alleles
   b. genes
   c. genotypes
   d. autosomes
2. If B is dominant to b, which genotype expresses the recessive phenotype?
   a. BB
   b. Bb
   c. bb
   d. two of the above
3. If two Bb parents have offspring together, what percent of the offspring would you expect to have the same genotype as the parents?
   a. 100 percent
   b. 75 percent
   c. 50 percent
   d. 25 percent
4. For the parents in question 3, what percent of the offspring would you expect to have the same phenotype as the parents if B is dominant to b?
   a. 100 percent
   b. 75 percent
   c. 50 percent
   d. 25 percent
5. Examples of polygenic traits in human beings include
   a. ABO blood type
   b. color blindness
   c. skin color
   d. two of the above
6. The A and B alleles for the ABO blood type trait are
   a. both dominant to the O allele
   b. codominant with each other
   c. both recessive to the O allele
   d. two of the above
7. If a mother has a single allele for red-green color blindness, she always
   a. expresses the color-blindness trait
   b. passes the allele to all of her daughters
   c. passes the allele to all of her sons
   d. two of the above

Lesson 6.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ section of a chromosome that contains the genetic code for a particular protein
2. _____ individual with two different alleles for a given gene
3. _____ one of two or more versions of the same gene
4. _____ expression of an individual's alleles as traits
5. _____ situation in which two alleles for the same gene are expressed equally in heterozygotes
6. _____ alleles that an individual inherits for a given gene
7. _____ individual with two alleles of the same type for a given gene

Terms

a. genotype
b. homozygote
c. allele
d. phenotype
e. heterozygote
f. codominance
g. gene

Lesson 6.2: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. A trait that is controlled by more than one gene is called a(n)_____trait.
2. The X and Y chromosomes in humans are both known as _____chromosomes.
3. The position of a gene on a chromosome is called its _____.
4. A trait controlled by a gene on the X or Y chromosome is referred to as a(n)_____ trait.
5. _____dominance refers to the situation in which a dominant allele is only partially dominant to a recessive allele.
6. Any chromosome that is not a sex chromosome is known as a(n)_____.
7. An individual's phenotype is a product of the individual's genotype and_____.

Lesson 6.2: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how to use a Punnett square to determine the expected genotypes of offspring of a given pair of parents.

6.3 Advances in Genetics

Lesson 6.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Knowledge of the human genome helps us understand how the human species evolved.
2. _____ Dominant genetic disorders are more common than recessive genetic disorders.
3. _____ Based on his phenotype, U.S. president Abraham Lincoln is thought to have had Turner's syndrome.
4. _____ Most chromosomal disorders involve the sex chromosomes.
5. _____ Biotechnology is also referred to as genetic engineering.
6. _____ The only use of biotechnology is curing genetic disorders.
7. _____ Eating GMOs has been shown to cause genetic disorders in people.

Lesson 6.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Biotechnology is the use of technology to change the genetic makeup of living things for human purposes. The purposes might be to treat human diseases or to modify other organisms so they are more useful to people.

Biotechnology uses a variety of methods, but some are commonly used in many applications. They include the polymerase chain reaction and gene cloning. Both are used to quickly make many copies of a desired gene.

- The polymerase chain reaction uses high temperatures and an enzyme to make new DNA molecules. The process keeps cycling to make many copies of a gene.
- Gene cloning uses bacteria to make new DNA molecules. The desired gene is inserted into the DNA of a bacterial cell. Bacteria multiply very rapidly by binary fission. Each time a bacterial cell divides, the inserted gene is copied.

Biotechnology has many uses. It is especially useful in medicine and agriculture. Biotechnology is used to:

- treat genetic disorders. For example, copies of a normal gene might be inserted into a patient with a defective gene. This is called gene therapy. Ideally, it can cure a genetic disorder.
- produce human proteins. Insulin is one example. This protein is needed to treat diabetes. The human insulin gene is inserted into bacteria. The bacteria reproduce rapidly so there are soon enough of them to produce large quantities of insulin.
- create genetically modified organisms (GMOs). Many GMOs are food crops such as corn. Genes are inserted into plants to give them desirable traits. This might be the ability to get by with little water or to resist insect pests. The modified plants are likely to be healthier and produce more food. They may also need less pesticide.

Questions

1. What is biotechnology?
2. Describe the polymerase chain reaction and gene cloning. Why might these techniques be used?
3. Define GMO. Why might GMO crops be able to produce more food than non-GMO crops?

Lesson 6.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Specific aims of the Human Genome Project include
   a. identifying the more than 20,000 human genes
   b. mapping all human genes on chromosomes
   c. sequencing the 3 billion bases in human DNA
   d. all of the above
2. Which type of trait is sickle cell anemia?
   a. X-linked recessive
   b. X-linked dominant
   c. autosomal recessive
   d. autosomal dominant
3. Chromosomal disorders occur when chromosomes fail to separate normally during
   a. meiosis
   b. fertilization
   c. mitosis
   d. birth
4. Which disorder is caused by a missing chromosome?
   a. Turner's syndrome
   b. Klinefelter's syndrome
   c. Down syndrome
   d. all of the above
5. The Human Genome Project was completed in
   a. 1900
   b. 1990
   c. 2003
   d. 2010
6. An example of an X-linked disorder caused by a mutation in a single gene is
   a. Hemophilia A
   b. Turner's syndrome
   c. Klinefelter's syndrome
   d. two of the above
7. Why did scientists insert the gene for human insulin into bacteria?
   a. to cure the bacteria of diabetes
   b. to make large quantities of insulin
   c. to better understand diabetes
   d. to cause mutations in the gene

Lesson 6.3: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ method of making copies of a gene that uses bacteria
2. _____ any disease caused by mutations
3. _____ example of a disease caused by a chromosomal mutation
4. _____ example of a disease caused by a dominant mutation
5. _____ method of making copies of a gene that uses heat and an enzyme
6. _____ international effort to determine the complete genetic blueprint of a human being
7. _____ example of a disease caused by a recessive mutation

Terms

a. polymerase chain reaction
b. cystic fibrosis
c. gene cloning
d. Marfan syndrome
e. Human Genome Project
f. Down syndrome
g. genetic disorder

Lesson 6.3: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. All the genetic information of a species makes up its _____.
2. A heterozygote for a recessive genetic disorder is called a(n) _____.
3. _____is any use of technology to change the genetic makeup of living things for human purposes.
4. The letters _____stand for an organism that has been artificially modified by receiving genes for desirable traits.
5. A(n) _____ allele is expressed in every individual who inherits even one copy of it.
6. _____syndrome is a genetic disorder caused by an extra copy of chromosome 21.
7. Inserting a normal gene into a patient with a defective gene is called _____therapy.

Lesson 6.3: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Do you think food producers should be required to state on food labels whether their foods contain GMOs? Why or why not?

CHAPTER 7 MS Evolution Worksheets

Chapter Outline

7.1 Darwin's Theory of Evolution

Lesson 7.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ The theory of evolution by natural selection explains and unifies all of life science.
2. _____ All of the giant Galápagos tortoises are now extinct.
3. _____ Animal breeders produce animals with desired traits by selecting which animals are allowed to reproduce.
4. _____ Lamarck's explanation for how evolution occurs was essentially the same as Darwin's.
5. _____ According to Malthus, disease and famine kill off the weakest people when human populations grow too large.
6. _____ Darwin knew nothing about the fossil evidence for evolution.
7. _____ Darwin's book on evolution by natural selection was rejected because it contained very little evidence.

Lesson 7.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

There were three scientists in particular that influenced Darwin. Their names are Lamarck, Lyell, and Malthus. All three were somewhat older than Darwin, and he was familiar with their writings.

Jean Baptiste Lamarck was a French naturalist. He was one of the first scientists to propose that species change over time. In other words, he proposed that evolution occurs. Lamarck also tried to explain how it happens, but he got that part wrong. Lamarck thought that the traits an organism developed during its life time could be passed on to its offspring. He called this the inheritance of acquired characteristics. Like Lamarck, Darwin assumed that species evolve, or change their traits over time. However, Darwin came up with a different explanation for how this occurs: natural selection.

Charles Lyell was an English geologist. He wrote a famous book called Principles of Geology. Darwin took the book with him on the Beagle. Lyell argued that geological processes such as erosion change Earth's surface very gradually. To account for all the changes that had occurred on the planet, Earth must be a lot older than most people believed. From Lyell, Darwin realized that living things had had a long time to evolve. There was enough time for evolution to produce the great diversity of organisms that Darwin had observed.

Thomas Malthus was an English economist. He wrote a popular essay called "On Population." He argued that human populations have the potential to grow more quickly than the resources they need. When populations grow too large, disease and famine occur. These calamities control population size by killing off the weakest people. From Malthus, Darwin saw that populations could become too large for their resources. This overproduction of offspring could lead to a struggle for existence in which the fittest would survive.

Questions

1. Compare and contrast Lamarck's and Darwin's ideas about how species change over time.
2. Why was Charles Lyell's book on geology an important influence on Darwin?
3. Explain how Malthus' ideas about human populations formed the basis of Darwin's concept of natural selection.

Lesson 7.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Darwin's famous book on evolution is called
    a. Adventures on the Beagle
    b. On the Origin of Species
    c. Evolution by Natural Selection
    d. The Theory of Evolution
2. The book described in question 1 was first published in
    a. 1801
    b. 1830
    c. 1859
    d. 1901
3. Onboard the Beagle, Darwin served as the ship's
    a. doctor
    b. captain
    c. naturalist
    d. navigator
4. Darwin observed that the environment on different Galápagos Islands was correlated with the shell shape of
    a. snails
    b. fossils
    c. tortoises
    d. none of the above
5. What types of specimens did Darwin collect on his voyage?
    a. plants
    b. animals
    c. rocks
    d. all of the above
6. The Galápagos Islands are located off the west coast of
    a. North America
    b. Africa
    c. Australia
    d. South America
7. In Galápagos finches, Darwin noted that beak size and shape seemed to reflect
    a. types of available food

b. species of dominant predators
c. kinds of nesting materials
d. sources of fresh water

Lesson 7.1: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ islands where Darwin made many important observations
2. _____ scientist who provided geologic evidence that Earth is very old
3. _____ scientist who argued that populations have the potential to grow faster than the resources they need
4. _____ change in the inherited traits of organisms over time
5. _____ scientist who proposed that living things change over time through the inheritance of acquired characteristics
6. _____ process in which living things with beneficial traits produce more offspring so their traits increase over time
7. _____ scientist who proposed the theory of evolution by natural selection

Terms

a. natural selection
b. Lamarck
c. Galápagos
d. Lyell
e. evolution
f. Malthus
g. Darwin

Lesson 7.1: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. When he was just 22 years old, Darwin went on a scientific expedition aboard a ship called the _____-_____.
2. Darwin investigated the beaks of birds called _____ on the Galápagos Islands.
3. _____selection refers to the process in which people breed plants and animals to have useful traits.
4. A French naturalist named_____ was one of the first scientists to propose that evolution occurs.
5. The book named Principles of Geology, which influenced Darwin, was written by_____.
6. In Darwin's words, the overproduction of offspring leads to a struggle for existence in which only the _____-_____survive.
7. Darwin used the word _____ to mean the ability of an individual to reproduce and pass traits to the next generation.

Lesson 7.1: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how evolution occurs according to Darwin's theory of evolution by natural selection.

7.2 Evidence for Evolution

Lesson 7.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Evidence for evolution includes millions of fossils.
2. _____ Fossils generally form from the hard parts of organisms.
3. _____ It is very common for dead organisms to become fossils.
4. _____ Remains are less likely to become fossils if they are covered quickly by sediments.
5. _____ Some fossils form when dead organisms are frozen in glaciers.
6. _____ Relative dating can be used to determine how long ago a fossil organism lived.
7. _____ Fossil evidence shows that whales evolved from mammals that had always lived in the ocean.

Lesson 7.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Scientists have learned a lot about evolution by comparing living organisms. They have compared body parts, embryos, and molecules such as DNA and proteins.

Comparing body parts of different species may reveal evidence for evolution. For example, mammals may have front limbs that look quite different and are used for different purposes. Bats use their front limbs to fly, whales use them to swim, and cats use them to run and climb. However, the front limbs of all three animals—as well as humans—have the same basic bone structure. The similar bones provide evidence that all four animals evolved from a common ancestor.

An embryo is an organism in a very early stage of development. Embryos of different species may look quite similar, even when the adult forms look very different. For example, the embryos of chickens, turtles, pigs, and human beings look so similar that it is hard to tell them apart. Such similarities provide evidence that all four types of animals are related. They help document that evolution has occurred.

Scientists can compare the DNA or proteins of different species. If the molecules are similar, this shows that the species are related. The more similar the molecules are, the closer the relationship is likely to be. When molecules are used in this way, they are called molecular clocks. This method assumes that random mutations occur at a constant rate for a given protein or segment of DNA. Over time, the mutations add up. The longer the amount of time since two species diverged, the more differences there will be in their DNA or proteins.

Questions

1. Explain how the front limbs of different types of mammals provide evidence that they evolved from a common ancestor.
2. How does a comparison of animal embryos provide evidence for evolution?

3. The longer the amount of time since two species diverged, the more differences there will be in their DNA. Explain why.

Lesson 7.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Most of what we know about dinosaurs is based on
    a. molecular data
    b. similarities in embryos
    c. vestigial organs
    d. fossils
2. Which of the following parts of animals are most likely to be preserved as fossils?
    a. skin
    b. feathers
    c. hair
    d. teeth
3. The front limbs of whales, bats, and cats
    a. look very different
    b. are used for different purposes
    c. have the same basic bone structure
    d. all of the above
4. The use of molecular clocks assumes that
    a. more similar molecules reflect closer relationships
    b. mutations occur at an increasing rate for a given molecule
    c. most molecules are identical in all living species
    d. all of the above
5. The Grants observed an increase in the average size of finch beaks during a
    a. drought
    b. hurricane
    c. cold spell
    d. volcanic eruption
6. Fossils most often form when minerals in water turn the remains of organisms to
    a. vestigial structures
    b. sediments
    c. bones
    d. stones
7. What percent of chimpanzee DNA is the same as human DNA?
    a. 24.4
    b. 44.4
    c. 88.8
    d. 98.8

Lesson 7.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ any method of estimating the age of fossils that determines only which of two fossils is older or younger than the other
2. _____ any evidence other than organic remains that a living organism leaves behind
3. _____ molecule that is compared among species to estimate how long it has been since they diverged from a common ancestor
4. _____ hardened tree resin
5. _____ body part that is no longer used but is still present in modern organisms
6. _____ any method of estimating the age of fossils that provides an approximate age in years
7. _____ very early stage of development of an organism

Terms

a. amber
b. molecular clock
c. relative dating
d. embryo
e. trace
f. absolute dating
g. vestigial structure

Lesson 7.2: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. _____ are the preserved remains or traces of organisms that lived during earlier ages.
2. Relative dating is based on the _____ of fossils in rock layers.
3. Carbon-14 dating is a method of _____dating.
4. A scientist who studies fossils to learn about evolution is called a(n) _____.
5. Fossils found in lower rock layers are generally_____than fossils found in rock layers closer to the surface.
6. The human appendix is an example of a(n)_____ structure.
7. In the 1970s, Peter and Rosemary _____ documented evolution by natural selection taking place on the Galápagos Islands.

Lesson 7.2: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how fossils form.

7.3 The Scale of Evolution

Lesson 7.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ It takes millions of years for microevolution to occur.
2. _____ Individuals can evolve if their allele frequencies change.
3. _____ The evolution the Grants observed in finches was macroevolution.
4. _____ Population size determines how quickly allele frequencies change by genetic drift.
5. _____ A gene pool is described by its allele frequencies.
6. _____ Darwin thought that evolution occurs very quickly.
7. _____ Mutation alone can cause rapid evolution.

Lesson 7.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Macroevolution occurs when the forces of evolution work over a long period of time. Types of macroevolution include speciation, convergent evolution, and coevolution.

Speciation is the evolution of a new species. For a new species to arise, some members of an existing species must change so they can no longer produce fertile offspring with the rest of the species. Speciation often occurs when some members of a species break off from the rest. The splinter group evolves in isolation from the original species. The original species also continues to evolve. Sooner or later, the splinter group becomes too different to breed with members of the original species. At that point, a new species has formed.

A good example of speciation involves anole lizards. There are about 150 different species of anole lizards in the Caribbean Islands. Scientists think that a single species of lizard first colonized one of the islands about 50 million years ago. A few lizards from this original species eventually reached each of the other islands, where they evolved in isolation. Anoles on different islands eventually evolved traits that prevented them from mating with lizards on other islands. They had undergone speciation. Over many millions of years, all the species of anoles known today evolved.

Sometimes two species evolve the same traits because they live in similar habitats. This is called convergent evolution. Caribbean anoles demonstrate this as well. On each Caribbean island, anoles in similar habitats independently evolved the same specialized traits. For example, anoles that lived on the forest floor evolved long legs for leaping and running on the ground. Anoles that lived on tree branches evolved short legs that helped them cling to small branches and twigs. On each of the islands, there were anole species that evolved in each of these same ways.

Species that often interact with each other and have a close relationship may influence each other's evolution. Examples include flowers and the animals that pollinate them. When one of the two species evolves new traits, the other species may evolve matching traits. This is called coevolution.

Questions

1. Explain how the speciation of anole lizards occurred on the Caribbean Islands.
2. What is convergent evolution? Why does it happen?
3. Define coevolution and explain when it occurs.

Lesson 7.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Forces of evolution include
    a. gene flow
    b. genetic drift
    c. mutation
    d. all of the above
2. How did horses change as they evolved over the past 50 million years?
    a. Their body size increased
    b. Their number of toes increased
    c. Their number of legs decreased
    d. all of the above
3. In a population of 100 individuals, there are 50 AA individuals and 50 aa individuals. What is the frequency of the A allele in this population?
    a. 0.0
    b. 0.5
    c. 0.7
    d. 1.0
4. Darwin thought that evolution occurs by
    a. genetic drift
    b. natural selection
    c. mutation
    d. gene flow
5. A group of organisms that can mate and produce fertile offspring together is called a(n)
    a. gene pool
    b. population
    c. species
    d. splinter group
6. Anole lizards in similar habitats on different Caribbean Islands evolved the same traits. This is an example of
    a. coevolution
    b. speciation
    c. convergent evolution
    d. genetic drift
7. Plants and the animals that pollinate them may evolve matching traits. This is an example of
    a. gene flow

b. coevolution
c. convergent evolution
d. none of the above

Lesson 7.3: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ all the genes in all the members of a population
2. _____ random change in a small population's allele frequencies
3. _____ process in which two species evolve the same traits because they live in similar habitats
4. _____ change in allele frequencies that occurs because some genotypes are more fit than others
5. _____ number of copies of an allele divided by the total number of alleles for the gene in a gene pool
6. _____ group of organisms of the same species that live in the same area
7. _____ movement of genes into or out of a population

Terms

a. population
b. allele frequency
c. gene flow
d. convergent evolution
e. natural selection
f. genetic drift
g. gene pool

Lesson 7.3: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Evolution that occurs over a short period of time is called _____.
2. _____occurs when two species with a close relationship influence each other's evolution.
3. The ultimate source of new genetic variation in a species is_____.
4. Evolution that occurs over a long period of time is called _____.
5. The evolution of a new species is referred to as_____.
6. The unit of microevolution is the_____.
7. Macroevolution occurs above the level of the_____.

Lesson 7.3: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Discuss the rate of evolution and what affects it.

7.4 History of Life on Earth

Lesson 7.4: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ During Earth's history, continents drifted and collided.
2. _____ If Earth's history is represented by a 24-hour day, humans appear at about 8:00 pm.
3. _____ Earth's earliest atmosphere contained more oxygen than the atmosphere does today.
4. _____ A total of four mass extinctions have occurred on Earth since life began.
5. _____ Fish first evolved during the Paleozoic Era.
6. _____ The Jurassic Period is known as the golden age of mammals.
7. _____ The extinction of the dinosaurs paved the way for reptiles to take over.

Lesson 7.4: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Many scientists think that organic molecules evolved before cells, perhaps as early as 4 billion years ago. It's possible that lightning sparked chemical reactions in Earth's early atmosphere. This could have created a "soup" of organic molecules from inorganic chemicals. Some scientists think that RNA was the first organic molecule to evolve. RNA can encode genetic instructions, and some RNA molecules can also carry out chemical reactions.

All living things are made of one or more cells. How the first cells evolved is not known for certain. The earliest cells may have consisted of little more than RNA inside a lipid membrane. The first cells probably evolved between 3.8 and 4 billion years ago. These cells were heterotrophs. They were unable to make food. Instead, they got energy by "eating" organic molecules in the "soup" around them. The earliest cells were also prokaryotes. They lacked a nucleus and other organelles. Gradually, these and other traits evolved.

- Photosynthesis evolved about 3 billion years ago. After that, certain cells could use sunlight to make food. These were the first autotrophs. They made food for themselves and other cells. They also added oxygen to the atmosphere. The oxygen was a waste product of photosynthesis.
- Oxygen was toxic to many cells because they had evolved in its absence. Many of them died out. The few that survived evolved a new way to use oxygen. They used it to get energy from food by cellular respiration.
- The first eukaryotic cells probably evolved about 2 billion years ago. That's when cells evolved organelles and a nucleus. According to the most widely accepted theory, this occurred when a large cell engulfed small cells. The small cells took on special roles that helped the large cell function. In return, the small cells got nutrients from the large cell. Eventually, the large and small cells could no longer live apart.
- With their specialized organelles, eukaryotic cells were powerful and efficient. They would go on to evolve sexual reproduction. They would also evolve into multicellular organisms. The first multicellular organisms evolved about 1 billion years ago.

Questions

1. Why do some scientists think that RNA was the first organic molecule to evolve?
2. How did the evolution of the first autotrophs change Earth's atmosphere? Why did this cause many living things to die out?
3. Outline how eukaryotes evolved according to the most widely accepted theory.

Lesson 7.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Life first appeared on Earth about
    a. 4.6 billion years ago
    b. 4.0 billion years ago
    c. 4.6 million years ago
    d. 4.0 million years ago
2. The geologic time scale is based on major changes in
    a. geology
    b. climate
    c. organisms
    d. all of the above
3. Which feature of modern Earth was absent when the planet first formed?
    a. solid crust
    b. oceans
    c. atmosphere
    d. all of the above
4. The earliest living things were
    a. autotrophs
    b. heterotrophs
    c. eukaryotes
    d. two of the above
5. The first multicellular organisms evolved about
    a. 4.0 billion years ago
    b. 3.6 billion years ago
    c. 3.0 billion years ago
    d. none of the above
6. The first mass extinction on Earth occurred at the end of the
    a. Precambrian Supereon
    b. Permian Period
    c. Mesozoic Era
    d. Cretaceous Period
7. Primates and human ancestors first appeared during the
    a. Jurassic Period

b. Tertiary Period
c. Devonian Period
d. Quaternary Period

Lesson 7.4: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ major division of Earth's history that is known as the age of dinosaurs
2. _____ first major division of Earth's history
3. _____ major division of Earth's history that is called the age of mammals
4. _____ event in which the majority of Earth's species die out
5. _____ division of Earth's history into eons, eras, and periods
6. _____ major division of Earth's history that began with the Cambrian explosion
7. _____ single cell believed to have given rise to all of the following life on Earth

Terms

a. Paleozoic Era
b. Precambrian Supereon
c. Cenozoic Era
d. LUCA
e. Mesozoic Era
f. mass extinction
g. geologic time scale

Lesson 7.4: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. _____ occurs when a species completely dies out.
2. Earth formed about _____ years ago.
3. Photosynthesis first evolved about _____ years ago.
4. Coal deposits formed form huge ferns and trees that lived during the_____ Period.
5. The supercontinent that formed during the Permian Period has been named _____.
6. The earliest dinosaurs evolved during the _____Period.
7. The last ice age occurred during the _____Period.

Lesson 7.4: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how volcanic eruptions or asteroids crashing into Earth could cause a mass extinction.

CHAPTER 8 MS Prokaryotes Worksheets

Chapter Outline

8.1 Introduction to Prokaryotes

Lesson 8.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____Most prokaryotic cells are much smaller than eukaryotic cells.
2. _____Prokaryotes were the first living things to evolve.
3. _____Some prokaryotes consist of more than one cell.
4. _____Oxygen is toxic to all known prokaryotes.
5. _____Prokaryotic cells have hair-like projections called pili.
6. _____The nucleoid of a prokaryotic cell is surrounded by a membrane.
7. _____Most prokaryotes get energy and carbon from other living things.

Lesson 8.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Like all living things, prokaryotes need energy and carbon. They meet these needs in a variety of ways and in a range of habitats.

Prokaryotes may have just about any type of metabolism. They may get energy from light or from chemical compounds. They may get carbon from carbon dioxide or from other living things. Most prokaryotes get both energy and carbon from other living things. Many of them are decomposers. They break down organic wastes and remains of dead organisms. In this way, they help to recycle carbon and nitrogen through ecosystems. Some prokaryotes use energy in sunlight to make food from carbon dioxide. They do this by the process of photosynthesis. They are important producers in aquatic ecosystems.

Prokaryotes live in a wide range of habitats. For example, they may live in habitats with or without oxygen. Prokaryotes that need oxygen are described as aerobic. They use oxygen for cellular respiration. Examples include the prokaryotes that live on your skin. Prokaryotes that don't need oxygen or are poisoned by it are described as anaerobic. They use fermentation or other anaerobic processes rather than cellular respiration. Examples include many of the prokaryotes that live inside your body.

Like most other living things, prokaryotes also have a temperature range that they "like" best. Thermophiles are prokaryotes that prefer a temperature above 45 °C (113 °F). They might be found in a compost pile. Mesophiles are prokaryotes that prefer a temperature of about 37 °C (98 °C). They might be found inside the body of an animal such as you. Psychrophiles are prokaryotes that prefer a temperature below 20 °C (68 °F). They might be found deep in the ocean.

Questions

1. How do prokaryotes help recycle carbon and nitrogen through ecosystems?

2. What are major differences between aerobic and anaerobic prokaryotes?
3. Explain why prokaryotes commonly found inside the human body are mesophiles.

Lesson 8.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Which of the following statements about prokaryotes is false?
    a. All prokaryotes lack membrane-bound organelles.
    b. Prokaryotes can be seen only with the help of a microscope.
    c. Prokaryotes are the least numerous organisms on Earth.
    d. Some prokaryotes cause human diseases.
2. Prokaryote domains include
    a. Prokarya.
    b. Eukarya.
    c. Archaea.
    d. two of the above
3. Shapes of prokaryotic cells include
    a. spirals.
    b. spheres.
    c. rods.
    d. all of the above
4. A prokaryote uses its “whip” for
    a. feeling its environment.
    b. moving.
    c. capturing prey.
    d. sensing light.
5. The cell membrane of a prokaryotic cell
    a. helps the cell hold onto surfaces.
    b. makes the cell stronger and more rigid.
    c. provides a site for cellular respiration.
    d. two of the above
6. New combinations of alleles are created in prokaryotes by the process of
    a. sexual reproduction.
    b. binary fission.
    c. genetic transfer.
    d. asexual reproduction.
7. What is the function of the capsule of a prokaryotic cell?
    a. protecting the cell from chemicals
    b. preventing the cell from drying out
    c. controlling what enters and leaves the cell
    d. two of the above

Lesson 8.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ layer outside the cell wall of a prokaryote
2. _____ type of prokaryote that prefers a temperature of about 37 °C
3. _____ large coil of DNA in the cytoplasm of a prokaryotic cell
4. _____ broadest taxon in modern classifications of living things
5. _____ type of prokaryote that prefers a temperature below 20 °C
6. _____ long, thin "whip" on a prokaryotic cell
7. _____ type of prokaryote that makes food by photosynthesis

Terms

a. domain
b. cyanobacterium
c. capsule
d. psychrophile
e. nucleoid
f. flagellum
g. mesophile

Lesson 8.1: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. All living things that lack a nucleus are referred to as _____.
2. All organisms that have a nucleus in their cell(s) are called _____.
3. Most prokaryotes have one or more small loops of DNA known as _____.
4. A(n) _____ is a colony of prokaryotes that is stuck to a surface.
5. A prokaryote that prefers a temperature above 45 °C is called a(n) _____.
6. Prokaryotes can increase genetic variation by exchanging the DNA in their_____.
7. Bacteria are commonly classified by their _____.

Lesson 8.1: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast prokaryotes and eukaryotes.

8.2 Bacteria

Lesson 8.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ A book lying on your desk is likely to be covered with bacteria.
2. _____ Bacteria are the most diverse organisms on Earth.
3. _____ Bacteria stain differently with gram stain depending on whether they have a cell nucleus.
4. _____ All bacteria cause human illnesses.
5. _____ Some bacteria can be used as pesticides.
6. _____ Pickles and cheese on a cheeseburger are both made with the help of bacteria.
7. _____ Strep throat is a bacterial infection.

Lesson 8.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Bacteria are the most abundant living things on Earth. The total number of bacteria in the world is an astounding 5 million trillion trillion! Bacteria live almost everywhere, including the air, ocean, soil, and intestines of animals. They are even found in rocks deep below Earth's surface. Any surface that has not been sterilized is likely to be covered with bacteria.

Bacteria are also the most diverse organisms on Earth. Thousands of species of bacteria have been discovered, and many more are thought to exist. The known species are classified on the basis of various traits. For example, they may be classified by the shape of their cells or how they react to gram stain.

- Bacteria come in several different shapes: bacillus (rod shaped), coccus (sphere shaped), and spirillus (spiral shaped). The different shapes can be seen by examining bacteria under a light microscope.
- Different types of bacteria stain a different color when gram stain is applied to them. Bacteria that stain purple are called gram-positive bacteria. They have a thick cell wall without an outer membrane. Bacteria that stain red are called gram-negative bacteria. They have a thin cell wall with an outer membrane. These differences in structure explain why they react differently to gram stain.

Questions

1. Describe the abundance of living things in the Bacteria Domain.
2. Explain how you could classify bacteria using just a light microscope.
3. Explain why some bacteria stain purple and some stain red with gram stain.

Lesson 8.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Salmonella bacteria are
    a. prokaryotes.
    b. bacillus bacteria.
    c. a common cause of food poisoning.
    d. all of the above
2. Bacteria
    a. are the most abundant organisms on Earth.
    b. have fewer species than any other domain.
    c. can be observed only with an electron microscope.
    d. all of the above
3. Gram-positive bacteria have a(n)
    a. thick cell wall.
    b. outer membrane.
    c. cell nucleus.
    d. two of the above
4. Lyme disease is caused by bacteria that are spread by
    a. mosquitoes.
    b. black flies.
    c. deer ticks.
    d. bed bugs.
5. Bacteria live in Earth's
    a. crust.
    b. ocean.
    c. atmosphere.
    d. all of the above
6. The development of antibiotic resistance is an example of
    a. gene therapy.
    b. biotechnology.
    c. gene cloning.
    d. natural selection.
7. The best way to kill bacteria in drinking water is to
    a. raise its temperature to the boiling point (100 °C).
    b. add a large amount of chlorine bleach to it.
    c. dissolve antibiotic drugs in it.
    d. pass it through a sieve.

Lesson 8.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ sphere-shaped bacterium
2. _____ organism that spreads pathogens from host to host
3. _____ name of the dye used to color bacteria
4. _____ rod-shaped bacterium
5. _____ type of drug used to treat bacterial infections
6. _____ organism that causes disease
7. _____ spiral-shaped bacterium

Terms

a. gram
b. spirillus
c. vector
d. bacillus
e. pathogen
f. coccus
g. antibiotic

Lesson 8.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Any organism in the Bacteria Domain is called a(n) _____.
2. Without staining bacteria, you can classify them by _____.
3. Gram-positive bacteria stain the color _____.
4. Gram-negative bacteria stain the color _____.
5. Bacteria that decompose organic wastes recycle carbon and _____ in ecosystems.
6. Photosynthetic bacteria are called _____.
7. Some bacteria have developed _____ resistance so their infections are difficult to treat.

Lesson 8.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

It could be said of bacteria that we can't live with them and we can't live without them. Explain why.

8.3 Archaea

Lesson 8.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Archaeans were placed in their own domain in the late 1970s.
2. _____ Scientists now know a lot about the Archaea Domain.
3. _____ All species in the Archaea Domain are extremophiles.
4. _____ There are just three types of archaean extremophiles.
5. _____ Archaeans called acidophiles thrive at negative pH values.
6. _____ Archaeans are very common in the ocean.
7. _____ Many Archaeans live in or on other organisms.

Lesson 8.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Archaeans are prokaryotes in the Archaea Domain. They were first discovered in extreme environments such as hot springs. For a long time, they were classified as bacteria. As more was learned about them, however, they were found to be quite different from bacteria. They were finally placed in their own domain in the late 1970s.

Scientists still know relatively little about archaeans, and new species of archaeans are being discovered all the time. Many, but not all, archaeans are extremophiles. Extremophiles are organisms that live in extreme conditions. For example, some archaeans live around hydrothermal vents. Boiling hot, highly acidic water pours out of the vents. These extreme conditions don't deter archaeans. They have evolved adaptations for coping with them. Such conditions are also like those on ancient Earth. This suggests that archaeans may have evolved very early in Earth's history.

Questions

1. Why do you think archaeans were first classified as bacteria?
2. What are extremophiles?
3. What evidence suggests that archaeans may have evolved very early in Earth's history?

Lesson 8.3: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. Archaeans were first discovered
    a. in 1990.
    b. inside the human belly button.
    c. by Anton van Leeuwenhoek.
    d. in extreme environments.
2. Archaeans that live around hydrothermal vents must be able to withstand extremely
    a. high temperatures.
    b. acidic water.
    c. basic water.
    d. two of the above
3. Where might you find archaeans called hyperthermophiles?
    a. Dead Sea
    b. Mono Lake
    c. a hot spring
    d. two of the above
4. Archaeans are known to
    a. live just about everywhere on Earth.
    b. make up just 2 percent of Earth's total mass of living things.
    c. be important producers.
    d. none of the above
5. Archaeans that live inside human hosts
    a. usually harm their hosts.
    b. cause many human diseases.
    c. are more dangerous than bacteria.
    d. none of the above
6. Bodies of water that are saltier than the ocean include
    a. Mono Lake.
    b. Great Salt Lake.
    c. Dead Sea.
    d. all of the above
7. Conditions around hydrothermal vents
    a. are ideal for methanogens.
    b. are similar to conditions on ancient Earth.
    c. include extremely salty water.
    d. all of the above

Lesson 8.3: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ organism that "loves" salt
2. _____ organism that "loves" both salt and bases

3. _____ organism that "loves" acids
4. _____ organism that digests cellulose and produces methane as a waste product
5. _____ organism that "loves" very high temperatures
6. _____ any organism that "loves" extreme conditions
7. _____ organism that "loves" bases

Terms

a. acidophile
b. halophile
c. haloalkaliphile
d. hyperthermophile
e. extremophile
f. alkaliphile
g. methanogen

Lesson 8.3: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Any prokaryote that is not a bacterium is called a(n) _____.
2. Archaeans were first classified in the _____ Domain.
3. An organism with adaptations to one or more environmental extremes is called a(n) _____.
4. A(n) _____ vent is a crack on the ocean floor around which many archaea may live.
5. The type of extremophile that is adapted to water of the Great Salt Lake is a(n) _____.
6. An archaean that can reproduce in boiling water must be a(n) _____.
7. Archaeans that help cows digest tough plant fibers are called _____.

Lesson 8.3: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast two types of archaean extremophiles.

CHAPTER 9

MS Protists and Fungi Worksheets

Chapter Outline

9.1 Protists

Lesson 9.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Of all eukaryotes, protists are the simplest.
2. _____ The Protist Kingdom is sometimes called the "trash can" kingdom because it includes mainly decomposers.
3. _____ The total number of living species of protists is unknown.
4. _____ The cells of all protists contain membrane-bound organelles called chloroplasts.
5. _____ Most protists have very simple life cycles.
6. _____ Protists called protozoa are probably ancestors of plants.
7. _____ Human diseases caused by protists include giardiasis and malaria.

Lesson 9.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Fungus-like protists include slime molds and water molds. They exist as individual cells or as many cells that form a blob-like colony. They are probably ancestors of fungi. Like fungi, many fungus-like protists are decomposers. They absorb nutrients from dead logs, compost, and other organic remains.

Slime molds are commonly found on rotting organic matter such as compost. Swarms of cells move very slowly over the surface. They digest and absorb nutrients as they go. One type of slime mold is called "dog vomit" mold because it resembles dog vomit.

Water molds are commonly found in moist soil and surface water. Many water molds are plant pathogens or fish parasites. One type of water mold infiltrates potatoes and makes them unfit to eat.

Questions

1. Relate molds to fungi.
2. Describe slime molds, where they are typically found, and how they get nutrients.
3. What are water molds? What relationships do they have with other organisms?

Lesson 9.1: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. Which trait characterizes protists but not prokaryotes?
    a. cell nucleus
    b. cell membrane
    c. cell wall
    d. all of the above
2. Which statement about protists is false?
    a. They are thought be the oldest eukaryotes
    b. They probably evolved from prokaryotes
    c. Most of them are single celled
    d. Some of them have specialized cells
3. What is a benefit of sexual reproduction over asexual reproduction?
    a. Sexual reproduction can occur very quickly
    b. Sexual reproduction allows rapid population growth
    c. Sexual reproduction increases genetic variation
    d. two of the above
4. How do protozoa resemble animals?
    a. They are producers
    b. Most of them can move
    c. All of them are multicellular
    d. Some of them can grow very large
5. Examples of algae include
    a. diatoms
    b. seaweed
    c. kelp
    d. all of the above
6. Which structures do algae share with plants?
    a. roots
    b. stems
    c. leaves
    d. none of the above
7. Most protist diseases in humans are caused by
    a. water molds
    b. algae
    c. protozoa
    d. slime molds

Lesson 9.1: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ type of fungus-like protist commonly found on rotting organic matter
2. _____ common name for an animal-like protist

3. _____ temporary extension of the cytoplasm that a protozoan uses to move
4. _____ all the phases an organism goes through in its life time
5. _____ type of fungus-like protist commonly found in surface water
6. _____ common name for a plant-like protist
7. _____ appendage for movement that is found in protozoa and most prokaryotes

Terms

a. flagellum
b. alga
c. life cycle
d. water mold
e. pseudopod
f. protozoan
g. slime mold

Lesson 9.1: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. The Protist Kingdom is in the _____ Domain.
2. Algae that consist of single cells are called _____ .
3. Seaweed is an example of multicellular_____ .
4. Any fungus-like protist is commonly called a(n) _____ .
5. _____ are short, hair-like projections from protozoa that enable them to move.
6. Algae contain organelles called _____ , which allow them to make food by photosynthesis.
7. Protozoa get food by eating other organisms, so they are classified as _____ .

Lesson 9.1: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast protozoa and algae.

9.2 Fungi

Lesson 9.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Fungi obtain nutrients by absorbing organic compounds.
2. _____ Fungi used to be placed in the Animal Kingdom.
3. _____ Fungi have cell walls made of cellulose.
4. _____ All fungi are heterotrophs.
5. _____ Mycelia are always very large.
6. _____ Most fungi reproduce both sexually and asexually.
7. _____ Fungi are the only organisms that can decompose wood.

Lesson 9.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Most fungi reproduce both asexually and sexually. In both types of reproduction, they produce spores. A spore is a special reproductive cell. When fungi reproduce asexually, they can spread quickly. This is good when conditions are stable. When fungi reproduce sexually, they can increase their genetic variation. This is beneficial when conditions are changing. Variation helps ensure that at least some organisms survive the changing conditions.

During asexual reproduction, fungi produce haploid spores by mitosis of a haploid parent cell. A haploid cell has just one of each pair of chromosomes. The haploid spores are genetically identical to the parent cell. Spores may be spread by moving water, wind, or other organisms. Wherever the spores land, they will develop into new hyphae if conditions are suitable for growth.

Yeasts are an exception. They reproduce asexually by budding instead of by producing spores. An offspring cell forms on a parent cell. After it grows and develops, it buds off to form a new organism. The offspring cell is genetically identical to the parent cell.

Sexual reproduction in fungi occurs when two haploid hyphae mate. During mating, two haploid parent cells fuse. The single fused cell that results is a diploid spore. It is genetically different from both parents. The spore undergoes meiosis to form haploid daughter cells. These haploid cells develop into new hyphae.

Questions

1. Identify benefits of asexual and sexual reproduction in fungi.
2. Describe two forms of asexual reproduction in fungi.
3. Explain how fungi undergo sexual reproduction.

Lesson 9.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Which of the following is a fungus?
    a. slime mold
    b. water mold
    c. bread mold
    d. all of the above
2. Which of the following is true of all fungi?
    a. They are multicellular organisms
    b. They are heterotrophs
    c. They reproduce by budding
    d. all of the above
3. How are fungi similar to plants?
    a. They cannot move on their own
    b. They often grow in soil
    c. They have chloroplasts in their cells
    d. two of the above
4. When did the earliest fungi evolve?
    a. 600 million years ago
    b. 260 million years ago
    c. 60 million years ago
    d. 6 million years ago
5. Foods made with the help of fungi include
    a. blue cheese
    b. soy sauce
    c. bread
    d. all of the above
6. Athlete's foot is
    a. a skin infection
    b. very rare in the U.S
    c. caused by a different fungus than ringworm
    d. characterized by a rash on the hands, legs, and feet
7. Fungi can be used to produce
    a. antibiotics
    b. human hormones
    c. natural pesticides
    d. all of the above

Lesson 9.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ thread-like, multicellular structure produced by a fungus
2. _____ method of asexual reproduction in yeasts
3. _____ tough carbohydrate that makes up the cell walls of fungi
4. _____ close relationship between two species in which at least one species benefits
5. _____ body of a multicellular fungus
6. _____ reproductive cell produced by a fungus
7. _____ type of fungus that exists as single cells

Terms

a. mycelium
b. spore
c. chitin
d. symbiosis
e. yeast
f. budding
g. hypha

Lesson 9.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Mushrooms and yeasts are organisms in the_____ Kingdom.
2. The largest living thing on Earth is the_____ of a single fungus.
3. Sexual reproduction occurs in fungi when haploid _____ mate.
4. The outcome of mating in fungi is a diploid _____ .
5. _____ is a symbiotic relationship between a fungus and a plant.
6. _____ is a symbiotic relationship between a fungus and cyanobacteria or green algae.
7. A human fungal disease characterized by a ring-shaped rash is called _____ .

Lesson 9.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain the role of fungi in ecosystems.

CHAPTER 10 MS Plants Worksheets

Chapter Outline

10.1 Introduction to Plants

Lesson 10.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____The earliest plants to evolve were flowering plants.
2. _____Plants have reproductive organs that produce gametes.
3. _____Plants require oxygen for photosynthesis.
4. _____Each plant organ generally contains just one of the major types of plant tissues.
5. _____A fibrous root system has a very long primary root and few secondary roots.
6. _____After plant cells become specialized, they can no longer divide.
7. _____Most modern plants spend the majority of their life in the haploid generation.

Lesson 10.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

All plants have a life cycle that includes alternation of generations. Plants alternate between haploid and diploid generations. Haploid cells have one of each pair of chromosomes. Diploid cells have two of each pair of chromosomes.

Plants in the haploid generation are called gametophytes. They form from haploid spores. They have male and/or female reproductive organs and reproduce sexually. They produce haploid gametes by mitosis. Fertilization of gametes produces diploid zygotes. Zygotes develop into the diploid generation.

Plants in the diploid generation are called sporophytes. They form from the fertilization of gametes. They reproduce asexually. They have a structure called a sporangium that produces haploid spores by meiosis. Spores develop into the haploid generation. Then the cycle repeats.

One of the two generations of a plant's life cycle is usually dominant. Individuals in the dominant generation generally live longer and grow larger. They are the organisms that you would recognize as a fern, tree, or other plant. Individuals in the nondominant generation tend to be smaller and shorter-lived. They often live in or on the dominant plant. They may go unnoticed.

Early plants spent most of their life cycle as gametophytes. Some modern plants such as mosses still have this type of life cycle. However, almost all modern plants spend most of their life cycle as sporophytes.

Questions

1. Summarize the general plant life cycle.
2. Compare and contrast haploid and diploid generations of plants.
3. Describe the sporophyte generation of a maple tree.

Lesson 10.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. While plants are actively growing, they need
    a. sunlight
    b. temperatures above freezing
    c. carbon dioxide
    d. all of the above
2. Cuticle in plants is secreted by cells of
    a. ground tissue
    b. meristem
    c. dermal tissue
    d. vascular tissue
3. All of the following are functions of plant roots except
    a. storing food
    b. absorbing water
    c. releasing oxygen
    d. anchoring plants to the ground
4. Primary growth in plants
    a. occurs at the tips of roots
    b. allows plants to grow taller
    c. occurs only in very young plants
    d. two of the above
5. The life cycle of all plants includes
    a. alternation of generations
    b. sexual and asexual reproduction
    c. haploid and diploid generations
    d. all of the above
6. Sporophytes
    a. are plants in the diploid generation
    b. form from haploid spores
    c. produce haploid gametes
    d. none of the above
7. A sporangium
    a. produces diploid spores by mitosis
    b. produces haploid gametes by meiosis
    c. is found only in gametophytes
    d. none of the above

Lesson 10.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ type of plant tissue that transports fluids
2. _____ waxy substance secreted by plant cells that helps prevent water loss
3. _____ type of plant tissue consisting of undifferentiated cells that can continue to divide
4. _____ type of plant tissue that carries out biochemical reactions
5. _____ tiny pore in a plant leaf through which gas exchange takes place
6. _____ type of plant tissue that covers the outside of a plant
7. _____ plant organelle where photosynthesis takes place

Terms

a. dermal
b. chloroplast
c. cuticle
d. ground
e. stoma
f. vascular
g. meristem

Lesson 10.1: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Plant cells have cell walls that are made of _____.
2. _____ is the process in which plants release water vapor to the air from their leaves.
3. The vascular tissue called _____ carries water and dissolved minerals from a plant's roots to its leaves.
4. The vascular tissue called _____ carries water and dissolved sugar from a plant's leaves to other parts of the plant.
5. Plant roots that grow downward are called _____ roots.
6. Plant roots that grow out to the sides are called _____ roots.
7. _____ are plant organs that have the primary role of collecting sunlight and making food.

Lesson 10.1: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Describe and explain variation in plant leaves.

10.2 Evolution and Classification of Plants

Lesson 10.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Plants were the first organisms to colonize Earth's land surfaces.
2. _____ The earliest land plants were similar to modern ferns.
3. _____ An offspring plant is more likely to survive if it grows very close to the parent plant.
4. _____ The part of a seed plant that develops into a seed is the pollen.
5. _____ The scales of cones are modified flower petals.
6. _____ The stamen of a flower has a stalk-like filament that ends in an anther.
7. _____ All modern seed plants produce flowers and fruits.

Lesson 10.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

The most basic division of modern plants is between nonvascular and vascular plants.

Modern nonvascular plants are called bryophytes. There are about 17,000 bryophyte species. They include liverworts, hornworts, and mosses, which are the most numerous group of bryophytes. Most bryophytes are small. They lack not only vascular tissues but also true roots, leaves, seeds, and flowers. Bryophytes live in moist habitats. Without the adaptations of vascular plants, bryophytes are not very good at absorbing water. They also need water to reproduce.

Modern vascular plants are called tracheophytes. Their vascular tissues are specialized to transport fluid. This allows them to grow tall and take advantage of sunlight high up in the air. It also allows them to live in drier habitats. Most plants today are tracheophytes. There are hundreds of thousands of species of them. Although some tracheophytes, including ferns, do not produce seeds, most tracheophytes are seed plants.

Modern seed plants include gymnosperms and angiosperms. Gymnosperms are seed plants that produce naked seeds in cones. There are about 1000 species of gymnosperms. Conifers such as spruce trees are the most common group of gymnosperms. Angiosperms are seed plants that produce seeds in the ovaries of flowers. Today, they are by far the most diverse type of seed plants. In fact, the vast majority of all modern plants are angiosperms. There are hundreds of thousands of species of them. An apple tree is an example of a common angiosperm.

Questions

1. What are bryophytes? Why do bryophytes live only in moist habitats?
2. Why do you think that most modern plant species are tracheophytes?
3. Compare and contrast gymnosperms and angiosperms.

Lesson 10.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The earliest plants
    a. evolved from green algae
    b. were dominant aquatic organisms
    c. had vascular tissues
    d. evolved on land
2. Having a dominant sporophyte generation was an important adaptation for land plants because a sporophyte
    a. is haploid
    b. needs less water
    c. has a back-up copy of each gene
    d. all of the above
3. Which statement about vascular plants is false?
    a. Vascular plants evolved after seed plants had appeared
    b. Vascular plants are the dominant land plants on Earth
    c. Vascular plants have specialized tissues to transfer water
    d. Vascular plants can grow taller than nonvascular plants
4. Parts of a seed include
    a. an embryo
    b. endosperm
    c. a hull
    d. all of the above
5. Which structure finally freed plants from depending on moisture to reproduce?
    a. root system
    b. pollen tube
    c. vascular tissue
    d. seed cone
6. What is a function of flower petals?
    a. making seeds
    b. attracting pollinators
    c. forming fruits
    d. producing spores
7. Tracheophytes include
    a. ferns
    b. liverworts
    c. hornworts
    d. two of the above

Lesson 10.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ plant that produces seeds in the ovaries of flowers
2. _____ reproductive structure made of overlapping scales where naked plant seeds develop
3. _____ male reproductive organ in a flower
4. _____ plant that produces naked seeds in cones
5. _____ reproductive structure that contains a plant embryo and a food supply
6. _____ modern nonvascular plant
7. _____ female reproductive organ in a flower

Terms

a. seed
b. stamen
c. angiosperm
d. cone
e. gymnosperm
f. bryophyte
g. pistil

Lesson 10.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. The early growth and development of a plant embryo inside a seed is called _____.
2. _____ of a seed plant is a reproductive structure that contains a tiny male gametophyte enclosed in a tough capsule.
3. A(n) _____ of a seed plant is a reproductive structure that contains a tiny female gametophyte.
4. The pistil of a flower consists of a stigma, style, and _____.
5. The ovary of a flowering plant develops into a(n) _____.
6. A(n) _____ is an animal that picks up pollen from a flower and carries it to another flower.
7. Modern seed plants are called _____.

Lesson 10.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how and why the evolution of seeds revolutionized plant evolution.

10.3 Plant Responses and Special Adaptations

Lesson 10.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Plants are unable to resist predators because they cannot run away or hide.
2. _____ Plants detect and respond to the daily cycle of light and darkness.
3. _____ Plants have an immune system that protects them from disease.
4. _____ The narrow, strap-like leaves of cattails help them float on water.
5. _____ Carnivorous plants do not undergo photosynthesis to make food.
6. _____ A saguaro cactus uses its thick stem to store water.
7. _____ An orchid gets nutrients from its host tree.

Lesson 10.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Like all living things, plants detect and respond to stimuli in their environment. Unlike animals, plants can't run, fly, or swim toward food or away from danger. They are usually rooted firmly in the soil. Instead of fleeing, a plant's primary way of responding is to change how it is growing.

One way plants respond is by tropisms. A tropism is a turning toward, or away from, a stimulus in the environment. Examples of tropisms in plants include gravitropism and phototropism. Gravitropism is a response to gravity. Plant roots grow downward toward the center of Earth because of Earth's gravity. Phototropism is a response to light. Plant stems and leaves grow toward a light source.

Plants also detect and respond to daily and seasonal cycles. For example, some plants open their leaves during the day to collect sunlight and then close their leaves at night to prevent water loss. Many plants respond to the days growing shorter in the fall by going dormant. They suspend growth and development in order to survive the extreme coldness and dryness of winter.

Plants don't have an immune system, but they do respond to disease. Typically, their first line of defense is the death of cells surrounding infected tissue. This prevents the infection from spreading. Many plants also produce hormones and toxins to fight pathogens.

Questions

1. Define tropism. Compare and contrast gravitropism and phototropism.
2. Give examples that show how plants respond to cyclical stimuli.
3. How do plants respond to infections by pathogens?

Lesson 10.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Gravitropism occurs because of specialized cells in a plant's
    a. stems
    b. leaves
    c. roots
    d. flowers
2. Plant stems and leaves always grow toward
    a. the sky
    b. the equator
    c. a light source
    d. a water supply
3. Plants such as Venus fly traps consume insects to get extra
    a. energy
    b. carbon
    c. water
    d. nutrients
4. Anything in the environment that causes a response in a plant is called a
    a. tropism
    b. pathogen
    c. toxin
    d. stimulus
5. Which statement about aquatic plants is true?
    a. They have ancestors that lived on land
    b. They do not need any special adaptations
    c. They must have extensive root systems
    d. none of the above
6. Adaptations in xerophytes include
    a. widespread roots
    b. barrel-shaped stems
    c. thorns
    d. all of the above
7. Epiphytes in a rainforest use rainforest trees for
    a. food
    b. support
    c. oxygen
    d. pollination

Lesson 10.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ plant that is adapted to very dry conditions
2. _____ suspension of growth and development in a plant during periods of extreme coldness and dryness
3. _____ response of a plant to gravity
4. _____ any trait that has evolved to help an organism survive and reproduce under certain conditions
5. _____ any turning toward or away from a stimulus in the environment
6. _____ plant that grows on other plants rather than in soil
7. _____ response of a plant to light

Terms

a. adaptation
b. phototropism
c. xerophyte
d. dormancy
e. tropism
f. epiphyte
g. gravitropism

Lesson 10.3: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Primary plant roots always grow downward because of Earth's _____.
2. Some plants close their leaves at night to prevent loss of _____.
3. A(n) _____ plant is any plant that lives in water.
4. Plants called epiphytes obtain moisture from the _____.
5. _____ plants get some or most of their nutrients from other organisms.
6. A plant's primary way of responding to stimuli is to change how it is _____.
7. A plant may produce _____ to warn other plants of threats to their health.

Lesson 10.3: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain why this statement is true: Plants may be rooted in place, but they are far from helpless.

CHAPTER 11 MS Introduction to Animals Worksheets

Chapter Outline

11.1 What Are Animals?

Lesson 11.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ All animals are heterotrophs.
2. _____ Virtually all animals have internal digestion of food.
3. _____ Animals have the most complex life cycle of all eukaryotes.
4. _____ A zygote is a haploid cell that develops into an embryo.
5. _____ The larval form of an animal looks just like the adult form except smaller.
6. _____ There are almost 40 phyla in the Animal Kingdom.
7. _____ Phylum Chordata includes only vertebrates.

Lesson 11.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

The Animal Kingdom is one of four kingdoms in the Eukarya Domain. The Animal Kingdom, in turn, is divided into almost 40 phyla. Each of the top nine animal phyla has at least 10,000 species.

One basic way to divide animals is between invertebrates and vertebrates.

- Invertebrates are animals that lack a vertebral column, or backbone. All animal phyla except Phylum Chordata consist only of invertebrates. Even Phylum Chordata includes some invertebrate taxa. Invertebrates make up about 95 percent of all animal species.
- Vertebrates are animals that have a backbone. All of them are placed in Phylum Chordata. Modern vertebrates include fish, amphibians, reptiles, birds, and mammals. Only about 5 percent of animal species are vertebrates.

Questions

1. Outline how animals are classified.
2. What are invertebrates? How numerous are they?
3. How do vertebrates differ from invertebrates?

Lesson 11.1: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. Examples of organisms placed in the Animal Kingdom include
    a. sponges
    b. fungi
    c. yeasts
    d. two of the above
2. All animals have
    a. multiple cells
    b. specialized cells
    c. nuclei in their cells
    d. all of the above
3. What can animals do that other eukaryotes cannot?
    a. move on their own
    b. absorb nutrients
    c. respond to stimuli
    d. produce gametes
4. Most animals have
    a. a vertebral column
    b. specialized tissues
    c. internal digestion of food
    d. two of the above
5. Which structure is never found in animal cells?
    a. chloroplast
    b. mitochondrion
    c. cell membrane
    d. ribosome
6. The function of nerve cells in animals is to
    a. send signals to other cells
    b. produce gametes by mitosis
    c. form the vertebral column
    d. make animals flexible
7. Which of the following stages are generally included in an animal's life cycle?
    a. zygote
    b. gamete
    c. adult
    d. all of the above

Lesson 11.1: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ phylum in which all modern vertebrates are placed
2. _____ distinct juvenile form that many animals go through before becoming an adult

3. _____ another term for backbone
4. _____ domain in which the Animal Kingdom is placed
5. _____ any animal that has a backbone
6. _____ diploid cell that forms when a sperm and an egg fuse
7. _____ process in which two gametes fuse into one cell

Terms

a. vertebrate
b. Chordata
c. Eukarya
d. vertebral column
e. zygote
f. fertilization
g. larva

Lesson 11.1: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Any multicellular eukaryote in the Animal Kingdom is called a(n) _____.
2. Animals that lack a vertebral column are called _____.
3. Animal cells are flexible and can take on different shapes because they lack a cell _____.
4. Animals have specialized _____ cells that can detect light, sound, or other stimuli.
5. Most animals are diploid organisms that produce haploid gametes by _____.
6. Modern vertebrates include fish, amphibians, reptiles, birds, and _____.
7. Just about all animals produce offspring by_____ reproduction.

Lesson 11.1: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

What can animals do that other eukaryotes cannot do?

11.2 How Animals Evolved

Lesson 11.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ The earliest animals were aquatic invertebrates.
2. _____ Modern animals with just two embryonic cell layers include flatworms.
3. _____ Bilateral symmetry could evolve only after animals had evolved a distinctive head region.
4. _____ A jellyfish has a complete digestive system.
5. _____ Body segmentation increases an animal's flexibility and range of motion.
6. _____ Invertebrates with notochords include tunicates.
7. _____ Modern amniotes includes amphibians, reptiles, and birds.

Lesson 11.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Some invertebrates evolved a rigid rod along the length of their body. This rod is called a notochord. The notochord gives the body support and shape. It also provides a place for muscles to attach. It counterbalances the pull of the muscles when they contract. Animals with a notochord are called chordates. All of them are placed in Phylum Chordata. Living invertebrate chordates include tunicates.

The earliest vertebrates evolved around 550 million years ago. It happened when some chordates evolved a backbone to replace the notochord after the embryo stage. They also evolved a cranium, or bony skull. The cranium enclosed and protected the brain. The earliest vertebrates probably looked like hagfish.

Questions

1. Define Phylum Chordata.
2. What are functions of the notochord?
3. When and how did vertebrates evolve?

Lesson 11.2: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. When did the earliest animals evolve?

a. at least 630 million years ago
b. about 550 million years ago
c. about 450 million years ago
d. less than 400 million years ago

2. Which of the following animal traits evolved first?

a. body symmetry
b. coelom
c. body segmentation
d. notochord

3. Modern animals that have specialized cells but lack tissues are

a. jellyfish
b. sponges
c. flatworms
d. insects

4. Which of these animals has bilateral symmetry?

a. beetle
b. coral
c. sponge
d. none of the above

5. A notochord is adaptive because it gives the body

a. shape
b. support
c. a place for muscles to attach
d. all of the above

6. All of the following animals have segmented bodies except

a. human beings
b. ants
c. earthworms
d. roundworms

7. Flatworms are flat because they lack a(n)

a. coelom
b. notochord
c. exoskeleton
d. complete digestive system

Lesson 11.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ trait of an organism whose body is divided into multiple parts
2. _____ any animal with a notochord
3. _____ last embryonic cell layer to evolve

4. _____ fluid-filled body cavity completely enclosed by mesoderm
5. _____ any animal that produces eggs with waterproof membranes
6. _____ trait of an organism that can be divided into two identical halves
7. _____ rigid rod that runs the length of the body in some animals

Terms

a. notochord
b. symmetry
c. coelom
d. segmentation
e. chordate
f. mesoderm
g. amniote

Lesson 11.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Animals in Phylum _____ were the first terrestrial animals.
2. The first animal trait to evolve was _____.
3. The first vertebrates to live on land were _____.
4. A non-bony skeleton that covers the outside of the body is called a(n) _____.
5. Vertebrates evolved a bony skull, called a(n) _____, to enclose and protect the brain.
6. A(n) _____ digestive system has two body openings so food can move through it in just one direction.
7. An animal that can be divided into two identical halves along any diameter like a pie has _____-__ symmetry.

Lesson 11.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain the role of the amniotic egg in the evolution of animals.

CHAPTER 12

MS Invertebrates Worksheets

Chapter Outline

12.1 Sponges and Cnidarians

Lesson 12.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Almost all sponges live in fresh water.
2. _____ Adult sponges may live in colonies of many sponges.
3. _____ Collar cells in a sponge pump water out of the sponge's body.
4. _____ Jellyfish are filter feeders.
5. _____ Sponges are less complex than cnidarians.
6. _____ All cnidarians alternate between polyp and medusa forms.
7. _____ Cnidarians have an incomplete digestive system with a single opening.

Lesson 12.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Cnidarians are invertebrates such as jellyfish and corals. They belong to Phylum Cnidaria. All cnidarians are aquatic. Most of them live in the ocean, but a few species live in fresh water. Cnidarians are a little more complex than sponges. Besides specialized cells, they have tissues and radial symmetry. There are more than 10,000 cnidarian species.

Cnidarians can be found in almost all ocean habitats. Jellyfish, which spend most of their lives as medusae, may live virtually everywhere in the ocean. They prey on zooplankton, other invertebrates, and the eggs and larvae of fish.

Corals form large colonies in shallow tropical water. They are confined to shallow water because they have a symbiotic relationship with algae that live inside of them. The algae need sunlight for photosynthesis, so corals must stay relatively close to the surface of the water for the algae to get enough light. Corals exist only as polyps. They catch plankton with their tentacles. Many corals form a hard, mineral exoskeleton. Over time, this builds up to become a coral reef. Coral reefs provide food and shelter to many other ocean organisms.

Questions

1. What are cnidarians?
2. Where do jellyfish live, and how do they obtain food?
3. Why are corals confined to shallow water, and how do they catch food?

Lesson 12.1: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. Sponges have specialized
    a. cells
    b. tissues
    c. organs
    d. all of the above
2. A male sponge releases sperm into the water through a(n)
    a. porocyte
    b. osculum
    c. spicule
    d. collar cell
3. Reef sponges have symbiotic relationships with other species for which they provide
    a. shelter
    b. nutrients
    c. food
    d. water
4. Examples of cnidarians include
    a. anemones
    b. hydras
    c. corals
    d. all of the above
5. Which is function of a nematocyst?
    a. attacking prey
    b. producing gametes
    c. attaching to reefs
    d. filtering food
6. The medusa form of a cnidarian
    a. reproduces sexually
    b. is unable to move
    c. has a brain
    d. all of the above
7. The larval form of a sponge
    a. has a nerve net
    b. has cilia
    c. cannot move
    d. produces food

Lesson 12.1: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ name of the phylum to which sponges belong
2. _____ opening through which water flows out of a sponge
3. _____ specialized cell through which water enters the body of a sponge
4. _____ name of the phylum to which jellyfish belong
5. _____ one of many short, sharp projections that make up a sponge's endoskeleton
6. _____ structure that builds up over time from the exoskeletons of corals
7. _____ specialized cell that carries nutrients from digested food to the rest of the cells of a sponge

Terms

a. porocyte
b. spicule
c. coral reef
d. Porifera
e. osculum
f. Cnidaria
g. amebocyte

Lesson 12.1: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Cnidarians have one or more long, thin stingers called _____.
2. The production of light by a living organism is known as _____.
3. The internal skeleton of a sponge is called a(n) _____.
4. A(n) _____ is the tubular body form of a cnidarian.
5. A(n) _____is the bell-shaped body form of a cnidarian.
6. Asexual reproduction in sponges occurs by _____.
7. Both body forms of cnidarians have _____ symmetry.

Lesson 12.1: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast sponges and cnidarians.

12.2 Flatworms and Roundworms

Lesson 12.2: True or False

Name_____ Class_____ Date_____

Write true if the statement is true or false if the statement is false.

1. _____ All flatworms are several meters long.
2. _____ Flatworms have a concentration of nerve tissue in the head end.
3. _____ Flatworms may have several different larval stages.
4. _____ A parasitic flatworm usually needs more than one type of host to complete its life cycle.
5. _____ Phylum Nematoda has less than 800 known species.
6. _____ The body of a roundworm has a tough covering of cuticle.
7. _____ All parasitic roundworms have vertebrate hosts.

Lesson 12.2: Critical Reading

Name_____ Class_____ Date_____

Read this passage based on the text and answer the questions that follow.

Flatworms have a flat body because they lack a fluid-filled body cavity. They also have an incomplete digestive system with a single opening. However, flatworms represent several evolutionary advances in invertebrates. They have the following adaptations:

- Flatworms have three embryonic cell layers. They have a mesoderm layer in addition to ectoderm and endoderm layers. The mesoderm layer allows flatworms to develop muscle tissues so they can move easily over solid surfaces.
- Flatworms have a concentration of nerve tissue in the head end. This was a major step in the evolution of a brain. It was also needed for bilateral symmetry to evolve.
- Flatworms have bilateral symmetry. This gives them a better sense of direction than radial symmetry would.

Flatworms reproduce sexually. In most species, the same individuals produce both eggs and sperm. After fertilization occurs, the fertilized eggs pass out of the adult's body and hatch into larvae. There may be several different larval stages. The final larval stage develops into the adult form. Then the life cycle repeats.

Some flatworms are free-living organisms. They may live in water or moist soil where they eat invertebrates and decaying organic matter. Other flatworms, such as tapeworms, are parasites that live inside vertebrate hosts. They obtain nutrition directly from their hosts. Usually, more than one type of host is needed to complete the parasite's life cycle.

Questions

1. Identify three evolutionary advances that occurred in flatworms.
2. Explain how flatworms reproduce.
3. Outline two ways that flatworms obtain food.

Lesson 12.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. How many species belong to Phylum Platyhelminthes?
    a. more than 25,000
    b. fewer than 15,000
    c. about 10,000
    d. about 8,000
2. Flatworms are flat because they
    a. have an incomplete digestive system
    b. lack a pseudocoelom or coelom
    c. have just two embryonic cell layers
    d. lack a mesoderm cell layer
3. Flatworms reproduce by producing
    a. buds
    b. spores
    c. gametes
    d. none of the above
4. Both flatworms and roundworms may be found living in
    a. water
    b. moist soil
    c. vertebrate hosts
    d. any of the above
5. Which statement about roundworm reproduction is true?
    a. Sperm and eggs are produced by the same adult
    b. Fertilization occurs in the water outside the adult's body
    c. Eggs hatch into larvae, which develop into adults
    d. Reproduction may occur sexually or asexually
6. Free-living roundworms may feed on
    a. bacteria
    b. fungi
    c. protists
    d. all of the above
7. How many eggs can a single roundworm lay in a day?
    a. about 10
    b. up to 100
    c. around 1,000
    d. as many as 100,000

Lesson 12.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ name of the phylum to which roundworms belong
2. _____ common name for the type of worm that has a pseudocoelom
3. _____ parasitic roundworm with special structures for attaching to the host's intestines
4. _____ common name for the type of worm that lacks a pseudocoelom
5. _____ example of a flatworm that is a human parasite
6. _____ name of the phylum to which flatworms belong
7. _____ largest and most common parasitic worm in humans

Terms

a. hookworm
b. flatworm
c. Nematoda
d. roundworm
e. ascaris
f. Platyhelminthes
g. tapeworm

Lesson 12.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Invertebrates that belong to Phylum Platyhelminthes are commonly called _____.
2. Flatworms have a(n) _____ digestive system with a single opening.
3. Both flatworms and roundworms have _____ symmetry.
4. Invertebrates that belong to Phylum Nematoda are commonly called _____.
5. The worm named ascaris belongs to Phylum _____.
6. Roundworms that break down organic matter play an important role in the _____ cycle.
7. Hookworms enter their vertebrate host through the host's _____.

Lesson 12.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast the physical traits of flatworms and roundworms.

12.3 Mollusks and Annelids

Lesson 12.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ There are more than 100,000 known species of mollusks.
2. _____ The largest mollusk is about as big as a human adult's fist.
3. _____ A mollusk has a heart that pumps blood.
4. _____ The majority of mollusks live in moist soil.
5. _____ Annelids may have tentacles that they use for sensing or feeding.
6. _____ Annelids have a large coelom.
7. _____ Some annelids are filter feeders.

Lesson 12.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Annelids are segmented worms, such as earthworms, in Phylum Annelida. There are about 15,000 species of annelids. They range in length from less than a millimeter to more than 3 meters.

Annelids are divided into many repeating segments. Segmentation of annelids is highly adaptive. Each segment has its own nerve and muscle tissues. This allows the animal to move very efficiently. Some segments can also be specialized to carry out particular functions. They may have special structures on them. For example, they may have tentacles for sensing or feeding, "paddles" for swimming, or suckers for clinging to surfaces.

Annelids have a large coelom and several organ systems. Their organ systems include a circulatory system, an excretory system, a complete digestive system, and a nervous system. The nervous system includes a brain and sensory organs.

Most annelids can reproduce both asexually and sexually. Asexual reproduction may occur by budding or fission. Sexual reproduction varies by species. Some species go through a larval stage before developing into adults. Other species grow to adult size without going through a larval stage.

Questions

1. What are annelids? What is an example?
2. Describe annelid segmentation, and explain how it helps them survive.
3. Outline variation in annelid reproduction.

Lesson 12.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Mollusks include
    a. slugs
    b. squids
    c. scallops
    d. all of the above
2. Traits of mollusks include a(n)
    a. pseudocoelom
    b. incomplete digestive system
    c. distinct head region
    d. all of the above
3. The teeth of a sea slug are made of
    a. bone
    b. chitin
    c. cuticle
    d. cellulose
4. Which statement about mollusk reproduction is false?
    a. Mollusks may reproduce asexually or sexually
    b. Fertilization may be internal or external
    c. Most species have separate male and female sexes
    d. Fertilized eggs develop into larvae before becoming adults
5. Annelids have all of the following body systems except a(n)
    a. circulatory system
    b. excretory system
    c. nervous system
    d. incomplete digestive system
6. The body segments of annelids
    a. have their own nervous and muscle tissues
    b. may be specialized for particular functions
    c. may have structures such as tentacles or paddles
    d. all of the above
7. Earthworms get organic material by eating
    a. soil
    b. plant roots
    c. tiny invertebrates such as protozoa
    d. two of the above

Lesson 12.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ special tissue on the outer surface of a mollusk that secretes a shell
2. _____ type of annelid that feeds off the blood of a vertebrate host
3. _____ mollusk feeding organ with teeth
4. _____ name of the phylum to which snails belong
5. _____ type of annelid that lives on the ocean floor
6. _____ name of the phylum to which earthworms belong
7. _____ trait found in annelids but not in roundworms

Terms

a. Annelida
b. segmentation
c. polychaete worm
d. Mollusca
e. radula
f. leech
g. mantle

Lesson 12.3: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. The common name for any animal in Phylum Mollusca is _____.
2. Invertebrates called feather dusters are placed in Phylum _____.
3. Many mollusks have a hard outer _____ that covers the top of the body and encloses the internal organs.
4. The common name for any animal in Phylum Annelida is _____.
5. Mollusks generally have a muscular _____ that is used for walking or other purposes.
6. Asexual reproduction in annelids may occur by budding or _____.
7. Invertebrates such as clams are placed in Phylum_____.

Lesson 12.3: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Discuss the range of ways that mollusks and annelids obtain food.

12.4 Insects and Other Arthropods

Lesson 12.4: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ The wings of an insect are attached to the abdomen.
2. _____ Insect wings form from the exoskeleton.
3. _____ Arthropods have special breathing organs.
4. _____ In some arthropods, the head and the abdomen are joined together.
5. _____ The exoskeleton grows larger as the arthropod inside it grows.
6. _____ In some arthropods, newly hatched offspring look like small adults.
7. _____ Insects are the most numerous organisms on Earth.

Lesson 12.4: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Arthropods reproduce sexually. Male and female adults produce gametes. If fertilization occurs, eggs hatch into offspring.

After hatching, most arthropods go through one or more larval stages before reaching adulthood. The larvae may look very different from the adults. They change into the adult form in a process called metamorphosis. During metamorphosis, the arthropod is called a pupa. It may or may not spend this stage inside a special container called a cocoon. A familiar example of arthropod metamorphosis is the transformation of a caterpillar (larva) into a butterfly (adult).

Distinctive life stages and metamorphosis are highly adaptive. They allow functions to be divided among different life stages. Each life stage can evolve adaptations to suit it for its specific functions without affecting the adaptations of the other life stages.

Questions

1. How do arthropods reproduce?
2. Summarize an arthropod life cycle that includes metamorphosis.
3. Why are distinctive life stages and metamorphosis highly adaptive?

Lesson 12.4: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. Animals that are arthropods include all of the following except
    a. insects
    b. spiders
    c. snails
    d. centipedes
2. All arthropods have
    a. two pairs of wings
    b. six jointed legs
    c. multiple body segments
    d. all of the above
3. The purpose of molting is to
    a. shed an outgrown exoskeleton
    b. change from a larva into an adult
    c. mate with other members of the same species
    d. produce gametes for reproduction
4. Functions of the arthropod exoskeleton include
    a. preventing water loss
    b. protecting the body
    c. supporting the body
    d. all of the above
5. Which statement about insect diversity is false?
    a. Insects are the most diverse animals in the world
    b. More than half of all known organisms are insects
    c. Most insect species have already been identified
    d. There may be more than 10 million insect species in the world
6. Insects may use their antennae to
    a. smell chemicals
    b. taste chemicals
    c. hear sounds
    d. all of the above
7. The main reason insects have been so successful is their ability to
    a. molt
    b. mate
    c. jump
    d. fly

Lesson 12.4: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ shedding of the exoskeleton
2. _____ stage of an arthropod while it is going through metamorphosis
3. _____ name of the largest class of arthropods
4. _____ process in which most arthropods change from a distinct larval form to the adult form
5. _____ middle body segment of an arthropod
6. _____ name of the largest animal phylum
7. _____ substance that makes up the external skeleton of an arthropod

Terms

a. Insecta
b. metamorphosis
c. cuticle
d. Arthropoda
e. thorax
f. molting
g. pupa

Lesson 12.4: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. A(n) _____ is the common name given to any animal in the largest invertebrate phylum.
2. Most arthropods have a total of _____body segments.
3. A(n) _____ is an external skeleton, like that found in arthropods.
4. Arthropod appendages can bend because they are _____.
5. Sensory appendages on the head of an arthropod may include eyes and_____.
6. A pupa may go through metamorphosis in a special container called a(n) _____.
7. The type of life cycle in which an arthropod does not go through distinct larval stages is known as _____-_____ metamorphosis.

Lesson 12.4: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain why the arthropod exoskeleton was an important adaptation for colonizing the land.

12.5 Echinoderms and Invertebrate Chordates

Lesson 12.5: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ All echinoderms live in the ocean.
2. _____ There are about 600 living species of echinoderms.
3. _____ Echinoderms evolved from an ancestor with radial symmetry.
4. _____ Echinoderms can regrow missing body parts.
5. _____ Chordates have a central nervous system.
6. _____ The notochord provides stiffness to counterbalance the pull of muscles.
7. _____ Most living chordates are vertebrates.

Lesson 12.5: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

The term echinoderm means "spiny skin." An echinoderm's spines aren't actually made of skin. They are part of the animal's endoskeleton and just covered with a thin layer of skin. Most adult echinoderms have radial symmetry. However, echinoderms evolved from an ancestor with bilateral symmetry. You can tell because echinoderm larvae have bilateral symmetry and only develop radial symmetry as adults.

Another unique trait of echinoderms is a network of internal canals. Most of the canals have projections called tube feet. The end of each tube foot has a sucker. The suckers can stick to surfaces and help the animal crawl. The suckers can also be used to pry open the shells of prey.

Although echinoderms have a well-developed coelom and complete digestive system, they lack a centralized nervous system and do not have a heart. Some echinoderms have simple eyes that can sense light. Like annelids, echinoderms can regrow a missing body part. In fact, a complete starfish can regrow from a single "arm."

Questions

1. Explain how symmetry changes during the life cycle of an echinoderm.
2. Outline the structure and functions of an echinoderm's tube feet.
3. Identify other echinoderm traits.

Lesson 12.5: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. Echinoderms include
    a. sea stars
    b. sea squirts
    c. sea urchins
    d. two of the above
2. Echinoderms can use their tube feet to
    a. stick to surfaces
    b. pry open shells
    c. crawl
    d. all of the above
3. Echinoderms have all of the following except a
    a. heart for pumping blood
    b. well-developed coelom
    c. complete digestive system
    d. symmetrical body plan
4. Some echinoderms can reproduce asexually by
    a. producing gametes
    b. producing spores
    c. fissioning
    d. all of the above
5. At least during the embryonic stage, all chordates have
    a. a post-anal tail
    b. a hollow nerve cord
    c. pharyngeal slits
    d. all of the above
6. The earliest chordates evolved
    a. more than 500 million years ago
    b. about 100 million years ago
    c. no later than 50 million years ago
    d. within the last 5 million years
7. Which statement about lancelets is false?
    a. They are chordates
    b. They are invertebrates
    c. They lose their notochord as adults
    d. They are filter feeders as adults

Lesson 12.5: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ type of symmetry in echinoderm larvae
2. _____ name of the phylum that includes both invertebrates and vertebrates
3. _____ “spiny skin”
4. _____ type of symmetry in echinoderm adults
5. _____ name of the phylum that includes invertebrates such as sea stars
6. _____ sucker-covered appendage in an echinoderm
7. _____ defining trait of all chordates

Terms

a. notochord
b. bilateral
c. Chordata
d. tube foot
e. echinoderm
f. radial
g. Echinodermata

Lesson 12.5: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. The notochord develops into a backbone after the embryonic stage in animals called_____.
2. Pharyngeal slits in a human embryo later develop into parts of the _____.
3. Tunicates are invertebrates placed in Phylum_____.
4. Tunicates are also called sea _____.
5. Echinoderm spines are part of the animal’s internal skeleton, or_____.
6. Sand dollars are invertebrates placed in Phylum _____.
7. Any animal in Phylum Chordata is called a(n) _____.

Lesson 12.5: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast invertebrate and vertebrate chordates.

CHAPTER 13 MS Fishes, Amphibians, and Reptiles Worksheets

Chapter Outline

13.1 Introduction to Vertebrates

Lesson 13.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Amphibians were the first vertebrates that did not need water to reproduce.
2. _____ Vertebrates evolved endothermy before they evolved ectothermy.
3. _____ Amphibians evolved from a lobe-finned fish ancestor.
4. _____ All animals in Phylum Chordata are vertebrates.
5. _____ The earliest fish had a cartilage endoskeleton.
6. _____ An animal with a cartilage skeleton can grow larger than an animal with a bony skeleton.
7. _____ There are more than a million living species of vertebrates.

Lesson 13.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Like all chordates, vertebrates are animals with four defining traits, at least during the embryonic stage: notochord, dorsal hollow nerve cord, post-anal tail, and pharyngeal slits. Invertebrate chordates retain some or all of these traits, including the notochord, throughout life. Vertebrates, in contrast, develop a vertebral column, or backbone, from the notochord after the embryonic stage.

The vertebral column runs from head to tail along the dorsal (top) side of the body. It is made up of repeating units of bone called vertebrae (singular, vertebra). The vertebral column helps the vertebrate body hold its shape. It also protects the spinal nerve cord that runs through it. The vertebral column is the core of the vertebrate endoskeleton, or internal skeleton. In addition to the vertebral column, the vertebrate endoskeleton includes a cranium, or bony skull, that encloses and protects the brain; two pairs of limbs; and two limb girdles that connect the limbs to the rest of the endoskeleton.

Besides the vertebral column and the rest of the endoskeleton, most vertebrates share several other traits. The majority of vertebrates have:

- scales, feathers, fur, or hair covering their skin;
- muscles attached to the endoskeleton to allow movement;
- a circulatory system with a heart that pumps blood through a closed network of blood vessels;
- an excretory system that includes a pair of kidneys for filtering wastes out of the blood;
- a central nervous system with a brain and spinal cord, as well as nerve fibers that run throughout the body;
- an adaptive immune system that learns to recognize specific pathogens and launch tailor-made attacks against them;
- an endocrine system with glands that secrete chemical messenger molecules called hormones.

Questions

1. Explain how vertebrates differ from invertebrate chordates.
2. Describe the vertebral column and the rest of the vertebrate endoskeleton.
3. Identify several other vertebrate traits.

Lesson 13.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Of the nine classes of modern vertebrates, how many are fish?
    a. four
    b. five
    c. six
    d. three
2. What function(s) does the vertebral column of vertebrates serve?
    a. It protects the spinal cord
    b. It helps the body hold its shape
    c. It provides a counterforce to muscles
    d. all of the above
3. The vertebrate endoskeleton includes
    a. a cranium
    b. two limbs
    c. a long tail
    d. two of the above
4. Compared with cartilage, bone is
    a. more fragile
    b. stronger
    c. less flexible
    d. two of the above
5. Vertebrates have an endocrine system with glands that secrete
    a. messenger molecules
    b. digestive enzymes
    c. DNA molecules
    d. reproductive cells
6. Which statement about vertebrate reproduction is false?
    a. All vertebrates reproduce sexually
    b. Most vertebrates have separate male and female sexes
    c. All vertebrates have the same reproductive strategy
    d. Some vertebrates lay eggs
7. The earliest vertebrates to evolve were
    a. bony fish
    b. jawless fish
    c. cartilaginous fish
    d. amphibians

Lesson 13.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ development of an embryo in an egg outside the mother's body
2. _____ use of behavior to control body temperature from the outside
3. _____ reproductive strategy that occurs in almost all mammals
4. _____ tough, flexible tissue that contains collagen
5. _____ use of biology to control body temperature from the inside
6. _____ hard tissue that contains minerals in a collagen framework
7. _____ development of an embryo in an egg inside the mother's body

Terms

a. bone
b. ovovivipary
c. cartilage
d. ectothermy
e. vivipary
f. endothermy
g. ovipary

Lesson 13.1: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. Vertebrates are classified in Phylum _____.
2. The vertebral column develops from the _____ after the embryonic stage.
3. The vertebral column is made up of repeating units of bone called _____.
4. The part of the vertebrate skeleton that encloses the brain is the _____.
5. Vertebrates have limb _____ that connect the limbs to the rest of the skeleton.
6. A(n) _____ immune system can learn to recognize and attack specific pathogens.
7. _____ were the first vertebrates to live on land.

Lesson 13.1: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast vertebrate ectothermy and endothermy.

13.2 Fish

Lesson 13.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Fish have a circulatory system with a heart.
2. _____ Fish can see and hear but they can't smell or taste.
3. _____ A fish embryo develops in an egg inside the mother's body.
4. _____ Mouth brooding refers to a form of predation in some species of fish.
5. _____ There are about 28,000 living species of fish.
6. _____ Hagfish have a backbone but lack a cranium.
7. _____ Bony fish include ray-finned fish and lobe-finned fish.

Lesson 13.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Almost all fish have sexual reproduction, generally with separate sexes. Each fish typically produces large numbers of sperm or eggs. Fertilization takes place in the water outside the body in the majority of fish. Most fish are oviparous. Embryos develop in eggs outside the mother's body.

In many species of fish, reproduction includes spawning. Spawning occurs when many adult fish group together and release their sperm or eggs into the water at the same time. Spawning increases the chances that fertilization will take place. It typically results in a large number of embryos forming at once. This makes it more likely that at least some of the embryos will avoid being eaten by predators.

With spawning, fish parents can't identify their own offspring. Therefore, in most species, there is no parental care of offspring. However, there are exceptions. Some species of fish carry their fertilized eggs in their mouth until they hatch. This is called mouth brooding.

Fish eggs hatch into larvae. Each larva swims around attached to a yolk sac from the egg. The yolk sac provides it with food. Fish larvae look different from adult fish of the same species. They must go through metamorphosis to change into the adult form.

Questions

1. Describe reproduction in fish.
2. What is spawning? Why is it adaptive?
3. Describe the phenomenon of mouth brooding.

Lesson 13.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Which statement about fish is false?
    a. Most fish are endothermic
    b. Fish have a nervous system with a brain
    c. Fish make up more than half of all living vertebrate species
    d. Fish brains are small compared with the brains of other vertebrates
2. Fish generally have
    a. sexual reproduction
    b. external fertilization
    c. separate sexes
    d. all of the above
3. Fish larvae swim around attached to
    a. their mother
    b. a yolk sac
    c. each other
    d. none of the above
4. Which class(es) of fish lack scales?
    a. hagfish
    b. lampreys
    c. bony fish
    d. two of the above
5. Cartilaginous fish such as sharks lack
    a. a vertebral column
    b. jaws
    c. a swim bladder
    d. fins
6. Most modern fish are
    a. bony fish
    b. cartilaginous fish
    c. hagfish
    d. lampreys
7. The majority of fish are
    a. decomposers
    b. parasites
    c. predators
    d. producers

Lesson 13.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ inflatable fish organ that allows a fish to rise or sink in the water
2. _____ common reproductive behavior in fish
3. _____ fish organ that functions like a paddle or rudder
4. _____ most primitive class of fish
5. _____ fish organ that absorbs oxygen from water
6. _____ fish class that includes sharks
7. _____ ray-finned or lobe-finned fish

Terms

a. hagfish
b. bony fish
c. swim bladder
d. cartilaginous fish
e. spawning
f. fin
g. gill

Lesson 13.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Fish larvae must go through _____ to change into adults.
2. _____ are blood-sucking fish that lack scales.
3. _____ are named for a lung-like organ they can use for breathing air.
4. Most fish are covered with overlapping tissues called _____ that reduce friction with the water.
5. Water enters a fish's mouth, passes over the _____, and then exits the body.
6. Coelacanths and lungfish are classified as _____ fish.
7. The majority of living fish species are placed in the fish class called _____ fish.

Lesson 13.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Summarize how fish are classified.

13.3 Amphibians

Lesson 13.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Amphibians are thought to have evolved from cartilaginous fish.
2. _____ The mucous glands of some species of amphibians secrete toxins.
3. _____ The respiratory and reproductive systems of amphibians share a single body cavity.
4. _____ Frogs have a larynx that allows them to make sounds.
5. _____ Amphibians are oviparous.
6. _____ Amphibian parents typically guard their eggs and defend their larvae from predators.
7. _____ All known species of amphibians are placed in one of three orders.

Lesson 13.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

There are only about 6,200 known living species of amphibians. They are placed in three orders: frogs, salamanders, and caecilians.

The frog order includes toads as well as frogs. Unlike other amphibians, frogs and toads lack a tail by adulthood. Their back legs are also longer because they are specialized for jumping. Frogs can jump as far as 20 times their body length. That's like you jumping more than the length of a basketball court!

The salamander order includes both salamanders and newts. Salamanders and newts keep their tails as adults. They have a long body with short legs. They are adapted for walking and swimming rather than jumping. Unlike other vertebrates, salamanders can regrow legs or other body parts if they are bitten off by a predator.

The caecilian order is the amphibian order with the fewest species. Caecilians are closely related to salamanders. They have a long, worm-like body. They are the only amphibians without legs. Caecilians evolved from a four-legged ancestor but lost their legs later in their evolution. As adults, they often burrow into the soil. That's one reason why Caecilians tend to be less well known than other amphibians.

Questions

1. Summarize how amphibians are classified.
2. Explain how frogs are adapted for jumping whereas salamanders are adapted for walking and swimming.
3. What are two reasons that caecilians are not familiar to most people?

Lesson 13.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Amphibians have all of the following except
    a. sensory organs
    b. a digestive system
    c. an excretory system
    d. scales
2. Which statement about amphibian reproduction is true?
    a. Most amphibians reproduce asexually as well as sexually
    b. Fertilization may take place inside or outside the body
    c. Amphibian embryos develop inside the mother's body
    d. Amphibians produce amniotic eggs that do not dry out
3. Frog larvae
    a. live in water
    b. resemble fish
    c. lack legs
    d. all of the above
4. When a frog larva goes through metamorphosis it
    a. develops lungs
    b. grows a tail
    c. loses its swim bladder
    d. all of the above
5. The only continent where amphibians do not live is
    a. Australia
    b. Antarctica
    c. Africa
    d. South America
6. Animals that prey on amphibians include
    a. birds
    b. snakes
    c. fish
    d. all of the above
7. Amphibians live in all of the following habitats except
    a. saltwater lakes
    b. freshwater lakes
    c. freshwater ponds
    d. moist soil

Lesson 13.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ amphibian order that includes newts
2. _____ substance that keeps amphibian skin moist
3. _____ organs that amphibian adults use to breathe
4. _____ amphibian order that has the fewest species
5. _____ protein in amphibian skin
6. _____ multi-purpose body cavity in amphibians
7. _____ organs that amphibian larvae use to breathe

Terms

a. lungs
b. mucus
c. cloaca
d. gills
e. salamander
f. caecilian
g. keratin

Lesson 13.3: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. _____ were the first vertebrates to evolve four legs and colonize the land.
2. Amphibians become sluggish in cool weather because they are _____.
3. Amphibians breathe with gills or lungs and absorb extra oxygen through their _____.
4. An opening in the _____ allows wastes and gametes to exit an amphibian's body.
5. The early larval stage of a frog is called a(n) _____.
6. Toads are placed in the _____ order of amphibians.
7. The only amphibians without legs are placed in the _____ order.

Lesson 13.3: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain why amphibians are at high risk of extinction.

13.4 Reptiles

Lesson 13.4: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ The reptile class is one of the smallest classes of vertebrates.
2. _____ The brain of most reptiles is less complex than the amphibian brain.
3. _____ Reptile hatchlings look like smaller versions of the adults of their species.
4. _____ There are more than 8,200 living species of reptiles.
5. _____ Some snakes use their tongue to inject poison into their prey.
6. _____ Crocodilians have greater intelligence than other reptiles.
7. _____ Snakes evolved from a four-legged ancestor.

Lesson 13.4: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Modern reptiles live in many different habitats. They can be found on every continent except Antarctica.

Many turtles are aquatic. They may live in the ocean or in fresh water. Other turtles are terrestrial and live on land. All lizards are terrestrial. Their habitats may range from deserts to rainforests. They may live in a range of places, from underground burrows to the tops of trees. Most snakes are terrestrial, but some are aquatic. Crocodilians live in and around swamps or bodies of water. The water may be fresh or salty, depending on the species of crocodilian.

All reptiles are heterotrophs, and the majority eats other animals. Heterotrophs that eat only or mainly animals are called carnivores. Large carnivorous reptiles such as crocodilians are the top predators in their ecosystems. They prey on large birds, fish, deer, turtles, and sometimes farm livestock. Their powerful jaws are strong enough to crush bones and turtle shells. Smaller carnivorous reptiles—including tuataras, snakes, and many lizards—are lower-level predators. They prey on small animals such as insects, frogs, birds, and mice.

Most terrestrial turtles eat plants. Heterotrophs that eat only or mainly plants are called herbivores. Herbivorous turtles graze on grasses, leaves, flowers, and fruits. Marine turtles and some lizards feed on both plants and animals. Heterotrophs that eat a variety of foods including both plants and animals are called omnivores.

Questions

1. Summarize the range of habitats where modern reptiles live.
2. Describe some of the roles that reptiles play in their ecosystems.
3. Which reptiles are herbivores? What do they eat?

Lesson 13.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. All of the following are reptiles except
    a. turtles
    b. lizards
    c. salamanders
    d. gharils
2. Reptiles have a
    a. heart
    b. cloaca
    c. diaphragm
    d. all of the above
3. Which statement about reptile reproduction is false?
    a. Reptiles have internal fertilization
    b. Reptiles release sperm or eggs into fresh water
    c. Reptiles are oviparous
    d. Reptiles do not have a larval stage
4. The only reptile order that includes animals without legs is the
    a. Crocodilia Order
    b. Sphenodontia Order
    c. Squamata Order
    d. Testudines Order
5. The only reptiles that defend their eggs and hatchlings from predators are female
    a. alligators and crocodiles
    b. turtles and tortoises
    c. snakes and lizards
    d. none of the above
6. Terrapins are reptiles placed in the
    a. Crocodilia Order
    b. Sphenodontia Order
    c. Squamata Order
    d. Testudines Order
7. The majority of reptiles are
    a. herbivores
    b. omnivores
    c. carnivores
    d. decomposers

Lesson 13.4: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ order of reptiles that includes lizards and snakes
2. _____ organism that eats both plants and animals
3. _____ order of reptiles that includes turtles and tortoises
4. _____ organism that eats only animals
5. _____ order of reptiles that includes only tuataras
6. _____ order of reptiles that includes alligators and caimans
7. _____ breathing muscle in reptiles and mammals

Terms

a. Sphenodontia
b. diaphragm
c. Crocodilia
d. carnivore
e. omnivore
f. Squamata
g. Testudines

Lesson 13.4: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. _____ were the first vertebrates to lay amniotic eggs.
2. Reptile skin is covered with_____.
3. Reptiles use their _____ to smell scents in the air.
4. Adult reptiles release sperm or eggs into a body cavity called a(n) _____.
5. The least specialized of all living reptiles are placed in the _____ Order.
6. Modern reptiles can be found on every continent except _____.
7. Reptiles that eat only plants are called _____.

Lesson 13.4: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Discuss adaptations of reptiles for life on land.

CHAPTER 14 MS Birds and Mammals Worksheets

Chapter Outline

14.1 Birds

Lesson 14.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ The largest bird is about 2 meters tall.
2. _____ Birds evolved from a four-legged ancestor.
3. _____ Birds' brains are small for their body size.
4. _____ All birds build nests the same way.
5. _____ Only mother birds take care of the eggs and hatchlings.
6. _____ Many perching birds are songbirds.
7. _____ About a quarter of all birds are flightless.

Lesson 14.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Birds reproduce sexually and have separates sexes. Fertilization occurs internally, so males and females must mate. Many bird species have special behaviors, such as unique songs or visual displays, for attracting mates. These special behaviors are called courtship. For example, a peacock puts on a stunning display of his amazing tail feathers to court a mate.

After mating and fertilization occur, eggs are laid, usually in a nest. Most birds build nests for their eggs and hatchlings, and each species has a certain way of doing it. Nests range from little more than a depression in the ground to elaborately built structures.

In most species, one or both parents take care of the eggs. They sit on the eggs to keep them warm until they hatch. This is called incubation. After the eggs hatch, the parents generally continue their care. They feed the hatchlings until they are big enough to feed on their own. This is usually at a younger age in ground-nesting birds such as ducks than in tree-nesting birds such as robins.

Questions

1. Summarize how birds reproduce.
2. Explain the purpose of courtship behaviors.
3. What are some ways that birds increase the chances that their offspring will survive?

Lesson 14.1: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. Birds
    a. have two limbs
    b. are bipedal
    c. have two pairs of wings
    d. all of the above
2. Which statement about birds is false?
    a. Birds are the most numerous class of vertebrates
    b. Birds are the vertebrate class that evolved most recently
    c. Some birds lost the ability to fly during their evolution
    d. Like reptiles, birds lay amniotic eggs and are ectothermic
3. All birds have
    a. a beak
    b. feathers
    c. air sacs
    d. all of the above
4. Which statement about bird reproduction is true?
    a. Reproduction can be sexual or asexual
    b. Separate sexes produce sperm and eggs
    c. Fertilization of gametes is external
    d. Parents provide no care to their offspring
5. How many orders of flying birds are there?
    a. 2
    b. 7
    c. 9
    d. 29
6. All of the following birds can fly except for the
    a. moa
    b. hawk
    c. gull
    d. crow
7. On which continent(s) do birds live?
    a. Africa
    b. Antarctica
    c. Australia
    d. all of the above

Lesson 14.1: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ organism that eats many different types of food
2. _____ process of keeping eggs warm until they hatch
3. _____ organism that eats just one type of food
4. _____ member of the order of flying birds that has more species than all other bird orders combined
5. _____ of or relating to an animal that walks on two legs
6. _____ member of the order of flying birds in which birds hunt for prey at night
7. _____ type of animal behavior that is used to attract mates

Terms

a. nocturnal raptor
b. bipedal
c. courtship
d. specialist
e. incubation
f. generalist
g. perching bird

Lesson 14.1: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. _____ are four-limbed, endothermic vertebrates that lay amniotic eggs.
2. _____ are structures in birds that provide air resistance, lift, and insulation.
3. Large flight muscles in the _____ control the wings of birds.
4. The front limbs of birds evolved into _____ .
5. Most birds build _____ for their eggs and hatchlings.
6. There are a total of about _____ living species of birds.
7. The majority of flying birds are _____ birds.

Lesson 14.1: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain the significance of flight in birds.

14.2 Mammals

Lesson 14.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ The ears of mammals have specialized structures that make them extremely good at hearing.
2. _____ The limbs of most mammals are specialized for a particular way of moving.
3. _____ Compared with the cells of other animals, the cells have mammals have more nuclei.
4. _____ Shivering helps the mammalian body generate heat to stay warm.
5. _____ Some mammals consume leaf litter and wood.
6. _____ Mammals that are herbivores include wolves and seals.
7. _____ Only placental mammals give birth to live young.

Lesson 14.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Placental mammals get their name from the placenta. This is a spongy structure that develops during pregnancy only in placental mammals. The placenta sustains the fetus while it grows inside the mother's uterus. It consists of membranes and blood vessels from both mother and fetus. It allows substances to pass between the mother's blood and that of the fetus. The fetus gets oxygen and nutrients from the mother. It passes carbon dioxide and other wastes to the mother. The placenta permits a long period of fetal growth. As a result, the fetus can become relatively large and mature before birth. This increases its chances of survival. On the other hand, supporting a growing fetus may be difficult for the mother. She has to eat more while pregnant and may become less mobile as the fetus grows larger. Giving birth to a large infant is also risky.

By giving birth to tiny embryos, marsupial mothers are at less risk. However, the tiny newborn marsupial may be less likely to survive than a newborn placental mammal. The marsupial embryo completes its growth and development outside the mother's body in a pouch. It gets milk by sucking on a nipple in the pouch. There are very few living species of marsupials. They include kangaroos, koalas, and opossums.

There are even fewer living species of monotremes, or egg-laying mammals. They include the echidna and platypus. Monotremes are found only in Australia and the nearby island of New Guinea. Female monotremes lack a uterus and vagina. Instead, they have a cloaca with one external opening, like the cloaca of reptiles and birds. The opening is used to excrete wastes as well as lay eggs. The eggs of monotremes have a leathery shell, like the eggs of reptiles. Female monotremes have mammary glands but not nipples. They secrete milk to feed their young from a patch on their belly. This form of reproduction is least risky for the mother but most risky for the offspring.

Questions

1. Describe the placenta and explain its function.

2. Compare and contrast reproduction in placental and marsupial mammals.
3. Identify risks to the mother of the three types of reproduction in mammals.

Lesson 14.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Traits of mammals include
    a. hair or fur
    b. amniotic eggs
    c. four limbs
    d. all of the above
2. The fastest land animal is the
    a. horse
    b. deer
    c. cheetah
    d. kangaroo
3. Mammals classified as frugivores
    a. include chimpanzees
    b. eat mainly insects
    c. are also called carnivores
    d. two of the above
4. Which mammals are oviparous?
    a. monotreme mammals
    b. marsupial mammals
    c. placental mammals
    d. none of the above
5. All of the following mammals are marsupials except for
    a. koalas
    b. echidnas
    c. opossums
    d. kangaroos
6. Which mammals have a cloaca instead of a uterus and vagina?
    a. placental mammals
    b. marsupial mammals
    c. monotreme mammals
    d. none of the above
7. Subclasses of mammals include
    a. insectivores
    b. marsupials
    c. primates
    d. all of the above

Lesson 14.2: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ mammal that gives birth to a tiny embryo
2. _____ salty fluid secreted by glands in the skin of most mammals
3. _____ mammal that lays eggs
4. _____ temporary spongy structure that supports the fetus of a placental mammal
5. _____ process of producing milk for an offspring
6. _____ mammal that gives birth to a large and well-developed fetus
7. _____ tiny air sac in mammalian lungs

Terms

a. alveolus
b. placenta
c. placental mammal
d. lactation
e. marsupial mammal
f. sweat
g. monotreme mammal

Lesson 14.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Glands in female mammals that produce milk for offspring are called _____ glands.
2. Mammals have a total of _____ different types of teeth.
3. Glands in mammalian skin that produce a salty fluid are called_____ glands.
4. Mammals generate heat mainly by maintaining a high rate of _____ .
5. Mammals have a layer of insulating _____ beneath their skin.
6. Mammals that eat only or mainly plant foods or algae are classified as _____ .
7. Carnivorous mammals that eat mainly insects are known as _____ .

Lesson 14.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how mammals control their body temperature.

14.3 Primates

Lesson 14.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Prosimian primates include monkeys and apes.
2. _____ Primates evolved from arboreal ancestors.
3. _____ Humans are the only primates that have color vision.
4. _____ Primates have relatively slow rates of development compared with other mammals of a similar size.
5. _____ Most modern primates live in trees at least some of the time.
6. _____ Chimpanzees eat only fruit and other plant foods.
7. _____ Human beings are the only primates that can make and use tools.

Lesson 14.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

A number of traits set primates apart from other orders of placental mammals. Primates evolved from tree-living, or arboreal, ancestors. As a result, many primate traits are adaptations for life in the trees. Living in trees requires good grasping ability. Being able to judge distances is also important.

Primates have five digits (fingers or toes) on each extremity. Unlike the hooves of horses or the paddles of whales, the digits of primates are relatively unspecialized. Therefore, they can be used to do a variety of tasks, including grasping branches and holding tools. Most primates have opposable thumbs. An opposable thumb can be brought into opposition with the other fingers of the same hand. This allows the hand to grasp and hold things.

Primates usually rely more on the sense of vision than the sense of smell, which is the dominant sense in many other mammals. The importance of vision in primates is reflected by the bony socket that surrounds and protects the primate eye. Primates have widely spaced eyes in the same plane that give them stereoscopic (3-D) vision, needed for judging distances. Some primates, including humans, have also evolved color vision.

Primates tend to have bigger brains for their body size than other mammals. This is reflected in their relatively high level of intelligence and their dependence on learned behavior. Primates have slower rates of development than other mammals their size. They reach maturity later and have longer lifespans. Being dependent on adults for a long maturation period gives young primates plenty of time to learn from their elders.

Questions

1. Primates have relatively unspecialized digits. What does this mean, and why might it be adaptive?
2. Describe the primate sense of vision.
3. Relate the rate of development in primates to their dependence on learned behavior.

Lesson 14.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Primates include all of the following mammals except
    a. lemurs
    b. koalas
    c. tarsiers
    d. orangutans
2. Many primate traits are adaptations for life in the
    a. water
    b. desert
    c. trees
    d. mountains
3. Compared with other mammals, primates tend to have
    a. larger brains
    b. more specialized digits
    c. shorter lifespans
    d. two of the above
4. Most primate species are
    a. carnivores
    b. herbivores
    c. omnivores
    d. none of the above
5. Which statement about prosimians is false?
    a. They are generally smaller than other primates
    b. They are thought to be similar to the earliest primates
    c. They include New World and Old World monkeys
    d. There are fewer of them than non-prosimian primates
6. An opposable thumb can be brought into opposition with the
    a. thumb on the opposite hand
    b. other fingers on the same hand
    c. wrist above the thumb
    d. palm of the opposite hand
7. Except for human beings, most modern primates live in
    a. tropical rainforests
    b. high mountain regions
    c. aquatic environments
    d. open plains and fields

Lesson 14.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ type of vision that characterizes primates
2. _____ of or relating to an animal that lives in trees
3. _____ example of an Old World non-prosimian primate
4. _____ group of primates that includes lemurs and lorises
5. _____ moving through trees by swinging from branch to branch
6. _____ example of a New World non-prosimian primate
7. _____ type of thumb found in primates

Terms

a. vervet
b. brachiation
c. squirrel monkey
d. arboreal
e. stereoscopic
f. prosimians
g. opposable

Lesson 14.3: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Human beings belong to the _____ Order of mammals.
2. Primates have a total of _____ fingers or toes on each extremity.
3. The dominant sense in most primates is the sense of _____ .
4. The preferred food for almost all primates except humans is _____ .
5. Primates have a bony _____ that surrounds and protects the eye.
6. Primates have 3-D vision because both eyes are in the same _____ .
7. Tarsiers and humans are grouped together as _____ primates.

Lesson 14.3: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Identify two primate traits that are adaptive for an arboreal lifestyle, and explain why they are adaptive.

CHAPTER 15 MS Animal Behavior Worksheets

Chapter Outline

15.1 Understanding Animal Behavior

Lesson 15.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ An example of an innate behavior is a duckling following its mother wherever she goes.
2. _____ An example of a learned behavior is a monkey using a rock as a tool.
3. _____ Innate animal behaviors are always simple and easy to perform.
4. _____ A bee learns to do the waggle dance by observing the behavior in other bees.
5. _____ The only innate behaviors in human beings are reflex behaviors.
6. _____ Learning by conditioning always involves a reward.
7. _____ The more intelligent a species is, the more it depends on learned behaviors.

Lesson 15.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Learned behavior is behavior that occurs only after experience or practice. Most animals are capable of learning, but animals that are more intelligent are better at learning and depend more on learned behaviors. The big advantage of learned behaviors over innate behaviors is that learned behaviors are flexible. They can be changed to suit changing conditions. There are several different ways in which animals learn. Two ways are habituation and learning through play.

One of the simplest ways of learning that occurs in just about all animals is habituation. Habituation means learning to get used to something after being exposed to it repeatedly. It usually involves getting used to something that is frightening or annoying but not dangerous. Habituation lets animals ignore things that won't harm them. It allows them to avoid wasting time and energy escaping from things that aren't really dangerous.

Many animals, especially mammals, spend a lot of time playing when they are young. Although playing is fun, it's likely that animals play for other reasons as well. Learning behaviors that will be important in adulthood is one likely outcome of play. For example, bear cubs play by pretending to fight with each other. Through this type of play, they may be learning skills such as fighting and hunting that they will need as adults. Other young animals may play in different ways. For example, young deer play by running and kicking up their hooves. This may help them learn how to escape from predators. Human children learn by playing as well. For example, playing games and sports may help them learn how to follow rules and work with others.

Questions

1. What is the main advantage of learned behaviors?
2. Explain how animals learn by habituation.
3. What might young animals learn by playing?

Lesson 15.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Behaviors controlled by genes that help an animal survive or reproduce
    a. increase fitness.
    b. evolve by natural selection.
    c. become more common in the species.
    d. all of the above
2. Compared with learned behaviors, innate behaviors are more
    a. flexible.
    b. predictable.
    c. variable.
    d. all of the above
3. Which of the following animal behaviors is a learned behavior?
    a. building a nest
    b. spinning a web
    c. making a cocoon
    d. using a twig as a tool
4. When a human infant grasps a finger placed in its palm, it is performing a(n)
    a. learned behavior.
    b. conditioned response.
    c. reflex behavior.
    d. insight behavior.
5. Ways animals may learn behaviors include
    a. observing.
    b. playing.
    c. conditioning.
    d. all of the above
6. When you teach a dog to sit on command by rewarding it with treats, the type of learning involved is
    a. insight learning.
    b. conditioning.
    c. reflex learning.
    d. habituation.
7. Which types of animals have been observed making and using tools to solve problems?
    a. only humans
    b. only primates
    c. only mammals
    d. both mammals and birds

Lesson 15.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ any behavior that occurs only after experience or practice
2. _____ way of learning that involves a reward or punishment
3. _____ any way that an animal interacts with other animals or the environment
4. _____ learning from past experiences and reasoning
5. _____ simple response that always occurs when a certain stimulus is present
6. _____ learning to get used to something after being exposed to it repeatedly
7. _____ any behavior that occurs naturally in all the animals of a given species

Terms

a. habituation
b. innate behavior
c. reflex behavior
d. animal behavior
e. conditioning
f. learned behavior
g. insight learning

Lesson 15.1: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Another term for innate behavior is _____.
2. The waggle dance in bees is an example of a(n) _____ behavior.
3. The only innate behaviors in human beings are _____ behaviors.
4. Learning by watching and copying the behavior of someone else is called _____ learning.
5. The first time an animal performs a(n) _____ behavior, the animal does it well.
6. All members of a species perform a(n) _____ behavior in exactly the same way.
7. _____ learning generally involves coming up with new ways to solve problems.

Lesson 15.1: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Identify two examples of innate behavior in animals and explain how they increase fitness.

15.2 Types of Animal Behavior

Lesson 15.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Animals that communicate with sounds include frogs, birds, and monkeys.
2. _____ In a honeybee colony, most of the adult bees are drones.
3. _____ The only way animals cooperate is by sharing food.
4. _____ All birds have the same courtship behaviors.
5. _____ Animals are more likely to put on a defensive display than fight to defend their territory.
6. _____ Animals that hibernate include some species of bats, squirrels, and snakes.
7. _____ Only the human species has a biological clock to control circadian rhythms.

Lesson 15.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Some of the most important behaviors in animals involve reproduction. They include behaviors to attract mates and behaviors for taking care of the young.

Mating is the pairing of an adult male and an adult female animal for the purpose of reproduction. In many animal species, females choose the males they will mate with. For their part, males try to show females that they would be better mates than other males. To be chosen as mates, males may perform courtship behaviors. These are special behaviors that help attract a mate. Male courtship behaviors are meant to get the attention of females and show off the male's traits. Different species of animals have different courtship behaviors.

In most species of birds and mammals, one or both parents care for the young. This may include building a nest or other shelter. It may also include feeding the young and protecting them from predators. Caring for the young increases their chances of surviving. This, in turn, increases the parents' fitness, so such behaviors evolve by natural selection.

Emperor penguins make great sacrifices to take care of their young. After laying an egg, a penguin mother returns to the sea for two months to feed. Her mate stays behind to keep the egg warm. He balances the egg on top of his feet to keep it warm for the entire time the mother is away. During this time, he goes without food. To survive the cold, he huddles together with other males. If the chick hatches before the mother returns, the father feeds it with a high-protein, high-fat substance he produces just for this purpose.

Questions

1. What are courtship behaviors? What is their purpose?
2. How does caring for offspring increase the fitness of parents?
3. Describe parental care in emperor penguins.

Lesson 15.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Nonhuman animals may communicate using
    a. hearing.
    b. sight.
    c. smell.
    d. any of the above
2. How do ants communicate the location of a food source?
    a. They do a waggle dance.
    b. They mark the trail to the food source with chemicals.
    c. They use gestures to point toward the food source.
    d. none of the above
3. The most important way that humans communicate is with
    a. facial expressions.
    b. gestures.
    c. language.
    d. body postures.
4. Social animals include
    a. bees.
    b. ants.
    c. wolves.
    d. all of the above
5. A dog marks its territory by
    a. releasing chemicals in urine.
    b. barking and growling.
    c. showing its teeth.
    d. raising its fur.
6. Which statement about animal migration is false?
    a. Migration is most common in birds, fish, and insects.
    b. All birds migrate south for the winter.
    c. Migrating animals generally follow the same route each year.
    d. Migration is triggered by changes in the environment.
7. The biological clock causes changes in biology and behavior that repeat every
    a. month.
    b. week.
    c. year.
    d. day.

Lesson 15.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ use of symbols to communicate
2. _____ of or relating to animals that are active during the day
3. _____ animal that lives in a group with other members of its species
4. _____ of or relating to animals that are active during the night
5. _____ any way that animals share information
6. _____ daily cycle of behavior
7. _____ tiny structure in the brain that controls circadian rhythms

Terms

a. biological clock
b. circadian rhythm
c. communication
d. nocturnal
e. social animal
f. language
g. diurnal

Lesson 15.2: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. _____ is any type of behavior in which animals work together with other animals of the same species.
2. Male animals perform _____ behaviors to get the attention of females and show off the males' traits.
3. _____ is an annual state in which an animal's body processes slow down and its body temperature falls.
4. The annual movement of animals from one place to another where more resources are available is called _____.
5. The pairing of an adult male and an adult female for the purpose of reproduction is termed _____.
6. In a bee colony, the three types of adult bees are the queen, workers, and _____.
7. The biological clock is controlled by changes in the amount of light entering the _____.

Lesson 15.2: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain the importance of communication in social animals.

CHAPTER 16

MS Skin, Bones, and Muscles Worksheets

Chapter Outline

16.1 Introduction to the Human Body

Lesson 16.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Each cell of the body carries out basic life processes.
2. _____ Most human cells have specialized functions.
3. _____ There are a total of five basic types of human tissues.
4. _____ The skin consists mainly of muscle tissue.
5. _____ Neurons are cells that can send and receive electrical messages.
6. _____ Smooth muscle tissue is found in the heart.
7. _____ Connective tissues are found in the walls of blood vessels.

Lesson 16.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

The organ systems of the body work together to carry out life processes and maintain homeostasis. The body is in homeostasis when its internal environment is kept more-or-less constant. For example, levels of sugar, carbon dioxide, and water in the blood must be kept within narrow ranges. This requires continuous adjustments. For example:

- After you eat and digest a sugary snack, the level of sugar in your blood quickly rises. In response, the endocrine system secretes the hormone insulin. Insulin helps cells absorb sugar from the blood. This causes the level of sugar in the blood to fall back to its normal level.
- When you work out on a hot day, you lose a lot of water through your skin in sweat. The level of water in the blood may fall too low. In response, the excretory system excretes less water in urine. Instead, the water is returned to the blood to keep water levels from falling lower.

What happens if homeostasis is not maintained? Cells may not get everything they need, or toxic wastes may build up in the body. If homeostasis is not restored, it may cause illness or even death.

Questions

1. What is homeostasis? How is it maintained?
2. Explain why your urine may become more concentrated when you work out on a hot day.
3. Explain what happens if homeostasis is not maintained.

Lesson 16.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Which of the following is a human connective tissue?
    a. skin
    b. muscle
    c. blood
    d. none of the above
2. The type of tissue that secretes hormones and absorbs nutrients is
    a. muscle tissue.
    b. nerve tissue.
    c. epithelial tissue.
    d. connective tissue.
3. Types of muscle tissue include
    a. skeletal muscle.
    b. cardiac muscle.
    c. smooth muscle.
    d. all of the above
4. Nervous tissue makes up most of the
    a. lungs.
    b. kidneys.
    c. brain.
    d. stomach.
5. How does the hormone insulin help maintain homeostasis in the human body?
    a. It helps cells absorb sugar from the blood after you eat and digest food.
    b. It stimulates the production of sweat on a hot day to cool the body.
    c. It controls the contractions of cardiac muscles when you work out.
    d. It keeps the level of carbon dioxide in the blood within a narrow range.
6. What is the basic function of the circulatory system?
    a. transporting substances
    b. taking in oxygen
    c. controlling sensations
    d. allowing movement
7. Type(s) of tissue found in the human heart and blood vessels include
    a. nervous tissue.
    b. epithelial tissue.
    c. connective tissue.
    d. all of the above

Lesson 16.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ type of tissue that includes bone and cartilage
2. _____ structure composed of two or more types of tissues that work together to do the same task
3. _____ type of tissue that consists of cells that can contract
4. _____ one of the basic building blocks of the human body
5. _____ type of tissue that can send and receive electrical messages
6. _____ any group of specialized cells of the same type that perform the same function
7. _____ type of tissue that covers inner and outer body surfaces

Terms

a. nervous
b. muscle
c. cell
d. organ
e. epithelial
f. tissue
g. connective

Lesson 16.1: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. The organ system that provides structure to the body and protects internal organs is the _____ system.
2. The _____ system takes in oxygen and releases waste gases.
3. The _____ system breaks down food and absorbs its nutrients.
4. The body is in a state of _____ when its internal environment is kept stable.
5. The average human adult body consists of about 100 _____ cells.
6. Tissues are organized into _____.
7. Muscles cells have extra _____ to provide the energy needed to move the body.

Lesson 16.1: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Describe the levels of organization of the human body

16.2 The Integumentary System

Lesson 16.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ The human skin is about 2 centimeters thick.
2. _____ All the cells on the surface of the epidermis are dead.
3. _____ People with light skin have fewer melanocytes per square inch than people with dark skin.
4. _____ The production of melanin in the skin is stimulated by exposure to ultraviolet light.
5. _____ Sweat contains only water and salt.
6. _____ When blood vessels in the skin dilate, more heat reaches the body surface.
7. _____ Skin damaged by ultraviolet light is at greater risk of developing cancer.

Lesson 16.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

The epidermis is the outer layer of skin. It consists almost entirely of epithelial cells. There are no blood vessels, nerve endings, or glands in this skin layer. Nonetheless, this layer of skin is very active. The cells at the bottom of the epidermis are always dividing by mitosis to form new cells. The new cells gradually move up through the epidermis toward the surface of the body. As they move, they produce the tough, fibrous protein called keratin. By the time the cells reach the surface, they have filled with keratin and died. On the surface, the dead cells form a protective, waterproof layer. Dead cells are gradually shed from the surface of the epidermis. As they are shed, they are replaced by other dead cells that move up from below.

The epidermis also contains cells called melanocytes, which produce melanin. Melanin is a brown pigment that gives skin much of its color. Everyone's skin has about the same number of melanocytes per square inch. However, the melanocytes of people with darker skin produce more melanin. The amount of melanin that is produced depends partly on your genes and partly on how much ultraviolet light strikes your skin. The more light you get, the more melanin your melanocytes produce. Melanin has the important role of absorbing ultraviolet light. This prevents the light from reaching and damaging the dermis.

Questions

1. Describe the structure of the epidermis.
2. How are cells of the epidermis renewed?
3. What is melanin? How is it produced, and how does it help protect the skin?

Lesson 16.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Functions of the integumentary system include
    a. maintaining a stable body temperature.
    b. preventing the body from drying out.
    c. keeping bacteria out of the body.
    d. all of the above
2. The outer layer of the skin contains
    a. blood vessels.
    b. nerve endings.
    c. sweat glands.
    d. melanocytes.
3. The epidermis consists almost entirely of
    a. epithelial tissue.
    b. connective tissue.
    c. muscle tissue.
    d. nervous tissue.
4. The dermis is attached to the epidermis by
    a. collagen fibers.
    b. muscle fibers.
    c. keratin fibers.
    d. nerve fibers.
5. What is the function of sebum?
    a. keeping the body cool
    b. absorbing ultraviolet light
    c. waterproofing the hair and skin
    d. none of the above
6. The major cause of acne is
    a. exposure to sunlight.
    b. infection by bacteria.
    c. overproduction of sweat.
    d. lack of sleep.
7. The dermis contains all of the following except
    a. sebaceous glands.
    b. hair follicles.
    c. melanin-producing cells.
    d. sweat glands.

Lesson 16.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ outer layer of the skin
2. _____ tough protein that fills hair cells
3. _____ skin structure where a hair originates
4. _____ major organ of the integumentary system
5. _____ oily substance secreted by glands in the skin
6. _____ inner layer of the skin
7. _____ type of cell that produces a brown pigment in skin

Terms

a. melanocyte
b. follicle
c. sebum
d. dermis
e. epidermis
f. keratin
g. skin

Lesson 16.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. The integumentary system consists of skin, hair, and _____.
2. The brown pigment produced in the outer layer of skin is called _____.
3. The layer of skin that has blood vessels and nerve endings is the _____.
4. _____ glands are structures in the dermis that secrete sebum.
5. Sweat glands are located in the layer of skin called the _____.
6. _____ is a condition in which pimples form on the skin.
7. Fingernails and toenails are filled with the tough protein named _____.

Lesson 16.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how the hair and nails help the body maintain homeostasis.

16.3 The Skeletal System

Lesson 16.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Bones release stored calcium to the blood as needed.
2. _____ Bones are like chalk: dead, dry, and brittle.
3. _____ Bones are organs made up of four types of bone tissues.
4. _____ Compact bone lies between spongy bone and periosteum.
5. _____ Blood cells are produced by compact bone.
6. _____ By birth, the human skeleton consists entirely of bone.
7. _____ Bones grow thicker when they are put under stress by muscles.

Lesson 16.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Bones are the main organs of the skeletal system. In adults, the skeleton consists of 206 bones, many of them in the hands and feet. The skeletal system also includes cartilage and ligaments. Cartilage is a tough, flexible connective tissue that contains the protein collagen. It covers the ends of bones where they meet. Ligaments are bands of fibrous connective tissue. They connect bones of the skeleton and hold them together.

Without bones, you would be a soft, wobbly pile of skin, muscles, and internal organs. Clearly, bones are needed to support and shape the body. They have several other important roles as well.

- The skeletal system makes blood cells. Most blood cells are produced inside certain types of bones.
- The skeletal system stores calcium and helps maintain normal levels of calcium in the blood. Bones take up and store calcium when blood levels of calcium are high. They release some of the stored calcium when blood levels of calcium are low.
- The skeletal system works with muscles to move the body. Try to walk without bending your knees and you'll see how important the skeletal system is for movement.
- The skeletal system protects the soft organs of the body. For example, the skull surrounds and protects the brain, and the ribs protect the heart and lungs.

Questions

1. Identify the structures of the skeletal system.
2. Explain what you would look like if you didn't have a skeletal system.
3. Explain one way that the skeletal system helps maintain homeostasis.

Lesson 16.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The adult skeleton consists of
    a. 56 bones.
    b. 76 bones.
    c. 106 bones.
    d. 206 bones.
2. Functions of the skeletal system include
    a. making blood cells.
    b. storing calcium.
    c. giving the body shape.
    d. all of the above
3. Which type of tissue gives bones their strength?
    a. periosteum
    b. compact bone
    c. spongy bone
    d. bone marrow
4. Immovable joints connect the bones of the
    a. rib cage.
    b. shoulder.
    c. skull.
    d. none of the above
5. Partly movable joints are held together by
    a. collagen.
    b. keratin.
    c. cartilage.
    d. ligaments.
6. Which joint moves like the hinge on a door?
    a. shoulder
    b. elbow
    c. knee
    d. back
7. Which statement about bone fractures is false?
    a. Bone fractures naturally heal on their own.
    b. Bone fractures are caused by excess stress on bone.
    c. People with osteoporosis have an increased risk of bone fractures.
    d. none of the above

Lesson 16.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ type of bone tissue that contains many tiny pores
2. _____ tough, fibrous tissue that forms the outer layer of bone
3. _____ type of bone tissue that is very dense and hard
4. _____ band of fibrous tissue that holds bones together
5. _____ soft tissue inside spongy bone that makes blood cells
6. _____ tough, flexible connective tissue containing collagen
7. _____ process in which cartilage changes to bone

Terms

a. compact bone
b. ossification
c. cartilage
d. spongy bone
e. periosteum
f. ligament
g. bone marrow

Lesson 16.3: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. A(n) _____ is a place where two or more bones of the skeleton meet.
2. The disease in which bones lose calcium and become porous and weak is _____.
3. A bone _____ is a crack or break in a bone.
4. A sprain is a strain or tear in a(n) _____.
5. The type of joints that allow the greatest movement are called _____ joints.
6. The elbow is an example of a(n) _____ joint.
7. In the human embryo, the skeleton is made entirely of _____.

Lesson 16.3: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast the three major types of joints based on the amount of movement they allow.

16.4 The Muscular System

Lesson 16.4: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ There are four different types of muscle tissues in the human body.
2. _____ Aerobic exercise increases muscle endurance.
3. _____ Tendons attach one bone to another at a joint.
4. _____ Skeletal muscles work in pairs.
5. _____ The quadriceps is a muscle in the upper arm.
6. _____ Sit-ups and pushups increase muscle size and strength.
7. _____ Muscle contractions are responsible for virtually all movements of the body.

Lesson 16.4: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

There are three different types of muscle tissues in the human body: cardiac, smooth, and skeletal muscle tissues. All three types consist mainly of muscle fibers, but the fibers have different arrangements.

Cardiac muscle is found only in the walls of the heart. It is striated, or striped, because its muscle fibers are arranged in bundles. Contractions of cardiac muscle are involuntary. This means that they are not under conscious control. When cardiac muscle contracts, the heart beats and pumps blood.

Smooth muscle is found in the walls of other internal organs such as the stomach. It isn't striated because its muscle fibers are arranged in sheets rather than bundles. Contractions of smooth muscle are involuntary. When smooth muscles in the stomach contract, they squeeze food inside the stomach. This helps break the food into smaller pieces.

Skeletal muscle is attached to the bones of the skeleton. It is striated like cardiac muscle because its muscle fibers are arranged in bundles. Contractions of skeletal muscle are voluntary. This means that they are under conscious control. Whether you are doing pushups or pushing a pencil, you are using skeletal muscles. Skeletal muscles are the most common type of muscles in the body.

Many skeletal muscles are attached to the ends of bones where they meet at joints. The muscles are attached to the bones by tough bands of connective tissue called tendons. When the muscles contract, they pull on the tendons, which pull on the bones in turn, causing them to move. Muscles can only contract. They can't actively lengthen. Therefore, to move bones back and forth at joints, skeletal muscles must work in pairs. For example, the biceps and triceps muscles of the upper arm work as a pair. When the biceps muscle contracts, it bends the arm at the elbow. When the triceps muscle contracts, it straightens the arm.

Questions

1. Compare and contrast cardiac and smooth muscle tissues.
2. Explain how skeletal muscles function to move bones.
3. Skeletal muscles like the biceps and triceps muscles work in pairs. Explain why.

Lesson 16.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Each muscle fiber contains many
    a. nuclei.
    b. mitochondria.
    c. myofibrils.
    d. all of the above
2. Cardiac muscle is
    a. striated.
    b. arranged in sheets.
    c. under conscious control.
    d. all of the above
3. Which statement about smooth muscle is true?
    a. It is arranged in bundles.
    b. Its contractions are voluntary.
    c. It is needed for the digestion of food.
    d. It is found in the walls of all internal organs.
4. How many skeletal muscles are there in the human body?
    a. fewer than 60
    b. about 160
    c. about 320
    d. more than 600
5. A single muscle can
    a. only contract.
    b. actively lengthen.
    c. move a bone back and forth.
    d. two of the above
6. The name of the muscle that bends the arm at the elbow is the
    a. biceps muscle.
    b. elbow muscle.
    c. triceps muscle.
    d. upper arm muscle.
7. Which form(s) of exercise would increase the strength of cardiac muscle?
    a. running
    b. biking
    c. weight lifting
    d. two of the above

Lesson 16.4: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ organelle that allows muscles to contract
2. _____ muscle found in the walls of internal organs except the heart
3. _____ tough connective tissue that attaches muscle to bone
4. _____ long, thin muscle cell
5. _____ muscle found in the walls of the heart
6. _____ protein filament that slides over another when a muscle contracts
7. _____ most common type of muscle in the body

Terms

a. actin
b. cardiac muscle
c. smooth muscle
d. muscle fiber
e. tendon
f. myofibril
g. skeletal muscle

Lesson 16.4: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. _____ are the main organs of the muscular system.
2. Muscles are composed primarily of cells called muscle _____.
3. _____ muscle is the only type of muscle tissue that is under conscious control.
4. You can straighten an arm bent at the elbow by contracting the _____ muscle.
5. Striated muscles include cardiac muscle and _____ muscle.
6. Myofibrils are made up of two types of proteins, called actin and _____.
7. Energy for muscle contractions comes from _____.

Lesson 16.4: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain muscle contraction at a molecular level.

CHAPTER 17 MS Food and the Digestive System Worksheets

Chapter Outline

17.1 Food and Nutrients

Lesson 17.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ All carbohydrates provide the body with energy.
2. _____ Fiber helps keep sugar and lipids at normal levels in the blood.
3. _____ Carbohydrates and proteins provide 4 Calories of energy per gram.
4. _____ Eating trans fats can increase the risk of heart disease.
5. _____ Your body can produce some of the minerals it needs.
6. _____ Potassium is needed for strong bones and teeth.
7. _____ Vitamin B_{12} is needed for normal nerve function.

Lesson 17.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Micronutrients are nutrients the body needs in relatively small amounts. They include minerals and vitamins. These nutrients don't provide the body with energy, but they are still essential for good health.

Minerals are chemical elements that don't come from living things or include the element carbon. Many different minerals are needed, and they have a diversity of functions. For example, the minerals calcium, magnesium, and phosphorus are needed for strong bones; and the minerals potassium and sodium are needed for normal muscle and nerve functions. Your body can't produce any of the minerals it needs, so you must get all you need from the foods you eat.

Vitamins are organic compounds that the body needs in small amounts to function properly. Humans need 16 different vitamins, and they have a diversity of functions. For example, vitamin A is needed for normal vision, and vitamin K is needed for normal blood clotting. Most vitamins have to be consumed in food, but there are a few exceptions. Vitamin D is made in the skin when it is exposed to sunlight. Vitamins B12 and K are made by bacteria that normally live in the gut.

Questions

1. What are micronutrients?
2. Compare and contrast vitamins and minerals.
3. Identify two minerals and two vitamins that the human body needs, and state their functions in the body.

Lesson 17.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Your body needs food for
    a. energy.
    b. growth and repair of body tissues.
    c. control of body processes.
    d. all of the above
2. There are six major types of nutrients. One of the six types is
    a. water.
    b. trans fat.
    c. glucose.
    d. fiber.
3. Micronutrients include
    a. starches.
    b. minerals.
    c. fiber.
    d. proteins.
4. Roles of proteins in the body include
    a. making up cell membranes.
    b. helping blood clot.
    c. keeping bones strong.
    d. fighting infections.
5. How many Calories are provided by one gram of lipids?
    a. 4
    b. 5
    c. 8
    d. 9
6. Vitamins made by bacteria in the gut include vitamin
    a. A.
    b. B_{12}.
    c. D.
    d. two of the above
7. All of the following types of nutrients can be used for energy except
    a. vitamins.
    b. proteins.
    c. carbohydrates.
    d. lipids.

Lesson 17.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ state in which the body does not contain enough water
2. _____ any nutrient the body needs in relatively small amounts
3. _____ chemical element needed in small amounts for normal functioning of the body
4. _____ artificial lipid added to foods to preserve freshness
5. _____ any nutrient the body needs in relatively large amounts
6. _____ nutrient made up of amino acids
7. _____ sugar, starch, or fiber

Terms

a. trans fat
b. macronutrient
c. carbohydrate
d. dehydration
e. protein
f. micronutrient
g. mineral

Lesson 17.1: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The energy in food is measured in a unit called the _____.
2. Any substance in food that the body needs is called a(n) _____.
3. _____ is a complex carbohydrate that consists mainly of cellulose and cannot be digested.
4. The only macronutrient that does not provide energy to the body is _____.
5. _____ are organic compounds that the body needs in small amounts to function properly.
6. Complex carbohydrates that provide the body with energy are called _____.
7. Vitamin _____ is made in the skin when it is exposed to sunlight.

Lesson 17.1: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain functions of carbohydrates in the body, and identify good food sources of these nutrients.

17.2 Choosing Healthy Foods

Lesson 17.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ There is no food group on MyPlate for foods such as cookies and potato chips.
2. _____ The grains food group includes breads and cereals.
3. _____ The protein food group includes only foods that come from animals.
4. _____ The first item at the top of a nutrition facts label is the total fat content of the package.
5. _____ The percent daily values on a nutrition facts label are based on a 2000-Calorie-per-day diet.
6. _____ The last item on an ingredients list is always the amount of a vitamin or mineral in the food.
7. _____ Getting regular exercise may help improve your mood as well as your physical health.

Lesson 17.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Physical activity is an important part of balanced eating. It helps you use up any extra Calories in the foods you eat. You should try to get at least an hour of exercise just about every day. What happens if you don't get enough exercise to balance the food you eat? Any unused energy in the food is stored as fat. If you take in more energy than you use day after day, you will store more and more fat and become overweight. Eventually, you may become obese. Obesity is diagnosed in people who have a high percentage of body fat.

Obesity is associated with many health problems, including high blood pressure and diabetes. People that remain obese during their entire adulthood usually do not live as long as people that stay within a healthy weight range. The current generation of young people in the U.S. is the first generation in our history that may have a shorter life span than their parents because of obesity and the health problems associated with it.

You can avoid gaining too much weight and becoming obese. Choose healthy foods and balance the energy in food with exercise. To choose healthy foods, use MyPlate and nutrition facts labels. On food labels, pay attention to Calories as well as nutrients. Keep in mind that the average 11–13 year old needs about 2000 Calories a day. To balance energy with exercise, aim to get about an hour of physical activity each day.

Questions

1. What role does physical activity play in balanced eating?
2. What is obesity? What health risks are associated with obesity?
3. How can you avoid gaining too much weight and becoming obese?

Lesson 17.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Which two food groups half fill MyPlate?
    a. fruits and vegetables
    b. grains and dairy
    c. fruits and protein
    d. protein and dairy
2. Which foods are placed in the grains group?
    a. beans
    b. nuts
    c. pasta
    d. all of the above
3. Guidelines for using MyPlate recommend avoiding
    a. sugary drinks.
    b. high-sodium foods.
    c. full-fat milk.
    d. all of the above
4. Which grains are generally the most nutritious?
    a. processed grains
    b. enriched grains
    c. whole grains
    d. bleached grains
5. Obesity is often diagnosed by measuring a person's
    a. blood pressure.
    b. blood sugar.
    c. caloric intake.
    d. body mass index.
6. Which statement about physical activity is false?
    a. Physical activity strengthens bones and muscles.
    b. Physical activity is an important part of balanced eating.
    c. You can use up extra energy in food with physical activity.
    d. You should get about 15 minutes of physical activity per day.
7. Tools that can help you choose the most nutritious foods and eat balanced meals include
    a. MyPlate.
    b. nutrition facts labels.
    c. ingredients lists.
    d. all of the above

Lesson 17.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ diagram showing how to choose foods for balanced eating
2. _____ item listed first on a food's ingredients list
3. _____ label on a food package giving nutritional information per serving
4. _____ disorder characterized by a high percentage of body fat
5. _____ amount of a food that is considered one serving
6. _____ percent of the daily need for a given nutrient that a food provides
7. _____ any specific item that a food contains

Terms

a. ingredient
b. MyPlate
c. percent daily value
d. nutrition facts label
e. obesity
f. serving size
g. main ingredient

Lesson 17.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. The foods on MyPlate represent a total of _____ food groups.
2. The _____ food group includes foods such as fish and beans.
3. The _____ food group includes foods such as yogurt and milk.
4. A food is considered low in a given nutrient if the percent daily value is _____ percent or less.
5. A food is considered high in a given nutrient if the percent daily value is _____ percent or more.
6. The _____ ingredient in a food is the ingredient present in the greatest amount.
7. At least half of the grains you eat should be _____ grains.

Lesson 17.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how you can use information on food packages to choose healthy foods.

17.3 The Digestive System

Lesson 17.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ All the organs of the digestive system are part of the GI tract.
2. _____ After food is digested and its nutrients absorbed, the only thing that remains in the GI tract is water.
3. _____ One function of the gall bladder is to make bile acids more concentrated.
4. _____ Substances that can be absorbed from the stomach include water and salt.
5. _____ The large intestine is much longer than the small intestine.
6. _____ The part of the small intestine where most digestion takes place is the ileum.
7. _____ Foodborne illness is the common term for a food allergy.

Lesson 17.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

The mouth is the first digestive organ that food enters. The sight, smell, or taste of food stimulates the release of saliva and digestive enzymes by salivary glands inside the mouth. Saliva wets the food, which makes it easier to break up and swallow. The enzyme amylase in saliva begins the chemical breakdown of starches to sugars. The teeth help to mechanically digest food. Sharp teeth in the front of the mouth cut or tear food when you bite into it. Broad teeth in the back of the mouth grind food when you chew. Your tongue helps mix the food with saliva and enzymes and also helps you swallow. When you swallow, a lump of chewed food passes from the mouth into a tube in your throat called the pharynx. From the pharynx, the food passes into the esophagus.

The esophagus is a long, narrow tube that carries food from the pharynx to the stomach. It has no other purpose. Food moves through the esophagus because of peristalsis. At the lower end of the esophagus, a circular muscle, called a sphincter, controls the opening to the stomach. The sphincter relaxes to let food pass into the stomach. Then the sphincter contracts to prevent food from passing back into the esophagus.

The stomach is a sac-like organ at the end of the esophagus. It has thick muscular walls that contract and relax to squeeze and mix food. This helps break the food into smaller pieces. It also helps mix the food with enzymes and other secretions in the stomach. For example, the stomach secretes the enzyme pepsin, which helps digest proteins. Water, salt, and simple sugars can be absorbed into the blood through the lining of the stomach. However, most substances must undergo further digestion in the small intestine before they can be absorbed. The stomach stores the partly digested food until the small intestine is empty. Then a sphincter between the stomach and small intestine relaxes, allowing food to enter the small intestine.

Questions

1. Describe the types of human teeth and the role each type plays in the digestion of food.

2. What is the function of the esophagus in digestion?
3. Explain how the stomach contributes to the mechanical and chemical digestion of food.

Lesson 17.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Organs of the GI tract include the
    a. liver.
    b. pancreas.
    c. stomach.
    d. all of the above
2. Chemical digestion takes place mainly in the
    a. mouth.
    b. esophagus.
    c. stomach.
    d. small intestine.
3. Which digestive enzyme is produced in the mouth?
    a. amylase
    b. pepsin
    c. lipase
    d. ribonuclease
4. Which statement about bile acids is false?
    a. They are secreted by the pancreas.
    b. They are stored in the gall bladder.
    c. They are released into the small intestine.
    d. They are needed to help digest fat.
5. Bacteria in the large intestine
    a. break down toxins.
    b. produce vitamins.
    c. control the growth of harmful bacteria.
    d. all of the above
6. The digestive enzyme that helps digest fats is
    a. amylase.
    b. pepsin.
    c. lipase.
    d. ribonuclease.
7. Mechanical digestion takes place in the
    a. mouth.
    b. stomach.
    c. small intestine.
    d. two of the above

Lesson 17.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ breaking down of large chunks of food into smaller pieces
2. _____ passage of solid food waste out of the body
3. _____ organ that carries food from the pharynx to the stomach
4. _____ organ than secretes lipase and ribonuclease
5. _____ organs of the digestive system through which food actually passes as it undergoes digestion
6. _____ breaking down of large food molecules into smaller nutrient molecules
7. _____ organ that secretes bile acids

Terms

a. pancreas
b. gastrointestinal tract
c. chemical digestion
d. liver
e. elimination
f. esophagus
g. mechanical digestion

Lesson 17.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The _____ system is the body system that breaks down food, absorbs nutrients, and eliminates solid food wastes.
2. The series of muscle contractions that move food through the GI tract is called _____.
3. The process in which nutrients or other molecules are taken up by the blood is known as _____.
4. Pepsin is a digestive enzyme produced by the _____.
5. Most nutrients are absorbed into the blood in the part of the small intestine called the _____.
6. The inside of the small intestine is covered with tiny projections called _____.
7. Food _____ occur when the immune system reacts to harmless substances in food as though they were germs.

Lesson 17.3: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast mechanical and chemical digestion.

CHAPTER 18 MS Cardiovascular System Worksheets

Chapter Outline

18.1 Overview of the Cardiovascular System

Lesson 18.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Nutrients are absorbed by the blood mainly in the small intestine.
2. _____ Transport of substances by the cardiovascular system is necessary for homeostasis.
3. _____ When less blood flows to the body surface, it allows the body to lose excess heat.
4. _____ The pulmonary and systemic loops of the cardiovascular system are not connected.
5. _____ In the pulmonary circulation, oxygen-poor blood returns to the heart.
6. _____ In the systemic circulation, oxygen-rich blood leaves the heart.
7. _____ As blood flows by body cells, it absorbs cellular waste products from them.

Lesson 18.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

The heart and blood vessels form a closed system through which blood keeps circulating because of the pumping action of the heart. However, blood actually circulates in two different loops within this closed system. The two loops are called the pulmonary circulation and the systemic circulation. In both loops, blood passes through the heart. As blood circulates throughout the body, it travels first through one loop and then the other loop, over and over again.

The pulmonary circulation is the shorter loop of the cardiovascular system. It carries blood between the heart and lungs. Oxygen-poor blood flows from the heart to the lungs. In the lungs, the blood absorbs oxygen and releases carbon dioxide. Then the oxygen-rich blood returns to the heart.

The systemic circulation is the longer loop of the cardiovascular system. It carries blood between the heart and the rest of the body. Oxygen-rich blood flows from the heart to cells throughout the body. As it passes body cells, the blood releases oxygen and absorbs carbon dioxide. Then the oxygen-poor blood returns to the heart.

Questions

1. Describe the cardiovascular system.
2. Summarize how blood flows through the two loops of the cardiovascular system.
3. Compare and contrast the blood that flows through the two circulations.

Lesson 18.1: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. The cardiovascular system includes the
    a. heart.
    b. kidneys.
    c. lungs.
    d. all of the above
2. Substances carried in the blood include
    a. oxygen.
    b. nutrients.
    c. hormones.
    d. all of the above
3. The cardiovascular system helps regulate body temperature by
    a. stimulating sweat production.
    b. increasing the rate of metabolism.
    c. controlling where blood flows in the body.
    d. absorbing ultraviolet light through the skin.
4. Oxygen-poor blood flows from the heart to the
    a. kidneys.
    b. cells of the body.
    c. lungs.
    d. liver.
5. Oxygen-rich blood flows
    a. through the pulmonary circulation.
    b. through the systemic circulation.
    c. from the lungs to the heart.
    d. all of the above
6. In the lungs, blood
    a. releases carbon dioxide.
    b. picks up water vapor.
    c. absorbs nutrients.
    d. all of the above
7. As blood passes by cells of the body, it
    a. releases oxygen.
    b. releases carbon dioxide.
    c. absorbs energy.
    d. none of the above

Lesson 18.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ shorter of two loops that make up the cardiovascular system
2. _____ major function of the cardiovascular system
3. _____ system comprised of the heart, blood vessels, and blood
4. _____ longer of two loops that make up the cardiovascular system
5. _____ fist-sized organ that pumps blood
6. _____ tubular organ that carries blood
7. _____ liquid connective tissue

Terms

a. pulmonary circulation
b. blood
c. blood vessel
d. cardiovascular
e. systemic circulation
f. heart
g. transport

Lesson 18.1: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. Oxygen enters the blood in the _____.
2. Wastes are removed from the blood in the _____ to form urine.
3. In both the pulmonary and systemic circulations, blood passes through the _____.
4. The pulmonary circulation carries blood between the heart and the _____.
5. The systemic circulation carries blood between the _____ and the rest of the body.
6. When blood first passes into the systemic circulation, it is rich in _____.
7. When more blood flows to the surface of the body, it _____ the surface.

Lesson 18.1: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Relate the structure of the cardiovascular system to its main functions.

18.2 Heart and Blood Vessels

Lesson 18.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Blood flows through the heart in two paths
2. _____ A valve prevents blood from flowing from a ventricle to an atrium.
3. _____ The systemic circulation includes the right atrium and right ventricle.
4. _____ The aorta is a large blood vessel that carries blood to the heart.
5. _____ Veins have thicker walls than arteries.
6. _____ One way that blood vessels help maintain homeostasis is by dilating or constricting.
7. _____ The leading cause of cardiovascular disease is atherosclerosis.

Lesson 18.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

The heart is a muscular organ in the chest. It consists mainly of cardiac muscle tissue. It pumps blood by repeated, rhythmic contractions. This produces the familiar "lub-dub" sound of each heartbeat.

The heart has four chambers. Each chamber is an empty space with muscular walls through which blood can flow. The top two chambers of the heart are called the left and right atria (atrium, singular). The atria of the heart receive blood from the body or lungs and pump it into the bottom chambers of the heart. The bottom two chambers of the heart are called the left and right ventricles. The ventricles receive blood from the atria and pump it out of the heart, either to the lungs or to the rest of the body.

Flaps of tissue called valves separate the heart's chambers. Valves keep blood flowing in just one direction through the heart. For example, a valve at the bottom of the right atrium opens to let blood flow from the right atrium to the right ventricle. Then the valve closes so the blood can't flow back into the right atrium.

Blood flows through the heart in two paths. One path is through the right atrium and right ventricle. The right atrium receives oxygen-poor blood from the body. It pumps the blood into the right ventricle. Then the right ventricle pumps the blood out of the heart to the lungs. This path through the heart is part of the pulmonary circulation. The other path is through the left atrium and left ventricle. The left atrium receives oxygen-rich blood from the lungs. It pumps the blood into the left ventricle. Then the left ventricle pumps the blood out of the heart to the rest of the body. This path through the heart is part of the systemic circulation.

To move blood through the heart, cardiac muscles must contract in a certain sequence. First the atria must contract, followed quickly by the ventricles contracting. This series of contractions keeps blood moving continuously through the heart. Contractions of cardiac muscles aren't under voluntary control. They are controlled by a cluster of special cells within the heart, commonly called the pacemaker. These cells send electrical signals to cardiac muscles so they contract in the correct sequence and with just the right timing.

Questions

1. Describe the four chambers of the heart.
2. Outline the two paths through which blood flows through the heart.
3. Explain the role of the pacemaker in keeping blood flowing through the heart.

Lesson 18.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Blood in an atrium always flows next to
   a. a ventricle.
   b. an artery.
   c. the lungs.
   d. a vein.
2. In the pulmonary circulation, blood flows through the
   a. right atrium.
   b. right ventricle.
   c. lungs.
   d. all of the above
3. The pacemaker controls the beating of the heart with
   a. enzymes.
   b. hormones.
   c. electrical signals.
   d. valves.
4. Tissues that make up blood vessels include
   a. muscle tissues.
   b. connective tissues.
   c. epithelial tissues.
   d. all of the above
5. Muscular blood vessels that generally carry oxygen-rich blood are
   a. veins.
   b. arteries.
   c. capillaries.
   d. venules.
6. The largest vein in the body is the
   a. aorta.
   b. arteriole.
   c. inferior vena cava.
   d. none of the above
7. Which statement about capillaries is false?
   a. The walls of capillaries may be just one cell thick.
   b. Capillaries connect arterioles and venules.
   c. The exchange of substances between cells and the blood takes place across capillary walls.
   d. Capillaries contain valves to prevent the backflow of blood.

Lesson 18.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ disorder that occurs when plaque blocks coronary arteries
2. _____ chamber of the heart that receives oxygen-poor blood from the body
3. _____ chamber of the heart that pumps blood out of the heart to the rest of the body
4. _____ chamber of the heart that receives oxygen-rich blood from the lungs
5. _____ event in which blood supply to the heart is blocked so cardiac muscle cells die
6. _____ chamber of the heart that pumps blood out of the heart to the lungs
7. _____ cluster of cells in the heart that control contractions of cardiac muscles

Terms

a. right atrium
b. pacemaker
c. left ventricle
d. heart attack
e. right ventricle
f. left atrium
g. coronary heart disease

Lesson 18.2: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. _____ is a condition in which plaque builds up inside arteries.
2. A flap of skin that keeps blood flowing in just one direction through the heart is called a(n) _____.
3. Blood vessels that carry blood away from the heart are referred to as _____.
4. Blood vessels that carry blood toward the heart are known as _____.
5. The smallest type of blood vessel is called a(n) _____.
6. The top two chambers of the heart are named _____.
7. The bottom two chambers of the heart are named _____.

Lesson 18.2: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how lifestyle choices can reduce the risk of cardiovascular diseases.

18.3 Blood

Lesson 18.3: True or False

Name_____ Class_____ Date_____

Write true if the statement is true or false if the statement is false.

1. _____ Plasma carries dissolved substances such as glucose and proteins.
2. _____ There are more white blood cells than red blood cells in normal blood.
3. _____ Phagocytes are cells that help form blood clots.
4. _____ The main function of blood is transport.
5. _____ Your ABO blood type is controlled by genes you get from your parents.
6. _____ One cause of anemia is lack of iron in the diet.
7. _____ Hemophilia is more common in females than in males.

Lesson 18.3: Critical Reading

Name_____ Class_____ Date_____

Read this passage based on the text and answer the questions that follow.

Blood is a liquid connective tissue that consists of both liquid and cells. The liquid part of blood is called plasma. Plasma is a watery, golden-yellow fluid that contains many dissolved substances. Substances dissolved in plasma include glucose, proteins, and gases. There are three types of cells in blood: red blood cells, white blood cells, and platelets.

Red blood cells are shaped like flattened disks. There are trillions of red blood cells in your blood. Each red blood cell has millions of molecules of hemoglobin. Hemoglobin is a protein that contains iron. The iron in hemoglobin gives red blood cells their red color. It also explains how hemoglobin carries oxygen. The iron in hemoglobin binds with oxygen molecules so they can be carried by red blood cells.

White blood cells are larger than red blood cells, but there are far fewer of them. Their role is to defend the body in various ways. For example, white blood cells called phagocytes engulf and destroy microorganisms and debris in the blood.

Platelets are small, sticky cell fragments that help blood clot. A blood clot is a solid mass of cell fragments and other substances that plugs a leak in a damaged blood vessel. Platelets stick to tears in blood vessels and to each other, helping to form a clot at the site of injury. Platelets also release chemicals that are needed for clotting to occur.

Questions

1. Define blood, and identify its main components.
2. What are some differences between red blood cells and white blood cells?
3. Explain how platelets help blood clot.

Lesson 18.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. How much blood does your cardiovascular system normally contain?
    a. 3.5–4.0 liters
    b. 4.5–5.0 liters
    c. 5.5–6.0 liters
    d. 6.5–7.0 liters
2. Blood consists of
    a. plasma.
    b. cells and cell fragments.
    c. dissolved substances.
    d. all of the above
3. How does blood carry oxygen molecules?
    a. Iron in hemoglobin binds with them.
    b. White blood cells engulf them.
    c. Platelets stick to them.
    d. none of the above
4. What does blood in veins carry?
    a. oxygen
    b. carbon dioxide
    c. cellular wastes
    d. two of the above
5. Which genotype produces blood type A?
    a. AO
    b. AB
    c. OO
    d. none of the above
6. The blood of a person with leukemia cannot
    a. carry enough oxygen.
    b. fight infections.
    c. clot normally.
    d. two of the above
7. A person with sickle-cell hemoglobin is resistant to
    a. blood clots.
    b. heart disease.
    c. malaria.
    d. hemophilia.

Lesson 18.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ solid mass of cell fragments and other substances that plugs a leak in a blood vessel
2. _____ condition in which blood does not have enough hemoglobin (or iron) to carry adequate oxygen to cells
3. _____ type of cancer in which bone marrow produces abnormal white blood cells
4. _____ genetic disorder in which abnormal hemoglobin causes red blood cells to change shape
5. _____ small, sticky cell fragment that helps blood clot
6. _____ classification of an individual's blood based on its red blood cell antigens
7. _____ genetic disorder in which blood is lacking a normal clotting factor

Terms

a. blood type
b. hemophilia
c. sickle-cell disease
d. blood clot
e. anemia
f. platelet
g. leukemia

Lesson 18.3: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. _____ blood cells are shaped like flattened disks and carry oxygen.
2. _____ blood cells are shaped like spheres and defend the body in various ways.
3. Blood-type proteins carried on the surface of red blood cells are called _____.
4. Sickle-cell disease is most common in people from the continent of _____.
5. _____ is a protein containing iron that gives red blood cells their color.
6. If your red blood cells lack the Rhesus antigen, your blood type is _____.
7. If your red blood cells carry neither antigen A nor antigen B, you have blood type _____.

Lesson 18.3: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Predict what will happen if a patient receives a transfusion of blood containing antigens not found in his or her own blood. Explain your prediction.

CHAPTER 19 MS Respiratory and Excretory Systems Worksheets

Chapter Outline

19.1 The Respiratory System

Lesson 19.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Gas exchange occurs twice during the process of respiration.
2. _____ Air is inhaled when the diaphragm relaxes.
3. _____ Cilia in the bronchi sweep mucus and particles toward the alveoli.
4. _____ Each alveolus is surrounded by a network of capillaries.
5. _____ When you inhale, oxygen is more concentrated in the blood than in the air inside alveoli.
6. _____ When you exhale, carbon dioxide diffuses out of the blood into the air in the alveoli.
7. _____ In some people, asthma attacks may be triggered by strenuous exercise.

Lesson 19.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Common diseases of the respiratory system include asthma, pneumonia, and emphysema. All of them are diseases of the lungs.

- Asthma is a disease in which bronchioles in the lungs periodically swell and fill with mucus. Symptoms of asthma may include difficulty breathing, wheezing, coughing, and chest tightness. An asthma attack may be triggered by allergies, strenuous exercise, stress, or another respiratory illness such as a cold.
- Pneumonia is a disease in which some of the alveoli in the lungs fill with fluid so they can no longer exchange gases. Symptoms of pneumonia typically include coughing, chest pain, difficulty breathing, and fatigue. Pneumonia may be caused by an infection or an injury to the lungs.
- Emphysema is a disease in which the walls of the alveoli break down so less gas can be exchanged by the lungs. The main symptom of emphysema is shortness of breath. The damage to the alveoli is usually caused by smoking and is permanent.

The main way to keep your respiratory system healthy is to avoid smoking or breathing in the smoke of others. Smoking causes, or makes you more susceptible to, many respiratory diseases, including asthma, bronchitis, emphysema, and lung cancer.

Other steps you can take to keep your respiratory system healthy include eating well, getting enough sleep, and being active every day. These healthy lifestyle choices will help keep your immune system healthy so it can fight off respiratory infections and other diseases. Another step you can take is washing your hands often. This will reduce your risk of picking up viruses or bacteria that could make you sick with colds or other respiratory infections. You should also avoid contact with other people when they are sick and stay home when you are sick. These steps will help reduce the spread of infectious diseases of the respiratory system.

Questions

1. Identify symptoms of asthma and some of the triggers of asthma attacks.
2. What is emphysema, and how does smoking cause it?
3. Explain how to keep your respiratory system healthy.

Lesson 19.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. What happens during respiration?
    a. breathing
    b. gas exchange between air and blood
    c. gas transport by blood
    d. all of the above
2. How is respiration related to cellular respiration?
    a. Respiration supplies the oxygen needed for cellular respiration.
    b. Respiration provides the glucose "burned" during cellular respiration.
    c. Respiration removes the carbon dioxide produced by cellular respiration.
    d. two of the above
3. When you inhale through your nose, which organ does the air pass through next?
    a. larynx
    b. trachea
    c. bronchiole
    d. pharynx
4. What happens when the diaphragm contracts?
    a. The size of the chest decreases.
    b. Air pressure inside the lungs increases.
    c. Air rushes into the lungs.
    d. two of the above
5. Why does oxygen pass into cells from the blood of capillaries?
    a. Oxygen diffuses down a concentration gradient from the blood to cells.
    b. Oxygen is carried into cells from the blood by active transport.
    c. Oxygen is forced into cells from the blood by blood pressure.
    d. none of the above
6. The main symptom of emphysema is
    a. coughing.
    b. chest pain.
    c. chest tightness.
    d. shortness of breath.
7. Bronchioles connect the
    a. bronchi and alveoli.
    b. trachea and bronchi.
    c. larynx and trachea.
    d. none of the above

Lesson 19.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ tiny air sac in the lungs where gas exchange takes place
2. _____ large, sheet-like muscle below the lungs needed for normal breathing
3. _____ voice box
4. _____ process of moving air into and out of the lungs
5. _____ process in which cell's obtain energy by "burning" glucose
6. _____ one of two passages that carry air between the trachea and bronchioles
7. _____ wind pipe

Terms

a. larynx
b. cellular respiration
c. bronchus
d. alveolus
e. trachea
f. diaphragm
g. breathing

Lesson 19.1: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The _____ is a passageway in the throat that is part of both the digestive and the respiratory systems.
2. The bronchi are covered with mucus and tiny hairs called _____.
3. When you inhale, air passes from the bronchi into smaller passages called _____.
4. After blood picks up oxygen in the lungs, it leaves the lungs and travels to the _____.
5. In the disease called _____, bronchioles periodically swell and fill with mucus, making breathing difficult.
6. _____ is a disease in which some of the alveoli of the lungs fill with fluid so they can no longer exchange gas.
7. _____ is a disease in which the walls of the alveoli break down so less gas can be exchanged by the lungs.

Lesson 19.1: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how gas exchange takes place in the lungs

19.2 The Excretory System

Lesson 19.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Organs of excretion include the large intestine and sweat glands in the skin.
2. _____ Blood containing wastes enters each kidney through a ureter.
3. _____ All of the water filtered out of the blood in the kidneys is excreted in urine.
4. _____ The process of urination is normally under conscious control.
5. _____ The kidneys filter all of the blood in the body once a day.
6. _____ One function of the kidneys is to help keep blood pressure within a normal range.
7. _____ You need both kidneys to live a normal, healthy life.

Lesson 19.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Excretion is any process in which excess water or wastes are removed from the body. Excretion is the job of the excretory system. Besides the kidneys, other organs of excretion include the large intestine, liver, skin, and lungs. The large intestine eliminates solid food wastes that remain after digestion takes place. The liver removes excess amino acids and toxins from the blood. Sweat glands in the skin excrete excess water and salts in sweat. The lungs exhale carbon dioxide and also excess water as water vapor.

The kidneys are the main organs of excretion. Their main function is to filter waste products and excess water from the blood and excrete them from the body as urine. The kidneys help the body maintain homeostasis by filtering all the blood in the body many times each day and producing urine. They control the amount of water and dissolved substances in the blood by excreting more or less of them in urine. The kidneys also secrete hormones that help maintain homeostasis. For example, they produce a hormone that stimulates bone marrow to produce red blood cells when more are needed. They also secrete a hormone that helps regulate blood pressure and keep it within a normal range.

Questions

1. What is excretion? Identify three organs of the excretory system (other than the kidneys), and state their functions.
2. How do the kidneys help maintain homeostasis as organs of excretion?
3. Explain two other ways the kidneys help maintain homeostasis.

Lesson 19.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Excess water is removed from your body when you
    a. urinate.
    b. exhale.
    c. sweat.
    d. all of the above
2. The urinary system includes all of the following organs except the
    a. liver.
    b. ureters.
    c. urethra.
    d. urinary bladder.
3. How many nephrons does each kidney contain?
    a. fewer than 10
    b. around 100
    c. about 1,000
    d. more than 1,000,000
4. Clean blood leaves a kidney through a(n)
    a. artery.
    b. capillary.
    c. urethra.
    d. vein.
5. Urine moves through the ureters by
    a. gravity.
    b. diffusion.
    c. peristalsis.
    d. none of the above
6. How do the kidneys help maintain homeostasis?
    a. They control the amount of water in the body.
    b. They secrete a hormone that regulates sweat production.
    c. They secrete a hormone that stimulates muscle contractions.
    d. all of the above
7. How does untreated diabetes cause kidney failure?
    a. It leads to kidney stones that damage nephrons.
    b. It damages capillaries in the kidneys.
    c. It causes frequent urinary tract infections.
    d. It causes urine to back up in the kidneys.

Lesson 19.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ muscular tube that carries urine out of the body
2. _____ tiny structure in a kidney that filters blood and forms urine
3. _____ sac-like organ that stores urine
4. _____ mineral crystal that forms in urine inside a kidney
5. _____ artificial filtering of blood through a machine
6. _____ muscular tube that carries urine from a kidney to the urinary bladder
7. _____ main organ of the urinary system

Terms

a. ureter
b. kidney stone
c. nephron
d. urethra
e. kidney
f. hemodialysis
g. urinary bladder

Lesson 19.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. _____ is any process in which excess water or wastes are removed from the body.
2. The _____ are a pair of bean-shaped organs on each side of the body just above the waist.
3. Organs of the _____ system include the kidneys, liver, and lungs.
4. The main function of the kidneys is to filter blood and form _____.
5. The part of each nephron called the _____ is where blood is filtered.
6. The part of each nephron called the _____ is where excess water and wastes are collected.
7. The process of urine leaving the body is referred to as _____.

Lesson 19.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Describe the organs of the urinary system, and explain the function of each organ in excretion.

CHAPTER 20 MS Controlling the Body Worksheets

Chapter Outline

20.1 The Nervous System

Lesson 20.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ A single neuron may have thousands of dendrites.
2. _____ The cerebellum controls conscious functions such as thinking and speaking.
3. _____ The two hemispheres of the cerebrum are identical to each other.
4. _____ The peripheral nervous system includes all of the nervous tissue in the body except for the brain.
5. _____ The sympathetic division of the autonomic nervous system prepares the body for emergencies.
6. _____ Seizures in epilepsy are caused by abnormal electrical activity in the brain.
7. _____ All psychoactive drugs are illegal drugs.

Lesson 20.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

The structure of a neuron suits it for its function of transmitting nerve impulses. It has a special shape that lets it pass electrical signals to and from other cells. A neuron has three main parts: cell body, dendrites, and axon. The cell body contains the nucleus and other organelles that carry out basic cellular processes. Dendrites receive nerve impulses from other cells. A single neuron may have thousands of dendrites. The axon passes on the nerve impulses to other cells. It branches at the end into multiple nerve endings so it can transmit impulses to many other cells.

The nerve endings of an axon don't actually touch the dendrites of other neurons. Nerve impulses must cross a tiny gap between the two neurons, called the synapse. Chemicals called neurotransmitters carry impulses across the synapse. When a nerve impulse arrives at the end of an axon, neurotransmitters are released. They travel across the synapse to a dendrite of another neuron. The neurotransmitters bind to the membrane of the dendrite, triggering a nerve impulse in the next neuron.

There are three basic types of neurons: sensory neurons, motor neurons, and interneurons. All three types must work together to receive and respond to information. Sensory neurons transmit nerve impulses from sense organs and internal organs to the brain via the spinal cord. In other words, they carry information about the inside and outside environment to the brain. Motor neurons transmit nerve impulses from the brain via the spinal cord to internal organs, glands, and muscles. In other words, they carry information from the brain to the body, telling the body how to respond. Interneurons carry nerve impulses back and forth between sensory and motor neurons.

Questions

1. Identify the parts of a neuron and their functions.
2. Explain how nerve impulses travel from one neuron to another.
3. Compare and contrast the three basic types of neurons.

Lesson 20.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Functions of the human nervous system include

    a. sensing the internal and external environments.
    b. helping maintain homeostasis of the body.
    c. preparing the body to fight or flee in emergencies.
    d. all of the above

2. How do nerve impulses travel across a synapse?

    a. They swim across through synaptic fluid.
    b. They are carried across by special chemicals.
    c. They jump across like an electric spark.
    d. They move across through interneurons.

3. Which statement about the brain is false?

    a. It is the most complex organ in the body.
    b. It is the largest organ in the body.
    c. It consists of billions of neurons.
    d. It serves as the control center of the body.

4. Which part of the brain controls involuntary functions such as heartbeat?

    a. cerebrum
    b. cerebellum
    c. brain stem
    d. temporal lobe

5. Which part of the peripheral nervous system controls only involuntary responses of the body?

    a. sensory division
    b. motor division
    c. somatic nervous system
    d. autonomic nervous system

6. Central nervous system infections include

    a. encephalitis.
    b. epilepsy.
    c. meningitis.
    d. two of the above

7. Use of a drug without the advice of medical professionals and for reasons not originally intended is referred to as

    a. drug addiction.
    b. drug overdose.
    c. drug abuse.
    d. none of the above

Lesson 20.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ type of nerve cell that carries nerve impulses back and forth between sensory and motor neurons
2. _____ largest part of the brain
3. _____ part of a neuron that contains the nucleus and other organelles
4. _____ part of the brain that controls coordination and balance
5. _____ part of a neuron that receives nerve impulses from other cells
6. _____ part of a neuron that passes on nerve impulses to other cells
7. _____ electrical message carried by neurons

Terms

a. axon
b. cerebellum
c. cell body
d. dendrite
e. nerve impulse
f. cerebrum
g. interneuron

Lesson 20.1: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. A(n) _____ is a bundle of nerve cells.
2. The most common type of brain injury is a(n) _____.
3. Nerve cells that carry messages are known as _____.
4. To pass from one nerve cell to another, a nerve impulse must cross a tiny gap called a(n) _____.
5. _____ neurons transmit nerve impulses from sense organs and internal organs to the brain via the spinal cord.
6. _____ neurons transmit nerve impulses from the brain via the spinal cord to internal organs, glands, and muscles.
7. Loss of sensation and the ability to move, often due to a spinal cord injury, is called _____.

Lesson 20.1: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Identify the major parts of the brain, and summarize their functions.

20.2 The Senses

Lesson 20.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ We see most objects because they reflect light from another source.
2. _____ The colored part of the eye is called the iris.
3. _____ Hyperopia can be corrected with concave lenses.
4. _____ The only function of the ears is to sense sound.
5. _____ Taste neurons on the tongue can detect thousands of different tastes.
6. _____ Sensory neurons in the nose sense chemicals in the air.
7. _____ The sense of smell plays an important role in the sense of taste.

Lesson 20.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Touch is the ability to sense pain, pressure, or temperature. Nerve cells that sense touch are found mainly in the skin. The skin on the palms, soles, face, and lips has the most neurons. Neurons that sense pain are also found inside the body in the tongue, joints, muscles, and other organs.

The sense of taste is controlled by sensory neurons on the tongue. They are grouped in bundles called taste buds. Taste neurons sense chemicals in food. They can detect five different tastes: sweet, salty, sour, bitter, and umami, which is a meaty taste. When taste neurons sense chemicals, they send messages about them to the brain. The brain then decides which of the five basic tastes you are detecting.

The sense of smell also involves sensory neurons that sense chemicals. These neurons are found in the nose, and they sense chemicals in the air. Unlike taste neurons, smell neurons can detect thousands of different odors. Your sense of smell plays a big role in your sense of taste. You can use your sense of taste alone to learn that a food is sweet. However, you have to use your sense of smell as well to learn that the food tastes like apple pie.

Questions

1. Why is skin on the palms, soles, face, and lips especially sensitive to touch?
2. What is the sense of taste?
3. How is the sense of smell related to how food tastes?

Lesson 20.2: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. Why are human beings able to see in three dimensions?
    a. We have two eyes that face the same direction but are a few inches apart.
    b. Both of our eyes focus on the same object but from slightly different angles.
    c. The brain uses images from the two eyes to determine the distance to the object.
    d. all of the above
2. When light from an object reaches the human eye, it passes first through the
    a. pupil.
    b. cornea.
    c. lens.
    d. iris.
3. Which statement about rods and cones in the human eye is false?
    a. Rods and cones are special light-sensing cells in the lens.
    b. Rods and cones send nerve impulses to the optic nerve.
    c. Cones sense different colors of light and rods sense dim light.
    d. none of the above
4. Myopia
    a. occurs when images focus in front of the retina.
    b. results when the eyeball is too short.
    c. can be corrected with convex lenses.
    d. all of the above
5. The middle ear
    a. contains three tiny bones called ossicles.
    b. passes vibrations from the eardrum to the inner ear.
    c. amplifies vibrations as they pass through.
    d. all of the above
6. The human eye senses differences in the wavelengths of visible light as different
    a. brightnesses.
    b. intensities.
    c. shapes.
    d. colors.
7. Nerve cells that sense touch are found mainly in the
    a. joints.
    b. muscles.
    c. heart.
    d. skin.

Lesson 20.2: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ structure in the inner ear that responds to vibrations by sending nerve impulses to the auditory nerve
2. _____ opening in the center of the eye that lets light pass through
3. _____ vision problem in which distant objects can be seen clearly but nearby objects appear blurry
4. _____ layer of cells at the back of the eye where images normally form
5. _____ vision problem in which nearby objects can be seen clearly but distant objects appear blurry
6. _____ structure in the inner ear involved in maintaining balance
7. _____ bundle of sensory neurons on the tongue that sense chemicals in food

Terms

a. retina
b. hyperopia
c. pupil
d. semicircular canal
e. taste bud
f. cochlea
g. myopia

Lesson 20.2: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The ability to see is called _____.
2. The ability to sense sound is called _____.
3. Touch is the ability to sense pain, pressure, and _____.
4. Sound waves that enter the outer ear first strike a membrane called the _____.
5. The _____ interprets messages from the eyes and tells you what you are seeing.
6. The _____ nerve carries messages about sounds from the ears to the brain.
7. The clear, curved structure in the eye that helps focus light is the _____.

Lesson 20.2: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain the role of the brain in human senses.

20.3 The Endocrine System

Lesson 20.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Endocrine hormones travel more slowly than nerve impulses.
2. _____ Endocrine hormones affect only nearby cells.
3. _____ The pineal gland is part of the endocrine system.
4. _____ All hormones released by the hypothalamus control the pituitary gland.
5. _____ The pituitary gland is located in the neck.
6. _____ Growth hormone stimulates cells to make proteins.
7. _____ Luteinizing hormone is secreted by the gonads.

Lesson 20.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Endocrine hormones travel throughout the body in the blood. However, each endocrine hormone affects only certain cells, called target cells. A target cell is affected by a given hormone because it has proteins on its surface to which the hormone can bind. When the hormone binds to a target cell protein, it causes changes inside the cell. For example, binding of the hormone might cause the release of enzymes inside the cell. The enzymes then influence cell processes.

Endocrine hormones control many cell activities, so they are very important for homeostasis. But what controls the hormones? Most endocrine hormones are controlled by feedback loops. In a feedback loop, the hormone produced by a gland feeds back to control its own production by the gland. A feedback loop can be negative or positive. Most endocrine hormones are controlled by negative feedback loops. Negative feedback occurs when rising levels of a hormone feed back to decrease secretion of the hormone or when falling levels of the hormone feed back to increase its secretion.

An example of a negative feedback loop is the one that controls the thyroid gland. This loop involves the hypothalamus and pituitary gland as well as the thyroid. Low levels of thyroid hormones in the blood cause the release of hormones by the hypothalamus and pituitary gland. These hormones stimulate the thyroid gland to secrete more hormones. The opposite happens with high levels of thyroid hormones in the blood. The hypothalamus and pituitary gland stop releasing hormones that stimulate the thyroid, so the thyroid stops secreting its hormones.

Questions

1. Endocrine hormones travel through the blood to cells throughout the body, but they affect only certain cells. Explain how this happens.
2. Most endocrine hormones are controlled by negative feedback loops. Explain how this works.

3. How would a positive feedback loop work? Why would this type of feedback not be useful for maintaining homeostasis?

Lesson 20.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Which structure provides a link between the nervous and endocrine systems?
    a. pituitary gland
    b. hypothalamus
    c. adrenal gland
    d. thyroid gland
2. Most pituitary hormones control
    a. other endocrine glands.
    b. the hypothalamus.
    c. body cells.
    d. the brain.
3. The pituitary hormone called follicle-stimulating hormone stimulates the
    a. testes to produce sperm.
    b. hair follicles to grow hair.
    c. ovaries to secrete estrogen.
    d. two of the above
4. Which gland secretes growth hormone?
    a. adrenal gland
    b. thyroid gland
    c. ovary
    d. pituitary gland
5. Endocrine hormones influence target cells by
    a. acting as enzymes and speeding up chemical reactions in the cells.
    b. absorbing glucose and actively transporting it into the cells.
    c. binding with proteins on the surface of the cells.
    d. creating negative feedback loops with the cells.
6. Males and females have the same endocrine glands except for the
    a. thyroid gland.
    b. pituitary gland.
    c. adrenal glands.
    d. gonads.
7. What happens when the level of thyroxin rises in the blood?
    a. The pituitary gland releases thyroid-stimulating hormone.
    b. The thyroid gland starts releasing more hormones.
    c. The level of TSH in the blood falls.
    d. two of the above

Lesson 20.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ messenger molecule released by an endocrine gland
2. _____ pancreatic hormone that helps cells absorb glucose from the blood
3. _____ any gland that secretes hormones into the bloodstream
4. _____ gland that secretes sex hormones
5. _____ part of the brain that secretes hormones affecting the pituitary gland
6. _____ pituitary hormone that stimulates the mammary glands to produce milk
7. _____ master gland of the endocrine system

Terms

a. hypothalamus
b. gonad
c. insulin
d. hormone
e. endocrine gland
f. prolactin
g. pituitary gland

Lesson 20.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The _____ system is a system of glands that release hormones into the blood.
2. The _____ gland secretes the hormone thyroxin.
3. Adrenaline, which prepares the body for emergencies, is secreted by the _____ glands.
4. The cell on which a given endocrine hormone has an effect is called a(n) _____ cell.
5. Type 1 diabetes occurs when the immune system attacks cells of the _____.
6. The testes secrete the male sex hormone called _____.
7. The ovaries secrete the female sex hormone called _____.

Lesson 20.3: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how the nervous and endocrine systems work together to control the body and maintain homeostasis.

CHAPTER 21 MS Diseases and the Body's Defenses Worksheets

Chapter Outline

21.1 Infectious Diseases

Lesson 21.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Schistosoma is a human parasite that is spread by a vector..
2. _____ An example of a bacterium that may cause human disease is *Escherichia coli.*
3. _____ Human viral infections include tetanus and measles.
4. _____ A common human fungal infection is genital herpes.
5. _____ "Traveler's diarrhea" is generally caused by protozoa.
6. _____ You can pick up the virus that causes the common cold from an object such as a doorknob.
7. _____ The proper way to wash your hands is to scrub with soap for at least 20 seconds.

Lesson 21.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

There are many things you can do to reduce your risk of getting infectious diseases. Eating well and getting enough sleep are a good start. These habits will help keep your immune system healthy. With a healthy immune system, you will be able to fight off many pathogens.

Vaccines are available for some infectious diseases. For example, there are vaccines to prevent measles, mumps, whooping cough, and chicken pox. These vaccines are recommended for infants and young children.

You can also take the following steps to avoid picking up pathogens or spreading them to others.

- Wash your hands often with soap and water. Spend at least 20 seconds scrubbing with soap.
- Avoid touching your eyes, nose, or mouth with unwashed hands.
- Avoid close contact with people who are sick. This includes kissing, hugging, shaking hands, and sharing cups or eating utensils.
- Cover your coughs and sneezes with a tissue or shirt sleeve, not your hands.
- Disinfect frequently touched surfaces, such as keyboards and doorknobs, especially if someone is sick.
- Stay home when you are sick.

The best way to prevent diseases that are spread by vectors is to avoid contact with the vectors. For example, you can wear long sleeves and long pants to avoid tick and mosquito bites. Using insect repellent can also reduce your risk of insect bites.

Questions

1. How does eating well and getting enough sleep reduce your risk of getting infectious diseases?

2. What are vaccines, and which infectious diseases can they prevent?
3. Tara is allergic to the flu vaccine, so she can't receive the vaccine. How can she reduce her risk of getting the flu during flu season?

Lesson 21.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The common cold is
    a. an infectious disease.
    b. caused by bacteria.
    c. spread by a vector.
    d. two of the above
2. Types of pathogens that cause human diseases include
    a. bacteria.
    b. fungi.
    c. protozoa.
    d. all of the above
3. Which disease can potentially be cured with antibiotic drugs?
    a. influenza
    b. athlete's foot
    c. chicken pox
    d. tuberculosis
4. Which type of pathogen causes AIDS?
    a. bacterium
    b. virus
    c. fungus
    d. protozoan
5. An example of a pathogen that spreads through water is
    a. Herpes simplex.
    b. Giardia lamblia.
    c. HPV.
    d. two of the above
6. Which human infectious disease can be prevented with a vaccine?
    a. food poisoning
    b. candidiasis
    c. genital warts
    d. syphilis
7. The common cold can be spread by pathogens
    a. in airborne droplets.
    b. on objects or surfaces.
    c. in contaminated water.
    d. two of the above

Lesson 21.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ any organism that carries pathogens from one organism to another
2. _____ any disease that is caused by pathogens
3. _____ type of drug that is used to cure bacterial diseases
4. _____ substance that is used to prevent certain infectious diseases
5. _____ type of organisms that cause malaria and giardiasis
6. _____ any organism or virus that causes disease in another living thing
7. _____ particle that reproduces by taking over living cells

Terms

a. pathogen
b. vaccine
c. virus
d. vector
e. infectious disease
f. protozoa
g. antibiotic

Lesson 21.1: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. _____ diseases are contagious because you can catch them from someone else.
2. Pathogens are commonly called _____.
3. Pathogens called _____ caused humans diseases such as strep throat and syphilis.
4. The type of pathogen that causes the common cold is a(n) _____.
5. Ringworm is an infectious disease caused by _____.
6. Pathogens that spread through food cause _____ illness.
7. The bacteria that cause Lyme disease are spread by _____.

Lesson 21.1: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain three different ways you could catch the common cold.

21.2 Noninfectious Diseases

Lesson 21.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Cancer in childhood is rare.
2. _____ Warning signs of cancer include difficulty swallowing.
3. _____ Surgery is the only way to treat cancer.
4. _____ Type 1 diabetes usually develops in childhood or adolescence.
5. _____ Your risk of developing type 2 diabetes is greater if you are overweight.
6. _____ In multiple sclerosis, the immune system attacks the joints.
7. _____ Hay fever is a noninfectious disease characterized by a high fever.

Lesson 21.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Cancer is a disease in which cells divide out of control. The rapidly dividing cells may form a mass of abnormal tissue called a tumor. As a tumor increases in size, it may harm normal tissues around it. Sometimes cancer cells break away from a tumor. If they enter the bloodstream, they are carried throughout the body. Then the cells may start growing in other tissues. This is usually how cancer spreads from one part of the body to another. Once cancer spreads, it is very hard to stop.

Most cancers are caused by mutations. Mutations are random errors in genes. Mutations that lead to cancer usually occur in genes that control the cell cycle. Because of the mutations, abnormal cells are allowed to divide. Some mutations that lead to cancer may be inherited. However, most of the mutations are caused by environmental factors, such as certain chemicals and some types of radiation.

Many cases of cancer can be cured if the cancer is diagnosed and treated in an early stage. Therefore, it's important to know the warning signs of cancer so it can be diagnosed as early as possible. Having warning signs doesn't mean that you have cancer, but you should check with a doctor to be sure. Warning signs of cancer include:

- a change in bowel or bladder habits.
- a sore that doesn't heal.
- unusual bleeding or discharge.
- a lump in the breast or elsewhere.
- persistent indigestion.
- difficulty swallowing.
- obvious changes in a wart or mole.
- persistent cough or hoarseness.

Questions

1. What is cancer, and what causes it?
2. Why is it important to diagnose cancer at an early stage?
3. List five warning signs of cancer. What does it mean if you have any of these warning signs, and what should you do about it?

Lesson 21.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Causes of noninfectious diseases include
    a. environmental toxins.
    b. gene mutations.
    c. pathogens.
    d. two of the above
2. Mutations that lead to cancer usually occur in genes that control the
    a. cell cycle.
    b. production of insulin.
    c. development of the lungs.
    d. maturation of the reproductive organs.
3. Common carcinogens include
    a. nicotine.
    b. UV light.
    c. radon gas.
    d. all of the above
4. The most common type of cancer in adult males is cancer of the
    a. adrenal gland.
    b. thyroid gland.
    c. pituitary gland.
    d. prostate gland.
5. The second-most-common type of cancer in adult males and females is cancer of the
    a. stomach.
    b. liver.
    c. lung.
    d. kidney.
6. All of the following are autoimmune diseases except
    a. type 1 diabetes.
    b. type 2 diabetes.
    c. multiple sclerosis.
    d. rheumatoid arthritis.
7. Allergies are
    a. never life threatening.

b. autoimmune diseases.
c. commonly caused by pollen.
d. two of the above

Lesson 21.2: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ mass of abnormal tissue formed by cancer cells
2. _____ any disease that is not contagious
3. _____ disease in which the level of glucose in the blood is too high
4. _____ anything in the environment that may cause cancer
5. _____ any substance that may cause an allergy
6. _____ disease in which cells divide out of control
7. _____ any disease caused by the immune system attacking the body's own cells

Terms

a. autoimmune disease
b. carcinogen
c. cancer
d. noninfectious disease
e. allergen
f. diabetes
g. tumor

Lesson 21.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Diseases that are not caused by pathogens are called _____ diseases.
2. Most cancers are caused by _____ in genes.
3. The most common type of cancer in adult females is cancer of the _____.
4. The most common type of cancer in children is _____.
5. Type _____ diabetes is caused by the immune system destroying normal cells of the pancreas.
6. Type _____ diabetes is caused by body cells no longer responding normally to insulin.
7. Two types of immune system diseases are autoimmune diseases and _____.

Lesson 21.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain why type 2 diabetes is becoming more common in teens and children. What can you do to reduce your risk of developing this type of diabetes?

21.3 First Two Lines of Defense

Lesson 21.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ It is very difficult for pathogens to penetrate the epidermis.
2. _____ Mucous membranes keep out pathogens because they are as tough as skin.
3. _____ Helpful bacteria defend your body from pathogens by competing with them for food and space.
4. _____ Your body's first line of defense against pathogens includes phagocytosis and fever.
5. _____ You develop a fever because of chemicals released by phagocytes.
6. _____ Physical barriers to infection include mucus and cilia.
7. _____ Inflammation reduces blood flow to an area of infection or injury.

Lesson 21.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

If bacteria enter the skin through a splinter or other wound, the area may become red, warm, and painful. These are signs of inflammation. Inflammation is one way the body reacts to infections or injuries and is part of the body's second line of defense. It occurs due to chemicals that are released when tissue is damaged. The chemicals cause nearby blood vessels to dilate, increasing blood flow to the area. The chemicals also attract white blood cells to the area. The white blood cells leak out of blood vessels and into the damaged tissue.

The white blood cells that go to a site of inflammation and leak into damaged tissue are called phagocytes. They start "eating" pathogens and dead cells by engulfing and destroying them. This process is called phagocytosis. Phagocytes also release chemicals that cause a fever. A fever is a higher-than-normal body temperature. Normal human body temperature is 37 °C (98.6 °F). Most bacteria and viruses that infect people reproduce quickly at this temperature. When the temperature rises higher, the pathogens can't reproduce as quickly. Therefore, a fever helps to limit the infection. A fever also causes the immune system to make more white blood cells to fight the infection.

Questions

1. What is inflammation? Why does it occur?
2. How do phagocytes fight pathogens?
3. Explain why a fever helps to limit an infection.

Lesson 21.3: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. Type of barriers that make up your body's first line of defense include
    a. physical barriers.
    b. chemical barriers.
    c. biological barriers.
    d. all of the above
2. Most pathogens cannot survive in the stomach because it is too
    a. wet.
    b. warm.
    c. acidic.
    d. all of the above
3. Body fluids that contain lysozymes include
    a. tears.
    b. sweat.
    c. saliva.
    d. all of the above
4. Inflammation occurs due to chemicals released by
    a. invading bacteria.
    b. red blood cells.
    c. damaged tissues.
    d. bone marrow.
5. Inflammation causes white blood cells to
    a. leak out of blood vessels.
    b. lower the body's temperature.
    c. excrete wastes from the body.
    d. become damaged and die.
6. Results of a fever include
    a. the immune system making more white blood cells.
    b. bacteria reproducing so quickly they die of crowding.
    c. cilia becoming more active so they remove pathogens more quickly.
    d. two of the above
7. The normal temperature of the human body is about
    a. 95.8 °F.
    b. 96.6 °F.
    c. 98.6 °F.
    d. 100.8 °F.

Lesson 21.3: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ sticky secretion that traps pathogens on mucous membranes
2. _____ process in which white blood cells engulf and destroy pathogens
3. _____ organ that is the body's most important barrier to pathogens
4. _____ tiny, hair-like projections that cover many mucous membranes
5. _____ chemical in the stomach that kills most pathogens in food or water
6. _____ reaction to infection that causes redness, warmth, and pain
7. _____ enzyme that breaks down the cell walls of bacteria

Terms

a. lysozyme
b. hydrochloric acid
c. mucus
d. inflammation
e. phagocytosis
f. skin
g. cilia

Lesson 21.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. Respiratory and digestive organs are lined with _____ membranes.
2. _____ lining the respiratory organs sweep mucus and pathogens toward the pharynx.
3. Urine is too _____ for most pathogens to grow in it.
4. Biological barriers to infection refer to the _____ that normally live in or on your body.
5. White blood cells that "eat" pathogens are called _____.
6. A(n) _____ is a higher-than-normal body temperature.
7. Inflammation is part of the body's _____ line of defense.

Lesson 21.3: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Describe your body's first line of defense, and explain why it is like the moat and high walls of an ancient castle.

21.4 Immune System Defense

Lesson 21.4: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ The body's third and final line of defense against pathogens involves the immune system.
2. _____ Lymph is moved through lymphatic vessels by the force of gravity.
3. _____ Types of lymphocytes include phagocytes, B cells, and T cells.
4. _____ T cells are produced by the thymus gland.
5. _____ Lymphocytes must be "switched on" in order to fight a specific pathogen.
6. _____ One type of immune response involves killer T cells and one type involves helper T cells.
7. _____ Antibodies are proteins that the body recognizes as either self or nonself.

Lesson 21.4: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

There are two different types of lymphocytes, called B cells and T cells. The two types of cells launch an immune response, but they do so in different ways.

B cells respond to pathogens in the blood and lymph. Most B cells fight infections by making antibodies. An antibody is a large, Y-shaped molecule that binds to an antigen. Each antibody can bind with just one specific type of antigen. The antibody and antigen fit together like a lock and key. Once an antibody binds with an antigen, it signals a phagocyte to engulf and destroy them, along with the pathogen that carries the antigen on its surface.

There are different types of T cells, including killer T cells and helper T cells. Killer T cells destroy infected, damaged, or cancerous body cells. When a killer T cell comes into contact with such a cell, it releases toxins. The toxins make tiny holes in the cell's membrane. This causes the cell to burst open. Both the cell and any pathogens inside it are destroyed.

Helper T cells do not destroy infected, damaged, or cancerous body cells. However, they are still needed for an immune response. They help by releasing chemicals that control other lymphocytes. The chemicals released by helper T cells "switch on" B cells and killer T cells so they can recognize and fight specific pathogens.

Questions

1. Explain how B cells respond to pathogens.
2. Summarize how killer T cells destroy cancerous cells.
3. What is the function of the helper T cells in an immune response?

Lesson 21.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The immune system includes all of the following structures and tissues except the
    a. pancreas.
    b. bone marrow.
    c. spleen.
2. What is the function of the tonsils?
    a. They help produce speech.
    b. They trap pathogens in the throat.
    c. They produce lymphocytes.
    d. They store B cells while they mature.
3. How do lymph vessels differ from blood vessels?
    a. They contain lymph instead of blood.
    b. The heart does not pump fluid through them.
    c. The fluid they contain does not circulate.
    d. two of the above
4. Which statement about lymphocytes is false?
    a. They make up about one quarter of all white blood cells.
    b. There are normally trillions of them in the human body.
    c. A minority of them are in the blood.
    d. none of the above
5. What triggers an immune response?
    a. inflammation
    b. fever
    c. phagocytes
    d. antigens
6. Both B and T cells
    a. are produced in bone marrow.
    b. mature in the thymus gland.
    c. fight infections by destroying infected cells.
    d. two of the above
7. What happens to lymph when it reaches the main lymph vessels?
    a. It is excreted in urine by the kidneys.
    b. It is returned to the blood in the chest.
    c. It is stored in the thymus gland.
    d. It is filtered out of the vessels by the spleen.

Lesson 21.4: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ liquid that normally leaks out of tiny blood vessels into tissues
2. _____ organ in the abdomen that filters pathogens out of the blood
3. _____ immune system's reaction to a specific pathogen
4. _____ type of white blood cell involved in an immune response
5. _____ small structure that removes pathogens from lymph
6. _____ tissue that produces both B cells and T cells
7. _____ organ that stores T cells until they mature

Terms

a. spleen
b. lymph node
c. thymus gland
d. bone marrow
e. immune response
f. lymphocyte
g. lymph

Lesson 21.4: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. A large, Y-shaped molecule that binds to the antigen on a pathogen is called a(n) _____.
2. _____ is the immune system's ability prevent a pathogen from causing disease because it "remembers" the pathogen from a previous exposure.
3. The type of lymphocytes that make antibodies are called _____ cells.
4. The type of lymphocytes that control other lymphocytes are named _____ T cells.
5. The type of lymphocytes that destroy infected body cells are named _____ T cells.
6. _____ cells are B and T cells that last a long time and "remember" a pathogen after an infection is over.
7. The process of deliberately exposing people to pathogens so they develop immunity is called _____.

Lesson 21.4: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain the relationship between vaccination and immunity.

CHAPTER 22 MS Reproductive Systems and Life Stages Worksheets

Chapter Outline

22.1 Male Reproductive System

Lesson 22.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ The reproductive system is the only human body system that differs significantly between males and females.
2. _____ Both mitosis and meiosis are involved in the production of sperm.
3. _____ Testosterone causes the voice to deepen when a male goes through puberty.
4. _____ The only external male reproductive organ is the penis.
5. _____ Testosterone is a hormone secreted by the prostate gland.
6. _____ Sperm are stored in the vas deferens until they leave the body.
7. _____ A teaspoon of semen may contain as many as half a billion sperm.

Lesson 22.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

The male reproductive system has two main functions: producing sperm and releasing testosterone. Sperm are male gametes, or reproductive cells. Sperm form when certain cells in the male reproductive system divide by meiosis to form haploid cells. Being haploid means they have half the number of chromosomes of other cells in the body. An adult male may produce millions of sperm each day. Testosterone is the major sex hormone in males. Testosterone has two primary roles. During adolescence, testosterone causes most of the changes associated with puberty. In adulthood, testosterone is needed for the production of sperm.

The male reproductive organs include the penis, testes, epididymis, vas deferens, and prostate gland. The penis is an external, cylinder-shaped organ that contains the urethra. The urethra is the tube that carries urine out of the body. It also carries sperm out of the body. The two testes (testis, singular) are oval organs that produce sperm and secrete testosterone. They are located inside a sac called the scrotum that hangs down outside the body. The scrotum also contains the epididymis. The epididymis is a tube that is about 6 meters (20 feet) long in adults. It is tightly coiled, so it fits inside the scrotum on top of the testes. The epididymis is where sperm mature. It also stores the sperm until they leave the body. The vas deferens is a tube that carries sperm from the epididymis to the urethra. The prostate gland secretes a fluid that mixes with sperm to help form semen. Semen is a whitish liquid that contains sperm. It passes through the urethra and out of the body.

Questions

1. Describe the two main functions of the male reproductive system.
2. Identify three structures of the male reproductive system. What are their roles in reproduction?
3. Compare and contrast sperm and semen.

Lesson 22.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. What are roles of testosterone in males?
    a. causing the sex organs to mature at puberty
    b. stimulating the production of sperm by the testes
    c. causing facial hair to start growing in teens
    d. all of the above
2. Which of the following statements about sperm is false?
    a. Sperm are gametes.
    b. Sperm are diploid cells.
    c. The only role of sperm is reproduction.
    d. Only mature sperm have a tail.
3. How many sperm does the average adult male produce each day?
    a. about ten
    b. several dozen
    c. a few hundred
    d. millions
4. Sperm cells leave the body through the
    a. ureter.
    b. vas deferens.
    c. epididymis.
    d. urethra.
5. The scrotum contains the
    a. testes.
    b. epididymis.
    c. prostate gland.
    d. two of the above
6. The acrosome of a sperm
    a. is at the end of the tail.
    b. contains enzymes.
    c. makes the tail move.
    d. two of the above
7. For sperm to form and mature, it takes up to two
    a. days.
    b. weeks.
    c. months.
    d. years.

Lesson 22.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ tube that carries sperm from the epididymis to the urethra
2. _____ major male sex hormone
3. _____ whitish fluid that contains sperm
4. _____ male sex cell
5. _____ coiled tube where sperm mature
6. _____ male organ that contains the urethra
7. _____ structure that secretes a fluid that helps form semen

Terms

a. penis
b. vas deferens
c. prostate gland
d. sperm
e. epididymis
f. semen
g. testosterone

Lesson 22.1: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. The two _____ are organs that produce sperm and secrete testosterone.
2. The smallest of all human cells are _____.
3. The part of a sperm that contains the nucleus is the _____.
4. The part of a sperm that moves like a propeller is the _____.
5. Before sperm cells grow tails, they are haploid cells called _____.
6. The connecting piece of a sperm is packed with _____ that produce energy.
7. The hormone _____ causes most of the changes associated with puberty in males.

Lesson 22.1: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Summarize the formation and maturation of sperm.

22.2 Female Reproductive System

Lesson 22.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ The main female reproductive organs are inside the body.
2. _____ The male and female reproductive systems have identical functions.
3. _____ Estrogen is needed for an adult woman to release eggs from the ovaries.
4. _____ The ovaries make eggs only after a female has gone through puberty.
5. _____ The upper end of each fallopian tube is attached to an ovary.
6. _____ An egg completes meiosis just before it leaves the ovary.
7. _____ While an egg is developing in a follicle, the lining of the uterus breaks down and passes out of the body.

Lesson 22.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Two functions of the female reproductive system are producing eggs and secreting estrogen, which is the main sex hormone in females. Estrogen has two major roles. During adolescence, estrogen causes the changes of puberty. It causes the reproductive organs to mature and other female traits to develop. During adulthood, estrogen is needed for a woman to release eggs from the ovaries. The female reproductive system has another important function. It supports a baby as it develops before birth and gives birth to the baby at the end of pregnancy.

The female reproductive organs include the ovaries, fallopian tubes, uterus, and vagina. The two ovaries are small, oval organs on either side of the abdomen. Each ovary contains thousands of eggs. However, the eggs do not develop fully until a female has gone through puberty. Then, about once a month, an egg is released by one of the ovaries. The ovaries also secrete estrogen. The two fallopian tubes are thin tubes that are connected to the uterus and extend almost to the ovaries. The upper end of each fallopian tube has "fingers" called fimbriae that sweep an egg into the fallopian tube when it is released by the ovary. The egg then passes through the fallopian tube to the uterus. If an egg is fertilized, this normally occurs in the fallopian tube.

The uterus is a hollow organ with muscular walls. The uterus is where a baby develops until birth. The walls of the uterus stretch to accommodate the growing fetus. The muscles in the walls contract to push the baby out during birth. The uterus is connected to the vagina by a small opening called the cervix. The vagina is a cylinder-shaped organ that opens to the outside of the body. The other end joins with the uterus. Sperm deposited in the vagina swim up through the cervix into the uterus, and from there into a fallopian tube. During birth, a baby passes from the uterus through the vagina to leave the mother's body.

Questions

1. Identify three functions of the female reproductive system.

2. Explain how eggs are released from the ovaries and how they reach the uterus.
3. Describe the roles of the uterus and vagina in reproduction.

Lesson 22.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. When a girl is born, how many eggs does each of her ovaries normally contain?
    a. none
    b. a few
    c. about a hundred
    d. thousands
2. Which female reproductive structure secretes estrogen?
    a. uterus
    b. vagina
    c. ovary
    d. cervix
3. An egg reaches the uterus through
    a. a fallopian tube.
    b. the vagina.
    c. the cervix.
    d. none of the above
4. The walls of the uterus
    a. can stretch.
    b. are muscular.
    c. push out a baby during birth.
    d. all of the above
5. For fertilization to take place, sperm generally must be deposited in the
    a. ovary.
    b. fimbria.
    c. uterus.
    d. vagina.
6. A human egg cell
    a. contains very little cytoplasm.
    b. is a diploid cell.
    c. lacks a tail.
    d. two of the above
7. The changes of the menstrual cycle take place in the
    a. ovaries.
    b. uterus.
    c. labium.
    d. two of the above

Lesson 22.2: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ structure where fertilization of an egg normally occurs
2. _____ cylinder-shaped organ through which a baby passes during birth
3. _____ one of a pair of organs that produce and release eggs
4. _____ organ where a fetus develops and grows until birth
5. _____ female gamete
6. _____ small opening that connects the uterus to the vagina
7. _____ main female sex hormone

Terms

a. estrogen
b. uterus
c. cervix
d. vagina
e. egg
f. fallopian tube
g. ovary

Lesson 22.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. After puberty, an egg is released about once a(n) _____ by one of the ovaries.
2. The upper end of each fallopian tube has "fingers" called _____.
3. The largest of all human cells are _____.
4. A(n) _____ is a nest of cells in an ovary within which an egg develops.
5. _____ refers to the event in which an egg bursts out of an ovary.
6. Shedding of the lining of the uterus if fertilization does not occur is called _____.
7. The female reproductive system goes through a monthly cycle of changes called the _____ cycle.

Lesson 22.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how and when an egg is produced and completes its development.

22.3 Reproduction and Life Stages

Lesson 22.3: True or False

Name_____ Class_____ Date_____

Write true if the statement is true or false if the statement is false.

1. _____ A zygote has the haploid number of chromosomes.
2. _____ As soon as a zygote starts to divide, it is called an embryo.
3. _____ Most organs start to form during the embryonic stage.
4. _____ The fetal period typically lasts about 30 weeks.
5. _____ The purpose of the placenta is to cushion the fetus and protect it from injury.
6. _____ The umbilical cord is cut only after the baby starts to breathe on its own.
7. _____ Puberty generally occurs at an earlier age in girls than in boys.

Lesson 22.3: Critical Reading

Name_____ Class_____ Date_____

Read this passage based on the text and answer the questions that follow.

Puberty is the stage of life when a child becomes sexually mature. Puberty lasts from about 10 to 16 years of age in girls and from about 12 to 18 years of age in boys. In both girls and boys, puberty begins when the pituitary gland signals the gonads (ovaries or testes) to start secreting sex hormones (estrogen in girls, testosterone in boys). Sex hormones, in turn, cause many other changes to take place.

- In girls, the uterus and ovaries grow. The ovaries start releasing eggs, and menstrual cycles begin. Pubic hair grows, the hips widen, and the breasts develop.
- In boys, the penis and testes grow, and the testes to start producing sperm. Pubic and facial hair grow, the shoulders broaden, and the voice becomes deeper.

Girls and boys of the same age are similar in height during childhood. In both girls and boys, growth in height and weight is very fast during puberty. But boys grow more quickly than girls do, and their period of rapid growth also lasts longer. In addition, boys generally start puberty later than girls, so they have a longer period of childhood growth. For all these reasons, by the end of puberty, the average height of boys is 10 centimeters (about 4 inches) greater than the average height of girls.

Adolescence is the stage of life between the start of puberty and the beginning of adulthood. Adolescence begins with the physical changes of puberty. It also includes many other changes, including mental, emotional, and social changes. During adolescence, teens develop new thinking abilities and get better at problem solving. Teens also try to establish a sense of identity, become more independent from their parents, and spend more time with their peers.

Questions

1. Outline the major changes that occur at puberty in girls and boys. What causes these changes?

2. Girls and boys of the same age are about the same height in childhood. However, by the time they stop growing, boys are taller than girls on average. Explain why.
3. The terms puberty and adolescence are sometimes used interchangeably. Explain how puberty and adolescence differ.

Lesson 22.3: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. What happens when a sperm penetrates the cell membrane of an egg?
    a. The egg completes meiosis.
    b. The sperm's tail falls off.
    c. The nuclei of sperm and egg fuse.
    d. all of the above
2. After fertilization occurs, how long does it normally take for the blastocyst to reach the uterus and implant in the uterine lining?
    a. about an hour
    b. about a day
    c. about a week
    d. about a month
3. Which of these events occurs during the embryonic stage?
    a. The eyelids form.
    b. The heart begins to beat.
    c. Tooth buds appear.
    d. all of the above
4. Which of the following changes does not occur during the fetal stage?
    a. The blood starts to circulate.
    b. The brain becomes active.
    c. Alveoli form in the lungs.
    d. Muscles develop.
5. At about how many weeks after fertilization does birth typically occur?
    a. 16
    b. 24
    c. 32
    d. 38
6. During infancy, which of these developments generally occurs first ?
    a. sitting
    b. babbling
    c. crawling
    d. smiling
7. During which of the following life stages is growth in height and weight usually most rapid?
    a. infancy
    b. early childhood

c. middle childhood
d. late childhood

Lesson 22.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ process in which a blastocyst embeds in the uterine lining
2. _____ fluid-filled membrane that surrounds and protects a fetus
3. _____ fluid-filled ball of cells that forms soon after fertilization occurs
4. _____ cell layer in the blastocyst that will develop into the placenta
5. _____ tube containing blood vessels that connects a fetus to the placenta
6. _____ cell that results when a sperm fertilizes an egg
7. _____ temporary organ consisting of blood vessels from both the mother and fetus

Terms

a. placenta
b. blastocyst
c. amniotic sac
d. zygote
e. trophoblast
f. implantation
g. umbilical cord

Lesson 22.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The cell layer of a blastocyst that will develop into a baby is the _____.
2. After implantation occurs, a blastocyst is called a(n) _____.
3. From the eighth week following fertilization until birth, a developing human being is called a(n) _____.
4. The first year of life after birth is referred to as _____.
5. The stage of life when a child becomes sexually mature is known as _____.
6. The stage of life between the start of puberty and the beginning of adulthood is called _____.
7. The stage of life known as _____ adulthood begins in the mid-60s and continues until death.

Lesson 22.3: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast the embryonic and fetal stages of human development.

22.4 Reproductive System Health

Lesson 22.4: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Many STIs can spread through body fluids such as blood.
2. _____ A person with just one sexual partner cannot get STIs by sexual contact.
3. _____ Untreated STIs may lead to the inability to have children.
4. _____ Viral STIs usually last for life.
5. _____ AIDS is diagnosed in anyone who has an HIV infection.
6. _____ Injuries to the testes are very rare.
7. _____ Ovarian cysts are usually harmless.

Lesson 22.4: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Most common disorders of the male reproductive system involve the testes. They include injuries and cancer.

- Injuries to the testes are very common. In teens, such injuries occur most often while playing sports. Injuries to the testes are likely to be very painful and cause bruising and swelling. However, they generally subside fairly quickly.
- Cancer of the testes is most common in males aged 15 to 35 years. It occurs when cells in the testes grow out of control and form a tumor. If found early, cancer of the testes usually can be cured with surgery.

Disorders of the female reproductive system may involve the vagina, uterus, or ovaries. They may also affect the breasts.

- Vaginitis is a very common disorder. Symptoms include redness and itching of the vagina. It may be caused by irritation from soap or bubble bath. Another possible cause is a yeast infection, which can be treated with medication.
- Ovaries may develop cysts. A cyst is a sac filled with fluid or other material. Ovarian cysts are usually harmless and often disappear on their own. However, some cysts may be painful and require surgery.
- Many females experience abdominal cramps during menstruation. This is usually normal and not a cause for concern. Exercise, heat, or medication may help relieve the pain. In severe cases, prescription medicine may be needed.
- Breast cancer is the most common type of cancer in adult females. It occurs when cells in the breast grow out of control and form a tumor. Breast cancer is rare in teens but becomes more common as females get older. Regular breast cancer screening is recommended for most women starting around age 40. If found early, breast cancer usually can be cured with surgery.

Questions

1. Describe two medical problems involving the testes.
2. Describe two disorders of the female reproductive organs.
3. Why is it important to detect cancer of the testes or breast as soon as possible?

Lesson 22.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. In which of the following age groups are STIs most common?
    a. preteens
    b. teens and young adults
    c. middle-aged adults
    d. elderly adults
2. What causes STIs?
    a. pathogens
    b. injuries
    c. environmental toxins
    d. two of the above
3. Which STI can be treated with antibiotics?
    a. genital herpes
    b. genital warts
    c. syphilis
    d. AIDS
4. The most common reproductive system cancer in young males is cancer of the
    a. penis.
    b. testes.
    c. prostate gland.
    d. vas deferens.
5. Infection with HPV may eventually lead to
    a. AIDS.
    b. herpes.
    c. cancer.
    d. gonorrhea.
6. Which statement about STIs is false?
    a. All STIs can be cured with antibiotics.
    b. Many STIs do not cause symptoms.
    c. Some STIs can be fatal if left untreated.
    d. STIs may be caused by viruses or bacteria.
7. Which STI below is linked with the wrong initial symptom?
    a. chlamydia: discharge from the genitals
    b. gonorrhea: small sore on the genitals
    c. syphilis: painful urination
    d. two of the above

Lesson 22.4: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ serious condition that may occur if tampons are not changed often
2. _____ any sexually transmitted infection
3. _____ virus that causes genital warts
4. _____ virus that may cause AIDS
5. _____ viral STI that can be prevented with a vaccine
6. _____ disease that may develop in someone infected with HIV
7. _____ most common bacterial STI in the U.S.

Terms

a. chlamydia
b. STI
c. genital warts
d. HPV
e. AIDS
f. toxic shock syndrome
g. HIV

Lesson 22.4: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. Some STIs can spread from a mother to her infant during _____.
2. Bacterial STIs usually can be cured with _____.
3. The STIs chlamydia, gonorrhea, and syphilis are all caused by _____.
4. HIV stands for human _____ virus.
5. HIV destroys white blood cells called _____.
6. HPV stands for human _____ virus.
7. _____ cancer is the most common type of cancer in adult females.

Lesson 22.4: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Discuss reasons why STIs are more common in teens and young adults than older people.

CHAPTER 23 MS Introduction to Ecology Worksheets

Chapter Outline

23.1 What is Ecology

Lesson 23.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ All organisms have the same basic needs.
2. _____ Environmental factors can be classified as either biotic or abiotic.
3. _____ An individual is a single living thing.
4. _____ Members of the same population rarely interact with each other.
5. _____ The biotic component of a biome is a community.
6. _____ An ecosystem includes only biotic factors.
7. _____ The biosphere includes all the other levels of organization in ecology.

Lesson 23.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Organisms are individual living things. They range from microscopic bacteria to gigantic blue whales. Despite their great diversity, all organisms have the same basic needs: energy and matter. Energy and matter must be obtained from the environment.

Because organisms depend on their environment to meet their needs, they are greatly influenced by it. There are many factors in the environment that affect organisms. The factors can be classified as either biotic or abiotic. Biotic factors are all of the living or once-living aspects of the environment. They include all the organisms that live there as well as the remains of dead organisms. Abiotic factors are all of the aspects of the environment that have never been alive. They include factors such as sunlight, soil minerals, temperature, and moisture.

Questions

1. What do all organisms need from their environment?
2. Identify three possible biotic factors in the environment of a squirrel living in a forest.
3. Describe some of the abiotic factors in the environment in which you live.

Lesson 23.1: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. Ecology shares data and theories with the science(s) of

a. geography.
b. biology.
c. climatology.
d. all of the above

2. What do all living things need from their environment?

a. sunlight
b. energy
c. matter
d. two of the above

3. Biotic factors in the environment include

a. remains of dead organisms.
b. minerals in the soil.
c. temperature.
d. two of the above

4. An ecosystem consists of

a. biotic factors.
b. abiotic factors.
c. a community.
d. all of the above

5. Ecosystems in a biome have the same general

a. consumers.
b. abiotic factors.
c. populations.
d. all of the above

6. Which choice shows levels of organization in ecology from smaller to larger?

a. individual → community → population
b. ecosystem → biome → biosphere
c. community → biome → ecosystem
d. population → ecosystem → community

7. Abiotic factors in the environment include all of the following except

a. organic wastes.
b. moisture.
c. temperature.
d. minerals.

Lesson 23.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ individual living thing
2. _____ any living or once-living aspect of the environment
3. _____ group of similar ecosystems

4. _____ group of individuals of the same species that live in the same area
5. _____ any aspect of the environment that has never been alive
6. _____ all the biotic and abiotic factors in an area and their interactions
7. _____ all the populations of all the species that live in the same area

Terms

a. abiotic factor
b. organism
c. community
d. biotic factor
e. ecosystem
f. biome
g. population

Lesson 23.1: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. The science of how living things interact with each other and their environment is called _____.
2. A land-based biome is called a(n) _____ biome.
3. A water-based biome is called a(n) _____ biome.
4. The _____ consists of all the parts of Earth where life can be found.
5. Ecology is a major branch of _____ science.
6. The lowest level of organization in ecology is the _____.
7. The highest level of organization in ecology is the _____.

Lesson 23.1: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Outline and define the levels of organization in ecology.

23.2 Populations

Lesson 23.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ The most common pattern of population distribution is a random pattern.
2. _____ Only births and deaths change the size of a population.
3. _____ A pattern of exponential population growth generally cannot continue for very long.
4. _____ The age-sex structure of a population may influence the population's growth rate.
5. _____ The human population started growing very rapidly about 10,000 years ago.
6. _____ Many countries today remain in stage 1 of the demographic transition.
7. _____ The human population is predicted to exceed 9 billion by the year 2050.

Lesson 23.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Major changes in the human population first began in the 1700s. These changes occurred mainly in Europe, North America, and a few other places that became industrialized. First, death rates fell. Then, somewhat later, birth rates also fell. These changes in death and birth rates affected the rate of population growth and are referred to as the demographic transition.

The demographic transition is generally divided into four stages. In stage 1, birth and death rates were both high, so population growth was slow. In stage 2, death rates fell while birth rates remained high. Why did death rates fall? There were several reasons, including new scientific knowledge of the causes of disease. Water supplies were cleaned up, and sewage was disposed of more safely. Better farming techniques and machines increased the food supply and the distribution of food. For all these reasons, death rates fell, especially in children. Birth rates, on the other hand, remained high. This resulted in faster population growth.

Before long, birth rates also started to fall. This was the beginning of stage 3 of the demographic transition. People started having fewer children because large families became too expensive. For example, with better farming machines, farm families no longer needed as many children to work in the fields. Laws were also passed that required children to go to school. They could no longer work and help support the family. Having many children became too costly. Eventually, birth rates fell to match death rates. As a result, population growth slowed down. When this occurred, stage 4 had been reached.

Just as they did in Europe and North America, death rates have fallen throughout the world. No country today remains in stage 1 of the demographic transition. However, birth rates are still high in many of the poorest countries of the world. Many populations seem to be stuck in stage 2 of the demographic transition. They have high population growth rates because low death rates are not matched by equally low birth rates. Whether these countries will ever reach stage 4 and attain very low rates of population growth is uncertain.

Questions

1. Briefly describe the four stages of the demographic transition.
2. Explain why death rates fell in stage 2 of the demographic transition in Europe and North America and why birth rates in these areas started to fall in stage 3.
3. How well does the demographic transition model apply to the poorest countries of the world today?

Lesson 23.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The population is the unit of
    a. natural selection.
    b. adaptation.
    c. microevolution.
    d. all of the above
2. If a population of 80 foxes lives in an area of 8 square kilometers, what is the fox population density?
    a. 80 foxes per square kilometer
    b. 64 foxes per square kilometer
    c. 10 foxes per square kilometer
    d. 8 foxes per square kilometer
3. In which pattern of population distribution are organisms evenly spaced over the area they occupy?
    a. random
    b. clumped
    c. uniform
    d. none of the above
4. What does a positive population growth rate mean?
    a. Fewer people are being added than lost.
    b. The population is increasing in size.
    c. The population has reached its carrying capacity.
    d. two of the above
5. The human species first evolved about
    a. 10,000 years ago.
    b. 40,000 years ago.
    c. 100,000 years ago.
    d. 200,000 years ago.
6. The demographic transition
    a. began in the 1700s.
    b. occurred first in Africa.
    c. happened in two stages.
    d. included an increase in the birth rate.
7. About how many human beings presently live on Earth?
    a. 7 million

b. 1 billion
c. 5 billion
d. 7 billion

Lesson 23.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ way in which individuals in a population are spread over their area
2. _____ pattern of population growth in which the rate of growth keeps increasing as the population gets larger
3. _____ how quickly population size changes over time
4. _____ largest population size that can be supported in an area without harming the environment
5. _____ average number of individuals in a population for a given area
6. _____ numbers of individuals of each age and sex in a population
7. _____ pattern of population growth in which the rate of growth slows as the population nears the carrying capacity

Terms

a. carrying capacity
b. age-sex structure
c. population density
d. exponential growth
e. population growth rate
f. population distribution
g. logistic growth

Lesson 23.2: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. A(n) _____ is a group of individuals of the same species that live in the same area.
2. Population _____ refers to the number of individuals in a population.
3. A special bar graph that represents the age-sex structure of a population is called a population _____.
4. If populations of a species become very small, the species may be at risk of going _____.
5. The growth of the world's human population has had a pattern of _____ growth.
6. The pattern of population distribution in which organisms are clustered together in groups is called _____.
7. A population that is decreasing in size over time has a(n) _____ rate of growth.

Lesson 23.2: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast exponential and logistic patterns of population growth.

23.3 Communities

Lesson 23.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Camouflage is a common adaptation in both predator and prey species.
2. _____ A symbiotic relationship may not be beneficial to either species.
3. _____ Types of symbiosis include intraspecific and interspecific competition.
4. _____ Many species of animals are parasites, at least during some stage of their life cycle.
5. _____ A parasite generally lives in or on its host.
6. _____ Most parasites eventually kill their host.
7. _____ Predator adaptations help them escape from prey.

Lesson 23.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Predation is a relationship in which members of one species consume members of another species. The consuming species is called the predator. The species that is consumed is called the prey. For examples, wolves are predators, and moose are their prey.

A predator-prey relationship tends to keep the populations of both species in balance. As the prey population increases, there is more food for the predators. So after a slight lag time, the predator population also increases. As the number of predators increases, more prey animals are consumed. This causes the prey population to decrease, followed by the predator population decreasing again.

Some predator species play a special role in their community. They are called keystone species. When the population size of a keystone species changes, the populations of many other species are affected. Prairie dogs are an example of a keystone species. Their numbers affect most of the other species in their community. Prairie dog actions improve the quality of soil and amount of water for plants, upon which most other species in the community depend.

Both predators and prey have adaptations to predation that evolve through natural selection. Predator adaptations help them capture prey. Prey adaptations help them avoid predators. A common adaptation in both predator and prey species is camouflage.

Questions

1. Explain how predator-prey populations affect each other.
2. What is a keystone species? Why are prairie dogs considered keystone species in their communities?
3. How might camouflage help a predator capture its prey?

Lesson 23.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Types of community interactions include
    a. predation.
    b. competition.
    c. symbiosis.
    d. all of the above
2. Which statement about predator-prey populations is true?
    a. The relationship between predator and prey populations keeps both populations in balance.
    b. A decrease in the prey population is followed by an increase in the predator population.
    c. An increase in the predator population is followed by an increase in the prey population.
    d. two of the above
3. An example of a keystone species is
    a. moose.
    b. prairie dogs.
    c. deer.
    d. rabbits.
4. Which statement about communities is false?
    a. Populations in communities often interact with each other.
    b. Community interactions are important factors in natural selection.
    c. All community interactions are mutualistic.
    d. all of the above
5. Competition can occur
    a. between members of the same species.
    b. between members of different species.
    c. over food, water, or space.
    d. all of the above
6. What type of relationship exists between a clownfish and sea anemone?
    a. mutualism
    b. parasitism
    c. predation
    d. commensalism
7. An example of a commensal relationship is the relationship between
    a. cattle egrets and cattle.
    b. wolves and moose.
    c. hookworms and humans.
    d. none of the above

Lesson 23.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ relationship between members of the same species that depend on the same resources
2. _____ type of species whose numbers affect the populations of many other species in the same community
3. _____ close relationship between two species in which both species benefit
4. _____ relationship between members of different species that depend on the same resources
5. _____ close relationship between two species in which one species benefits and the other species is neither helped nor harmed
6. _____ relationship between two species in which members of one species consume members of the other species
7. _____ close relationship between two species in which one species benefits and the other species is harmed

Terms

a. commensalism
b. predation
c. parasitism
d. intraspecific competition
e. mutualism
f. interspecific competition
g. keystone

Lesson 23.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The biotic component of an ecosystem is a(n) _____.
2. The species that consumes another in a predator-prey relationship is the _____.
3. The species that is consumed in a predatory-prey relationship is the _____.
4. _____ is any relationship between organisms that depend on the same resources.
5. _____ is any close relationship between two species in which at least one of the species benefits.
6. The species that benefits in a parasitic relationship is called the _____.
7. The species that is harmed in a parasitic relationship is called the _____.

Lesson 23.3: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast mutualism, parasitism, and commensalism

23.4 Ecosystems

Lesson 23.4: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ An ecosystem is a unit of nature.
2. _____ Energy is constantly recycled through ecosystems.
3. _____ A major aspect of a species' niche is how the species obtains energy and matter.
4. _____ A habitat is the physical environment to which a species has adapted.
5. _____ When two species occupy the same niche in the same habitat at the same time, both species always go extinct.
6. _____ An ecosystem always covers a large geographic area.
7. _____ Features of a species' habitat include relationships with other species.

Lesson 23.4: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

An important concept associated with the ecosystem is the niche. A species' niche is the role that the species plays in its ecosystem. This role includes all the ways that the species interacts with the biotic and abiotic factors in the ecosystem. A major aspect of any niche is how the species obtains energy and matter. For example, grass obtains energy from sunlight and uses it to convert carbon dioxide and water to sugar by photosynthesis. Deer get matter and energy by consuming and digesting grass (and other plants). Each of these species has a different and distinctive niche.

Another important aspect of a species' niche is its habitat. Habitat is the physical environment in which a species lives and to which it has adapted. The main features of a habitat are abiotic factors such as temperature and rainfall. These factors influence the adaptations of the organisms that live there.

A given habitat may contain many different species. However, each species in the same habitat must have a different niche. Two different species cannot occupy the same niche in the same habitat at the same time. What do you think would happen if two species were to occupy the same niche in the same habitat? The two species would compete for everything they needed in the environment. One species might outcompete and replace the other. Or both species might evolve different specializations so they could fill slightly different niches.

Questions

1. Define niche and describe two examples.
2. What is a habitat? What are its main features?
3. Explain what might happen if two different species occupied the same niche in the same habitat at the same time.

Lesson 23.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. All of the following could be classified as an ecosystem except a
    a. pond.
    b. forest.
    c. dead tree.
    d. bare rock.
2. Components of an ecosystem include
    a. a community.
    b. species interactions.
    c. abiotic factors.
    d. all of the above
3. Why can an ecosystem never be a closed system?
    a. Energy must be constantly added to the ecosystem from outside.
    b. Matter must be constantly brought in to replace what is used up.
    c. Organisms must come into the ecosystem to replace those that die.
    d. all of the above
4. A niche is the role in an ecosystem of a(n)
    a. individual.
    b. species.
    c. community.
    d. none of the above
5. The features of a habitat depend mainly on
    a. abiotic factors.
    b. biotic factors.
    c. competition.
    d. two of the above
6. A given habitat can have
    a. just one niche.
    b. just one species.
    c. many different species.
    d. up to two species per niche.
7. All of the following are recycled through ecosystems except
    a. energy.
    b. carbon.
    c. nitrogen.
    d. water.

Lesson 23.4: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ common focus of study in ecology
2. _____ principle that each species in the same habitat must have a different niche
3. _____ physical environment in which a species lives
4. _____ source of energy for most ecosystems
5. _____ role that a particular species plays in its ecosystem
6. _____ outcome when two species occupy the same niche in the same habitat at the same time
7. _____ example of matter that is recycled through ecosystems

Terms

a. water
b. niche
c. competitive exclusion
d. competition
e. ecosystem
f. habitat
g. sunlight

Lesson 23.4: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. A(n) _____ consists of all the biotic and abiotic factors in an area and all the ways they interact.
2. A minority of ecosystems have primary producers that make food using _____ energy.
3. A species' _____ includes all of the ways it interacts with the biotic and abiotic factors in its ecosystem.
4. Features of a species' habitat depend mainly on _____ factors such as temperature.
5. Two species cannot occupy the same _____ in the same habitat at the same time.
6. An ecosystem needs a constant input of _____ to supply the needs of its organisms.
7. Unlike energy, _____ is recycled through ecosystems.

Lesson 23.4: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Do you think that the human body could be considered an ecosystem? Why or why not?

23.5 Biomes

Lesson 23.5: True or False

Name_____ Class_____ Date_____

Write true if the statement is true or false if the statement is false.

1. _____ All ecosystems at the same latitude are placed in the same biome.
2. _____ Ecosystems in the same biome have the same type of primary producers.
3. _____ Plants are the primary producers in all of Earth's biomes.
4. _____ Which plants grow in a particular biome depends mainly on climate.
5. _____ Arctic tundra is found only at low latitudes.
6. _____ Rivers and lakes are examples of marine biomes.
7. _____ Deep water generally contains more dissolved oxygen than water near the surface.

Lesson 23.5: Critical Reading

Name_____ Class_____ Date_____

Read this passage based on the text and answer the questions that follow.

Zones in the oceans include the intertidal, pelagic, and benthic zones. The types of organisms found in these ocean zones are determined by the amount of sunlight the water receives and how rich the water is in dissolved nutrients and oxygen. These factors, in turn, depend mainly on the depth of the water and its distance from shore.

The intertidal zone is the narrow strip along a coastline that is covered by water at high tide and exposed to air at low tide. There are plenty of nutrients and sunlight in the intertidal zone. Producers here include phytoplankton and algae. Other organisms include barnacles, snails, crabs, and mussels. They must have adaptations for the constantly changing conditions in this zone.

The pelagic zone is all the water farther from shore in the open ocean. It is further divided by depth of water. The top 200 meters of water is the photic zone. Producers here include seaweeds and phytoplankton. Other organisms are plentiful. They include zooplankton and animals such as fish, whales, and dolphins. Below 200 meters is the aphotic zone. There are no primary producers here because there isn't enough sunlight for photosynthesis. However, the water may be rich in nutrients because of dead organisms drifting down from above. Organisms that live here may include bacteria, sponges, sea anemones, worms, sea stars, and fish.

The benthic zone includes the ocean floor and the water just above it. Organisms living in this zone include clams and crabs. They may be few in number due to relatively scarce nutrients in this zone. There are many more organisms around deep-sea vents on the ocean floor. Microorganisms use chemicals that pour out of the vents to make food by chemosynthesis. These producers support large numbers of other organisms, including crustaceans and tubeworms.

Questions

1. What is the intertidal zone? What conditions in this zone shape the adaptations of the organisms that live there?

2. Explain why the pelagic zone is further divided by depth of water. How does depth affect the types and numbers of organisms that live in these zones?
3. Compare and contrast abiotic and biotic factors around a deep-sea-vent with those in the rest of the benthic zone.

Lesson 23.5: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Terrestrial biomes include all of the following except
   a. tropical dry forests.
   b. alpine tundra.
   c. polar forests.
   d. boreal rainforests.
2. Which of the following is not a type of temperate biome?
   a. deciduous forest
   b. desert
   c. rainforest
   d. savanna
3. A tropical rainforest has
   a. very high biodiversity.
   b. a humid climate.
   c. a year-round growing season.
   d. all of the above
4. The main factors that determine aquatic biomes include
   a. temperature.
   b. types of plants.
   c. dissolved substances.
   d. two of the above
5. The limnetic zone of a lake has
   a. enough light for photosynthesis.
   b. more dissolved nutrients than any other lake zone.
   c. less dissolved oxygen than any other lake zone.
   d. none of the above
6. The types of plants found in tundra biomes include
   a. mosses.
   b. grasses.
   c. trees.
   d. two of the above
7. Reptiles live in all of the following biomes except
   a. tundra.
   b. tropical rainforest.
   c. tropical dry forest.
   d. temperate grassland.

Lesson 23.5: Matching

Name_____ **Class**_____ **Date**_____

Match each definition with the correct term.

Definitions

1. _____ primary producers in most aquatic biomes
2. _____ shallow water near the shore of a lake
3. _____ part of a body of water that is too deep for sunlight to reach
4. _____ general term for a group of similar ecosystems
5. _____ top 200 meters of a body of water
6. _____ average weather in a place over a long period of time
7. _____ of or relating to the ocean

Terms

a. photic zone
b. biome
c. climate
d. littoral zone
e. phytoplankton
f. marine
g. aphotic zone

Lesson 23.5: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. The bottom of the ocean is called the _____ zone.
2. All the water in the open ocean is called the _____ zone.
3. Producers that live around deep-sea vents make food by _____.
4. The _____ zone of the ocean is exposed to air at low tide.
5. Prairie, outback, and steppe are other names for a temperate _____ biome.
6. The major climatic factors affecting plant growth are moisture and _____.
7. Ecosystems in the same biome have the same general primary producers and _____ factors.

Lesson 23.5: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast the factors that determine terrestrial vs. aquatic biomes.

CHAPTER 24 MS Ecosystem Dynamics Worksheets

Chapter Outline

24.1 Flow of Energy

Lesson 24.1: True or False

Name_____ Class_____ Date_____

Write true if the statement is true or false if the statement is false.

1. _____ Energy enters most ecosystems in the form of chemical compounds.
2. _____ All ecosystems have organisms that are classified as producers.
3. _____ Chemoautotrophs include archaea and certain bacteria.
4. _____ Heterotrophs include producers and decomposers.
5. _____ Examples of detritivores include fungi and cockroaches.
6. _____ Most organisms are consumed by just one species.
7. _____ There are rarely more than four trophic levels in a food chain or food web.

Lesson 24.1: Critical Reading

Name_____ Class_____ Date_____

Read this passage based on the text and answer the questions that follow.

Living things can be classified on the basis of how they obtain energy. Some use the energy in sunlight or chemical compounds directly to make food. Some get energy indirectly by consuming other organisms, either living or dead.

Producers are living things that produce food for themselves and other organisms. They use energy and simple inorganic molecules to make organic compounds. Producers are vital to all ecosystems because all organisms need organic compounds for energy. Producers are also called autotrophs. There are two basic types of autotrophs. Photoautotrophs use energy in sunlight to make organic compounds by photosynthesis. Chemoautotrophs use energy in chemical compounds to make organic compounds by chemosynthesis.

Consumers are organisms that depend on other living things for food. They take in organic compounds by eating or absorbing other living things. Consumers are also called heterotrophs. There are several different types of heterotrophs depending on exactly what they consume. Herbivores consume producers such as plants or algae, carnivores consume animals, and omnivores consume both plants and animals.

Some heterotrophs are decomposers that break down the wastes of other organisms or the remains of dead organisms. They release simple inorganic molecules back into the environment so producers can then use them to make new organic compounds. For this reason, decomposers are essential to every ecosystem. Decomposers are classified by the type of organic matter they break down. Scavengers consume the soft tissues of dead animals. Detritivores consume dead leaves, animal feces, and other organic debris that collects on the ground or at the bottom of a body of water. Saprotrophs feed on any remaining organic matter that is left after other decomposers do their work.

Questions

1. Outline how organisms are classified based on how they obtain energy.
2. Explain why autotrophs are vital to all ecosystems.

3. Compare and contrast two different types of heterotrophs.

Lesson 24.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Organisms that are photoautotrophs include
    a. plants.
    b. certain fungi.
    c. all bacteria.
    d. two of the above
2. Which of the following organisms are omnivores?
    a. lions
    b. frogs
    c. rabbits
    d. crows
3. All of the following are decomposers except
    a. scavengers.
    b. detritivores.
    c. autotrophs.
    d. saprotrophs.
4. Which trophic level of a food chain consists of secondary consumers?
    a. trophic level 1
    b. trophic level 2
    c. trophic level 3
    d. trophic level 4
5. About 10 percent of the energy at any given trophic level is
    a. used for metabolic processes.
    b. available for the next higher trophic level.
    c. given off as heat to the environment.
    d. used by producers such as plants to make food.
6. Higher trophic levels tend to have
    a. larger organisms.
    b. more organisms.
    c. more biomass.
    d. two of the above
7. What do scavengers consume?
    a. dead leaves
    b. animal feces
    c. dead animals
    d. none of the above

Lesson 24.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ organism that breaks down organic wastes or remains
2. _____ diagram that represents a single pathway by which energy flows through an ecosystem
3. _____ ability to change or move matter
4. _____ organism that gets energy by consuming other organisms
5. _____ organism that consumes both plants and animals
6. _____ organism that makes food for itself and other organisms
7. _____ feeding position in a food chain or food web

Terms

a. heterotroph
b. omnivore
c. producer
d. trophic level
e. energy
f. food chain
g. decomposer

Lesson 24.1: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. A producer that uses energy in sunlight to make organic compounds is classified as a(n) _____.
2. Consumers that eat only plants are called _____.
3. Carnivores are heterotrophs that consume only _____.
4. _____ are decomposers that consume organic debris that collects on the ground or at the bottom of a body of water.
5. The total mass of organisms at a given trophic level is referred to as _____.
6. Primary consumers at trophic level 2 of a food chain eat _____.
7. The process in which some producers make food using chemical energy is called _____.

Lesson 24.1: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain why all ecosystems need a constant input of energy.

24.2 Cycles of Matter

Lesson 24.2: True or False

Name_____ Class_____ Date_____

Write true if the statement is true or false if the statement is false.

1. _____ The ocean is a reservoir in the carbon cycle.
2. _____ Life on Earth could not exist without water.
3. _____ Individual water molecules may be billions of years old.
4. _____ Water changes to a gas by the process of condensation.
5. _____ Water in clouds is in the gaseous state.
6. _____ Most precipitation falls on land.
7. _____ Volcanic eruptions can release underground carbon from rocks into the atmosphere.

Lesson 24.2: Critical Reading

Name_____ Class_____ Date_____

Read this passage based on the text and answer the questions that follow.

The element carbon is the basis of all life on Earth. Biochemical compounds consist of chains of carbon atoms and just a few other elements. Like water, carbon is constantly recycled through the biotic and abiotic factors of ecosystems. The carbon cycle includes carbon in sedimentary rocks and fossil fuels under the ground as well as carbon in the ocean, the atmosphere, and living things.

Sedimentary rocks, fossil fuels, and the ocean are major reservoirs of carbon. Sediments from dead organisms may form carbon-containing sedimentary rocks. Alternatively, the sediments may form carbon-rich fossil fuels, which include oil, natural gas, and coal. Carbon can be stored in these reservoirs for millions of years. However, if fossil fuels are extracted and burned, the stored carbon enters the atmosphere as carbon dioxide. Natural processes, such as volcanic eruptions, can release underground carbon from rocks into the atmosphere. Carbon in rocks can also be dissolved by flowing water in runoff, rivers, and streams, which may carry the dissolved carbon to the ocean. Ocean water dissolves carbon dioxide from the atmosphere. Dissolved carbon may be stored in the deep ocean for thousands of years.

Major exchange pools of carbon include living things and the atmosphere. Carbon cycles more quickly between these components of the carbon cycle. Photosynthesis by plants and other producers removes carbon dioxide from the atmosphere to make organic compounds for living things. Cellular respiration by living things releases carbon into the atmosphere or ocean as carbon dioxide. Decomposition of dead organisms and organic wastes releases carbon back to the atmosphere, soil, or ocean.

Questions

1. Why is the element carbon so important to life on Earth?
2. Identify three major reservoirs of carbon. Describe one process by which carbon can leave a reservoir and enter an exchange pool.

3. How does carbon cycle back and forth between living things and the atmosphere?

Lesson 24.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Exchange pools for water include
   a. the atmosphere.
   b. polar ice caps.
   c. aquifers.
   d. all of the above
2. Which statement about the water cycle is false?
   a. The water cycle is a global cycle.
   b. The water cycle takes place only on and above Earth's surface.
   c. In the water cycle, water exists in three different states.
   d. Water cycle processes include condensation.
3. How do solid carbon compounds change to carbon dioxide in the atmosphere during the carbon cycle?
   a. cellular respiration by living things
   b. photosynthesis by photoautotrophs
   c. decomposition of dead organisms
   d. two of the above
4. What role do plants called legumes play in the nitrogen cycle?
   a. Their roots change nitrogen gas in the air into nitrates.
   b. Their roots provide a home for nitrogen-fixing bacteria.
   c. Their leaves transpire nitrogen gas into the atmosphere.
   d. Their leaves change ammonium ions into nitrogen gas.
5. All of the following processes are part of the water cycle except
   a. transpiration.
   b. sublimation.
   c. evaporation.
   d. decomposition.
6. Nitrogen gas is released into the soil by
   a. nitrogen-fixing bacteria.
   b. denitrifying bacteria.
   c. decomposers.
   d. two of the above
7. The process in which plants absorb nitrates through their roots is called
   a. nitrification.
   b. denitrification.
   c. assimilation.
   d. ammonification.

Lesson 24.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ process in which water vapor changes to liquid water
2. _____ part of a biogeochemical cycle that holds a substance for a long period of time
3. _____ water that falls as precipitation and then flows over the surface of the land
4. _____ biogeochemical cycle that includes sedimentary rocks and fossil fuels
5. _____ part of a biogeochemical cycle that holds a substance for a short period of time
6. _____ biogeochemical cycle that includes the atmosphere and several types of bacteria
7. _____ process in which snow and ice change directly to water vapor

Terms

a. reservoir
b. sublimation
c. carbon cycle
d. runoff
e. exchange pool
f. condensation
g. nitrogen cycle

Lesson 24.2: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. Chemical elements and water are recycled in ecosystems through _____ cycles.
2. _____ is the process in which plants release water vapor from their leaves.
3. Condensation of water vapor may form clouds, fog, or _____.
4. Water that soaks into the ground is called _____.
5. An underground layer of rock that stores water is called a(n) _____.
6. Major exchange pools of carbon include living things and the _____.
7. The only form of nitrogen that plants can use is in chemical compounds called _____.

Lesson 24.2: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain the role of plants in the water, carbon, and nitrogen cycles.

24.3 Ecosystem of Change

Lesson 24.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ No ecosystem is completely unchanging.
2. _____ All ecological change is either primary or secondary succession.
3. _____ Wind and water help weather rock and form soil in primary succession.
4. _____ Plants can grow in an area only after soil has formed.
5. _____ Trees usually colonize an area before small plants such as grasses.
6. _____ Ecological succession always ends at a final, stable state.
7. _____ Most ecosystems have climax communities.

Lesson 24.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

The towering trees in an old forest have been growing there for hundreds of years. It may seem as though the forest has been there forever. But no ecosystem is truly static. The numbers and types of species in most ecosystems change to some degree through time. This is called ecological succession.

Two important cases of ecological succession are primary succession and secondary succession. Primary succession occurs in an area that has never before been colonized by living things. Generally, the area starts out as nothing but bare rock. This type of environment could come about when a landslide uncovers bare rock, a glacier retreats and leaves behind bare rock, or lava flows from a volcano and hardens into bare rock. Secondary succession occurs in a formerly inhabited area that was disturbed. Secondary succession could result from a fire, flood, or human action such as farming. For example, a forest fire might kill all the trees and other plants in a forest, leaving behind only charred wood and soil.

Does a changing ecosystem ever stop changing? Does its community of organisms ever reach some final, stable state? Scientists used to think that ecological succession always ended at a stable state, called a climax community. Now their thinking has changed. Theoretically, a climax community is possible, but continued change is probably more likely for real-world ecosystems. Most ecosystems are disturbed too often to ever develop a climax community.

Questions

1. Define ecological succession.
2. Contrast primary and secondary succession.
3. Why is a climax community unlikely for most ecosystems?

Lesson 24.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Which events would most likely produce conditions where primary succession would occur?
    a. plowing by a farmer
    b. retreating of a glacier
    c. flooding by a river
    d. burning of a forest
2. In primary succession, the first few species to colonize the area
    a. can live on rock.
    b. weather rock.
    c. help form soil.
    d. all of the above
3. During primary succession, the first plants to live in the area
    a. must be able to grow in thin, poor soil.
    b. use up all the organic matter in the soil.
    c. prevent trees from moving into the area.
    d. are usually tall plants such as shrubs.
4. Which statement about secondary succession is false?
    a. It is faster than primary succession.
    b. The soil is already in place.
    c. Pioneer species include plants.
    d. none of the above
5. Which statement applies to most ecosystems?
    a. They rarely change.
    b. They reach a final, stable community.
    c. They change continuously.
    d. They are rarely disturbed.
6. Adding organic matter to soil
    a. improves soil quality.
    b. helps soil hold water.
    c. may allow shrubs and trees to grow.
    d. all of the above
7. Pioneer species
    a. are the same in primary and secondary succession.
    b. always include plants such as grasses.
    c. are always the first species to colonize a disturbed area.
    d. all of the above

Lesson 24.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ type of succession that occurs in a formerly inhabited area
2. _____ theoretical, final stable state of an ecosystem
3. _____ first species to colonize a disturbed area
4. _____ type of succession that occurs in an area that has never before been colonized
5. _____ possible cause of primary succession
6. _____ any change over time in the numbers and types of species in an ecosystem
7. _____ possible cause of secondary succession

Terms

a. secondary succession
b. forest fire
c. ecological succession
d. climax community
e. pioneer species
f. primary succession
g. landslide

Lesson 24.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. _____ succession occurs where there is nothing but bare rock.
2. _____ succession occurs where there is nothing but bare soil.
3. Bacteria and lichen are pioneer species in _____ succession.
4. Fireweed and grasses are pioneer species in _____ succession.
5. _____ succession would occur on lava rock from a volcano.
6. _____ succession would occur on sediments left behind by a flood.
7. Most ecosystems are disturbed too often to ever develop a(n) _____ community.

Lesson 24.3: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Assume that lava poured out of a volcano over a large area. When the lava cooled, it hardened to form rock. Explain how ecological succession will occur in this area.

CHAPTER 25 MS Environmental Problems Worksheets

Chapter Outline

25.1 Air Pollution

Lesson 25.1: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Air pollution is no longer a major problem in the U.S.
2. _____ Heart attacks may be triggered by pollutants in the air.
3. _____ Acid rain may kill animals but does not affect plants.
4. _____ Earth had no greenhouse effect until human beings started burning fossil fuels.
5. _____ Outdoor air is always more polluted than indoor air.
6. _____ Air pollution is a major contributor to respiratory diseases.
7. _____ It is easier to control the quality of indoor air than outdoor air.

Lesson 25.1: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

A major problem caused by air pollution is global climate change. Gases such as carbon dioxide from the burning of fossil fuels increase the greenhouse effect and raise Earth's temperature.

The greenhouse effect is a natural feature of Earth's atmosphere. It occurs when certain gases in the atmosphere, including carbon dioxide, radiate the sun's heat back down to Earth's surface. Without greenhouse gases in the atmosphere, the heat would escape into space. The natural greenhouse effect of Earth's atmosphere keeps the planet's temperature within a range that can support life.

The rise in greenhouse gases due to human actions, especially the burning of fossil fuels, is too much of a good thing. It increases the greenhouse effect and causes Earth's average temperature to rise. Rising global temperatures, in turn, are melting polar ice caps and glaciers. With more liquid water on Earth's surface, sea levels are rising.

Adding more heat energy to Earth's atmosphere also causes more extreme weather and changes in precipitation patterns. Global warming is already causing food and water shortages and species extinctions. These problems will only grow worse unless steps are taken to curb greenhouse gases and global climate change.

Questions

1. What is the natural greenhouse effect? Why is it important to life on Earth?
2. Explain why the greenhouse is effect greater now than in the past.
3. Discuss environmental consequences of the recent increase in the greenhouse effect.

Lesson 25.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The major cause of outdoor air pollution is
    a. use of chemicals such as fertilizers.
    b. erosion of disturbed soil.
    c. burning of fossil fuels.
    d. ranching activities.
2. Carbon monoxide is
    a. a major cause of global climate change.
    b. a toxic gas that may pollute indoor air.
    c. one of the chief causes of acid rain.
    d. two of the above
3. The main sources of pollutants that form acid rain include
    a. mining activities.
    b. coal burning.
    c. motor vehicle exhaust.
    d. two of the above
4. Consequences of acid rain may include
    a. destruction of stone buildings.
    b. deaths of aquatic organisms.
    c. damage to soil.
    d. all of the above
5. What are VOCs?
    a. toxic compounds released by some furniture and paints
    b. nerve poisons produced by the burning of fossil fuels
    c. deadly gases released by poorly vented furnaces
    d. none of the above
6. Fossils fuels are burned in
    a. power plants.
    b. motor vehicles.
    c. factories.
    d. all of the above
7. Which of the following is a common indoor and outdoor air pollutant?
    a. dust
    b. radon
    c. pet dander
    d. ground-level ozone

Lesson 25.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ main gas that is causing global climate change
2. _____ naturally occurring radioactive gas that may pollute indoor air
3. _____ air pollutant produced by burning coal that causes acid rain
4. _____ air pollutant caused by motor vehicle exhaust that worsens respiratory problems
5. _____ toxic gas that may be released by faulty fuel-burning appliances
6. _____ any harmful substance released into the atmosphere
7. _____ natural feature of Earth's atmosphere that warms Earth's surface

Terms

a. air pollution
b. ground-level ozone
c. carbon monoxide
d. sulfur oxide
e. greenhouse effect
f. radon
g. carbon dioxide

Lesson 25.1: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Air pollution includes chemical substances and _____ released into the atmosphere.
2. _____ is a metal released into the air by burning coal that causes nerve poisoning.
3. Rain that has a lower pH than normal rain is called _____ rain.
4. Carbon dioxide causes global warming by increasing the _____ effect.
5. Radon gas may seep into buildings from underground _____.
6. Sulfur and _____ oxides are air pollutants that lower the pH of rain.
7. Exposure to radon gas may cause _____ cancer.

Lesson 25.1: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Identify pollutants added to the air by motor vehicles, and explain some of the environmental and health problems they cause.

25.2 Water Pollution

Lesson 25.2: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Less than half of Earth's water is in the ocean, glaciers, and ice caps.
2. _____ Algal blooms are due to excess nutrients polluting bodies of water.
3. _____ There is a very large dead zone in the Gulf of Mexico.
4. _____ Examples of wetlands include marshes and bogs.
5. _____ Waterborne diseases are caused by pathogens in drinking water.
6. _____ Virtually all thermal pollution of Earth's water is caused by global warming.
7. _____ The ocean is so huge that it can never become seriously polluted.

Lesson 25.2: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Water pollution has many causes. One of the biggest causes is fertilizer in runoff. Runoff dissolves fertilizer as it flows over farm fields, lawns, and golf courses. It carries the dissolved fertilizer into bodies of water. More dissolved fertilizer may enter a body of water at the mouth of a river, but there is generally no single point where this type of pollution enters the water. That's why this type of water pollution is called nonpoint-source pollution.

When fertilizer ends up in bodies of water, the added nutrients cause excessive growth of algae. This is called an algal bloom. The algae out-compete other water organisms and may make the water unfit for human consumption or recreation. Eventually, the algae in an algal bloom die and decompose. Their decomposition uses up oxygen in the water so that the water becomes hypoxic ("without oxygen"). This has occurred in many bodies of fresh water and large areas of the ocean, creating dead zones. Dead zones are areas where the hypoxic water can't support life. A very large dead zone exists in the Gulf of Mexico. Nutrients carried into the Gulf of Mexico by the Mississippi River caused this dead zone.

Cutting down on the use of chemical fertilizers is one way to prevent dead zones in bodies of water. Preserving wetlands is also important. Wetlands are habitats such as swamps, marshes, and bogs where the ground is soggy or covered with water much of the year. Wetlands slow down and filter runoff before it reaches bodies of water. Wetlands also provide breeding grounds for many different species of organisms.

Questions

1. What is nonpoint-source pollution? What are sources of dissolved chemicals in this type of pollution?
2. What causes algal blooms? Why do algal blooms lead to dead zones in bodies of water?
3. Explain why preserving wetlands helps prevent dead zones.

Lesson 25.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. What percent of Earth's water is fresh, liquid water?
    a. 1 percent
    b. 10 percent
    c. 50 percent
    d. 90 percent
2. Pollutants in Earth's waters include
    a. chemicals.
    b. sewage.
    c. heat.
    d. all of the above
3. How many people worldwide do not have enough clean, fresh water?
    a. fewer than a hundred
    b. about a thousand
    c. about a million
    d. more than a billion
4. The main pollutant added to water by nonpoint-source pollution is
    a. plastic trash.
    b. pathogens.
    c. fertilizer.
    d. none of the above
5. Water becomes hypoxic when algae in an algal bloom
    a. undergo cellular respiration.
    b. carry out photosynthesis.
    c. grow and reproduce.
    d. die and decompose.
6. Why are wetlands important for the environment?
    a. They filter runoff before it reaches bodies of water.
    b. They provide breeding grounds for many different species.
    c. They can be filled in with soil so more native plants will grow.
    d. two of the above
7. Which statement about point-source pollution is false?
    a. It may enter the water from a factory.
    b. It may include thermal pollution.
    c. It may come from a sewage treatment plant.
    d. It enters a body of water in runoff.

Lesson 25.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ problem resulting from too much dissolved carbon dioxide in ocean water
2. _____ main way that nonpoint-source pollution enters bodies of water
3. _____ main source of chemicals that cause algal blooms
4. _____ area where water cannot support aquatic life because it is hypoxic
5. _____ reduction in water quality due to an increase in water temperature
6. _____ excessive growth of aquatic producers
7. _____ habitat with moist soil, such as a swamp

Terms

a. algal bloom
b. wetland
c. fertilizer
d. runoff
e. acidification
f. dead zone
g. thermal pollution

Lesson 25.2: Fill in the Blank

Name_____ **Class**_____ **Date**_____

Fill in the blank with the appropriate term.

1. Dead zones are areas where water contains too little dissolved _____.
2. A(n) _____ is an area where the ground is soggy or covered by water much of the year.
3. Pollution that enters a body of water at just one place is referred to as _____ pollution.
4. Any illness caused by drinking sewage-contaminated water is called a(n) _____ disease.
5. The increase in greenhouse gases is causing ocean _____.
6. Fertilizer enters bodies of water mainly in _____.
7. Warm water holds _____ dissolved oxygen than cold water.

Lesson 25.2: Critical Writing

Name_____ **Class**_____ **Date**_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Point-source pollution is generally easier to control than nonpoint-source pollution. Explain why.

25.3 Natural Resources

Lesson 25.3: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ All natural resources are used for energy.
2. _____ Some minerals are renewable resources.
3. _____ It takes millions of years for fossil fuels to form.
4. _____ At current rates of use, oil will be used up in just a few decades.
5. _____ The use of nuclear power adds greenhouse gases to the atmosphere.
6. _____ Decomposition of garbage releases methane gas that can be used for fuel.
7. _____ LED light bulbs use less energy than incandescent light bulbs.

Lesson 25.3: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Renewable resources are natural resources that are remade by natural processes as quickly as people use them. Examples of renewable resources include sunlight and wind. They are in no danger of being used up. Metals and some other minerals are considered renewable as well because they are not destroyed when they are used. Instead, they can be recycled and used over and over again.

Living things are also renewable resources. They can reproduce to replace themselves. However, living things can be over-used or misused to the point of extinction. For example, over-fishing has caused some of the best fishing spots in the ocean to be nearly depleted, threatening entire fish species with extinction. To be truly renewable, living things must be used wisely. They must be used in a way that meets the needs of the present generation but also preserves them for future generations.

Nonrenewable resources are natural resources that can't be remade or else take too long to remake to keep up with human use. Examples of nonrenewable resources are coal, oil, and natural gas, all of which are fossil fuels. Fossil fuels form from the remains of plants and animals over hundreds of millions of years. We are using them up far faster than they can be replaced. At current rates of use, oil and natural gas will be used up in just a few decades, and coal will be used up in a couple of centuries. Uranium is another nonrenewable resource. It is used to produce nuclear power. Uranium is a naturally occurring chemical element that can't be remade. It will run out sooner or later if nuclear energy continues to be used.

Soil is a very important natural resource. Plants need soil to grow, and plants are the basis of terrestrial ecosystems. Theoretically, soil can be remade. However, it takes millions of years for soil to form, so from a human point of view, it is a nonrenewable resource. Soil can be misused and eroded. It must be used wisely to preserve it for the future. This means taking steps to avoid soil erosion and contamination of soil by toxins such as oil spills.

Questions

1. Whether natural resources are classified as renewable or nonrenewable depends in part on how they are used. Explain why.
2. Living things are renewable resources but could still be used up. How might this happen?
3. What makes soil a nonrenewable resource when new soil is constantly being made?

Lesson 25.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Which energy resource is used more than any other in the world?
    a. wood
    b. wind
    c. sun
    d. oil
2. Renewable resources include
    a. living things.
    b. uranium.
    c. coal.
    d. two of the above
3. Nonrenewable energy resources include
    a. natural gas.
    b. nuclear energy.
    c. biomass energy.
    d. two of the above
4. Renewable energy resources include
    a. sunlight.
    b. wind.
    c. living things.
    d. all of the above
5. The method of conserving resources that uses the least energy is
    a. reducing resource use.
    b. reusing resources.
    c. recycling resources.
    d. refining resources.
6. Soil is a nonrenewable natural resource because it
    a. can never be renewed.
    b. takes so long to form.
    c. is not needed in nature.
    d. does not produce energy.
7. Energy resources that do not create air pollution when they are used include
    a. solar energy.
    b. biomass energy.
    c. natural gas.
    d. two of the above

Lesson 25.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ energy provided by burning or decomposing organic matter
2. _____ resource that cannot be remade at all or as quickly as people use it
3. _____ use of resources in a way that meets current needs and also the needs of future generations
4. _____ coal, oil, or natural gas
5. _____ anything supplied by nature that helps support life
6. _____ nonrenewable resource that plants need to grow
7. _____ resource that is remade by natural processes as quickly as people use it

Terms

a. soil
b. natural resource
c. biomass energy
d. renewable resource
e. sustainable use
f. fossil fuel
g. nonrenewable resource

Lesson 25.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. Sunlight and wind are classified as _____ energy resources.
2. Metals such as aluminum are considered renewable resources because they can be _____.
3. The radioactive element _____ is used to produce nuclear power.
4. Solar cells can be used to turn sunlight into _____.
5. The three Rs of resource conservation stand for reduce, reuse, and _____.
6. A wind _____ turns wind energy into electrical energy.
7. All fossil fuels are classified as _____ energy resources.

Lesson 25.3: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Write an essay persuading readers of the need to conserve natural resources and giving tips for easy ways to do it.

25.4 Biodiversity and Extinction

Lesson 25.4: True or False

Name_____ **Class**_____ **Date**_____

Write true if the statement is true or false if the statement is false.

1. _____ Biodiversity is an important natural resource.
2. _____ Scientists have already discovered most of the species that are alive today.
3. _____ Scientists estimate that there are a total of 100 million species currently in existence.
4. _____ Products that living things provide include rubber, dyes, and adhesives.
5. _____ More than half of the most important prescription drugs come from wild species.
6. _____ Amphibians are particularly sensitive to environmental toxins because of their permeable skin.
7. _____ Most domestic species have been bred to be genetically variable.

Lesson 25.4: Critical Reading

Name_____ **Class**_____ **Date**_____

Read this passage based on the text and answer the questions that follow.

Biodiversity has direct economic benefits to people.

- Besides food, living things provide us with many different products, such as fibers, paper, and timber.
- Living things are an invaluable source of medical drugs.
- Amphibian species may warn us of toxins in the environment.
- Wild organisms maintain a valuable pool of genetic variation. This is important because most domestic species have been bred to be genetically uniform.
- Living things provide inspiration for technology. For example, water strider insects have helped engineers develop tiny robots that can walk on water.

Biodiversity is also important for healthy ecosystems. It generally increases ecosystem productivity and stability. It also helps ensure that at least some species will survive environmental change. Biodiversity provides many additional ecosystem services.

- Plants and algae maintain Earth's atmosphere. They add oxygen to the air and remove carbon dioxide when they undertake photosynthesis.
- Plants help protect the soil. Their roots grip the soil and keep it from washing or blowing away. When plants die, their organic matter improves the soil as it decomposes.
- Microorganisms purify water in rivers and lakes, decompose organic matter, and return nutrients to the soil. Certain bacteria fix nitrogen and make it available to plants.
- Predator species such as birds and spiders control insect pests. They reduce the need for chemical pesticides, which are expensive and may be harmful to human beings and other organisms.

- Animals including bees and bats pollinate flowering plants. Many crop plants depend on pollination by wild animals.

Questions

1. Identify three direct economic benefits of biodiversity to people.
2. Explain why biodiversity is important for healthy ecosystems.
3. Describe three ecosystem services provided by biodiversity.

Lesson 25.4: Multiple Choice

Name_____ **Class**_____ **Date**_____

Circle the letter of the correct choice.

1. Biodiversity refers to
   a. variation in living organisms.
   b. genetic differences among living things.
   c. the range of communities and ecosystems worldwide.
   d. all of the above
2. How many living species have scientists identified?
   a. fewer than 1 thousand
   b. about 1 million
   c. close to 2 million
   d. at least 3 million
3. Which of the following types of ecosystems has the greatest biodiversity?
   a. temperate grassland
   b. intertidal zone
   c. tropical rainforest
   d. alpine tundra
4. Economic benefits of biodiversity include
   a. storing genetic variation.
   b. providing inspiration for technology.
   c. warning of environmental toxins.
   d. all of the above
5. How do microorganisms benefit ecosystems?
   a. They fix nitrogen.
   b. They purify water.
   c. They return nutrients to soil.
   d. all of the above
6. The fifth mass extinction
   a. is occurring now.
   b. wiped out the dinosaurs.
   c. occurred about 10,000 years ago.
   d. two of the above
7. Which of the following is an example of an exotic species in North America?

a. peregrine falcon
b. purple loosestrife
c. bison
d. honey bee

Lesson 25.4: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

1. _____ species that is introduced to a new habitat where it never existed before
2. _____ extinction event in which many species go extinct around the same time
3. _____ variety of life and its processes
4. _____ complete dying out of a species
5. _____ one of the most biodiverse ecosystems on Earth
6. _____ single biggest cause of extinction at present
7. _____ example of an ecosystem service provided by biodiversity

Terms

a. biodiversity
b. exotic species
c. pollination
d. extinction
e. habitat loss
f. mass extinction
g. coral reef

Lesson 25.4: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. Engineers used water strider insects as models for _____ that could walk on water.
2. Predators that eat insect pests reduce the need for chemical _____.
3. Many crop plants depend on _____ by wild animals such as bees in order to reproduce.
4. More than _____ percent of all the species that ever lived on Earth have gone extinct.
5. The present mass extinction is the _____ mass extinction that has occurred on Earth.
6. A species' _____ is the area where it lives and to which it has become adapted.
7. The peregrine falcon nearly went extinct in the mid-1900s because of the pesticide _____.

Lesson 25.4: Critical Writing

Name_____ Class_____ Date_____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

What is the sixth mass extinction? Explain its causes.

CONCEPT 26 Middle School Life Science Workbook Answer Keys