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CK-12 Earth Science For Middle School Workbook

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Jean Brainard, Ph.D.

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AUTHOR
Jean Brainard, Ph.D.

CONTRIBUTORS
Dana Desonie, Ph.D.
Julie Sandeen

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CHAPTER 1 MS What is Earth Science? Worksheets

Chapter Outline

1.1 THE NATURE OF SCIENCE

1.2 EARTH SCIENCE AND ITS BRANCHES

1.1 The Nature of Science

Lesson 1.1: True or False

Name_____ Class_____ Date_____

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

_____ 1. Science is a set of knowledge and also a way of knowing things.

_____ 2. A scientific hypothesis is useful only if it is proven to be true.

_____ 3. Controls are factors that could affect the outcome of an experiment.

_____ 4. A scientific investigation always begins with a theory.

_____ 5. An example of a scientific hypothesis is that angels dance on the head of a pin.

_____ 6. An example of a scientific theory is the theory of plate tectonics.

_____ 7. A globe is a physical model of planet Earth.

_____ 8. Only models that are perfect representations of reality are useful in science.

_____ 9. You should wear a hoodie to protect your hair when you work in a science lab.

_____ 10. You should take a first aid kit when you do a science investigation in the field.

Lesson 1.1: Critical Reading

Name_____ Class_____ Date_____

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

Doing Science: An Example

A certain farmer is having an erosion problem. She wants to keep more soil on her fields. She learns that a farming method called "no-till farming" allows farmers to plant seeds without plowing the land. She wonders if planting seeds without plowing will reduce the erosion problem and help keep more soil on her land. Her question is this: "Will using the no-till method result in less soil loss?"

First, the farmer needs to learn more about no-till farming. She looks up information in books and magazines in the library, searches the Internet, and talks to people who have tried this way of farming. She learns that no-till farming doesn't disturb the soil and break up plant roots that help hold soil in place. By not plowing, she thinks, she will have less soil erosion. She forms this hypothesis: "If a field is not plowed, then it will have less soil loss." A hypothesis is a reasonable answer to a question that can be tested. It may be a right or wrong answer, but it must be testable to be a scientific hypothesis. The farmer's hypothesis is testable, so she decides to an experiment to test it.

In an experiment, just one factor should be changed to see how it affects another factor. The factor that is changed is called the independent variable. The factor that is affected is the called the dependent variable. In the example, the farmer's independent variable is plowing/not plowing, and her dependent variable is amount of soil loss. The farmer will prepare and plant two fields. One will be plowed and the other will not. At the end of the growing season, the

farmer will assess the amount of soil lost from each field. Other than plowing, the farmer will keep everything the same for both fields: the type of crop, amount of water and fertilizer, and slope and direction of the field. These are her experimental controls. Controls are factors that might affect the dependent variable. By controlling these factors, the farmer changes only the plowing variable, so she can see the impact of that one variable on soil loss.

At the end of the growing season, the farmer estimates that only about half as much soil was lost from the unplowed field as compared with the plowed field. Does this result support her hypothesis?

Questions

1. State the question and hypothesis that the farmer posed.
2. Identify the farmer's independent and dependent variables.
3. How does the farmer control other factors that might affect the dependent variable?
4. Why is it necessary to have controls in an experiment?
5. Explain whether the farmer's result supports her hypothesis.

Lesson 1.1: Multiple Choice

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

Circle the letter of the correct choice.

1. Steps of the scientific method include all of the following except
    a. doing background research.
    b. constructing a hypothesis.
    c. asking a question.
    d. proving a theory.
2. The data collected in an experiment should always be
    a. labeled.
    b. recorded.
    c. reported.
    d. all of the above
3. If the results of an experiment disprove a hypothesis, then the
    a. results should not be reported.
    b. hypothesis is just a theory.
    c. data must contain errors.
    d. none of the above
4. Which statement about a scientific theory is false?
    a. A theory can never be disproven.
    b. A theory is supported by many observations.
    c. A theory may develop from a well-supported hypothesis.
    d. A theory may be rejected if conflicting data are discovered.
5. Types of scientific models include
    a. mathematical equations.
    b. computer models.
    c. physical models.
    d. all of the above
6. Which of the following is a lab safety rule?

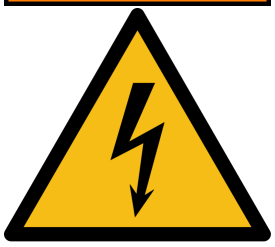
a. You may drink but not eat in the lab.
b. You should tie back your hair if it is long.
c. You may wear sandals but not flip-flops in the lab.
d. You should leave used glassware for your teacher to wash.

7. Which of the following lab safety symbols stands for high voltage?

a. 

b. 

c. 

d. 

Lesson 1.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. representation of something using objects

_____ 2. factor that is held constant in a scientific experiment

_____ 3. variable that is changed in an experiment to see how it affects another variable

_____ 4. scientific explanation that is widely accepted because it has been tested repeatedly and not proven false

_____ 5. series of logical steps that scientists may use to seek answers to questions

_____ 6. possible answer to a question that can be tested to see whether it is false

_____ 7. variable that is measured in an experiment to see how it is affected by another variable

Terms

a. control

b. dependent variable

c. hypothesis

d. independent variable

e. physical model

f. theory

g. scientific method

Lesson 1.1: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. A scientific investigation generally begins with a(n) _____.
2. A scientific hypothesis should be reasonable and must be _____.
3. The final step of the scientific method is to _____ the results.
4. A drawing or diagram is an example of a(n) _____ model.
5. A(n) _____ is a controlled investigation of independent and dependent variables.
6. A model is always _____ than the real object or system.
7. A skull and cross bones safety symbol represents a substance that is _____.

Lesson 1.1: Critical Writing

Name_____ Class_____ Date_____

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

Explain how the farmer in the lesson used evidence and logic to answer her question about soil loss.

1.2 Earth Science and Its Branches

Lesson 1.2: True or False

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

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

_____ 1. Earth science is a branch of geology.

_____ 2. Some geologists specialize in the study of soil.

_____ 3. Rock layers below Earth's surface are a record of Earth's history.

_____ 4. The science of oceanography started with mapping the oceans.

_____ 5. Scientists have not yet visited the deepest parts of the ocean.

_____ 6. Most of Earth's water is in rivers and lakes.

_____ 7. Humans have had relatively little impact on the oceans.

_____ 8. There are several branches of oceanography.

_____ 9. Meteorologists study meteors.

_____ 10. The burning of fossil fuels contributes to global warming.

Lesson 1.2: Critical Reading

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

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

Astronomy

Astronomy is the study of solar systems, galaxies, and the universe. Astronomers have shown that the planets in our solar system are not the only planets in the universe. Hundreds of planets have already been discovered outside our solar system, and there are likely to be billions that have not yet been discovered. In addition to planets, the universe also contains black holes, galaxies, asteroids, comets, and nebulas. As big as Earth seems, the entire universe is vastly more enormous. Earth is an extremely tiny part of the universe.

Astronomers use many tools to study things in space. Earth-orbiting satellites with telescopes view stars and galaxies from the darkness of space. They have optical or radio telescopes that can see distant objects that the human eye cannot. Spacecraft without human occupants travel great distances and send back information to scientists on Earth. Robots land on Mars and collect data directly on the planet's surface.

Astronomers try to answer a wide variety of questions with their studies of space. For example:

- What are the properties of black holes?
- How did the universe begin?
- Is there life on other planets?

- Are there resources on other planets that human beings could use?
- How do bursts of energy from the Sun (solar flares) affect communications on Earth?

Questions

1. Define astronomy.
2. What does the universe contain?
3. Identify tools that astronomers use to study space.
4. Choose one of the questions listed above that astronomers ask. Which question interests you the most? Why?

Lesson 1.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Earth science is the study of
   a. solid Earth.
   b. Earth's oceans.
   c. Earth's atmosphere.
   d. all of the above
2. A geologist would be most likely to investigate how
   a. mountains form.
   b. people cause pollution.
   c. tornadoes occur.
   d. two of the above
3. Which type of Earth scientist might look for petroleum for an oil company?
   a. meteorologist
   b. climatologist
   c. geologist
   d. ecologist
4. Chemical oceanography is the study of the
   a. human pollution of ocean water.
   b. naturally occurring elements in ocean water.
   c. rising levels of ocean water.
   d. rocks on the ocean floor.
5. The problem of global warming is most likely to be the focus of a scientist known as a
   a. planetary geologist.
   b. seismologist.
   c. physical oceanographer.
   d. climatologist.
6. Which type of Earth scientist would you expect to give a weather report?
   a. volcanologist
   b. meteorologist
   c. climatologist
   d. environmental scientist

7. Tools typically used by meteorologists include
    a. satellites.
    b. radar.
    c. telescopes.
    d. two of the above

Lesson 1.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. study of Earth's weather

_____ 2. study of earthquakes

_____ 3. study of Earth's oceans

_____ 4. study of solid Earth

_____ 5. study of human effects on Earth

_____ 6. study of all aspects of planet Earth

_____ 7. study of the universe

Terms

a. astronomy

b. oceanography

c. geology

d. environmental science

e. Earth science

f. seismology

g. meteorology

Lesson 1.2: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. A volcanologist studies _____.
2. _____ is the study of rocks and minerals.
3. The study of fossils is referred to as _____.
4. Scientists called _____ study hurricanes and tornadoes.
5. _____ oceanography is the study of water movements such as waves and currents.
6. The study of living things and their environments is known as _____.
7. _____ are scientists who study space.

Lesson 1.2: Critical Writing

Name_____ Class_____ Date_____

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

Explain which branches and specialties of Earth science might focus on the problem of rising ocean temperatures.

CHAPTER 2

MS Studying Earth's Surface Worksheets

Chapter Outline

2.1 INTRODUCTION TO EARTH'S SURFACE

2.2 MODELING EARTH'S SURFACE

2.3 TOPOGRAPHIC MAPS

2.4 USING SATELLITES AND COMPUTERS

2.1 Introduction to Earth's Surface

Lesson 2.1: True or False

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

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

_____ 1. Earth's magnetic north pole is always located in the same place.

_____ 2. A compass needle points toward Earth's true north.

_____ 3. All landforms are created by constructive forces.

_____ 4. A mountain may wear away into a high flat area called a plateau.

_____ 5. Examples of landforms include hills, straits, and capes.

_____ 6. The ocean basin begins where the ocean meets the land.

_____ 7. The continental shelf is the part of a continent that is under ocean water.

_____ 8. The continental rise is formed by volcanic eruptions.

_____ 9. Mid-ocean ridges form from sediments deposited by ocean water.

_____ 10. The Mariana Trench is the deepest place on Earth.

Lesson 2.1: Critical Reading

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

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

Continents and Landforms

If you could take away the water in the oceans, Earth would look very different. You would see that Earth's surface has two main features: continents and ocean basins. Continents are large land masses. Ocean basins extend from the edges of continents to the ocean floor and into deep trenches. Continents are much older than ocean basins. Some rocks on the continents are billions of years old. Ocean basins, in contrast, are at most only millions of years old.

Because the continents are so old, a lot has happened to them! Landforms have repeatedly been built up and then destroyed. Landforms are physical features on Earth's surface, such as mountains and valleys. Constructive forces cause landforms to grow. Destructive forces wear them down.

Lava flowing out of a volcano can eventually build a mountain, so a volcano is a constructive force. A volcano can also erupt explosively and blow off its top, so a volcano can be a destructive force as well.

Other destructive forces work much more slowly than a volcano exploding. For example, it may take millions of years for a mountain to be worn down and carried away by wind, moving water, or other forces of weathering and erosion. Nonetheless, over time a mountain may wear down to a high flat area called a plateau, or it may wear all the way down to a low-lying plain.

The pieces of rock carried by wind and moving water are eventually deposited somewhere else. For example, rivers drop deposits where they slow down. This can happen when they enter a lake or the ocean. The sediments they drop may create new landforms. Sediments from rivers can form deltas, like the Mississippi River delta, or barrier islands, like Padre Island in Texas. Rivers also bring sand to the shore, which forms beaches. In these ways, the sediments carried by moving water make it a constructive force.

Questions

1. What are continents? How do they differ from ocean basins?
2. Define landforms, and give two examples of landforms.
3. Compare and contrast how constructive and destructive forces change landforms.

Lesson 2.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. You could use a topographic map to find the
   a. elevation of landforms in a region.
   b. average temperature of an area.
   c. population density of a region.
   d. type of vegetation in an area.
2. Which statement about continents is true?
   a. They may have rocks that are billions of years old.
   b. They are younger than the ocean basins.
   c. They float on ocean water.
   d. none of the above
3. Constructive forces form
   a. mountains.
   b. river deltas.
   c. barrier islands.
   d. all of the above
4. Which of the following can be both a constructive force and a destructive force?
   a. volcanic eruption
   b. weathering
   c. erosion
   d. two of the above
5. The continental margin includes the continental
   a. shelf.
   b. slope.
   c. rise.
   d. all of the above
6. The abyssal plain makes up much of the
   a. interior of continents.
   b. deep-ocean trenches.
   c. floor of the ocean.

d. mid-ocean ridges.

7. The deepest places in the ocean are

   a. continental slopes.
   b. mid-ocean ridges.
   c. seamounts.
   d. trenches.

Lesson 2.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. difference in elevation of landforms in a region

_____ 2. land mass above sea level

_____ 3. relief over a given region

_____ 4. figure on a map or nautical chart that shows north, south, east, and west

_____ 5. height of a land feature measured relative to sea level

_____ 6. device with a magnetic needle that is used to find the magnetic north pole

_____ 7. physical feature on Earth's surface

Terms

a. compass

b. compass rose

c. continent

d. elevation

e. relief

f. topography

g. landform

Lesson 2.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Earth's _____ north pole is about 11 degrees from its geographic north pole.
2. The area covered by the water of an ocean is called an ocean _____.
3. Mountains and valleys are examples of _____.
4. _____ forces such as lava flowing cause landforms to grow.
5. _____ forces such as erosion cause landforms to wear away.
6. Deltas and barrier islands form where _____ deposit bits of rock.

7. An undersea volcano is known as a(n) _____.

Lesson 2.1: Critical Writing

Name_____ Class_____ Date_____

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

Explain how moving water can be both a destructive and a constructive force.

2.2 Modeling Earth's Surface

Lesson 2.2: True or False

Name_____ Class_____ Date_____

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

_____ 1. The top of a map generally represents north.

_____ 2. A geographic map shows types and locations of rocks in an area.

_____ 3. Mercator projections are no longer used today.

_____ 4. On a Mercator projection, landmasses near the poles are reduced in size.

_____ 5. The poles are often mapped with gnomonic projections to avoid distortion.

_____ 6. A Robinson projection is more accurate than a Mercator projection.

_____ 7. Lines of latitude meet at the poles.

_____ 8. Lines of longitude are all parallel to one another.

_____ 9. You can find your location on a map if you know only your latitude and longitude.

_____ 10. Distances are true to scale on a globe.

Lesson 2.2: Critical Reading

Name_____ Class_____ Date_____

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

Mercator Projection

Earth is a round, three-dimensional ball. Over a small area, Earth looks flat, so it is not hard to make accurate two-dimensional maps of small areas. When map makers want to map larger regions or the entire Earth in two dimensions, they must use projections. What happens if you try to flatten out the skin of a peeled orange? Or if you try to gift wrap a soccer ball? To flatten out, the orange peel must rip and its shape must become distorted. To wrap a round object with flat paper requires lots of extra cuts and folds. A projection is a way to represent Earth's curved surface on flat paper. There are several types of projections. Each uses a different way to change three dimensions to two dimensions.

The oldest type of projection is a Mercator projection. How is a Mercator projection made? Imagine wrapping the round, ball-shaped Earth with a big, flat piece of paper. First you make a cylinder. The cylinder will touch Earth at its fattest part, the equator. The equator is the imaginary line running horizontally around the middle of Earth. If you shine a light from the inside of your model Earth onto the paper cylinder, the image projected on the paper is a Mercator projection.

A Mercator projection accurately represents Earth's surface within about 15 degrees north and south of the equator. However, landmasses or countries outside that zone get stretched out of shape. The farther a landmass is from the

equator, the more out of shape it is stretched. For example, Greenland is a relatively small island near the north pole, but on a Mercator projection, Greenland looks almost as big the United States. Because Greenland is close to the north pole, its shape and size are greatly distorted.

Early sailors and navigators found the Mercator projection very useful. In a Mercator projection, all compass directions are straight lines. This makes it a good map for navigation. Also, because most early explorations were located near the equator, there wasn't much distortion in the shapes and sizes of the landmasses of interest. Even today, Mercator projections are still widely used. For example, road maps are usually Mercator projections.

Questions

1. What is a projection?
2. How is a Mercator projection made?
3. What are the pros and cons of Mercator projections?

Lesson 2.2: Multiple Choice

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

Circle the letter of the correct choice.

1. Types of maps include
   a. relief maps.
   b. climate maps.
   c. geologic maps.
   d. all of the above
2. The Mercator projection was invented in the
   a. 1300s.
   b. 1500s.
   c. 1700s.
   d. 1900s.
3. A map in which all the lines of latitude and longitude are straight lines is a
   a. gnomonic projection.
   b. Robinson projection.
   c. Mercator projection.
   d. conic projection.
4. Which type of map would you use if you wanted a very accurate representation of a tiny part of Earth's surface?
   a. conic projection
   b. gnomonic projection
   c. Mercator projection
   d. Robinson projection
5. You know whether a place is in the northern or southern hemisphere based on its
   a. latitude.
   b. longitude.
   c. projection.
   d. prime meridian.
6. Which coordinates represent a location within the continental United States?

a. 35 °N, 95 °W
b. 35 °S, 95 °W
c. 35 °N, 95 °E
d. 35 °S, 95 °E

7. To move to a location that is 4 meters west of your current position, you would need a

a. compass.
b. metric ruler or tape.
c. Mercator projection.
d. two of the above

Lesson 2.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. distance north or south of the equator

_____ 2. map made by projecting one point on Earth onto a flat surface

_____ 3. map made by projecting Earth's surface onto a cylinder

_____ 4. map made by projecting Earth's surface onto a cone

_____ 5. distance east or west of the prime meridian

_____ 6. numbers in a grid that locate a particular point

_____ 7. any method of representing Earth's curved surface in two dimensions

Terms

a. conic map

b. coordinates

c. gnomonic map

d. latitude

e. longitude

f. projection

g. Mercator projection

Lesson 2.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. A(n) _____ is any two-dimensional representation of Earth's surface.

2. The _____ of a map explains how the map represents different types of features.

3. The type of map that shows the borders of states and countries is a(n) _____ map.

4. The _____ is the imaginary line running horizontally around Earth midway between the poles.
5. On a Mercator projection, the closer an area is to the _____, the better the map represents it.
6. Lines of longitude begin at the _____, which passes through Greenwich, England.
7. The most accurate way to represent all of Earth's surface is a(n) _____.

Lesson 2.2: Critical Writing

Name_____ Class_____ Date_____

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

If Earth's surface is represented by a two-dimensional map, why must the map be a projection?

2.3 Topographic Maps

Lesson 2.3: True or False

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

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

_____ 1. On a topographic map, only the contour lines that are numbered represent changes in elevation.

_____ 2. Two contour lines on a topographic may be parallel or they may intersect each other.

_____ 3. The contour interval of a topographic map represents the horizontal distance between contour lines.

_____ 4. You can use a topographic map to determine the slope of the land.

_____ 5. On a bathymetric map, contour lines represent the distance to the bottom of the water.

_____ 6. A topographic map can be used to determine the direction that rivers and streams flow.

_____ 7. A topographic map of a mountain shows which side of the mountain is steepest.

_____ 8. If contour lines are so close together that they almost touch, they represent a plain or plateau.

_____ 9. Topographic maps are useful only to geologists and other Earth scientists.

_____ 10. Geologic maps use different colors to represent different types of rocks.

Lesson 2.3: Critical Reading

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

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

Interpreting Contour Maps

If you know how to interpret a contour map, it can tell you a lot about the shape of the land surface. The spacing of contour lines shows the slope of the land. Contour lines that are close together indicate a steep slope, where the elevation changes quickly over a short distance. If the contour lines are so close together that they seem to touch, they indicate a very steep slope, such as a cliff. In contrast, contour lines that are far apart indicate a gentle slope.

Concentric contour lines that form closed loops indicate hills. The smaller loops are the higher elevations on the hill, and the smallest loop encloses the highest point on the hill. The larger loops encircling the smaller loops are the lower elevations of the hill. Other concentric contour lines that form closed loops indicate depressions. In this case, the contour lines have hatch marks. Hatch marks are short lines inside a closed loop that are perpendicular to the contour line. The innermost hatch-marked loop encloses the lowest elevation of the depression.

V-shaped portions of contour lines indicate stream or river valleys. The narrow points of the "Vs" point uphill and the wide parts of the "Vs" point downhill. You can tell the direction that streams or rivers flow from these V-shaped lines, because water always flows from higher to lower elevations.

Questions

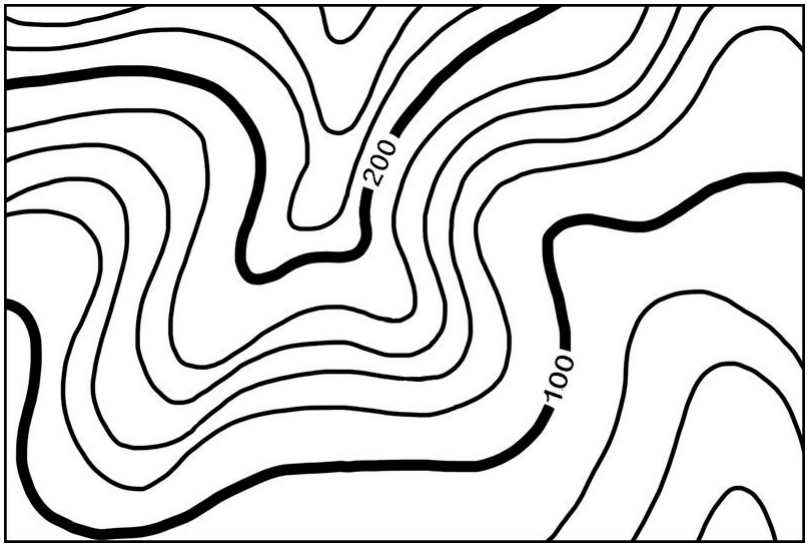
1. How does the spacing of contour lines show the slope of the land?
2. Describe the difference between a hill and a depression on a topographic map.
3. Explain how contour lines can be used to determine the direction that a river is flowing.

Lesson 2.3: Multiple Choice

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

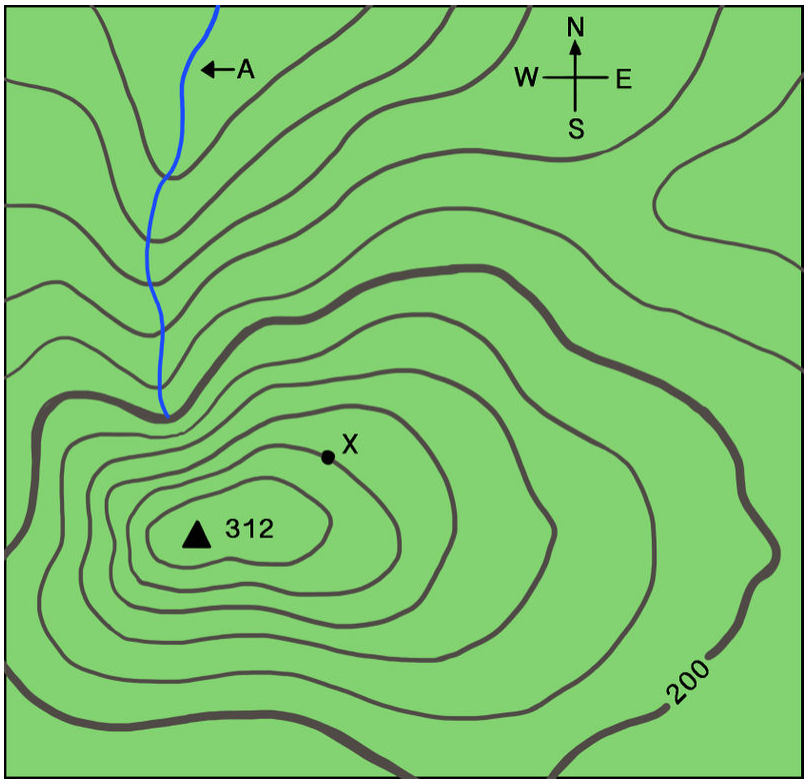
Circle the letter of the correct choice.

1. What is the contour interval on this metric topographic map?



a. 100 meters
b. 50 meters
c. 20 meters
d. 10 meters

Use the following topographic map to answer questions 2–6:



2. What surface feature is represented by the concentric contour lines on the map?
   (a) hill
   (b) lake
   (c) valley
   (d) depression
3. Which side of the feature in question 2 has the gentlest slope?
   (a) north
   (b) south
   (c) west
   (d) east
4. The arrow labeled "A" on the map points to a
   (a) mountain.
   (b) river.
   (c) cliff.
   (d) hill.
5. If the map's contour interval is 20 meters, what is the elevation of point X?
   (a) 120 meters
   (b) 180 meters
   (c) 220 meters
   (d) 280 meters
6. Toward which direction does the river on the map flow?
   (a) east
   (b) west
   (c) north
   (d) south

7. What feature does this topographic map show? {{Inline image |source=File:Topography_map_3.jpg |size=300px |author=Laura Guerin |license=CC BY-NC 3.0 |url=CK-12 Foundation |other=illustration
   (a) pond
   (b) swamp
   (c) depression
   (d) mountain peak

Lesson 2.3: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. feature on a topographic map represented by concentric contour lines with hatch marks

_____ 2. map that shows water depths in a body of water

_____ 3. difference in elevation between adjacent contour lines on a topographic map

_____ 4. map that shows elevations of features on Earth's surface

_____ 5. feature on a topographic map represented by concentric contour lines without hatch marks

_____ 6. line connecting points with the same elevation on a topographic map

_____ 7. feature on a topographic map represented by v-shaped contour lines

Terms

a. contour interval

b. topographic map

c. contour line

d. depression

e. river valley

f. bathymetric map

g. hill

Lesson 2.3: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Each contour line on a topographic map represents a specific _____.
2. The contour interval of a topographic map is given in the map's _____.
3. Closely spaced contour lines indicate a(n) _____ slope.
4. The scale of a topographic map indicates horizontal _____.
5. You can use a topographic map to determine the _____ of flowing water.
6. Higher numbers on a bathymetric map show where water is _____.
7. A(n) _____ map indicates the types of rocks on the surface of a region.

Lesson 2.3: Critical Writing

Name_____ Class_____ Date_____

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

Explain how you would represent the following feature on a topographic map: a hill with a stream running down one side and a depression at the top.

2.4 Using Satellites and Computers

Lesson 2.4: True or False

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

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

_____ 1. Satellites can be used to track the paths of hurricanes.

_____ 2. All satellites orbit Earth from east to west.

_____ 3. Communications satellites have polar orbits.

_____ 4. Some weather satellites have geostationary orbits.

_____ 5. Polar orbits are closer to Earth than geostationary orbits.

_____ 6. Satellites in polar orbits always remain over Earth's north or south pole.

_____ 7. Satellites identify vegetation by the color of light it reflects.

_____ 8. Satellites can help you locate your precise position on Earth's surface.

_____ 9. A GPS receiver detects lines of latitude and longitude.

_____ 10. Any type of information that can be linked with locations can be used to make a map.

Lesson 2.4: Critical Reading

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

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

Global Positioning System

In order to locate your exact position on a map, you must know your latitude and longitude. But you need several instruments to measure latitude and longitude. What if you could locate your exact position with just one instrument? With a GPS receiver you can.

GPS stands for Global Positioning System. This is a system of at least 24 working satellites that were launched in the late 20th century by the United States military to help soldiers locate their positions on battlefields. Later, the United States government allowed the public to use the system. You must have a GPS receiver to use the system. You can buy a stand-alone GPS receiver in many stores. GPS receivers are also built into cars, cell phones, and other devices. A GPS receiver detects radio signals from nearby GPS satellites. There are precise clocks on each satellite and in the receiver. The receiver measures the time it takes for radio signals to reach it from each of the satellites. Then the receiver uses the time and the speed of radio signals to calculate the distance between the receiver and the satellites. The receiver must use signals from at least four different GPS satellites in order to pinpoint its exact location on Earth's surface.

Questions

1. What is the Global Positioning System? Why was it developed?

2. What does a GPS receiver detect?
3. How does a GPS receiver determine its distance from a GPS satellite?
4. How does a GPS receiver identify its exact position on Earth's surface?

Lesson 2.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. A weather satellite with a geostationary orbit could be used to observe
   a. changes in weather all over Earth's surface.
   b. changing weather conditions over one location on Earth's surface.
   c. a cold front moving across the North American continent.
   d. a hurricane moving across the Atlantic Ocean.
2. A satellite with a polar orbit maintains a distance from Earth's surface of
   a. 3,600 kilometers.
   b. 36,000 kilometers.
   c. 90,000 kilometers.
   d. several hundred kilometers.
3. U.S. government agencies that use scientific satellites to gather information include
   a. NASA.
   b. NOAA.
   c. USGS.
   d. all of the above
4. Information gathered by scientific satellites includes
   a. land temperatures.
   b. ocean water levels.
   c. global vegetation.
   d. all of the above
5. To use GPS to find your location on Earth's surface, you need radio signals from at least
   a. 1 satellite.
   b. 3 satellites.
   c. 4 satellites.
   d. 24 satellites.
6. Maps that link information on natural resources with GPS positioning information are created by
   a. computers.
   b. GPS receivers.
   c. GIS satellites.
   d. GPS satellites.
7. Satellites could be used to study global warming by measuring the
   a. amounts of gases in the atmosphere.
   b. temperatures of ocean water.
   c. sizes of polar ice caps.
   d. all of the above

Lesson 2.4: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. U.S. government agency that has launched a fleet of scientific satellites

_____ 2. type of orbit that allows a satellite to "see" all of Earth's surface in less than a day

_____ 3. artificial body that orbits Earth

_____ 4. system of satellites used to locate exact positions on Earth's surface

_____ 5. device that detects radio signals from satellites to determine its position on Earth's surface

_____ 6. type of orbit that allows a satellite to stay over the same location on Earth's surface

_____ 7. system that links GPS information with other types of information

Terms

a. geostationary orbit

b. GPS receiver

c. polar orbit

d. satellite

e. GIS

f. NASA

g. GPS

Lesson 2.4: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. The amount of time it takes a geostationary satellite to complete one orbit is _____.
2. A satellite with a polar orbit completes one orbit in _____.
3. A satellite that orbits Earth in the same direction that Earth rotates has a(n) _____ orbit.
4. GPS stands for global _____ system.
5. GPS satellites were launched by the U.S. _____.
6. A GPS receiver uses the time and _____ of radio signals to calculate its distance from a satellite.
7. GIS stands for geographic _____ system.

Lesson 2.4: Critical Writing

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

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

Explain how GIS is used in map mapping.

CHAPTER 3

MS Earth's Minerals Worksheets

Chapter Outline

3.1 MINERALS

3.2 IDENTIFICATION OF MINERALS

3.3 FORMATION OF MINERALS

3.4 MINING AND USING MINERALS

3.1 Minerals

Lesson 3.1: True or False

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

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

_____ 1. Some minerals are chemical compounds.

_____ 2. Each mineral has a specific chemical composition.

_____ 3. Minerals are inorganic substances.

_____ 4. Table salt is an example of a sulfide mineral.

_____ 5. Fracture is the tendency of a mineral to break along flat surfaces

_____ 6. Minerals are classified in groups based on their physical properties.

_____ 7. Scientists use the physical properties of minerals to identify them.

_____ 8. There are only 40 known minerals.

_____ 9. The largest mineral group is called the native elements.

_____ 10. Minerals with similar crystal structures are grouped together.

Lesson 3.1: Critical Reading

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

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

What are Minerals?

Minerals are solids formed by natural processes that take place on or under Earth's surface. For example, some minerals form when hot lava cools. Other minerals form when solids precipitate out of water. Still other minerals form when rocks are exposed to high pressures and temperatures. Minerals are generally not made by living organisms, so they are called inorganic substances. Substances made by living things are called organic substances. Everything else is inorganic.

Minerals have a definite chemical composition. A few minerals are made of only one kind of element. For example, silver is a mineral that consists only of the element silver, and diamond is a mineral that consists only of the element carbon. However, most minerals are chemical compounds, which consist of two or more elements. For example, the mineral quartz is the compound silicon dioxide. It contains one atom of silicon for every two atoms of oxygen. Like quartz, all mineral compounds have a definite ratio of elements.

Almost all minerals form crystals. A crystal is a solid structure in which atoms are arranged in a regular repeating pattern. Some minerals, such as table salt, form crystals that are cube-shaped. Other minerals form crystals with different shapes, such as pyramids. Different minerals can have the same chemical composition but different crystal structures. For example, graphite (the "lead" in pencils) and diamond both consist only of carbon. However, their

atoms are arranged in different patterns, giving them different crystal structures. As a result, graphite and diamond have very different physical properties and are considered to be different minerals. Graphite is dull and gray and so soft that it breaks easily. Diamond, in contrast, is shiny and clear and the hardest of all minerals.

Questions

1. What are minerals?
2. What are some specific ways that minerals form?
3. Describe the chemical composition of minerals.
4. Graphite and diamond are minerals that have the same chemical composition. Describe the physical properties of these two minerals, and explain why they are so different from one another.

Lesson 3.1: Multiple Choice

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

Circle the letter of the correct choice.

1. Examples of minerals include
    a. silver.
    b. table salt.
    c. quartz.
    d. all of the above
2. All minerals
    a. have a definite chemical makeup.
    b. are pure elements.
    c. form crystals.
    d. contain carbon.
3. Minerals may form when
    a. rocks are heated to high temperatures.
    b. rocks are exposed to high pressure.
    c. lava cools and hardens.
    d. all of the above
4. The color of a mineral's powder is its
    a. streak.
    b. luster.
    c. color.
    d. cleavage.
5. The mineral gypsum is a common
    a. sulfide.
    b. sulfate.
    c. carbonate.
    d. silicate.
6. Minerals known as salts are classified as
    a. oxides.
    b. phosphates.
    c. halides.

d. silicates.

7. Oxides include
   a. hematite.
   b. feldspar.
   c. calcite.
   d. none of the above

Lesson 3.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. atom that has become electrically charged by gaining or losing electron(s)

_____ 2. positively charged particle in the nucleus of an atom

_____ 3. smallest particle of an element that has all the element's properties

_____ 4. center of an atom consisting of protons and neutrons

_____ 5. negatively charged particle that orbits the nucleus of an atom

_____ 6. smallest possible particle of a chemical compound

_____ 7. uncharged particle in the nucleus of an atom

Terms

a. atom

b. electron

c. ion

d. molecule

e. neutron

f. nucleus

g. proton

Lesson 3.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. A(n) _____ is a substance made of two or more elements in a certain ratio.
2. An inorganic solid that forms by a natural process is a(n) _____.
3. Organic substances are made by _____.
4. The atoms of most minerals are arranged in a regular repeating pattern called a _____.
5. _____ are scientists who study minerals.
6. Minerals known as _____ contain silicon and oxygen.

7. _____ are minerals that contain one carbon atom bonded to three oxygen atoms.

Lesson 3.1: Critical Writing

Name_____ Class_____ Date_____

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

Identify two groups of minerals. Then compare and contrast their chemical compositions, and given an example of each.

3.2 Identification of Minerals

Lesson 3.2: True or False

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

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

_____ 1. You can usually identify a mineral by its color alone.

_____ 2. The color of a mineral is always same as the color of its powder.

_____ 3. The streak of a given mineral does not vary.

_____ 4. A mineral with a vitreous luster appears glassy.

_____ 5. The mineral pyrite has a non-metallic luster.

_____ 6. The Mohs hardness scale ranges from 1 to 100.

_____ 7. The cleavage of a mineral depends on its crystal structure.

_____ 8. Mica tends to form cubes when it cleaves.

_____ 9. Some minerals have a distinctive smell.

_____ 10. Certain minerals are attracted to a magnet.

Lesson 3.2: Critical Reading

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

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

Mineral Hardness

Hardness is a mineral's ability to resist being scratched. Minerals that are not easily scratched are hard, and minerals that are easily scratched are soft. You can test the hardness of a mineral by scratching its surface with minerals of known hardness. Mineralogists use the Mohs hardness scale, shown in the **Table** 3.1, as a reference for mineral hardness. The scale lists common minerals in order of their relative hardness

TABLE 3.1: Mohs Hardness Scale

Hardness	Mineral
1	talc
2	gypsum
3	calcite
4	fluorite
5	apatite
6	feldspar
7	quartz

TABLE 3.1: (continued)

Hardness	Mineral
8	topaz
9	corundum
10	diamond

As you can see from the Mohs hardness scale, diamond has a hardness of 10. Diamond is the hardest mineral, so no other mineral can scratch it. Quartz has a hardness of 7. It can be scratched by all the minerals harder than 7 on the scale: topaz, corundum, and diamond. On the other hand, quartz can scratch minerals that are softer than 7, from feldspar to talc. Talc is the softest mineral, with a hardness of 1. All other minerals can scratch talc and it cannot scratch any other mineral.

You can use the minerals in the Mohs hardness scale to determine the hardness of an unknown mineral. Assume that you have a piece of a mystery mineral. To determine its hardness, you could try to scratch it with minerals on the Mohs hardness scale. Suppose you find that the mystery mineral is scratched by fluorite but not by calcite. Then it would have a hardness value between 3 and 4 on the Mohs hardness scale.

Questions

1. What is the hardness of a mineral?
2. Describe the Mohs hardness scale.
3. How can you use the Mohs hardness scale to determine the hardness of an unknown mineral?

Lesson 3.2: Multiple Choice

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

Circle the letter of the correct choice.

1. A mineral's physical properties are determined by its
   a. vitreous luster.
   b. crystal structure.
   c. chemical composition.
   d. two of the above
2. Factors that may affect a mineral's color include
   a. mass.
   b. streak.
   c. cleavage.
   d. weathering.
3. To do a streak test, you scrape a mineral across a
   a. diamond crystal.
   b. piece of talc.
   c. porcelain plate.
   d. cleavage plane.
4. What is the least reliable property for identifying minerals?
   a. streak
   b. hardness

c. color
d. luster

5. A mineral with which type of luster is soft looking with long fibers?

   a. resinous
   b. earthy
   c. silky
   d. pearly

6. Which of the following minerals has the greatest density?

   a. gold
   b. pyrite
   c. quartz
   d. fool's gold

7. Which sequence shows minerals in the correct order from softer to harder?

   a. gypsum, apatite, corundum
   b. apatite, gypsum, corundum
   c. apatite, corundum, gypsum
   d. corundum, apatite, gypsum

Lesson 3.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. amount of mass per unit volume of a substance

_____ 2. how a mineral breaks when it does not break along a plane

_____ 3. color of the powder of a mineral

_____ 4. tendency of a mineral to break along certain planes

_____ 5. ability of a mineral to resist being scratched

_____ 6. ability of a mineral to glow under ultraviolet light

_____ 7. how light reflects off the surface of a mineral

Terms

a. cleavage

b. fluorescence

c. density

d. fracture

e. hardness

f. luster

g. streak

Lesson 3.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Minerals with a(n) _____ luster are opaque and shiny like pyrite.
2. Minerals with a(n) _____ luster may look sparkly, glassy, or pearl-like.
3. The density of a substance is calculated by dividing the substance's mass by its _____.
4. The Mohs scale is a reference scale for mineral _____.
5. No other mineral can scratch the mineral _____.
6. The mineral with the lowest value on the Mohs scale is _____.
7. If a mineral bubbles when exposed to weak acid, it has the property of _____.

Lesson 3.2: Critical Writing

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

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

Describe the mineral properties of color and streak. Explain why streak is more reliable than color for identifying minerals.

3.3 Formation of Minerals

Lesson 3.3: True or False

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

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

_____ 1. Minerals are used to make many different products.

_____ 2. All minerals form in the same way.

_____ 3. Some places inside Earth are so hot that underground rocks melt.

_____ 4. The only water on Earth's surface that contains dissolved salts is the ocean.

_____ 5. Salts easily precipitate out of water.

_____ 6. The mineral calcite is deposited only when magma cools.

_____ 7. Water moves through cracks in rocks below Earth's surface.

_____ 8. Water can dissolve rocks and form a solution.

_____ 9. Geodes result from the formation of large mineral crystals.

_____ 10. A vein of minerals forms when lava cools inside a crack in a rock.

Lesson 3.3: Critical Reading

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

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

Formation of Minerals from Solutions

Most water on Earth contains dissolved elements. Even fresh water contains a small amount of dissolved elements, although salt water contains a lot more. Water that contains dissolved substances is called a solution. Dissolved particles are mixed evenly throughout a solution. The particles are also so small that they will not come out of solution even if it is filtered. However, when the water of a solution evaporates, the dissolved elements it contains are left behind to form a solid deposit of minerals. The amount of minerals left behind after water evaporates is the same as the amount that was originally dissolved in the water before it evaporated.

Minerals may also precipitate out of water solutions. Precipitation occurs when enough dissolved elements are present to come together and form solids, which settle out of the solution. Ocean water is salty enough for minerals to precipitate and be deposited as solids. Some lakes, such as Mono Lake in California and Utah's Great Salt Lake, are also salty enough to precipitate solid minerals. Salt easily precipitates out of water but so do some other minerals, including calcite. Deposits of calcite may form limestone structures called tufa towers. For example, in California's Mono Lake, calcium-rich spring water enters the bottom of the lake. The spring water bubbles up through the water of the lake, and calcite is precipitated in tower-like shapes. When the lake level drops, the calcite towers are exposed.

Water moves through cracks and open spaces in rocks below Earth's surface. Underground water can be heated by

magma, and hot water can hold more dissolved particles than cold water can. The hot, salty solution has chemical reactions with the rocks around it, and the water picks up still more dissolved particles. As the solution flows through the cracks and spaces in rocks, the water deposits solid minerals. When minerals are deposited in cracks in rocks, the deposits are called veins. When minerals are deposited in open spaces in rocks, large mineral crystals grow, forming deposits called geodes.

Questions

1. What is a solution? What happens when the water in a solution of water and dissolved elements evaporates?
2. Describe how minerals precipitate out of ocean water.
3. What are tufa towers? How do they form?
4. Explain how minerals form from underground solutions.
5. Compare and contrast veins and geodes.

Lesson 3.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Ways that minerals form include
    a. magma cooling.
    b. salt water evaporating.
    c. dissolved elements precipitating.
    d. all of the above
2. Dissolved elements in water can form
    a. lava flows.
    b. magma pools.
    c. mineral deposits.
    d. two of the above
3. When water evaporates, any dissolved elements are left behind as mineral deposits. The amount of minerals deposited
    a. is the same as the original amount of water.
    b. equals the amount of minerals dissolved in the water.
    c. is determined by the type of minerals that form.
    d. depends on the rate at which the water evaporates.
4. In a water solution, dissolved elements
    a. can be filtered out of the water.
    b. are mixed evenly throughout the water.
    c. may precipitate out of the water.
    d. two of the above
5. Which type of feature may form in open spaces inside rocks?
    a. vein
    b. geode
    c. tufa tower
    d. none of the above
6. Water in rocks underground can be heated by

a. the sun.
b. magma.
c. lava.
d. two of the above

7. When underground water is heated, it can

a. contain fewer dissolved particles.
b. dissolve more rocks.
c. become a precipitate.
d. all of the above

Lesson 3.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. to come out of a solution as a solid

_____ 2. water mixed with dissolved substances

_____ 3. solid mixture of minerals

_____ 4. melted rock below Earth's surface

_____ 5. long, narrow mineral deposit

_____ 6. melted rock that has erupted onto Earth's surface

_____ 7. rock formed by the growth of large mineral crystals

Terms

a. lava

b. geode

c. vein

d. magma

e. solution

f. precipitate

g. rock

Lesson 3.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. Particles in a solution are so small that they will not come out of the solution even when you _____ the solution.
2. Tufa towers form when the mineral calcite _____ from a water solution.

3. Underground water may be naturally heated by _____.
4. Hot water can hold _____ dissolved mineral particles than cold water can.
5. Minerals form when molten rock _____.
6. When magma flows out of a volcano, it is known as _____.
7. When dissolved minerals are deposited in open spaces in rocks, the form _____.

Lesson 3.3: Critical Writing

Name_____ Class_____ Date_____

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

Explain the role of liquids in the formation of solid minerals.

3.4 Mining and Using Minerals

Lesson 3.4: True or False

Name_____ Class_____ Date_____

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

_____ 1. Certain places on Earth are more likely than others to have ore deposits.

_____ 2. All mines are located deep underground.

_____ 3. A placer is a type of underground mineral deposit.

_____ 4. Gold is no longer mined in California.

_____ 5. Underground mining is more expensive than surface mining.

_____ 6. Most minerals are a combination of metals and other elements.

_____ 7. Chemical reactions are used to separate minerals from waste rock.

_____ 8. It takes more energy to recycle aluminum than to obtain aluminum by mining.

_____ 9. Electrical wires are made of the metal copper.

_____ 10. Most diamonds are used as gemstones to make jewelry.

Lesson 3.4: Critical Reading

Name_____ Class_____ Date_____

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

Surface and Underground Mining

Ores are rocks that have high concentrations of valuable minerals. They are found in deposits at or under Earth's surface, and they are removed from the ground by mining. There are two main methods of mining: surface mining and underground mining.

Surface mining is used to obtain ores from deposits near the surface. Blasting breaks up the soil and rocks that contain the ore. Enormous trucks haul the broken rocks to locations where the ores can be removed. Surface mining includes open-pit mining, strip mining, and quarrying.

- Open-pit mining creates a big pit from which the ore is mined. The pit grows in size as more ore is removed.
- Strip mining is similar to open-pit mining, but the ore is removed in large strips instead of from a pit.
- Quarrying is a type of open-pit mining that produces rocks and minerals that are used to make buildings and roads.

If ore deposits are deep below Earth's surface, it may be too expensive to remove all the rock above them in order to reach the ore. These deposits are obtained by underground mining. Tunnels are blasted through rocks underground so miners and equipment can get to the ore. The ore is then drilled, blasted, or cut away from the surrounding

rock and taken out of the mine through the tunnels. Underground mines can be very deep. Compared with surface mines, they are more expensive to build and operate. Underground mines are also very dangerous places to work. Underground miners breathe in lots of toxic particles and dust. In addition, drilling or blasting may trigger a mine collapse, in which miners may be hurt or killed.

Questions

1. What is surface mining?
2. Describe three methods of surface mining.
3. When is underground mining used to obtain mineral ores?
4. How is underground mining carried out?
5. What are drawbacks of underground miming?

Lesson 3.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. All the metals we use were originally extracted from the ground as
    a. ores.
    b. geodes.
    c. placers.
    d. pure minerals.
2. Any rock that contains enough minerals to be mined for profit is called a(n)
    a. gemstone.
    b. vein.
    c. ore.
    d. none of the above
3. What is the first step in obtaining minerals?
    a. mapping a vein
    b. digging a mine
    c. locating an ore deposit
    d. separating ore from waste rock
4. Blasting is used to break up rocks in
    a. underground mining.
    b. open-pit mining.
    c. strip mining.
    d. all of the above
5. Which mineral would be obtained from a quarry?
    a. gold
    b. silver
    c. gypsum
    d. diamond
6. Which products are made of minerals?
    a. glass
    b. rock salt

c. sheetrock
d. all of the above

7. Placer gold mined in California originally came from the

a. Pacific Ocean.
b. Sierra Nevada Mountains.
c. Mississippi River.
d. Gulf of Mexico.

Lesson 3.4: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. any rock that contains a concentration of valuable minerals

_____ 2. type of open-pit mine that produces rocks and minerals for buildings and roads

_____ 3. type of ore that is mined to make aluminum

_____ 4. restoring land that was mined to a natural state

_____ 5. type of mineral deposit that collects in stream gravel

_____ 6. any mineral that is cut and polished and used to make jewelry

_____ 7. general name for mining methods that include open-pit mining and strip mining

Terms

a. gemstone

b. reclamation

c. quarry

d. surface mining

e. ore

f. bauxite

g. placer

Lesson 3.4: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. _____ minerals are weathered from rocks and washed into rivers and streams.
2. Quarrying and placer mining are both methods of _____ mining.
3. Taking ore from deep below Earth's surface using tunnels is called _____ mining.
4. Material in ore that is not valuable is referred to as _____ rock.
5. Heating and chemical reactions are used to extract _____ from ores.

6. Minerals such as emerald, diamond, and ruby are classified as _____.
7. The gemstone _____ is so hard that it is used for drill bits and saw blades.

Lesson 3.4: Critical Writing

Name_____ Class_____ Date_____

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

Outline how an ore is mined and processed to produce minerals.

CHAPTER 4 MS Rocks Worksheets

Chapter Outline

4.1 TYPES OF ROCKS
4.2 IGNEOUS ROCKS
4.3 SEDIMENTARY ROCKS
4.4 METAMORPHIC ROCKS

4.1 Types of Rocks

Lesson 4.1: True or False

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

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

_____ 1. When a rock changes from one type to another, it usually happens very quickly.

_____ 2. One type of rock can change to any other type of rock.

_____ 3. All the processes of the rock cycle take place underground.

_____ 4. To see the minerals in rock, you always need to use a microscope.

_____ 5. Rocks are named for the minerals they contain and how the minerals came together.

_____ 6. A rock formed from pieces of gravel and sand would be classified as an igneous rock.

_____ 7. A rock resulting from the formation of mineral crystals would be classified as a sedimentary rock.

_____ 8. Sedimentary rocks include sandstone and shale.

_____ 9. Plants and animals can act to wear down rocks.

_____ 10. Metamorphism may change a rock's mineral composition.

Lesson 4.1: Critical Reading

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

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

Processes of the Rock Cycle

The rock cycle is a continuous cycle in which rocks change from one type to another, usually over hundreds, thousands, or even millions of years. There are three main processes that change rocks in the rock cycle: formation of crystals, sedimentation, and metamorphism.

Deep within Earth, temperatures can get hot enough to melt rock. Molten rock is called magma when it is under Earth's surface and lava if it erupts onto the surface. As molten rock cools, mineral crystals form, resulting in igneous rock. The crystals are larger if the molten rock cools slowly, as magma does if it remains deep within Earth. If the molten rock cools quickly, as lava does on the surface, the crystals are smaller.

Water, wind, ice, and even plants and animals all act to wear down rocks. Over time they can break rocks into smaller pieces called sediments. Moving water, wind, and glaciers may carry the sediments from one place to another. The sediments are eventually dropped, or deposited, somewhere else. The sediments may then be compacted and cemented together, forming sedimentary rock.

Metamorphism means "changing form." A rock undergoes metamorphism if it is exposed to extreme heat and pressure within Earth's crust. The rock does not melt, but it changes due to the heat and pressure. A metamorphic rock may have a new mineral composition and/or texture than the rock from which it formed.

Questions

1. What is the rock cycle? List the three main processes that change rocks in the rock cycle.
2. How do igneous rocks form?
3. Outline the steps in the formation of sedimentary rock from other types of rock.
4. Define metamorphism.
5. How does an igneous rock become a metamorphic rock? How might the metamorphic rock differ from the igneous rock from which it formed?

Lesson 4.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Major types of rocks include
    a. sedimentary rocks.
    b. metamorphic rocks.
    c. igneous rocks.
    d. all of the above
2. Which rocks may form on Earth's surface?
    a. sedimentary rocks
    b. metamorphic rocks
    c. igneous rocks
    d. two of the above
3. Weathering and erosion occur because of the actions of
    a. ice.
    b. wind.
    c. water.
    d. all of the above
4. The process in which sedimentary rocks form begins with
    a. erosion.
    b. deposition.
    c. weathering.
    d. compaction.
5. The rock called limestone forms when shells of sea organisms settle to the bottom of the water and gradually become pressed and cemented together. Which type of rock is limestone?
    a. igneous
    b. metamorphic
    c. sedimentary
    d. none of the above
6. If limestone is buried under the ground and placed under pressure until it becomes extremely hot, it changes to marble. The process in which marble forms from limestone is
    a. melting.
    b. compression.
    c. sedimentation.

d. metamorphism.

7. Which process is involved when a sedimentary rock changes to an igneous rock?

   a. metamorphism
   b. melting
   c. sedimentation
   d. weathering

Lesson 4.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. particle of rock or mineral

_____ 2. any mixture of minerals in the solid state

_____ 3. type of rock that forms when sediments are compacted and cemented together

_____ 4. type of rock that forms when existing rock is subjected to high heat and pressure

_____ 5. type of rock that forms when magma or lava cools

_____ 6. continuous series of processes by which rocks change from one type to another

_____ 7. process in which a rock changes to a different type of rock due to extreme heat and pressure

Terms

a. rock cycle

b. metamorphic rock

c. rock

d. sediment

e. igneous rock

f. metamorphism

g. sedimentary rock

Lesson 4.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Rocks are made of one or more types of _____.
2. Geologists classify rocks into three main types based on how the rocks _____.
3. Sandstone is an example of _____ rock.
4. Crystals in igneous rock are _____ when melted rock cools more slowly.
5. Mica schist is an example of _____ rock.
6. Weathering and erosion are processes involved in the formation of _____ rock.

7. Some _____ rocks form when solid minerals are left behind after a liquid evaporates.

Lesson 4.1: Critical Writing

Name_____ Class_____ Date_____

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

Describe one path through which igneous rock can go through the entire rock cycle and back to igneous rock again.

4.2 Igneous Rocks

Lesson 4.2: True or False

Name_____ Class_____ Date_____

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

_____ 1. The layer of Earth called the mantle is made entirely of igneous rock.

_____ 2. Rock on the ocean floor is intrusive igneous rock.

_____ 3. The Sierra Nevada Mountains in California are composed mainly of granite.

_____ 4. When melted rock cools more slowly, it forms larger crystals.

_____ 5. Melted rock cools more quickly underground than on Earth's surface.

_____ 6. Obsidian forms when magma cools and forms crystals.

_____ 7. Pumice contains holes because gas bubbles were trapped in lava as it cooled.

_____ 8. Basalt crystals are too small to see with the unaided eye.

_____ 9. The combination of minerals in igneous rocks is determined by the composition of the magma or lava.

_____ 10. Both porphyry and diorite are extrusive igneous rocks.

Lesson 4.2: Critical Reading

Name_____ Class_____ Date_____

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

Rocks Formed of Crystals

Igneous rocks form when melted rock cools and forms crystals. These rocks may form deep underground or on Earth's surface.

Igneous rocks that form underground are called intrusive igneous rocks. They form when magna cools slowly deep under the surface. Slow cooling gives large crystals a chance to form. Therefore, intrusive igneous rocks have relatively large crystals that are easy to see. Granite is the most common intrusive igneous rock.

Igneous rocks that form on the surface are called extrusive igneous rocks. They form when lava cools quickly as it pours onto the surface. Rapid cooling does not give large crystals a chance to form. Therefore, extrusive igneous rocks have relatively small crystals. Some extrusive igneous rocks, such as obsidian, cool so rapidly that crystals do not form at all. These rocks are as smooth as glass. Other extrusive igneous rocks, such as pumice, contain holes where gas bubbles were trapped in the lava as it cooled. The holes in pumice make it so light that it floats on water. The most common extrusive igneous rock is basalt, which makes up the ocean floor.

Questions

1. How do igneous rocks form?

2. What are intrusive igneous rocks? Give an example?
3. What are extrusive igneous rocks? Give an example.
4. Contrast the crystal sizes of intrusive and extrusive igneous rocks. What explains the difference?

Lesson 4.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Igneous rocks are classified by
    a. the size of their crystals.
    b. the type of sediments they contain.
    c. their mineral composition.
    d. two of the above
2. How many different kinds of igneous rocks are there?
    a. only 7
    b. about 70
    c. more than 700
    d. between 70 and 100
3. Granite is used to make
    a. countertops.
    b. buildings.
    c. statues.
    d. all of the above
4. How is pumice used?
    a. to smooth rough skin
    b. to stonewash jeans
    c. to make vases
    d. two of the above
5. The rock that makes up the ocean floor is
    a. granite.
    b. basalt.
    c. diorite.
    d. peridotite.
6. One property of pumice is
    a. a smooth glassy texture.
    b. very large crystals.
    c. the ability to float on water.
    d. none of the above
7. Many mountain ranges are made of
    a. granite.
    b. gabbro.
    c. andesite.
    d. komatite.

Lesson 4.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. any rock that forms when magma or lava cools

_____ 2. most common intrusive igneous rock

_____ 3. type of igneous rock that forms on Earth's surface

_____ 4. igneous rock that is full of holes

_____ 5. most common extrusive igneous rock

_____ 6. type of igneous rock that forms beneath Earth's surface

_____ 7. glass-like igneous rock that does not contain mineral crystals

Terms

a. extrusive igneous rock

b. basalt

c. igneous rock

d. intrusive igneous rock

e. obsidian

f. pumice

g. granite

Lesson 4.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Most of Earth is made of _____ rock.
2. Igneous rocks come about when melted rock forms _____.
3. _____ igneous rocks form when melted rock cools slowly.
4. The crystals of intrusive rock are _____ than the crystals of extrusive rock.
5. _____ igneous rocks form when melted rock cools rapidly.
6. Rocks that form when magma cools are classified as _____ igneous rocks.
7. Rocks that form when lava cools are classified as _____ igneous rocks.

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 rocks granite and basalt.

4.3 Sedimentary Rocks

Lesson 4.3: True or False

Name_____ Class_____ Date_____

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

_____ 1. Sandstone is very porous so water can move easily through it.

_____ 2. Sedimentary rocks may contain fossils.

_____ 3. Avalanches produce horizontal layers of sediments.

_____ 4. Particles of silt are smaller than particles of clay.

_____ 5. Fossils are always the remains of bones or teeth.

_____ 6. Sediments are pieces of rock.

_____ 7. Sediments on a beach may include cobbles and pebbles.

_____ 8. All sedimentary rocks form from sediments.

_____ 9. Shale may contain hardened mud.

_____ 10. Limestone is a chemical sedimentary rock.

Lesson 4.3: Critical Reading

Name_____ Class_____ Date_____

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

How Sedimentary Rocks Form

Sedimentary rocks form in two ways. Particles of sediment may be compacted and cemented together, or chemicals may precipitate out of water.

Sedimentary rocks that form when sediments are compacted and cemented together are called clastic sedimentary rocks. First, the sediments are compacted as they are squeezed together by the weight of all the sediments that have been deposited on top of them. Then, the sediments are cemented together, as minerals fill in the spaces between sediment particles. The cementing minerals come from water that moves through the sediments. Clastic sedimentary rocks are grouped by the size of the sediments they contain. Conglomerate and breccia are made of individual stones that have been cemented together. In conglomerate, the stones are rounded. In breccia, the stones are angular. Sandstone is made of sand. Siltstone is made of silt particles, which are smaller than sand but larger than clay. Shale consists of the smallest sediments. It is made mostly of clay and hardened mud.

Sedimentary rocks that form when chemicals precipitate out of water are called chemical sedimentary rocks. Halite, also called rock salt, forms in this way. You can make halite by simply leaving a shallow dish of salt water out in the sun. As the water evaporates, salt crystals form in the bottom of the dish. Gypsum is another example of a chemical sedimentary rock.

Questions

1. Name two ways that sedimentary rocks can form.
2. Describe how clastic sedimentary rocks form.
3. Compare and contrast conglomerate and shale.
4. Explain how chemical sedimentary rocks form, and give two examples.

Lesson 4.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Types of sediments that may make up sedimentary rocks include
   a. pebbles.
   b. silt.
   c. clay.
   d. all of the above
2. A river deposits sediments when the water
   a. slows down.
   b. enters a lake.
   c. reaches the ocean.
   d. all of the above
3. Which of the following sedimentary rocks contains the smallest sediments?
   a. conglomerate
   b. sandstone
   c. siltstone
   d. shale
4. Which of the following rocks is not a clastic sedimentary rock?
   a. limestone
   b. breccia
   c. halite
   d. two of the above
5. The White House in Washington, D.C., is made of
   a. clastic rock.
   b. sedimentary rock.
   c. sandstone.
   d. all of the above
6. When sediments settle out of water, they form
   a. chemical rocks.
   b. horizontal layers.
   c. precipitates.
   d. none of the above
7. Which sedimentary rock is formed of rounded stones that have been cemented together?
   a. breccia

b. sandstone
c. conglomerate
d. limestone

Lesson 4.3: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. type of sedimentary rock that forms when crystals precipitate out of liquid

_____ 2. squeezed together by upper layers of sediments

_____ 3. type of sedimentary rock that forms when rock fragments are compacted and cemented together

_____ 4. preserved material left behind by a once-living organism

_____ 5. stuck together by minerals that fill in spaces between sediments

_____ 6. example of a clastic sedimentary rock

_____ 7. example of a chemical sedimentary rock

Terms

a. cemented

b. clastic sedimentary rock

c. compacted

d. sandstone

e. rock salt

f. fossil

g. chemical sedimentary rock

Lesson 4.3: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Most sedimentary rocks form from _____.
2. Each layer of sedimentary rock is _____ than the layer below it.
3. A beach or desert collects large deposits of sediments known as _____.
4. Minerals that cement together sediments in clastic rock come from _____.
5. _____ sedimentary rocks are classified by the size of the sediments they contain.
6. Gypsum is an example of a(n) _____ sedimentary rock.
7. Coal is an example of a(n) _____ sedimentary rock.

Lesson 4.3: Critical Writing

Name_____ Class_____ Date_____

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

Contrast clastic and chemical sedimentary rocks.

4.4 Metamorphic Rocks

Lesson 4.4: True or False

Name_____ Class_____ Date_____

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

_____ 1. When a rock undergoes metamorphism, it becomes an entirely new type of rock.

_____ 2. During metamorphism, ions may move and new minerals may form.

_____ 3. There are two types of metamorphism.

_____ 4. Contact metamorphism causes rock to melt and form magma.

_____ 5. The most commonly used metamorphic rocks are slate and gneiss.

_____ 6. Quartzite is a relatively soft metamorphic rock.

_____ 7. Gneiss forms by contact metamorphism.

_____ 8. Schist is sometimes used as a landscaping material.

_____ 9. In the 1500s, Michelangelo carved statues from marble.

_____ 10. Metamorphic rocks cannot undergo further metamorphism and change to different types of rocks.

Lesson 4.4: Critical Reading

Name_____ Class_____ Date_____

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

Metamorphism

Metamorphic rocks start off as some kind of existing rock. The starting rock may be igneous rock, sedimentary rock, or even another metamorphic rock. Heat and/or pressure then change the rock's physical or chemical makeup. This is called metamorphism.

Chemical changes during metamorphism occur when ions move and new minerals form. The new minerals are more stable in the new environment. A physical change that may occur during metamorphism is foliation. Foliation is the formation of alternating bands of crystals of different colors. It is caused by extreme pressure being applied to rock from just one direction. If pressure is exerted from all directions, foliation usually does not occur.

There are two main types of metamorphism: contact metamorphism and regional metamorphism.

Contact metamorphism occurs when magma contacts a rock and changes it by extreme heat. Regional metamorphism occurs when great masses of rock are exposed to pressure from rock and sediment layers on top of them or from other geological processes.

Questions

1. What is metamorphism?

2. How do rocks change chemically during metamorphism?
3. Describe a physical change that may occur during metamorphism.
4. Distinguish between contact and regional metamorphism.

Lesson 4.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. During metamorphism, rocks may change
    a. chemically.
    b. physically.
    c. permanently.
    d. two of the above
2. Metamorphism begins with
    a. magma.
    b. sediments.
    c. lava.
    d. rock.
3. What type of change in rock is foliation?
    a. physical change
    b. chemical change
    c. mineral change
    d. two of the above
4. A metamorphic rock may undergo foliation when pressure is
    a. exerted from just one direction.
    b. exerted from all directions.
    c. relatively weak.
    d. absent.
5. Slate is a metamorphic rock that is used for
    a. building.
    b. landscaping.
    c. statues.
    d. two of the above
6. Which of the following types of rocks can undergo metamorphism?
    a. sedimentary rock
    b. igneous rock
    c. metamorphic rock
    d. all of the above
7. All of the following are metamorphic rocks except
    a. schist.
    b. quartzite.
    c. gneiss.
    d. granite.

Lesson 4.4: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. type of metamorphism in which magma contacts a rock and changes it by extreme heat

_____ 2. Any rock formed by extreme heat and pressure

_____ 3. metamorphic rock with alternating bands of light and dark crystals

_____ 4. type of metamorphism in which great masses of rock are exposed to extreme pressure

_____ 5. formation of layers in some metamorphic rock

_____ 6. metamorphic rock that is crushed and used to build railroad tracks

_____ 7. metamorphic rock that is used to make statues

Terms

a. regional metamorphism

b. metamorphic rock

c. contact metamorphism

d. hornfels

e. foliation

f. marble

g. quartzite

Lesson 4.4: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Metamorphism changes rocks by extreme heat and/or _____.
2. Hornfels is a rock that is formed by _____ metamorphism.
3. Regional metamorphic rocks often display layering called _____.
4. The minerals in hornfels separate from one another by _____.
5. After metamorphism occurs, the minerals in a rock are more _____.
6. Schist is a rock that is formed by _____ metamorphism.
7. The rocky peak named the Matterhorn consists of the metamorphic rock called _____.

Lesson 4.4: Critical Writing

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

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

Both igneous and sedimentary rocks may form on Earth's surface. Explain why metamorphic rocks can form only below Earth's surface.

CHAPTER 5

MS Earth's Energy Worksheets

Chapter Outline

5.1 EARTH'S ENERGY

5.2 NONRENEWABLE ENERGY RESOURCE

5.3 LESSON 5.3: RENEWABLE ENERGY RESOURCES

5.1 Earth's Energy

Lesson 5.1: True or False

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

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

_____ 1. Plants make food using energy from soil nutrients.

_____ 2. Fossil fuels are made of minerals and rocks.

_____ 3. Uneven heating by the sun causes wind.

_____ 4. The sun's energy drives the water cycle.

_____ 5. Kicking a soccer ball changes kinetic energy to potential energy.

_____ 6. The head of a match stores chemical energy.

_____ 7. It takes millions of years for fossil fuels to form.

_____ 8. Most fossil fuels will last for another 500 years.

_____ 9. Trees are a source of biomass energy.

_____ 10. Geothermal energy is a nonrenewable resource.

Lesson 5.1: Critical Reading

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

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

Types of Energy Resources

Energy resources can be put into one of two categories: nonrenewable or renewable. Nonrenewable resources are used faster than they can be replaced. In contrast, renewable resources can be replaced as quickly as they are used or are so abundant that they will never run out.

The most widely used nonrenewable energy resources today are fossil fuels. Fossil fuels include coal, oil, and natural gas. Millions of years ago, plants and other living things used energy from the sun to form carbon compounds. Over millions of years, these compounds were transformed into coal, oil, or natural gas. Fossil fuels are nonrenewable because they take so long to form. We will use up most fossil fuels in a matter of decades. Burning fossil fuels also releases large amounts of pollutants into the air and releases the greenhouse gas carbon dioxide.

Renewable energy resources include solar, water, wind, biomass, and geothermal energy. The sun will continue to shine for billions of years, so solar energy will not run out no matter how much we use. Water naturally flows from higher to lower places, and wind naturally blows from areas of higher to lower pressure. We can use moving water and wind to generate electricity, and we can count on wind and water to continue to move. Wood, which can be burned to produce heat and light, is one source of biomass energy. Grain plants can be used to make biofuels, another source of biomass energy. Biomass resources are renewable because we can plant more trees or other plants

to replace the ones we use. Geothermal energy is the energy of hot rocks beneath Earth's surface. It can be used to heat water and generate electricity. Like solar energy, geothermal energy will last for billions of years.

Questions

1. How do renewable resources differ from nonrenewable resources?
2. What are fossil fuels, and how do they form?
3. What are drawbacks of using fossil fuels for energy?
4. Identify three renewable energy resources. Explain why each of these energy resources is renewable.

Lesson 5.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Sources of energy on Earth include the
    a. sun.
    b. planet's internal heat.
    c. decay of radioactive elements.
    d. all of the above
2. What happens when energy changes form?
    a. Some of the energy is lost.
    b. The amount of energy increases.
    c. The energy is generally used up.
    d. The amount of energy remains the same.
3. An example of potential energy is a child who is
    a. running.
    b. swimming.
    c. sitting at the top of a slide.
    d. none of the above
4. An example of kinetic energy is a child who is
    a. running.
    b. swimming.
    c. sliding down a slide.
    d. all of the above
5. Most electricity used in homes comes from
    a. batteries.
    b. power plants.
    c. biomass fuels.
    d. solar energy.
6. Which statement is true of all renewable resources?
    a. They will never run out.
    b. They can be used unsustainably.
    c. They have no drawbacks.
    d. none of the above
7. The energy stored in fossil fuels came originally from

a. rocks.
b. magma.
c. the sun.
d. dinosaurs.

Lesson 5.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. any material that stores energy and releases it in a chemical change

_____ 2. law that energy cannot be created or destroyed

_____ 3. energy that has the potential to do work

_____ 4. coal, oil, or natural gas

_____ 5. ability to move or change matter

_____ 6. form of energy obtained from food

_____ 7. energy of moving matter

Terms

a. energy

b. chemical energy

c. kinetic energy

d. fossil fuel

e. potential energy

f. conservation of energy

g. fuel

Lesson 5.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Anything that moves or changes in any way needs _____.
2. Almost all the energy on Earth comes from the _____.
3. When fuel is burned, most of the energy is released as _____.
4. _____ resources are used faster than they can be replaced.
5. Burning fossil fuels releases the greenhouse gas _____.
6. The greatest energy sources for modern society are _____.
7. Solar, wind, and biomass energy are all _____ resources.

Lesson 5.1: Critical Writing

Name_____ Class_____ Date_____

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

Describe how you use energy throughout a typical day, and identify the sources of the energy you use.

5.2 Nonrenewable Energy Resource

Lesson 5.2: True or False

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

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

_____ 1. Fossil fuels are compounds known as hydrocarbons.

_____ 2. Unlike other types of coal, anthracite is igneous rock.

_____ 3. Most of the coal in the United States is found in the Rocky Mountains.

_____ 4. Petroleum formed at the bottom of ancient seas.

_____ 5. The United States produces more oil than it uses.

_____ 6. Burning gasoline leads to smog and ground-level ozone.

_____ 7. Natural gas is obtained from Earth's atmosphere.

_____ 8. Most coal contains the element sulfur.

_____ 9. Nuclear energy is a renewable energy resource.

_____ 10. Fuel rods in nuclear power plants are made of carbon.

Lesson 5.2: Critical Reading

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

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

Oil

The fossil fuel called oil, or petroleum, is a thick, dark brown or black liquid found in rock layers of Earth's crust. Oil is currently the most commonly used source of energy in the world. Earth's present oil reserves formed over millions of years from tiny sea organisms such as plankton and algae. After the organisms died, they settled to the bottom of the sea and were covered by sediments. As the organic material was buried more deeply, it was exposed to high heat and pressure. Eventually, the organic material changed to liquid oil.

Oil comes out of the ground as crude oil. Crude oil is a mixture of many different hydrocarbons. It is separated into different hydrocarbon compounds at an oil refinery. This can be done by heating the oil because each compound boils at a different temperature. Fuels that come from oil include gasoline, kerosene, diesel fuel, and heating oil. Oil is also used to make waxes, plastics, and fertilizers.

Oil-based fuels such as gasoline are concentrated sources of energy. They contain a large amount of energy for their weight. As liquids, they are also easily transported. These properties make them especially useful for cars, trucks, and other forms of transportation. In fact, oil-based fuels provide about 90 percent of the energy used for transportation around the world.

Using gasoline and other oil-based fuels has negative effects on the environment. When the fuels burn, they release

pollutants into the air. The pollutants create smog and ground-level ozone, both of which cause health problems. Air pollution is a big problem for cities where large numbers of people drive every day. Burning gasoline also produces carbon dioxide. This is a greenhouse gas and a major cause of global warming.

Questions

1. Explain how Earth's present oil reserves formed.
2. How and why is crude oil refined?
3. Identify products made from oil.
4. What are pros and cons of using oil-based fuels such as gasoline?

Lesson 5.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Which fossil fuel formed from dead plants that settled to the bottom of swamps millions of years ago?
    a. coal
    b. crude oil
    c. petroleum
    d. natural gas
2. What happens to crude oil at a refinery?
    a. It is separated into different compounds.
    b. It is removed from rock layers.
    c. It is heated.
    d. two of the above
3. Which products are made from crude oil?
    a. gasoline
    b. plastic
    c. fertilizer
    d. all of the above
4. The fossil fuel that is the biggest contributor to global warming is
    a. oil.
    b. coal.
    c. diesel fuel.
    d. natural gas.
5. Dead organisms turn to fossil fuels when they are exposed to
    a. oxygen.
    b. sulfuric acid.
    c. heat and pressure.
    d. underground water.
6. Which statement about natural gas is false?
    a. It releases no air pollutants when burned.
    b. It forms at higher temperatures than crude oil.
    c. It must be processed before it is used as a fuel.
    d. It produces less carbon dioxide than other fossil fuels.

7. What does a properly operating nuclear power plant release into the air?
    a. carbon dioxide
    b. sulfur dioxide
    c. particulates
    d. steam

Lesson 5.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. fossil fuel that produces the least pollution when burned

_____ 2. hardest form of coal

_____ 3. solid fossil fuel

_____ 4. element used to produce nuclear power

_____ 5. liquid fossil fuel

_____ 6. main component of natural gas

_____ 7. any compound consisting of carbon and hydrogen

Terms

a. methane

b. hydrocarbon

c. uranium

d. natural gas

e. petroleum

f. anthracite

g. coal

Lesson 5.2: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. Most coal is the type of rock called _____ rock.
2. The most commonly used fossil fuel in the world today is _____.
3. In the United States, most electricity is generated by burning _____.
4. The fossil fuel that releases the most carbon dioxide when it burns is _____
5. Sulfur dioxide released when _____ burns is the main cause of acid rain.
6. Nuclear energy is produced by _____ the nucleus of an atom.
7. Nuclear power plants use the energy they produce to heat _____.

Lesson 5.2: Critical Writing

Name_____ Class_____ Date_____

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

Compare and contrast coal and natural gas in terms of their uses and the consequences of their use.

5.3 Lesson 5.3: Renewable Energy Resources

Lesson 5.3: True or False

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

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

_____ 1. The sun is planet Earth's main source of energy.

_____ 2. Solar energy has been used by people only since the late 1900s.

_____ 3. A solar cell consists of many solar panels.

_____ 4. Solar power plants use mirrors to focus sunlight.

_____ 5. The technology needed for most uses of solar energy is expensive.

_____ 6. Streams with wide valleys are best for producing hydroelectric power.

_____ 7. Using water power has no negative effects on the environment.

_____ 8. Wind turbines are inexpensive and long lasting.

_____ 9. Some car engines can run on pure vegetable oil.

_____ 10. Geothermal energy can be used without processing.

Lesson 5.3: Critical Reading

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

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

Solar Energy

The sun is Earth's main source of energy, giving us both light and heat. The sun's energy comes from nuclear fusion, in which hydrogen changes to helium. Nuclear fusion releases huge amounts of energy. The energy travels from the sun to Earth mostly as visible light. It is transferred across empty space by radiation.

When sunlight is used as an energy resource, it is called solar energy. Solar energy has been used on a small scale for hundreds of years. Today, we are starting to use solar energy to generate electricity at solar power plants. These power plants use a large group of mirrors to focus sunlight on a receiver. The focused sunlight heats a liquid such as oil or water to a high temperature. The liquid transfers its heat by conduction. The energy conducted by the heated liquid is used to turn a turbine and generate electricity. Solar power plants are being built in many locations around the world. In the United States, deserts in the southwest are well suited for solar power plants because they receive so much sunlight.

In addition to generating electricity in solar power plants, solar energy is used for other purposes. It is used to heat homes and water and also to generate electricity on a small scale with solar cells. Solar cells are devices that turn sunlight directly into electricity. Many calculators, for example, are powered by solar cells. You may have seen solar panels on the roof of a home. Each solar panel consists of many solar cells that provide electricity for the home. The

sun's heat can also be trapped in a home by using south facing windows and good insulation.

The use of solar energy has many benefits. It does not produce any pollution, and there is plenty of it available. However, solar energy also has problems. The sun doesn't shine at night, so special batteries are needed to store extra energy during the day for use at night. In addition, the technology for most uses of solar energy is still expensive. Until solar technology becomes more affordable, most people will probably continue to use energy from other sources.

Questions

1. Explain how solar energy is used to generate electricity at solar power plants.
2. What are other uses of solar energy?
3. Identify pros and cons of solar energy use.

Lesson 5.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. If we could harness it, which of the following energy sources could provide all the energy needed by people around the world for billions of years?
    a. wind
    b. water
    c. biomass
    d. geothermal
2. Solar energy is used to
    a. heat water.
    b. heat homes.
    c. generate electricity.
    d. all of the above
3. Possible sources of water power include
    a. streams.
    b. waves.
    c. tides.
    d. all of the above
4. Generally, to harness the power of water flowing in a stream, the stream must be
    a. drained.
    b. dammed.
    c. depleted.
    d. destroyed.
5. A wind turbine is a device that uses the energy of wind to
    a. grind grain.
    b. pump water.
    c. generate electricity.
    d. all of the above
6. Which of the following is an advantage of using biofuels?

a. Growing plants for the fuels uses up carbon dioxide.
b. Using the fuels does not produce air pollution.
c. Producing the fuels does not require processing.
d. all of the above

7. A geothermal power plant generates electricity with

a. melted rock.
b. hot water.
c. flowing water.
d. wave energy.

Lesson 5.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. fuel made from plants

_____ 2. device that changes sunlight directly to electricity

_____ 3. transfer of energy between two objects that are in contact

_____ 4. transfer of energy through a liquid by currents

_____ 5. source of the sun's energy

_____ 6. transfer of energy by waves that can travel through matter or across space

_____ 7. electricity produced by harnessing the energy of flowing water

Terms

a. conduction

b. nuclear fusion

c. biofuel

d. convection

e. hydroelectric power

f. radiation

g. solar cell

Lesson 5.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The sun produces energy by changing hydrogen to _____.
2. Energy is transferred from the sun to Earth by _____.
3. The most widely used form of renewable energy worldwide is moving _____.

4. Water that is flowing downhill has _____ energy.
5. The horizontal movement of air over Earth's surface is called _____.
6. _____ energy comes from wood, grains, other plant materials, or wastes.
7. _____ energy comes from hot rocks and magma inside Earth.

Lesson 5.3: Critical Writing

Name_____ Class_____ Date_____

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

Electricity can be generated whenever a turbine turns in a power plant. Identify two sources of renewable energy that are used to generate electricity. Explain how each source is used to turn a turbine and generate electricity in a power plant.

CHAPTER 6 MS Plate Tectonics Worksheets

Chapter Outline

6.1 INSIDE EARTH
6.2 CONTINENTAL DRIFT
6.3 SEAFLOOR SPREADING
6.4 THEORY OF PLATE TECTONICS

6.1 Inside Earth

Lesson 6.1: True or False

Name_____ Class_____ Date_____

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

_____ 1. The mantle is divided into the inner mantle and outer mantle.

_____ 2. Earthquakes send waves of energy through rocks inside Earth.

_____ 3. Meteorites formed a long time ago in the early solar system.

_____ 4. Earth's crust is made of solid rock.

_____ 5. Lava flows formed the oceanic crust.

_____ 6. The continental crust contains only igneous rock.

_____ 7. Heat travels from the top to the bottom of the mantle.

_____ 8. Earth's core is very dense.

_____ 9. Convection currents occur in the inner core.

_____ 10. Plate tectonics is the theory that the lithosphere is divided into plates that move over Earth's surface.

Lesson 6.1: Critical Reading

Name_____ Class_____ Date_____

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

Earth's Crust

Scientists know more about Earth's crust than they do about the mantle or core. The crust is the thin, brittle outer shell of the planet. It is made of solid rock. The crust under the oceans is called oceanic crust. The crust of the continents is called continental crust. The two parts of the crust have several differences.

- Oceanic crust is made of basalt, an igneous rock. It formed when lava flowed onto the ocean floor and hardened into rock. The oceanic crust is denser than the continental crust but thinner, ranging from 5 to 12 kilometers in thickness. Thick layers of mud cover much of the ocean floor.
- Continental crust is made of all three types of rock: sedimentary, igneous, and metamorphic. It is less dense than oceanic crust, so it rises higher above the mantle than oceanic crust. Continental crust is much thicker than oceanic crust, averaging 35 kilometers in thickness.

Questions

1. Describe Earth's crust.
2. Why do you think scientists know more about Earth's crust than Earth's other layers?
3. Compare and contrast oceanic crust and continental crust.

Lesson 6.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Compared with the other layers of Earth, the crust is very
    a. thick.
    b. warm.
    c. brittle.
    d. two of the above
2. Seismic waves reveal information about Earth's interior because they travel
    a. at different speeds through different materials.
    b. only through liquids and gases.
    c. at the same speed as sound.
    d. only in straight lines.
3. Earth's layers differ from one another in
    a. chemical makeup.
    b. temperature.
    c. state of matter.
    d. all of the above
4. Compared to oceanic crust, continental crust is
    a. denser.
    b. thicker.
    c. less variable.
    d. all of the above
5. Earth's magnetic field is created by movements in Earth's
    a. inner core.
    b. outer core.
    c. mantle.
    d. crust.
6. The lithosphere is
    a. solid.
    b. rigid.
    c. able to flow.
    d. two of the above
7. The consistency of the asthenosphere is most like
    a. hard plastic.
    b. frozen water.
    c. silly putty.
    d. solid metal.

Lesson 6.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. rock from space that strikes Earth

_____ 2. Earth's middle layer

_____ 3. bendable layer of Earth in the upper mantle that lies beneath the lithosphere

_____ 4. Earth's outer layer

_____ 5. brittle layer of Earth consisting of the crust and uppermost mantle

_____ 6. liquid part of Earth's dense metallic center

_____ 7. solid part of Earth's dense metallic center

Terms

a. crust

b. asthenosphere

c. outer core

d. mantle

e. meteorite

f. lithosphere

g. inner core

Lesson 6.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Scientists learn about Earth's interior by studying _____ caused by earthquakes.
2. Scientist's think that Earth's core is similar in composition to a(n) _____.
3. The part of the crust that is made only of basalt is the _____ crust.
4. The part of the crust that is made of many types of rock is the _____ crust.
5. Continental crust is _____ dense than oceanic crust.
6. The lower mantle is heated directly by the core through the process of _____.
7. Heat moves throughout the mantle by the process of _____.

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 the lithosphere and asthenosphere.

6.2 Continental Drift

Lesson 6.2: True or False

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

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

_____ 1. The theory of plate tectonics was developed before the idea of continental drift.

_____ 2. Wegener believed that all the continents were once joined together.

_____ 3. Wegener's hypothesis of continental drift was widely accepted as soon as it was introduced.

_____ 4. Wegener and his supporters provided a lot of evidence for continental drift.

_____ 5. Wegener found rocks of the same type and age on both sides of the Atlantic Ocean.

_____ 6. Wegener suggested that Pangaea broke up a short time ago.

_____ 7. Wegener developed a theory to explain how continents can drift.

Lesson 6.2: Critical Reading

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

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

Magnetic Evidence for Continental Drift

Wegener collected a great deal of evidence for his continental drift hypothesis. But during Wegener's life, scientists did not know how continents could move, so Wegener's hypothesis seemed unbelievable. As a consequence, his idea that continents drift was nearly forgotten for many decades. However, more evidence for continental drift was discovered after Wegener's death, and eventually his hypothesis was widely accepted.

An important type of evidence discovered after Wegener's death was magnetic evidence. To understand the nature of this evidence, it's important to know that Earth has a magnetic field like that of a bar magnet, with north and south poles at opposite ends. Earth's magnetic north pole is near the geographic north pole, and its south magnetic pole is near the geographic south pole. If you have ever been hiking or camping, you may have used a compass to help you find your way. The needle of a compass always points toward Earth's magnetic north pole. The reason? The compass needle is magnetic, so it aligns itself with Earth's magnetic field.

Like a compass, some rocks contain little "magnets." As lava cools on Earth's surface, tiny iron-rich magnetite crystals form and line up with Earth's magnetic field. Anywhere lava has cooled, magnetite crystals point to Earth's magnetic north pole. However, scientists have discovered that some magnetite crystals do not point to the present location of Earth's magnetic north pole but to other locations. This shows that the continents were in different locations relative to the magnetic poles when these rocks formed than they are today. Therefore, the magnetic data provide additional evidence that the continents have moved over time.

Questions

1. Why was Wegener's hypothesis nearly forgotten for many decades?
2. Describe Earth's magnetic field.
3. Explain this statement from the reading passage: "Like a compass, some rocks contain little 'magnets.'"
4. How do magnetite crystals in rocks provide evidence that the continents have moved over time?

Lesson 6.2: Multiple Choice

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

Circle the letter of the correct choice.

1. To develop the theory of plate tectonics, scientists first had to accept the idea that
   a. Earth's core consists of molten metals.
   b. some organisms can cross the oceans.
   c. Earth's continents are able to move.
   d. all of the above
2. The idea of continental drift was first proposed in the early
   a. 1700s.
   b. 1800s.
   c. 1900s.
   d. 2000s.
3. Evidence for continental drift comes from ancient
   a. magnetic compasses.
   b. maps of Pangaea.
   c. coal seams.
   d. all of the above
4. Wegener observed that the Appalachian Mountains in eastern North America matched mountain ranges in
   a. western North America.
   b. South America.
   c. Greenland.
   d. Africa.
5. What was Alfred Wegener's role in the development of the theory of plate tectonics?
   a. He proposed the hypothesis of continental drift.
   b. He provided evidence that continents have moved.
   c. He identified magnetic evidence for plate tectonics.
   d. two of the above
6. In Pangaea, the present continent of South America was attached to present-day
   a. Australia.
   b. Eurasia.
   c. Africa.
   d. India.

Lesson 6.2: Matching

*Name*_____ *Class*_____ *Date*_____'

Match each definition with the correct term.

Definitions

_____ 1. region of magnetic force surrounding a magnet

_____ 2. evidence for continental drift identified after Wegener's death

_____ 3. hypothesis that continents move over Earth's surface

_____ 4. evidence for continental drift identified by Wegener

_____ 5. former supercontinent that consisted of all the present continents

_____ 6. theory that explains how continents can drift

Terms

a. plate tectonics

b. fossils

c. magnetite crystals

d. continental drift

e. Pangaea

f. magnetic field

Lesson 6.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. The meteorologist who first proposed the idea of continental drift was _____.
2. Continental drift is supported by glacial evidence that has been found near the _____.
3. Wegener found coral reef fossils in areas that are too _____ today for corals to live.
4. As lava cools, tiny iron-rich crystals line up with Earth's _____.
5. The theory of plate tectonics explains how Earth's continents are able to _____.
6. Evidence for continental drift includes rocks that were once side-by-side and are now located on separate _____.

Lesson 6.2: Critical Writing

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

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

Earth's continents seem to fit together like pieces of a jigsaw puzzle. Explain why.

6.3 Seafloor Spreading

Lesson 6.3: True or False

Name_____ Class_____ Date_____

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

_____ 1. An echo sounder with just one beam can create a three-dimensional map of the ocean floor.

_____ 2. A mid-ocean ridge runs from east to west through the center of the Atlantic Ocean.

_____ 3. Deep-sea trenches are found near the west coast of Central and South America.

_____ 4. The only mountains on the ocean floor are part of mid-ocean ridges.

_____ 5. Magnetometers were first used on ships to search for submarines.

_____ 6. Polar reversals have occurred only twice in Earth's history.

_____ 7. Magnetic stripes on the ocean floor end abruptly at the edges of continents.

_____ 8. The rocks currently found at mid-ocean ridges have reversed polarity.

_____ 9. The seafloor is older than the continents.

_____ 10. The seafloor is spreading away from mid-ocean ridges.

Lesson 6.3: Critical Reading

Name_____ Class_____ Date_____

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

Features of the Seafloor

Before World War II, people thought the seafloor was completely flat and featureless. There was no reason to think otherwise. But during the war, battleships and submarines carried devices called echo sounders. An echo sounder produces sound waves that travel outward in all directions. The sound waves bounce off underwater objects and the seafloor and return to the ship. The echo sounder has a receiver that detects the returned sound waves and records how long it took for them to return. The speed of sound in seawater is known and can be used with the echo sounder data to calculate the distance to the objects that the sound waves hit. The purpose of using echo sounders during the war was to detect enemy submarines. However, most of the sound waves did not hit submarines. Instead, they traveled to the bottom of the ocean and provided data that could be used to map the seafloor.

Scientists were surprised to learn that there are long, continuous ridges of huge mountains in the middle of the oceans. For example, a mid-ocean ridge runs approximately north-south through the center of the Atlantic Ocean. Scientists were also surprised to find out that there are very deep trenches around the edges of continents near chains of active volcanoes. For example, deep-sea trenches are found near the west coast of Central and South America. Trenches are the deepest places on Earth. The deepest trench is the Mariana Trench in the southwestern Pacific Ocean. This trench plunges about 11 kilometers (35,840 feet) below sea level. The seafloor also has isolated mountains scattered across the ocean floor as well as flat areas lacking other features. The flat areas are called abyssal plains.

Questions

1. Explain how echo sounders were used to learn about the seafloor.
2. What are mid-ocean ridges?
3. Describe deep-sea trenches. Where are they located?
4. Identify other features of the seafloor.

Lesson 6.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Before World War II, people thought the seafloor
    a. had huge mountain ranges.
    b. contained deep trenches.
    c. was flat and featureless.
    d. had active volcanoes.
2. Echo sounders were first developed to
    a. map the ocean floor.
    b. locate enemy submarines.
    c. determine the depth of the ocean.
    d. find evidence for seafloor spreading.
3. The deepest place on Earth is
    a. 11 km below sea level.
    b. 110 km below sea level.
    c. 1100 km below sea level.
    d. none of the above
4. Reversed polarity means that the north and south magnetic poles are
    a. located in the same positions as they are right now.
    b. located opposite their present positions.
    c. both in the same location.
    d. no longer magnetic.
5. The alternating magnetic stripes on the ocean floor show
    a. how Earth first formed.
    b. why the seafloor spreads.
    c. when polar reversals occurred.
    d. where sediments were deposited.
6. New seafloor forms at
    a. deep-sea trenches.
    b. mid-ocean ridges.
    c. continental edges.
    d. two of the above
7. Old seafloor sinks into the mantle at
    a. deep-sea trenches.

b. mid-ocean ridges.
c. continental edges.
d. two of the above

Lesson 6.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. hypothesis explaining how the ocean floor forms

_____ 2. device used to map the ocean floor

_____ 3. switching of Earth's magnetic poles

_____ 4. deepest places on the ocean floor

_____ 5. device used to study magnetic properties of the seafloor

_____ 6. flat regions of the ocean floor

_____ 7. mountain ranges on the ocean floor

Terms

a. echo sounder

b. mid-ocean ridges

c. abyssal plains

d. seafloor spreading

e. polar reversal

f. magnetometer

g. trenches

Lesson 6.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. Echo sounders produce _____ that travel outward in all directions.
2. Deep-sea trenches are found near chains of active _____.
3. The deepest trench is the Mariana Trench in the _____ Ocean.
4. The present locations of Earth's magnetic poles is called _____ polarity.
5. The continents are drifting apart because of seafloor _____.
6. The youngest rocks on the seafloor are found at _____.
7. Oceanic crust sinks into the mantle at _____.

Lesson 6.3: Critical Writing

Name_____ Class_____ Date_____

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

How does the hypothesis of seafloor spreading help explain why continents are able to move?

6.4 Theory of Plate Tectonics

Lesson 6.4: True or False

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

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

_____ 1. The locations of earthquakes have been used to identify plate boundaries.

_____ 2. The movement of Earth's plates is called plate tectonics.

_____ 3. The lithosphere is divided into just three major plates.

_____ 4. Most geologic activity takes place far from plate boundaries.

_____ 5. Mid-ocean ridges occur at convergent plate boundaries.

_____ 6. Many volcanoes occur along subduction zones.

_____ 7. The tallest mountains in the world formed at a transform plate boundary.

_____ 8. Geologic features called faults occur at divergent plate boundaries.

_____ 9. Scientists think that Pangaea was the first supercontinent.

_____ 10. The Aleutian Islands formed at a plate boundary.

Lesson 6.4: Critical Reading

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

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

Hot Spots

Most geologic activity takes place at tectonic plate boundaries. But some activity does not. Instead, it occurs within plates. This is called intraplate activity. Much intraplate activity is found at hot spots. A hot spot is a fixed location where magma rises up through the crust.

As an oceanic plate moves over a hot spot, it forms a chain of volcanoes. If the volcanoes are large enough, they form a chain of volcanic islands. This is how the Hawaiian Islands formed. Why does a chain of volcanic islands—rather than just a single volcanic island—form over a hot spot? At a hot spot, magma erupts through the plate, forming a volcanic island. Because the plate is moving, the volcanic island gradually moves away from the hotspot. Then magma erupts at the hot spot again, forming a new volcanic island. As the plate continues to move over the hot spot, a chain of volcanic islands forms. The youngest island in the chain is closest to the hot spot, and the oldest island is farthest from the hot spot.

Hot spots are also found under continental plates. However, it is more difficult for magma to rise up through the much thicker crust of a continent. Therefore, hot spot volcanic eruptions are less common in continental than oceanic crust. An exception is the Yellowstone hot spot. In the past, this very active hot spot produced enormous volcanic eruptions. Now it causes the region's famous hot geysers, including the geyser named "Old Faithful."

Questions

1. What are hot spots?
2. Explain how a hot spot forms a chain of volcanic islands.
3. Why are hot spot volcanoes less common in continental than oceanic plates.

Lesson 6.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Plate tectonics helps to explain
   a. how mountains form.
   b. where new seafloor is created.
   c. why earthquakes occur where they do.
   d. all of the above
2. The Pacific Ring of Fire is a ring around the Pacific ocean where
   a. volcanoes are common.
   b. tectonic plates interact.
   c. many hot spots occur.
   d. two of the above
3. Plates move over Earth's surface at a rate of
   a. 100 kilometers per year.
   b. a few kilometers per year.
   c. a few centimeters per year.
   d. a couple of millimeters per year.
4. Plates move over Earth's surface because of
   a. conduction within the crust.
   b. subduction in the outer core.
   c. radiation from the inner core.
   d. convection within the mantle.
5. Magma from the mantle rises up through Earth's crust at
   a. deep-sea trenches.
   b. mid-ocean ridges.
   c. hot spots.
   d. all of the above
6. The edge of a plate sinks into the mantle
   a. where two plates diverge.
   b. at a subduction zone.
   c. at a transform boundary.
   d. none of the above
7. Continental plates do not subduct because they
   a. are very thick and low in density.
   b. do not collide with other plates.
   c. have only intraplate activity.
   d. two of the above

Lesson 6.4: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. where two plates slide past each other in opposite directions

_____ 2. fixed place under a plate where magma rises and may create volcanoes

_____ 3. where two plates move away from each other

_____ 4. process in which an oceanic plate sinks beneath another plate

_____ 5. slab of lithosphere that can move on the planet's surface

_____ 6. where two plates move toward each other

_____ 7. divergent plate boundary that occurs within a continent

Terms

a. tectonic plate

b. divergent plate boundary

c. continental rift

d. convergent plate boundary

e. hot spot

f. transform plate boundary

g. subduction

Lesson 6.4: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Earth's lithospheric plates interact at _____.
2. A rift valley forms at a(n) _____ plate boundary.
3. Subduction occurs at a(n) _____ plate boundary.
4. The Himalayan Mountains formed where two continental plates _____.
5. Crust is neither created nor destroyed at a(n) _____ plate boundary.
6. A volcanic mountain range that forms where oceanic crust collides with a continent is called a(n) _____.
7. The San Andreas fault in California occurs at a(n) _____ plate boundary.

Lesson 6.4: Critical Writing

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

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

Compare and contrast convergent and divergent plate boundaries and the geologic activity associated with them.

CHAPTER 7

MS Earthquakes Worksheets

Chapter Outline

7.1 STRESS IN EARTH'S CRUST

7.2 NATURE OF EARTHQUAKES

7.3 MEASURING AND PREDICTING EARTHQUAKES

7.4 STAYING SAFE IN EARTHQUAKES

7.1 Stress in Earth's Crust

Lesson 7.1: True or False

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

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

_____ 1. Any force applied to rock is a stress.

_____ 2. When confining stress occurs, rock deforms.

_____ 3. Compression is the most common stress at convergent plates.

_____ 4. Stress is the cause of joints in rock.

_____ 5. A syncline is a fold that arches upward.

_____ 6. An area where faults are clustered is called a fault zone.

_____ 7. Movement of rock at faults is the cause of earthquakes.

_____ 8. Normal faults are caused by compression stress.

_____ 9. Strike-slip faults result from shear stress.

_____ 10. Only the process of folding creates mountain ranges.

Lesson 7.1: Critical Reading

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

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

Faults

With enough stress, a rock will fracture, or break. The fracture is called a joint if the rock breaks but doesn't move. If rocks on one or both sides of the fracture move, the fracture is called a fault. Faults may differ in how far rocks move, or slip. They may also differ in the angle, or dip, of the fault plane between the rocks.

- If the angle of the fault plane is vertical, the fault is called a strike-slip fault. If you stand with one foot on each side of a strike-slip fault, one side moves toward you while the other side moves away from you. Strike-slip faults are caused by shear stress.
- If the angle of the fault plane isn't vertical, then the fault is called a dip-slip fault. In a normal dip-slip fault, the rock above the fault (called the hanging wall) drops down relative to the rock below the fault (called the footwall). Normal faults are caused by tension stress. In a reverse dip-slip fault, the hanging wall pushes up relative to the footwall. Reverse faults are caused by compression stress.

Questions

1. What is the difference between a joint and a fault?

2. What is a strike-slip fault? Which type of stress causes a strike-slip fault?
3. What is a dip-slip fault?
4. Contrast normal and reverse dip-slip faults.

Lesson 7.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The most common stress at divergent plate boundaries is
   a. tension stress.
   b. compression stress.
   c. shear stress.
   d. confining stress.
2. Stresses change rock by causing
   a. folds.
   b. faults.
   c. fractures.
   d. all of the above
3. A fold that bends downward is known as a(n)
   a. monocline.
   b. syncline.
   c. anticline.
   d. incline.
4. A place where rock breaks but doesn't move it is called a
   a. fold.
   b. fault.
   c. joint.
   d. confinement.
5. A fracture becomes a fault only if rock
   a. cracks.
   b. moves.
   c. folds.
   d. deforms.
6. Which statement about the San Andreas fault is false?
   a. It is a transform fault.
   b. It is a strike-slip fault.
   c. It occurs at a plate boundary.
   d. none of the above
7. Most of the world's largest mountains formed at
   a. convergent plate boundaries.
   b. divergent plate boundaries.
   c. transform plate boundaries.
   d. confining plate boundaries

Lesson 7.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. fault in which the hanging wall drops down relative to the footwall

_____ 2. block of rock that is beneath a dip-slip fault plane

_____ 3. fault in which the hanging wall pushes up relative to the footwall

_____ 4. block of rock that is above a dip-slip fault plane

_____ 5. fault with a fault plane that is not vertical

_____ 6. fault with a vertical fault plane

_____ 7. reverse fault in which the fault plane is nearly horizontal

Terms

a. dip-slip fault

b. normal fault

c. reverse fault

d. strike-slip fault

e. thrust fault

f. hanging wall

g. footwall

Lesson 7.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. When plates are pushed or pulled, rock is subjected to _____.
2. A rock _____ when it bends without breaking.
3. _____ stress causes rocks to fold.
4. _____ stress pulls rocks apart.
5. _____ stress occurs when rocks slide past each other in opposite directions.
6. The angle of a fault is called the fault's _____.
7. The distance rocks move along a fault is called the fault's _____.

Lesson 7.1: Critical Writing

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

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

Identify and contrast the three types of folds.

7.2 Nature of Earthquakes

Lesson 7.2: True or False

Name_____ Class_____ Date_____

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

_____ 1. The energy released by an earthquake travels in seismic waves.

_____ 2. Only transform plate boundaries have earthquakes.

_____ 3. Earthquakes deep underground cause the most damage.

_____ 4. Earthquakes at mid-ocean ridges tend to be small and shallow.

_____ 5. Seismic waves travel outward in all directions from their source.

_____ 6. All seismic waves travel at the same speed through solid rock.

_____ 7. P-waves are the first seismic waves to reach a seismometer.

_____ 8. All undersea earthquakes generate tsunamis.

_____ 9. The deadliest tsunami of all time occurred in 2004 in Indonesia.

_____ 10. Tsunamis are more common in the Atlantic Ocean than the Pacific Ocean.

Lesson 7.2: Critical Reading

Name_____ Class_____ Date_____

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

Types of Seismic Waves

There are two major types of seismic waves: body waves and surface waves. Body waves travel underground through the Earth's interior. Surface waves travel along the surface of the ground. They move more slowly than body waves and do more damage because they are on the surface. Body waves and surface waves are each divided into two types.

The two types of body waves are primary (P) waves and secondary (S) waves.

- Primary waves travel at a higher speed than secondary waves. They are called primary waves because they are the first waves to reach a seismometer, which is a device that detects and measures seismic waves. Primary waves can travel through solids, liquids, and gases. They squeeze and release rocks as they travel, so the rocks return to their original shape after the primary waves goes by.
- Secondary waves travel at only about half the speed of primary waves. They are called secondary waves because they are the second type of waves to arrive at a seismometer. Secondary waves can travel only through solids. They change the shape of rocks as they travel.

The two types of surface waves are love waves and Raleigh waves. They differ in how they move across the surface

of the ground.

- Love waves move over the surface from side to side like a snake.
- Rayleigh waves move up and down over the surface in a rolling motion.

The two types of surface waves together cause objects on the surface to move back-and- forth as well as up-and-down. During an earthquake, these motions cause the most damage to rigid structures such as buildings.

Questions

1. Identify and define the two major types of seismic waves.
2. Which type of seismic waves, body waves or surface waves, does more damage to structures? Why?
3. Compare and contrast primary and secondary body waves.
4. What are the two types of surface waves? How do they differ?

Lesson 7.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. According to elastic rebound theory, earthquakes occur when stresses on rocks become too great and the rocks
   a. become deformed.
   b. fracture and form a joint.
   c. return to their original shape.
   d. are permanently stretched out of shape.
2. The focus of a shallow earthquake is
   a. less than 70 km below the surface.
   b. between 70 and 300 km below the surface.
   c. more than 300 kilometers below the surface.
   d. none of the above
3. About 80 percent of all earthquakes take place
   a. in the state of California.
   b. at divergent plate boundaries.
   c. along the Pacific Ring of Fire.
   d. far from plate boundaries.
4. The wavelength of a wave can be measured by finding the distance between
   a. the focus and the epicenter.
   b. a P wave and an S wave.
   c. a crest and a trough.
   d. two adjacent crests.
5. Seismic waves that do the most damage are
   a. body waves.
   b. surface waves.
   c. primary waves.
   d. secondary waves.
6. Surface waves that produce a rolling motion are

a. P waves.
b. S waves.
c. love waves.
d. Rayleigh waves.

7. Tsunamis may be caused by

a. landslides.
b. meteorites.
c. nuclear explosions.
d. all of the above

Lesson 7.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. high point of a wave

_____ 2. seismic wave that travels along the surface of the ground

_____ 3. point below the surface where an earthquake begins

_____ 4. low point of a wave

_____ 5. ground movement caused by the sudden release of energy stored in rocks

_____ 6. point on the surface above the focus of an earthquake

_____ 7. seismic wave that travels below Earth's surface

Terms

a. earthquake

b. body wave

c. crest

d. surface wave

e. epicenter

f. focus

g. trough

Lesson 7.2: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. Almost all earthquakes take place along _____.
2. The height of a wave is the wave's _____.
3. Slower traveling body waves are named _____ waves.

4. Body waves that can travel through all states of matter are called _____ waves.
5. The slowest of all seismic waves are _____ waves.
6. A(n) _____ wave is a surface wave that moves from side to side like a snake.
7. An earthquake below the ocean can create a huge wave called a(n) _____.

Lesson 7.2: Critical Writing

Name_____ Class_____ Date_____

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

What is a tsunami warning system? Why is such a system especially important in countries around the Pacific Ocean?

7.3 Measuring and Predicting Earthquakes

Lesson 7.3: True or False

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

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

_____ 1. The strength of an earthquake can be measured in several different ways.

_____ 2. The pen of a seismograph moves back and forth over a paper roll during an earthquake.

_____ 3. Modern seismographs record seismic waves using a stationary drum.

_____ 4. The S waves on a seismogram are usually smaller than the P waves.

_____ 5. For some earthquakes, only P waves and surface waves show up on a seismogram.

_____ 6. The Richter scale measures the magnitude of an earthquake's largest jolt of energy.

_____ 7. A Richter magnitude 8 earthquake occurs about once a week.

_____ 8. Most Richter magnitude 9 earthquakes have occurred around the Pacific Ring of Fire.

_____ 9. The preferred scale for measuring an earthquake's magnitude is the moment magnitude scale.

_____ 10. Today, scientists can accurately predict most earthquakes.

Lesson 7.3: Critical Reading

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

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

Earthquake Intensity and Magnitude

The ways seismologists measure an earthquake's strength have changed over the decades. Initially, seismologists could assess only what people felt and saw, such as the extent of building damage caused by an earthquake. This measure of an earthquake's strength is called its intensity. Now seismologists can measure the energy released during an earthquake. The amount of energy released is the earthquake's magnitude.

The earliest earthquake scale was the Mercalli scale. This scale measures earthquake intensity. There are several problems with the Mercalli scale. The damage from an earthquake is affected by many things in addition to the energy released during the quake. Also, different people may experience an earthquake differently. For these reasons, comparisons between earthquakes are difficult to make with the Mercalli scale.

Charles Richter developed the Richter scale in 1935. The Richter scale measures the magnitude of an earthquake's largest jolt of energy. This is determined from the height, or amplitude, of the seismic waves recorded on a seismogram. On the Richter scale, each level of magnitude is 10 times greater than the one before it. For example, an earthquake with magnitude 2 is 10 times stronger than an earthquake with magnitude 1. An earthquake with magnitude 3 is 100 (10×10) times stronger than an earthquake with magnitude 1. Like the Mercalli scale, the Richter scale has problems. A single sharp jolt measures higher on the Richter scale than a very long but less intense

earthquake. This is misleading because the longer-lasting earthquake may release more total energy and do more damage.

The moment magnitude scale is now the preferred method for measuring earthquake magnitude. It measures the total energy released by an earthquake. Moment magnitude is calculated on the basis of the length of the fault and the distance the ground moves along the fault.

Questions

1. Define earthquake intensity and magnitude.
2. What is the Mercalli scale? What are some problems with this scale?
3. How is earthquake magnitude measured on the Richter scale?
4. Describe the difference in magnitude between an earthquake with magnitude 3 and an earthquake with magnitude 9 on the Richter scale.
5. What does the moment magnitude scale measure? What data are used to calculate the moment magnitude of an earthquake?

Lesson 7.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Finding the amplitude of a seismic wave is one way of determining its
   a. intensity.
   b. magnitude.
   c. wavelength.
   d. wave speed.
2. What can you determine about an earthquake from a single sonogram?
   a. exact location of the epicenter
   b. distance from the epicenter to the seismograph
   c. strength of the earthquake
   d. two of the above
3. When an earthquake's focus is close to the surface, the largest waves recorded on a seismogram are
   a. primary waves.
   b. surface waves.
   c. body waves.
   d. S waves.
4. If a seismogram records only P waves and surface waves for an earthquake, the earthquake must be
   a. on the opposite side of Earth from the seismograph.
   b. extremely close to the seismograph.
   c. very far below Earth's surface.
   d. very close to Earth's surface.
5. An S-wave shadow occurs because S waves travel
   a. more quickly than surface waves.
   b. more slowly than P waves.
   c. only on the surface.
   d. only through solids.

6. The moment magnitude of an earthquake is calculated from the
    a. length of the fault.
    b. distance the ground moves.
    c. amplitude of the seismic waves.
    d. two of the above
7. Assume that an earthquake has a magnitude of 4 on the Richter scale. An earthquake that is 100 times stronger has a magnitude of
    a. 5.
    b. 6.
    c. 40.
    d. 400.

Lesson 7.3: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. earthquake scale based on the height of seismic waves on a seismogram

_____ 2. paper record of seismic waves produced by a seismograph

_____ 3. type of seismic wave that cannot travel through Earth's liquid outer core

_____ 4. earthquake scale based on the total energy released in an earthquake

_____ 5. device that records seismic waves

_____ 6. earthquake scale based on information such as the damage done to buildings

_____ 7. type of seismic wave that always arrives first at a seismometer

Terms

a. S wave

b. moment magnitude scale

c. Mercalli intensity scale

d. seismogram

e. P wave

f. Richter magnitude scale

g. seismograph

Lesson 7.3: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. A total of _____ seismograms are needed to pinpoint the exact location of an earthquake's epicenter.

2. The amount of energy released by an earthquake is the earthquake's _____.
3. An earthquake with a Richter scale magnitude of 5 releases _____ times as much energy as an earthquake with a magnitude of 4.
4. Earthquakes with a Richter scale magnitude of _____ are rare.
5. Seismologists can predict where but not _____ earthquakes will occur.
6. The longer the time is between the arrival of P and S waves, the _____ the distance is to the epicenter.
7. The last waves to arrive at a seismometer are always _____ waves.

Lesson 7.3: Critical Writing

Name_____ Class_____ Date_____

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

Explain how to use information from three seismograph stations to locate the epicenter of an earthquake.

7.4 Staying Safe in Earthquakes

Lesson 7.4: True or False

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

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

_____ 1. All earthquake damage is caused by the ground shaking.

_____ 2. A stronger earthquake always causes more damage than a weaker earthquake.

_____ 3. An earthquake always causes more deaths in cities closer to the epicenter.

_____ 4. The Great Alaska Earthquake had a magnitude greater than 9 on the Richter scale.

_____ 5. Most deaths in the Great Alaska Earthquake were due to the tsunami.

_____ 6. In earthquake zones, building materials should be strong and rigid.

_____ 7. Buildings should be constructed so they do not bend and sway in an earthquake.

_____ 8. If you are inside when an earthquake strikes, you should get beneath a sturdy table or desk.

_____ 9. If you are outside when an earthquake strikes, you should run to an open area away from buildings and power lines.

_____ 10. In earthquake zones, heavy furniture should be attached securely to walls.

Lesson 7.4: Critical Reading

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

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

Damage from Earthquakes

Of natural disasters, only hurricanes cause more damage than earthquakes. One way earthquakes cause damage is by shaking the ground and the structures on it. The shaking may cause buildings and bridges to collapse. It may also cause gas, electric, and water lines to rupture. Earthquakes cause damage in other ways as well. For example, earthquakes may cause tsunamis, and these giant waves may be responsible for more death and destruction than the shaking of the ground. Fires and landslides are also common with earthquakes, and they cause still more damage. Fires occur when gas and electric lines break. Landslides occur when wet soil on hillsides liquefies, or turns to a liquid state, when the earthquake waves shake it.

It's no surprise that earthquake magnitude affects how much damage is done by an earthquake. A stronger earthquake usually causes more damage to buildings and kills more people than a weaker earthquake. However, other factors also affect how much death and destruction an earthquake causes. These factors include how long the shaking lasts and how close the earthquake is to large population centers. The geology of a region is important too. Strong, solid bedrock shakes less than soils. Also, when soils liquefy from the shaking they may turn to quicksand, which can't support buildings and other large structures.

Communities along faults can take steps to reduce the death and destruction caused by earthquakes. City planners can use hazard maps to avoid building in places where damage is more likely. For example, when faced with two possible locations for a new hospital, planners should choose a site where it can be built on bedrock rather than clay. Buildings can also be constructed so they are earthquake-safe, and older buildings can be modified to make them safer. Even families and individuals can take steps to minimize damage and injury in their home. For example, they can secure heavy objects so the shaking will not cause them to fall over on people.

Questions

1. Describe ways that earthquakes may cause damage.
2. Identify factors that affect how much damage is done by an earthquake.
3. What steps can communities take to reduce earthquake damage?

Lesson 7.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Much of the damage caused by earthquakes is done by
    a. fires.
    b. tsunamis.
    c. landslides.
    d. all of the above
2. Earthquake-safe construction methods include
    a. making buildings out of stone.
    b. anchoring buildings to bedrock.
    c. making buildings without foundations.
    d. all of the above
3. The Great Alaska Earthquake occurred
    a. near the capital city of Juneau.
    b. where many people lived.
    c. at a subduction zone.
    d. in 2004.
4. Structures that reduce how much buildings sway during an earthquake include
    a. diagonal steel beams.
    b. heavy slate roofs.
    c. counterweights.
    d. two of the above
5. Steel is a good building material for earthquake zones because steel
    a. bends without breaking.
    b. is very light in weight.
    c. resists shaking.
    d. is very rigid.
6. If you live in a place where the risk of earthquakes is high, you should
    a. keep heavy objects near the floor.
    b. prepare an emergency kit.

c. use fluorescent light bulbs.
d. all of the above

7. If you are in a car when an earthquake occurs, you should

a. run into the nearest building.
b. get out of the car and drop to the ground.
c. stay in the car and away from buildings.
d. stay in the car and park under an overpass.

Lesson 7.4: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. solid material that shakes less than soil during an earthquake

_____ 2. earthquake risk that may occur because gas lines break when the ground shakes

_____ 3. tool for showing the likelihood of strong earthquakes in a region

_____ 4. sudden collapse of a hillside that may occur during an earthquake

_____ 5. one of many factors that affect how much damage is done by an earthquake

_____ 6. to change to a liquid

_____ 7. material that forms when wet soil shakes and liquefies in an earthquake

Terms

a. liquefy

b. magnitude

c. bedrock

d. landslide

e. hazard map

f. fire

g. quicksand

Lesson 7.4: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Of natural disasters, only _____ cause more damage than earthquakes.
2. In earthquake-prone areas, buildings should be built on _____.
3. The 1985 Mexico City earthquake caused so much damage because the city is built on _____.
4. The largest earthquake ever recorded in North America occurred in the state of _____.
5. In earthquake zones, wood is better than brick for buildings because wood can _____.

6. Smaller seismic waves that occur after the main seismic waves of an earthquake are called _____.
7. Any community located along a(n) _____ should be prepared for earthquakes.

Lesson 7.4: Critical Writing

Name_____ Class_____ Date_____

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

Describe either the 1995 Mexico earthquake or the 1964 Alaska earthquake, including the magnitude of the earthquake and the damage it caused. Identify factors that affected the amount of damage caused by the earthquake.

CHAPTER 8 MS Volcanoes Worksheets

Chapter Outline

8.1 VOLCANIC ACTIVITY
8.2 VOLCANIC ERUPTIONS
8.3 TYPES OF VOLCANOES
8.4 IGNEOUS LANDFORMS AND GEOTHERMAL ACTIVITY

8.1 Volcanic Activity

Lesson 8.1: True or False

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

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

_____ 1. Iceland consists of volcanoes that formed over a hot spot.

_____ 2. Volcanoes are scattered randomly across Earth's surface.

_____ 3. Many volcanoes occur along the mid-Atlantic Ridge.

_____ 4. Volcanoes occur only in oceanic crust.

_____ 5. Chains of volcanoes form above hot spots because of plate tectonics.

_____ 6. The Hawaiian hot spot is no longer active.

_____ 7. Hot spots never occur under continental crust.

_____ 8. The majority of mantle plumes are found under the ocean basins.

_____ 9. All hot spots are in the middle of tectonic plates.

_____ 10. The molten rock of a volcano comes from Earth's core.

Lesson 8.1: Critical Reading

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

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

Volcanoes at Plate Boundaries

There is a lot of volcanic activity at divergent plate boundaries in the oceans. For example, many undersea volcanoes are found along the Mid-Atlantic Ridge. This is a divergent plate boundary that runs north-south through the middle of the Atlantic Ocean. As tectonic plates pull away from each other at a divergent plate boundary, they create deep fissures, or cracks, in the crust. Molten rock, called magma, erupts through these cracks onto Earth's surface. At the surface, the molten rock is called lava. It cools and hardens, forming rock. Divergent plate boundaries also occur in continental crust. Volcanoes form at these boundaries, but less often than in ocean crust. That's because continental crust is thicker than oceanic crust. This makes it more difficult for molten rock to push up through the crust.

Many volcanoes form along convergent plate boundaries where one tectonic plate is pulled down beneath another at a subduction zone. The leading edge of the plate melts as it is pulled into the mantle, forming magma that erupts as volcanoes. When a line of volcanoes forms along a subduction zone, they make up a volcanic arc. The edges of the Pacific plate are long subduction zones lined with volcanoes. This is why the Pacific rim is called the "Pacific Ring of Fire."

Questions

1. Explain how volcanoes form at divergent plate boundaries.

2. Why are volcanoes less likely to form at continental than oceanic divergent plate boundaries?
3. Explain how volcanoes form at convergent plate boundaries.

Lesson 8.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The only place where the mid-Atlantic ridge is above sea level is
    a. Iceland.
    b. England.
    c. Greenland.
    d. none of the above
2. Volcanoes form at
    a. hot spots.
    b. divergent plate boundaries.
    c. convergent plate boundaries.
    d. all of the above
3. Many volcanoes are located
    a. within the Eurasian plate.
    b. at the edges of the Pacific plate.
    c. within the North American plate.
    d. at the edges of the Atlantic plate.
4. Volcanoes form in a subduction zone where a tectonic plate
    a. is pulled down into the mantle.
    b. remains over a hot spot.
    c. pulls away from another plate.
    d. creates a rift valley.
5. Examples of volcanic arcs that formed at convergent plate boundaries include the
    a. island nation of Japan.
    b. Cascade Range in Washington State.
    c. Andes Mountains of South America.
    d. all of the above
6. About how many hot spots have scientists identified on Earth?
    a. 5
    b. 15
    c. 50
    d. 500
7. Which U.S. state formed over a hot spot in an oceanic plate?
    a. Oregon
    b. California
    c. Florida
    d. Hawaii

Lesson 8.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. column of hot rock that lies below a hot spot

_____ 2. crack in Earth's crust where magma pushes up through the crust

_____ 3. feature that forms when magma flows onto Earth's surface

_____ 4. location where most volcanoes occur

_____ 5. fixed spot where magma rises through the crust and creates volcanoes

_____ 6. name for melted rock under Earth's surface

_____ 7. name for melted rock after it flows onto Earth surface

Terms

a. volcano

b. magma

c. lava

d. hot spot

e. mantle plume

f. plate boundary

g. fissure

Lesson 8.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Fissures occur at _____ plate boundaries.
2. Subduction occurs at _____ plate boundaries.
3. A hot spot lies directly above a(n) _____.
4. At a hot spot, magma travels toward the crust through a(n) _____.
5. As a tectonic plate moves over a hot spot, it creates an island _____.
6. The Emperor Seamounts formed over a(n) _____.
7. Iceland formed at a(n) _____ in the mid-Atlantic ridge.

Lesson 8.1: Critical Writing

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

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

Explain how a hot spot chain of volcanoes forms. Why do the volcanoes in the chain have different ages?

8.2 Volcanic Eruptions

Lesson 8.2: True or False

Name_____ Class_____ Date_____

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

_____ 1. The 1985 Mount St. Helens eruption was the biggest volcanic eruption that ever occurred.

_____ 2. All volcanic eruptions involve explosions.

_____ 3. A volcanic eruption may be more powerful than a nuclear explosion.

_____ 4. Gases form in a volcano when magma boils and evaporates.

_____ 5. Ash from a volcanic eruption may stay in the atmosphere for years.

_____ 6. Gases from a volcano may cause environmental problems.

_____ 7. A volcano is more likely to be explosive when lava is thin and runny.

_____ 8. When a'a lava cools, it forms lava tubes.

_____ 9. Pillow lava is especially common along mid-ocean ridges.

_____ 10. A volcano's history can help scientists predict whether the volcano is likely to erupt again.

Lesson 8.2: Critical Reading

Name_____ Class_____ Date_____

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

Types of Volcanic Eruptions

Volcanic eruptions can be explosive or non-explosive. Only rarely do explosive and non-explosive eruptions happen in the same volcano.

Explosive volcanic eruptions generally occur when magma is thick and doesn't flow easily. It may block the vent of a volcano, allowing a buildup of gases. Gas pressure grows until the volcano erupts in an explosion. Explosive volcanic eruptions can be thousands of time more powerful than an atomic bomb. Ash and other particles from the eruption may form a mushroom cloud, like the cloud formed by a nuclear explosion. Chunks of the volcano fly high into the atmosphere. Hot fragments of rock, called pyroclasts, fly up into the air at very high speeds and cool in the atmosphere. Huge clouds of ash and particles may shoot many kilometers into the sky. Some of the ash may stay in the atmosphere for years. It may block out sunlight, change weather patterns, and affect Earth's temperature. Gases from the eruption can form poisonous, invisible clouds. The poisonous gases may be toxic to living things located close to the volcano. Farther away from the volcano, the gases may cause environmental problems such as acid rain and ozone destruction.

Non-explosive volcanic eruptions generally occur when magma is thin and flows easily. Lava flows out of the volcano, rather than blocking the vent, and little or no gas forms inside the volcano. The lava simply pours out and

flows over the ground like a river. People generally have a lot of warning before a lava flow like this reaches them, so non-explosive eruptions are much less deadly. However, they may destroy property as it becomes covered with lava.

Questions

1. What factors lead to an explosive volcanic eruption?
2. Describe what happens during an explosive volcanic eruption.
3. What are some long-term effects that an explosive volcanic eruption may cause?
4. When is a volcanic eruption likely to be non-explosive?
5. Describe a non-explosive volcanic eruption.
6. Why is a non-explosive eruption less likely than an explosive eruption to cause deaths?

Lesson 8.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Which statement about Mount St. Helens is false?
    a. It is an active volcano.
    b. Its 1980 eruption was explosive.
    c. It is unlikely to erupt again.
    d. all of the above
2. Compared with the solid rock around it, magma is
    a. cooler.
    b. harder.
    c. less dense.
    d. two of the above
3. The deepest magma chambers are about
    a. 16 km below the surface.
    b. 160 km below the surface.
    c. 1600 km below the surface.
    d. 16,000 km below the surface.
4. A non-explosive volcanic eruption may release a large quantity of
    a. ash.
    b. gases.
    c. molten rock.
    d. pyroclasts.
5. The chemistry of magma determines
    a. how it erupts.
    b. how thick it is.
    c. what type of igneous rock it forms.
    d. all of the above
6. For magma to form, solid rock must reach a temperature of at least
    a. 600 °C.
    b. 1600 °C.

c. 6000 °C.
d. 16,000 °C.

7. Signs that a volcano may soon erupt include
   a. earthquakes.
   b. ground tilting
   c. release of gases.
   d. all of the above

Lesson 8.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. thickest type of non-explosive lava

_____ 2. volcano that has not erupted in recent history and probably will not erupt again

_____ 3. region within Earth that is surrounded by solid rock and contains magma

_____ 4. hot volcanic rock thrown into the air by an explosive eruption

_____ 5. lava that enters water

_____ 6. any release of magma onto Earth's surface

_____ 7. volcano that has erupted in recent history and probably will erupt again

Terms

a. magma chamber

b. volcanic eruption

c. pyroclast

d. a'a

e. dormant volcano

f. pillow lava

g. extinct volcano

Lesson 8.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. The type of volcanic eruption that occurs when gases build up in a volcano is a(n) _____ eruption.
2. When magma or lava cools, it forms _____ rock.
3. Thick lava may block the vent of a volcano and result in a(n) _____ eruption.
4. Pāhoehoe lava is _____ than a'a lava.
5. _____ are Earth scientists who specialize in the study of volcanoes.

6. A(n) _____ volcano is a volcano that is currently erupting or showing signs that it will erupt soon.
7. Magma collects in _____ beneath Earth's surface.

Lesson 8.2: Critical Writing

Name_____ Class_____ Date_____

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

Why is it important to predict volcanic eruptions? Identify factors that scientists use to predict eruptions.

8.3 Types of Volcanoes

Lesson 8.3: True or False

Name_____ Class_____ Date_____

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

_____ 1. Many composite volcanoes are found in the Pacific Ring of Fire.

_____ 2. All volcanoes release ashes, gases, and pyroclasts.

_____ 3. Composite volcanoes have steep sides because the lava cannot flow very far.

_____ 4. Mauna Loa in Hawaii is an example of a composite volcano.

_____ 5. A shield volcano has a flatter top than a composite volcano.

_____ 6. Cinder cones have gently sloping sides like shield volcanoes.

_____ 7. Most large volcanoes have nearby cinder cones.

_____ 8. Cinder cones usually build up very rapidly.

_____ 9. Cinder cones always erupt over a long period of time.

_____ 10. The largest supervolcano in North America is Yellowstone.

Lesson 8.3: Critical Reading

Name_____ Class_____ Date_____

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

Composite and Shield Volcanoes

Composite volcanoes have broad bases and steep sides. These volcanoes usually have a large crater at the top. The crater was created during the volcano's last eruption. Composite volcanoes are formed by alternating layers of magma and ash. The magma that creates composite volcanoes tends to be thick. Steep sides form because the lava cannot flow very far from the vent. The thick magma generally creates explosive eruptions. Ash and pyroclasts fly up into the air. Much of this material falls back down near the vent. This contributes to the steep sides of composite volcanoes. Composite volcanoes are common along convergent plate boundaries. When a tectonic plate subducts, it melts. This creates the thick magma needed to produce this type of volcano.

Shield volcanoes have a very wide base and a flatter top than composite volcanoes. The magma that creates shield volcanoes is relatively thin. Thin lava spreads out and builds up, layer by layer. Shield volcanoes tend to be very large. For example, the Mauna Loa shield volcano in Hawaii has a diameter of more than 112 kilometers (70 miles). Shield volcanoes often form along divergent plate boundaries. Because of their thin magma, shield volcano eruptions are non-explosive.

Questions

1. Contrast the shape and composition of composite and shield volcanoes.

2. Describe where and how composite volcanoes form.
3. Outline the formation of shield volcanoes.

Lesson 8.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Composite and shield volcanoes differ in their
    a. thickness of magma.
    b. overall shape.
    c. type of eruptions.
    d. all of the above
2. Composite volcanoes are common at
    a. divergent plate boundaries.
    b. subduction zones.
    c. mid-ocean ridges.
    d. hot spots.
3. Composite volcanoes are also called
    a. cone volcanoes.
    b. stratovolcanoes.
    c. cinder volcanoes.
    d. convergent volcanoes.
4. A shield volcano
    a. consists of layers of lava.
    b. is relatively small.
    c. has very thick lava.
    d. two of the above
5. A caldera forms when a
    a. vent is plugged by magma.
    b. magma chamber collapses.
    c. crater fills with water.
    d. lava field hardens.
6. Cinder cones are composed mainly of
    a. rock fragments.
    b. thin lava.
    c. magma.
    d. ashes.
7. A supervolcano
    a. is the most dangerous type of volcano.
    b. may cause Earth's temperature to rise.
    c. has no magma chamber.
    d. produces no ash.

Lesson 8.3: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. large, bowl-shaped depression that forms at the top of some volcanoes

_____ 2. smallest and most common type of volcano

_____ 3. example of a shield volcano

_____ 4. volcano with a broad base and steep sides

_____ 5. example of a composite volcano

_____ 6. volcano that produces so much ash that it blocks the sun

_____ 7. volcano that forms a huge, gently sloping mountain

Terms

a. caldera

b. cinder cone

c. composite volcano

d. shield volcano

e. supervolcano

f. Kilauea

g. Fuji

Lesson 8.3: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. A volcano formed of alternating layers of magma and ash is a(n) _____ volcano.
2. _____ volcanoes form from thick lava.
3. Composite volcanoes generally have _____ eruptions.
4. _____ volcanoes form from thin lava.
5. Shield volcanoes generally form along _____ plate boundaries.
6. Shield volcanoes generally have _____ eruptions.
7. Cinder cones usually have a(n) _____ at the summit.

Lesson 8.3: Critical Writing

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

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

What is a supervolcano? How can a supervolcano cause a volcanic winter?

8.4 Igneous Landforms and Geothermal Activity

Lesson 8.4: True or False

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

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

_____ 1. Intrusive igneous rocks are never visible on Earth's surface.

_____ 2. A lava dome is any mountain that forms from lava.

_____ 3. The lava that forms a lava dome is thin and runny.

_____ 4. A lava plateau forms when a volcano produces very little lava.

_____ 5. Lava from shield volcanoes created the Hawaiian Islands.

_____ 6. Intrusions form on the surface and later are buried by sediments.

_____ 7. The water in hot springs is heated by magma.

Lesson 8.4: Critical Reading

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

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

Hot Springs and Geysers

Underground water works its way through porous rocks or soil. Sometimes this water is heated by nearby magma. If the water makes its way to the surface, it forms a hot spring or geyser.

When hot water rises gently to the surface, it creates a hot spring. A hot spring forms where a crack in the ground allows hot water to reach the surface. Many hot springs are used by people as natural hot tubs. Some people believe that hot springs can cure illnesses. Hot springs are found all over the world, even in Antarctica.

Geysers are also created by water that is heated below Earth's surface. The water may be superheated by magma and become trapped in a narrow passageway. The heat and pressure build as more water is added. When the pressure becomes great enough, the superheated water bursts onto the surface. The eruption of hot water is a geyser. Not many areas of the world have the right conditions for geysers to form. Only about 1,000 geysers exist worldwide. About half of them are in the United States. The most famous geyser is Old Faithful at Yellowstone National Park. It erupts every 60 to 70 minutes with a plume of hot water that shoots nearly 60 meters up into the air. It is rare for a geyser to erupt so regularly, which is how Old Faithful got its name.

Questions

1. What causes underground water to get hot?
2. How does a hot spring form?
3. Where are hot springs found, and how do people use hot springs?
4. How does a geyser form?

5. Why are geysers relatively few in number?
6. How did the most famous geyser get its name?

Lesson 8.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. When lava is thick it
    a. travels far from vents.
    b. forms a caldera.
    c. flows rapidly.
    d. none of the above
2. Lava that flows from vents at mid-ocean ridges
    a. forms composite volcanoes.
    b. creates lava plateaus.
    c. creates lava domes.
    d. is thin and runny.
3. Examples of lava plateaus include the
    a. ocean basins.
    b. Columbia Plateau.
    c. Hawaiian Islands.
    d. two of the above
4. An intrusion forms when
    a. a volcano erupts.
    b. magma cools underground.
    c. lava hardens at the surface.
    d. lava is very thin.
5. Which statement about hot springs is false?
    a. They are very rare.
    b. They are found in Antarctica.
    c. They are used as natural hot tubs.
    d. They are thought to cure illnesses.
6. A geyser forms when underground water is
    a. superheated.
    b. under pressure.
    c. trapped in a narrow passage.
    d. all of the above
7. Which statement about geysers is false?
    a. There are only about 1000 geysers in the world.
    b. About half the world's geysers are in the U.S.
    c. The water in geysers is heated by magma.
    d. All geysers erupt on a regular schedule.

Lesson 8.4: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. hot water that seeps out of a crack at the surface

_____ 2. igneous rock formation that results when lava cools in the middle of a volcanic crater

_____ 3. hot water under pressure that forcefully erupts out of the surface

_____ 4. type of igneous rock that forms when magma cools below Earth's surface

_____ 5. type of igneous rock that forms when lava cools on Earth's surface

_____ 6. flat surface of igneous rock that forms when thin lava flows over a large area

Terms

a. extrusive igneous rock

b. intrusive igneous rock

c. lava dome

d. lava plateau

e. hot spring

f. geyser

Lesson 8.4: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. The lava that forms a lava dome is _____ lava.
2. The lava that forms a lava plateau is _____ lava.
3. The lava that forms the ocean floor is _____ lava.
4. Intrusions become landforms if they are exposed by _____.
5. Granite _____ form the Sierra Nevada Mountains in California.
6. Underground water may become very hot if it is heated by nearby _____.
7. The most famous geyser in the U.S. is _____ in Yellowstone National Park.

Lesson 8.4: Critical Writing

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

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

Compare and contrast intrusive and extrusive igneous rocks.

CHAPTER 9 MS Weathering and Formation of Soil Worksheets

Chapter Outline

9.1 WEATHERING

9.2 SOILS

9.1 Weathering

Lesson 9.1: True or False

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

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

_____ 1. Natural weathering is usually a very slow process.

_____ 2. Grains of sands are weathered particles of rock.

_____ 3. Agents of mechanical weathering include wind and gravity.

_____ 4. Ice wedging occurs only in extremely cold climates.

_____ 5. Pebbles in a stream are worn smooth by abrasion.

_____ 6. Burrowing animals cause mechanical weathering.

_____ 7. Only acids can dissolve rocks.

_____ 8. Carbon dioxide makes a weak acid when it combines with oxygen in the air.

_____ 9. Water is an agent of both mechanical and chemical weathering.

_____ 10. All rocks weather at the same rate.

Lesson 9.1: Critical Reading

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

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

Types of Weathering

Weathering is any process that breaks rocks into smaller pieces or changes their chemical composition. Weathering of rocks ultimately leads to the formation of soil. There are two basic types of weathering: mechanical weathering and chemical weathering.

Mechanical weathering breaks rocks into smaller pieces, called sediments, but does not alter their chemical makeup. Sediments can range in size from large boulders to tiny particles of clay. Processes of mechanical weathering include ice wedging and abrasion. Ice wedging occurs when water repeatedly seeps into cracks in rocks, freezes and expands, and eventually wedges rocks apart. Abrasion occurs whenever rocks are struck or scraped by other rocks or sediments. Gravity, moving water, and wind all cause abrasion.

Chemical weathering changes the chemical composition of rocks. There are many agents of chemical weathering. One of the most important is water, which can slowly dissolve many kinds of rock. Carbonic acid in natural rainfall and acid rain dissolve rocks more quickly than pure water. Oxygen also causes chemical weathering. It combines with iron in rocks and changes it to soft, crumbly rust.

Questions

1. What is weathering? What do weathered rocks eventually become?
2. Define mechanical weathering.
3. Describe two processes of mechanical weathering.
4. What is chemical weathering?
5. Identify agents of chemical weathering.

Lesson 9.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Sediments produced by weathering include
    a. boulders.
    b. gravel.
    c. silt.
    d. all of the above
2. What is the first step in the process of ice wedging?
    a. Ice melts in cracks in rocks.
    b. Water freezes in cracks in rocks.
    c. Water seeps into cracks in rocks.
    d. Ice wedges apart cracks in rocks.
3. Abrasion may be caused by all of the following except
    a. gravity.
    b. glaciers.
    c. moving water.
    d. carbon dioxide.
4. Plants can cause
    a. mechanical weathering.
    b. chemical weathering.
    c. ice wedging.
    d. two of the above
5. How does mechanical weathering increase the rate of chemical weathering?
    a. It makes rocks softer.
    b. It changes the minerals in rocks.
    c. It increases the surface area of rocks.
    d. all of the above
6. Agents of chemical weathering include all of the following except
    a. ice.
    b. water.
    c. nitric acid.
    d. sulfuric acid.
7. Which rock weathers quickly?
    a. basalt
    b. granite

c. limestone
d. none of the above

Lesson 9.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. agent of chemical weathering

_____ 2. weathering process that occurs when water freezes in cracks in rocks

_____ 3. weathering process that occurs when rocks and rock particles scrape other rocks

_____ 4. rock particle created by weathering

_____ 5. type of weathering that breaks rock into smaller pieces

_____ 6. movement of weathered rock particles

_____ 7. type of weathering that changes the minerals in rock

Terms

a. chemical weathering

b. carbonic acid

c. abrasion

d. mechanical weathering

e. sediment

f. erosion

g. ice wedging

Lesson 9.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Sediments form in the process of _____ weathering.
2. Ice wedging occurs because water _____ when it freezes.
3. Wind-blown sand can cause erosion by _____.
4. _____ weathering changes the chemical composition of rock.
5. Water can cause chemical weathering by _____ rock.
6. The element _____ can change the iron in rocks to rust.
7. _____ rocks weather slowly because they are very hard.

Lesson 9.1: Critical Writing

Name_____ Class_____ Date_____

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

Which forms of weathering do you think are most important where you live? Explain your answer.

9.2 Soils

Lesson 9.2: True or False

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

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

_____ 1. Without weathering, Earth would have no soils.

_____ 2. Most soils consist only of small rock particles and minerals.

_____ 3. The average rate of soil formation is about 1 cm/year.

_____ 4. Dry conditions produce the thickest soils.

_____ 5. The majority of soils in the U.S. are transported soils.

_____ 6. Most topsoil consists mainly of clay-sized rock particles.

_____ 7. The B horizon contains more organic material than the C horizon.

_____ 8. Dead leaves from deciduous trees enrich laterite soils each year.

_____ 9. Adding manure to soil reduces the amount of water the soil can hold.

_____ 10. No-till farming helps to conserve topsoil.

Lesson 9.2: Critical Reading

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

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

How Climate and Living Things Affect Soil Formation

How well soil forms and what type of soil forms depend on many factors. Climate is the most important factor in soil formation. Living things in soil are also important.

The climate of a region includes its rainfall and temperature. Rainfall is an important factor in soil formation because it influences the rate of weathering. More rain means that more rainwater passes through the soil. Chemical weathering occurs when rainwater reacts chemically with rock particles and minerals. High rainfall increases the amount of rock that experiences chemical reactions. High rainfall may also carry away soil minerals and very small rock particles. This exposes new surfaces to weathering, although it also removes nutrients from soil. Temperature is an important factor in soil formation because the rate of chemical weathering increases with higher temperatures. The rate of chemical reactions doubles for every 10 °C increase in temperature. Plants and other living things in soil also grow and multiply more quickly in areas at higher temperatures.

Living things affect soil formation in several ways. One way is by increasing the rate of weathering. Plant roots and animals such as earthworms help break up rock particles. Burrowing animals loosen soil, allowing more water to pass through it. After soil organisms die, they add organic matter to soil. Humus forms from the remains of dead plants and animals and is an extremely important part of the soil. Humus coats mineral particles, binding them

together into clumps that hold the soil together. This gives the soil its structure and helps it hold water. Soils rich in humus also hold nutrients better and are more fertile for plant growth.

Questions

1. How does the amount of rainfall in an area influence soil formation?
2. Why does chemical weathering occur more quickly in areas with higher temperatures?
3. Describe two ways that living things affect soil formation.

Lesson 9.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Factors that influence soil formation in a region include
   a. average temperature.
   b. amount of rainfall.
   c. type of bedrock.
   d. all of the above
2. How does humus affect soil?
   a. It prevents soil from holding water.
   b. It binds together mineral particles in soil.
   c. It reduces the nitrogen content of soil.
   d. It makes soil less fertile for plant growth.
3. Which size of rock particles in soil causes soil to hold the most water?
   a. gravel
   b. clay
   c. sand
   d. silt
4. Which soil horizon is usually darkest in color?
   a. A
   b. B
   c. C
   d. D
5. What type of soil is usually the most fertile?
   a. pedalfer
   b. pedocal
   c. laterite
   d. subsoil
6. A soil sample is red in color and contains almost no humus or soluble minerals. Which type of soil is it most likely to be?
   a. pedalfer
   b. pedocal
   c. laterite
   d. none of the above
7. Practices that help to conserve soil include

a. cutting down trees.
b. building terraces on steep slopes.
c. planting the same crops every year.
d. two of the above

Lesson 9.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. common name for soil horizon B

_____ 2. type of soil found in grasslands

_____ 3. common name for soil horizon A

_____ 4. type of soil found in tropical areas

_____ 5. organic material in soil

_____ 6. type of soil found in deciduous forests

_____ 7. all the layers of a particular soil

Terms

a. humus

b. laterite

c. topsoil

d. pedocal

e. subsoil

f. soil profile

g. pedalfer

Lesson 9.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. The most important factor that influences soil formation is _____.
2. Soil that is brought to an area from somewhere else is called _____ soil.
3. Soil that forms in place from the underlying bedrock is called _____ soil.
4. Soil that contains a mixture of clay, sand, and silt is known as _____.
5. An individual layer of soil at a given depth is called a(n) soil _____.
6. The _____ horizon of soil contains the most living things.
7. The _____ horizon of soil consists of partially weathered bedrock.

Lesson 9.2: Critical Writing

Name_____ Class_____ Date_____

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

Explain how soil can be considered both a renewable and a nonrenewable natural resource.

CHAPTER 10 MS Erosion and Deposition Worksheets

Chapter Outline

10.1 EROSION AND DEPOSITION BY FLOWING WATER
10.2 EROSION AND DEPOSITION BY WAVES
10.3 EROSION AND DEPOSITION BY WIND
10.4 EROSION AND DEPOSITION BY GLACIERS
10.5 EROSION AND DEPOSITION BY GRAVITY

10.1 Erosion and Deposition by Flowing Water

Lesson 10.1: True or False

Name_____ Class_____ Date_____

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

_____ 1. Flowing water can cause erosion by dissolving minerals in rocks.

_____ 2. More slowly flowing water can carry larger sediments.

_____ 3. The size of sediments determines how they are carried by flowing water.

_____ 4. Clay and silt are carried in flowing water by suspension.

_____ 5. Runoff is only a minor cause of soil erosion.

_____ 6. Rapidly flowing mountain streams cause little deposition.

_____ 7. Slowly flowing rivers erode their channels more at the bottom than at the sides.

_____ 8. Floodplains are poor places for growing crops.

_____ 9. A levee forms from the largest sediments a river carries.

_____ 10. Sinkholes are caused by groundwater erosion.

Lesson 10.1: Critical Reading

Name_____ Class_____ Date_____

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

How Flowing Water Causes Erosion and Deposition

Flowing water is a very important agent of erosion. It can erode both rock and soil. Flowing water dissolves and carries away minerals in rock. This process occurs both on the surface and under the ground. The process happens very slowly. However, over millions of years, flowing water can dissolve massive amounts of rock. Moving water also physically picks up and carries particles of soil and rock. More rapidly flowing water has more energy, so it can carry larger particles and a greater quantity of particles. What causes water to move more quickly? The slope of the land over which the water flows is one factor. The steeper the slope, the more rapidly the water flows. Another factor is the amount of water that's in a stream or river. With more water in the channel, moving water flows more quickly.

Flowing water eventually slows down and deposits the sediments it is carrying. It may slow down when it reaches flatter land. Or it may slow down when it flows into a large body of still water, such as a lake or the ocean. A river can also slow down if it overflows its banks and floods its floodplain. As soon as flowing water starts to slow down, it starts dropping particles. It drops the largest particles first and the smallest particles last.

Questions

1. What are two ways that flowing water can cause erosion?

2. How does the speed of flowing water affect its ability to erode?
3. When does flowing water deposit the sediments it is carrying?
4. Why does flowing water deposit the largest particles first?

Lesson 10.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Agents of erosion include
   a. gravity.
   b. waves.
   c. ice.
   d. all of the above
2. Erosion is always followed by
   a. deposition.
   b. weathering.
   c. suspension.
   d. saltation.
3. Factors that determine how much erosion runoff can cause include
   a. how fast the water is moving.
   b. how much water is flowing.
   c. whether the land is bare or covered with plants.
   d. all of the above
4. A waterfall forms when a stream flows
   a. from lower to higher elevations.
   b. from harder to softer rocks.
   c. from one meander to another.
   d. from side to side in its floodplain.
5. When flowing water slows down, which of the following sediments does it drop first?
   a. gravel
   b. sand
   c. silt
   d. clay
6. Which statement about stalactites is false?
   a. They form on the floors of caves.
   b. They consist of mineral deposits.
   c. They look like icicles.
   d. They grow slowly.
7. What forms when a river erodes the outside of a curve and deposits sediments on the inside of the curve?
   a. delta
   b. floodplain
   c. meander
   d. sinkhole

Lesson 10.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. broad flat area on both sides of a river where it floods its banks

_____ 2. underground hole or cavern eroded by groundwater

_____ 3. deposit that forms when a mountain stream flows suddenly onto flatter land

_____ 4. raised strip of sediments deposited along the bank of a river

_____ 5. hole on the surface of the ground that forms when a cave collapses

_____ 6. triangular deposit that forms when a river empties into a body of still water

_____ 7. body of water that forms when a meander is cut off from the rest of the river

Terms

a. alluvial fan

b. delta

c. levee

d. floodplain

e. cave

f. sinkhole

g. oxbow lake

Lesson 10.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. The transport of sediments is called _____.
2. _____ is the process by which eroded sediments are dropped somewhere else.
3. Particles such as sand move in flowing water by _____.
4. _____ is the process in which gravel rolls or drags along the bottom of moving water.
5. Water that runs over the land during a heavy rain is called _____.
6. A mountain stream carves a channel shaped like a(n) _____.
7. Large curves eroded in the channel of a slow-moving river are called _____.

Lesson 10.1: Critical Writing

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

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

Compare and contrast the erosion caused by a steep mountain stream with the erosion caused by a river flowing over nearly flat land.

10.2 Erosion and Deposition by Waves

Lesson 10.2: True or False

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

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

_____ 1. Bigger waves can carry more sediment.

_____ 2. The smallest sediments in ocean water are deposited on the shore.

_____ 3. Most waves strike the shore at an angle rather than straight on.

_____ 4. Longshore drift carries sediments far inland.

_____ 5. Groins are built to prevent the formation of sandbars.

_____ 6. Sediment in ocean water scrapes rocks like sandpaper.

_____ 7. Longshore drift moves sand opposite to the direction of prevailing winds.

_____ 8. The end of a spit may hook around toward the open ocean.

_____ 9. A barrier island is generally small and round in shape.

_____ 10. Sand collects on both sides of a groin.

Lesson 10.2: Critical Reading

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

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

Wave Deposition

Ocean water carries sediment from runoff, streams, and rivers. Eventually, the sediment is deposited. Deposition occurs where waves and other ocean motions become slower. The smallest particles of sediment, including silt and clay, are deposited away from shore where the water is calmer. These small sediments eventually settle down to the ocean floor, covering it with a layer of mud. Larger particles of sediment are deposited on or close to shore. This is where waves and other ocean motions are more vigorous. Deposition of larger particles of sediment by ocean waves may form beaches, spits, sandbars, or barrier islands.

- In relatively quiet areas along a shore, waves may deposit sand and form a beach. Most beaches also include larger pieces of rock and shell.
- Longshore drift moves sand down a shoreline. Deposits from longshore drift may form a spit. A spit is a ridge of sand that extends away from the shore. The end of the spit may hook around toward the quieter waters close to shore.
- Waves may also deposit sediments in a ridge parallel to shore, forming a sandbar or barrier island. A sandbar is a long, narrow deposit of sand under the surface of the water. A barrier island is a long, narrow island that forms when a sandbar has built up enough to break through the water's surface.

Questions

1. Why are the smallest sediments in ocean water deposited away from shore?
2. List four landforms created by wave deposition on or near shore.
3. Compare and contrast spits and sandbars. How and why are they different?

Lesson 10.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Factors that determine the size of ocean waves include
   a. speed of the wind.
   b. length of time the wind blows.
   c. distance the wind blows.
   d. all of the above
2. Sediments you are most likely to find on a beach include
   a. clay.
   b. silt.
   c. pieces of shell.
   d. all of the above
3. Erosion by ocean waves can cause
   a. sandbars.
   b. spits.
   c. cliffs.
   d. beaches.
4. Landforms created by longshore drift include
   a. spits.
   b. sea arches.
   c. sea stacks.
   d. two of the above
5. A breakwater is most similar to a
   a. spit.
   b. barrier island.
   c. wave-cut cliff.
   d. pillar of rock.
6. Landforms caused by ocean wave deposition include
   a. groins.
   b. sea stacks.
   c. sea caves.
   d. sandbars.
7. Which series of landforms shows the correct order in which a stretch of rocky shoreline may be eroded?
   a. sea arch, cliff, sea stack
   b. cliff, sea arch, sea stack
   c. sea stack, cliff, sea arch
   d. cliff, sea stack, sea arch

Lesson 10.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. landform that results when a sandbar builds up enough to rise above the water's surface

_____ 2. artificial barrier parallel to a shore that reduces beach erosion

_____ 3. landform that results when waves create a hole in a wave-cut cliff

_____ 4. artificial barrier perpendicular to the shore that reduces erosion by longshore drift

_____ 5. landform that results when waves erode the top of a sea arch

_____ 6. underwater ridge of sand running parallel to shore that is deposited by waves

_____ 7. ridge of sand extending out from shore that is caused by longshore drift

Terms

a. spit

b. barrier island

c. groin

d. sea stack

e. sandbar

f. sea arch

g. breakwater

Lesson 10.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. When wind blows over the surface of a body of water, it causes _____.
2. Waves that strike the shore at an angle cause the process of _____.
3. An artificial barrier island is called a(n) _____.
4. Ocean waves are _____ traveling through water.
5. Bigger waves form when wind speed is _____.
6. Ocean sediments come from streams, rivers, and _____.
7. _____ of ocean sediments occurs where water is calmer.

Lesson 10.2: Critical Writing

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

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

What is longshore drift, why does it occur, and how can it be prevented?

10.3 Erosion and Deposition by Wind

Lesson 10.3: True or False

Name_____ Class_____ Date_____

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

_____ 1. Wind causes very little erosion.

_____ 2. Wind can carry dust just a few kilometers.

_____ 3. Particles that the wind moves by traction stay on the ground.

_____ 4. Wind-blown sand cannot erode solid rock.

_____ 5. When wind slows down, it deposits smaller sediments first.

_____ 6. A sand dune migrates in the same direction that the wind usually blows.

_____ 7. A sand dune has a gentle slope on the slip face side.

_____ 8. Wind causes less erosion when it blows at a higher speed.

_____ 9. Wind erosion can be reduced by planting rows of trees around fields.

_____ 10. Fences are used to help prevent erosion of sand dunes.

Lesson 10.3: Critical Reading

Name_____ Class_____ Date_____

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

Formation of Sand Dunes

When the wind deposits sand, it forms small hills of sand. These hills are called sand dunes. For sand dunes to form, there must be plenty of sand and wind. Sand dunes are found mainly in deserts and on beaches.

The formation of a sand dune starts with an obstacle, such as a rock. The obstacle causes the wind to slow down. The wind then drops some of its sand. As more sand is deposited, the dune gets bigger. The dune becomes the obstacle that slows the wind and causes it to drop its sand. The hill takes on the typical shape of a sand dune. It has a gentle slope on the side from which the wind blows. The opposite side has a steep slope. This side is called the slip face.

Once a sand dune forms, it may slowly migrate over the land. The wind moves particles of sand up the gently sloping side of the dune. This is done by saltation. When the sand particles reach the top of the dune, they slip down the steeper side. The particles are pulled down the slip face by gravity. The constant movement of sand up and over the dune causes the dune to move along the ground. It moves in the same direction that the wind most often blows.

Questions

1. How does a sand dune form?

2. Describe the typical shape of a sand dune.
3. How and why do sand dunes migrate?

Lesson 10.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Wind drops the sediment it is carrying when it
    a. slows down.
    b. is very moist.
    c. arrives at a beach.
    d. reaches a certain altitude.
2. What is the first step in the formation of a sand dune?
    a. Wind carrying sand strikes an obstacle.
    b. Wind moves particles of sand up a gentle slope.
    c. Wind moves particles of sand down a slip face.
    d. Wind deposits particles of silt and clay.
3. A sand dune migrates because wind keeps
    a. reversing its direction.
    b. blowing sand up and over the dune.
    c. causing longshore drift.
    d. none of the above
4. Deposits called loess
    a. form vertical cliffs.
    b. have thick rich soil.
    c. are deposited by wind.
    d. all of the above
5. Loess deposits consist of
    a. sand and silt.
    b. silt and clay.
    c. clay and gravel.
    d. gravel and sand.
6. Loess deposits are used for
    a. rock climbing.
    b. gold mining.
    c. farming.
    d. none of the above
7. Soil is less likely to be eroded by wind if it is
    a. located on flat land.
    b. covered with plants.
    c. surrounded by trees.
    d. two of the above

Lesson 10.3: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. type of erosion caused by wind-blown sand

_____ 2. type of deposit formed when wind drops very small particles of sediment

_____ 3. how wind carries particles larger than sand

_____ 4. air moving over Earth's surface

_____ 5. how wind carries sand

_____ 6. small hill of sand deposited by wind

_____ 7. how wind carries the smallest sediments

Terms

a. loess

b. sand dune

c. suspension

d. wind

e. saltation

f. abrasion

g. traction

Lesson 10.3: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. A dust storm is more likely to occur in a _____ climate.
2. Wind carries clay and silt by _____.
3. _____ occurs when wind blows sediments in short hops.
4. _____ occurs when wind rolls or pushes sediments over the ground.
5. The side of a sand dune facing toward the wind has a(n) _____ slope.
6. The side of a sand dune facing away from the wind is called the _____.
7. Sand moves down the steep side of a sand dune because of _____.

Lesson 10.3: Critical Writing

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

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

Relate the size of sediments to the way the wind transports them.

10.4 Erosion and Deposition by Glaciers

Lesson 10.4: True or False

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

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

_____ 1. Glaciers presently cover about 40 percent of Earth's surface.

_____ 2. Continental glaciers are long and narrow.

_____ 3. Valley glaciers flow downhill through river valleys.

_____ 4. Continental glaciers form cirques and horns.

_____ 5. A glacier picks up sediments when they freeze to ice at the bottom of the glacier.

_____ 6. The narrow end of a drumlin points in the direction that the glacier moved.

_____ 7. All glaciers move because of gravity.

_____ 8. The main way glaciers cause erosion is by ice wedging.

_____ 9. Glaciers are getting smaller because of global warming.

_____ 10. The valley carved by a mountain glacier has gently sloping walls.

Lesson 10.4: Critical Reading

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

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

Erosion by Glaciers

Like flowing water, flowing ice erodes the land and deposits the material elsewhere. Glaciers cause erosion in two main ways: plucking and abrasion. Plucking is the process in which rocks and other sediments are picked up by a glacier. The sediments freeze to the bottom of the glacier and are carried away by the flowing ice. Abrasion is the process in which a glacier scrapes underlying rock. The sediments and rocks frozen in the ice at the bottom and sides of a glacier act like sandpaper. They wear away rock as the glacier flows over it. They may also leave scratches and grooves in rock that show the direction the glacier moved.

Valley glaciers form several unique features through erosion. As a valley glacier flows through a V-shaped river valley, it scrapes away the sides of the valley. It carves a U-shaped valley with nearly vertical walls. A line on the valley walls, called the trimline, shows the highest level the glacier reached. A cirque is a rounded hollow carved in the side of a mountain by a glacier. The highest cliff of a cirque is called the headwall. An arête is a jagged ridge that remains when cirques form on opposite sides of a mountain. A low spot in an arête is called a col. A horn is a sharp peak that is left behind when glaciers erode all sides of a mountain.

Questions

1. What is plucking? Why does it occur?

2. Why does a glacier cause abrasion?
3. Identify three features that are formed by valley glacier erosion, and explain how they form. Why do valley glaciers, but not continental glaciers, form these features?

Lesson 10.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Today, continental glaciers cover most of
    a. Alaska.
    b. Canada.
    c. Greenland.
    d. all of the above
2. Features caused by valley glacier erosion include
    a. eskers.
    b. cirques.
    c. drumlins.
    d. end moraines.
3. A trimline shows the
    a. highest level a valley glacier reached.
    b. direction in which a glacier traveled.
    c. greatest distance a glacier advanced.
    d. ending edge of a continental glacier.
4. A headwall is the
    a. starting point of a continental glacier.
    b. highest ridge of an esker.
    c. highest cliff of a cirque.
    d. low spot in an arête.
5. A valley glacier changes a V-shaped river valley to a
    a. kettle lake.
    b. drumlin field.
    c. U-shaped valley.
    d. meltwater stream.
6. A thick layer of sediments left behind by a retreating continental glacier is called
    a. ground moraine.
    b. end moraine.
    c. glacial till.
    d. none of the above
7. The last time glaciers dipped as far south as Chicago and New York City was
    a. 10 million years ago.
    b. 1 million years ago.
    c. 120,000 years ago.
    d. 12,000 years ago.

Lesson 10.4: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. rounded hollow carved in the side of a mountain by a glacier

_____ 2. type of glacier that is spread out over a large area

_____ 3. long low hill of sediments deposited by a glacier

_____ 4. type of glacier that forms in mountains

_____ 5. winding ridge of sand deposited by a stream of meltwater

_____ 6. jagged ridge that remains when two cirques form on opposite sides of a mountain

_____ 7. sharp peak that is left behind when glaciers erode all sides of a mountain

Terms

a. continental glacier

b. arête

c. esker

d. cirque

e. valley glacier

f. horn

g. drumlin

Lesson 10.4: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. A large mass of flowing ice is a(n) _____.
2. The process in which a glacier scrapes underlying rock is called _____.
3. The process in which a glacier picks up sediment is called _____.
4. Glaciers deposit their sediment when they _____.
5. The mixture of particles and rocks carried by a glacier is known as glacial _____.
6. A general term for sediments that have been deposited by a glacier is _____.
7. A lake that forms when a large chunk of glacial ice melts is called a(n) _____ lake.

Lesson 10.4: Critical Writing

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

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

Compare and contrast continental and valley glaciers.

10.5 Erosion and Deposition by Gravity

Lesson 10.5: True or False

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

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

_____ 1. Gravity pulls soil and rocks downhill.

_____ 2. Mass movement is always a very slow process.

_____ 3. A landslide may carry away an entire village.

_____ 4. Mudslides occur where soil consists mostly of sand.

_____ 5. Slump occurs more slowly that creep.

_____ 6. Slump is more destructive than a landslide.

_____ 7. Soil is lifted up when the ground freezes.

_____ 8. An earthquake is a type of mass movement.

_____ 9. Trees tilting downhill are evidence for slump.

_____ 10. During creep, soil moves downhill when it thaws.

Lesson 10.5: Critical Reading

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

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

Landslides and Mudslides

Landslides and mudslides are the most destructive types of mass movement. They occur when gravity suddenly pulls soil, rocks, or mud down a cliff or hillside. The sediments may bury or carry away entire villages.

A landslide happens when a large amount of soil and loose rocks suddenly falls downhill because of gravity. If a landslide falls into the ocean, it may cause a huge wave called a tsunami. Landslides are often triggered by the ground shaking of an earthquake. A landslide is more likely if the soil has become wet from heavy rains. Wet soil is slippery and heavy.

A mudslide is the sudden flow of mud downhill because of gravity. Mudslides occur where the soil consists mostly of clay. Like landslides, mudslides are more likely following an earthquake and when the soil is wet. Wet clay forms very slippery mud that easily slides downhill.

Questions

1. What is a landslide?
2. Describe conditions that may lead to a landslide.
3. How is a mudslide like a landslide? How is it different?

Lesson 10.5: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Gravity causes erosion by all of the following except
    a. glaciers.
    b. moving air.
    c. flowing water.
    d. mass movement.
2. Factors that increase the risk of landslides include
    a. dry soils.
    b. lack of rain.
    c. earthquakes.
    d. two of the above
3. Mass movement can occur
    a. suddenly.
    b. very slowly.
    c. only on sloping land.
    d. all of the above
4. Slump may be caused by
    a. wet clay.
    b. water erosion.
    c. scars on a hillside.
    d. two of the above
5. Creep usually takes place where the ground
    a. is level.
    b. is prevented from moving.
    c. freezes and thaws frequently.
    d. is always saturated with water.
6. Evidence that creep has occurred include
    a. cracked pavement.
    b. crescent-shaped holes.
    c. huge piles of mud.
    d. large chunks of rock.

Lesson 10.5: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. sudden movement of a large block of rock and soil down a slope

_____ 2. force that indirectly causes erosion by moving water or ice

_____ 3. sudden movement of a large amount of soil and loose rocks down a slope

_____ 4. gradual movement of rock and soil down a hillside

_____ 5. any type of erosion and deposition caused directly by gravity

_____ 6. sudden flow of a large amount of wet, slippery clay down a slope

Terms

a. creep

b. landslide

c. mass movement

d. mudslide

e. slump

f. gravity

Lesson 10.5: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. The most destructive types of mass movement are landslides and _____.
2. If a landslide flows into the ocean, it may cause a(n) _____.
3. Mudslides occur where the soil consists mostly of _____.
4. The mass movement called _____ causes fence posts to tilt downhill.
5. The type of mass movement that occurs very slowly is _____.

Lesson 10.5: Critical Writing

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

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

Contrast landslides and slump. Why do you think slump is less destructive than a landslide?

CHAPTER 11 MS Evidence About Earth's Past Worksheets

Chapter Outline

11.1 FOSSILS

11.2 RELATIVE AGES OF ROCK

11.3 ABSOLUTE AGES OF ROCKS

11.1 Fossils

Lesson 11.1: True or False

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

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

_____ 1. Preserved traces can include burrows.

_____ 2. Scientists have discovered fossil footprints.

_____ 3. Complete preservation occurs only when remains are preserved in rock.

_____ 4. It is very likely that any given organism will become a fossil.

_____ 5. Fossils of ocean animals have been found at the top of Mt. Everest.

_____ 6. Fossils show that Antarctica once had a much warmer climate.

_____ 7. Index fossils are the first fossils ever discovered of an extinct species.

_____ 8. Teeth are more likely than feathers to be preserved as fossils.

_____ 9. People first started discovering fossils about 150 years ago.

_____ 10. All fossils form when remains of dead organisms are covered with sediments.

Lesson 11.1: Critical Reading

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

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

How Fossils Form

The process by which remains or traces of once-living things become fossils is called fossilization. Most fossils form when a dead organism is buried by sediments. Layers of sediment slowly build up. Through time, the pressure of additional sediment layers turns the lower layers into sedimentary rock. The remains inside the rock layers also turn to rock. The remains are replaced by minerals, so they literally turn to stone.

There are several other ways in which fossils may form. Tree sap may cover an organism and then turn to amber. The organism encased in the amber is completely preserved. Scientists might even be able to study its DNA. Organisms can also be completely preserved in tar or ice. Molds and casts are other ways organisms can be fossilized. A mold is an imprint of an organism left in rock when the organism's remains break down completely. If rock fills in a mold, it forms a fossil called a cast. The cast resembles the original remains. Molds and casts usually form in sedimentary rock. Yet another way fossils form is by compression. Compression occurs when an organism's remains are put under great pressure inside rock layers. This leaves behind a dark stain in the rock. The stain is the same shape as the original remains.

Questions

1. Define fossilization.

2. Explain how most fossils form.
3. Identify and describe three other ways in which fossils may form.

Lesson 11.1: Multiple Choice

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

Circle the letter of the correct choice.

1. Which of the following parts of organisms are most likely to be fossilized?
    a. skin
    b. hair
    c. shells
    d. internal organs
2. Preserved traces of organisms might include
    a. casts.
    b. feces.
    c. molds.
    d. compressions.
3. Preserved remains that have become fossils have turned to
    a. tar.
    b. rock.
    c. amber.
    d. none of the above
4. Which type of organism's remains are least likely to be preserved as fossils?
    a. jellyfish
    b. salmon
    c. shark
    d. tuna
5. Fossils can show us
    a. how extinct organisms looked.
    b. what past environments were like.
    c. what geological processes occurred in the past.
    d. all of the above
6. To be used as index fossils, fossils must represent an organism that
    a. lived in the water.
    b. lived over a wide area.
    c. lived for a long period of time.
    d. lived less than 5 million years ago.

Lesson 11.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. dark stain in rock left by the remains of an organism

_____ 2. preserved tracks or other evidence of an organism that lived in the past

_____ 3. type of fossil that can be used to determine the age of rock layers

_____ 4. process by which remains or traces of living things become fossils

_____ 5. type of fossil that forms in a mold

_____ 6. any preserved remains or traces of an organism that lived in the past

_____ 7. imprint of an organism left in rock

Terms

a. fossil

b. mold

c. index fossil

d. cast

e. trace fossil

f. fossilization

g. compression

Lesson 11.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Most fossils are preserved in _____ rock.
2. As the remains of an organism change to a fossil, they are replaced by _____.
3. An organism may be preserved if it is covered by tree sap that turns to _____.
4. _____ provide the best clues about the history of life on Earth.
5. A trilobite fossil is an example of a(n) _____ fossil.
6. Most preserved remains are _____ parts of organisms such as bones.
7. Most fossils form when a dead organism is buried by _____.

Lesson 11.1: Critical Writing

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

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

Explain how index fossils are used and what properties of fossils make them useful for this purpose.

11.2 Relative Ages of Rock

Lesson 11.2: True or False

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

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

_____ 1. Earth's geologic processes have changed over time.

_____ 2. Extinction occurs when a species completely dies out.

_____ 3. Layers of sedimentary rock are called strata.

_____ 4. The relative age of a rock is its approximate age in years.

_____ 5. Rock layers on opposite sides of the Grand Canyon show lateral continuity.

_____ 6. Key beds are rock layers that have unconformities.

_____ 7. More than one type of index fossil provides stronger evidence that rock layers are the same age.

_____ 8. The Cretaceous Period ended when the first dinosaurs appeared.

_____ 9. The earliest geologic time scale showed how many years ago each era began.

_____ 10. Fish were common organisms during the Paleozoic Era.

Lesson 11.2: Critical Reading

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

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

Unconformities

Geologists can learn a lot about Earth's history by studying sedimentary rock layers. However, in some places, there's a gap in rock layers. For some period of time in the past, no rock layers are present. A gap in a sequence of rock layers is called an unconformity.

In the 1700s, a geologist named James Hutton discovered an unconformity in Scotland. Hutton saw that the lower rock layers in an area were very old. The upper rock layers in the same area were much younger. However, there were no rock layers in between the older and younger layers. Hutton concluded that intermediate rock layers had once existed. What happened to them? They must have eroded away before the younger rock layers were deposited.

Hutton's discovery of this unconformity was a very important event in geology. Hutton knew that deposition and erosion are very slow processes. He understood that for both processes to occur would take an extremely long time. He concluded that Earth must be much older than people of his time thought. This was a really big discovery. It meant that there was enough time for life on Earth to gradually evolve. Hutton's discovery was an important influence on the development of the theory of evolution.

Questions

1. What is an unconformity?
2. How might an unconformity cause confusion about the ages of rock layers?
3. What was Hutton's unconformity? What did Hutton conclude after discovering it?
4. Why was Hutton's discovery so important?

Lesson 11.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. If sedimentary rock layers are tilted, they must have
   a. formed at an angle.
   b. moved after they formed.
   c. been cross-cut by igneous rock.
   d. formed from deposits on a mountainside.
2. A key bed of clay from around the time the dinosaurs went extinct led to the hypothesis that the extinction was caused by a
   a. large flood.
   b. huge volcano.
   c. giant asteroid.
   d. none of the above
3. Evidence shows that Earth is about
   a. 1.9 million years old.
   b. 2.8 million years old.
   c. 3.8 billion years old.
   d. 4.5 billion years old.
4. Eons of the geologic time scale are divided first into
   a. years.
   b. periods.
   c. eras.
   d. epochs.
5. The Cenozoic Era is called the age of
   a. dinosaurs.
   b. mammals.
   c. reptiles.
   d. life.
6. What does the term paleozoic mean?
   a. fossil life
   b. ancient rock
   c. rock strata
   d. old life
7. Many of the divisions of the geologic time scale mark major events in the history of
   a. life.
   b. science.

c. astronomy.
d. Earth science.

Lesson 11.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. whether a rock is older or younger than other rocks

_____ 2. law stating that rock layers are deposited in horizontal layers

_____ 3. law stating that rock layers closer to the surface are younger than deeper rock layers

_____ 4. law stating that rock layers are older than any rocks that cut across them

_____ 5. gap in a sequence of rock layers

_____ 6. law stating that matching nearby rock layers are the same age

_____ 7. study of rock layers

Terms

a. stratigraphy

b. superposition

c. relative age

d. lateral continuity

e. original horizontality

f. cross-cutting relationships

g. unconformity

Lesson 11.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. A Danish geologist named _____ developed the laws of stratigraphy.
2. A Scottish geologist named _____ determined that Earth must be very old.
3. A(n) _____ is a thin layer of rock that is unique and widespread.
4. Rock layers containing the same index fossils are about the same _____.
5. The longest blocks of time on the geologic time scale are called _____.
6. The era of the geologic period when dinosaurs lived was the _____ Era.
7. The current epoch of the geologic time scale is named the _____ Epoch.

Lesson 11.2: Critical Writing

Name_____ Class_____ Date_____

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

Explain how geologists use stratigraphy to learn about Earth's past.

11.3 Absolute Ages of Rocks

Lesson 11.3: True or False

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

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

_____ 1. The number of protons in atoms of the same element may vary.

_____ 2. Almost all carbon atoms are atoms of carbon-14.

_____ 3. When an atom of carbon-14 decays, it loses an electron.

_____ 4. Carbon-14 atoms decay to carbon-13 atoms.

_____ 5. The half-life of a radioactive isotope is constant.

_____ 6. A living thing takes in carbon-14 only while it is alive.

_____ 7. Carbon-14 dating can be used to determine the ages of rocks.

_____ 8. The half-life of carbon-14 is 5730 years.

_____ 9. All fossils can be dated with carbon-14 dating.

_____ 10. To date a rock that is as old as Earth, you could use potassium-40 dating.

Lesson 11.3: Critical Reading

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

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

Carbon-14 Dating

The rate of decay of unstable isotopes can be used to estimate the absolute ages of fossils and rocks. This type of dating is called radiometric dating. The best-known method of radiometric dating is carbon-14 dating.

Here's how carbon-14 dating works. While an organism is alive, it takes in unstable carbon-14 (along with stable carbon-12). As the carbon-14 in the organism's body decays, it is replaced with more carbon-14. After the organism dies, it stops taking in carbon, including carbon-14. The carbon-14 that is already present in its body continues to decay. So the organism's remains contain less and less carbon-14 as time goes on. We can estimate the amount of carbon-14 that has decayed. We also know how quickly carbon-14 decays. With this information, we can tell how much time has passed since the organism died.

Carbon-14 dating has some drawbacks. For one thing, carbon-14 has a relatively short half-life at just 5730 years. It decays quickly compared to some other unstable isotopes. As a result, carbon-14 dating can be used only for specimens that aren't very old. Generally, specimens must be less than 50,000 years old for carbon-14 dating to be used. Another drawback of carbon-14 dating is that it can be used only for the remains of once-living things. It can't be used to date rocks.

Questions

1. Compare the levels of carbon-14 in an organism before and after it dies.
2. How can the amount of carbon-14 left in an organism's remains be used to determine when it died?
3. What are two drawbacks of carbon-14 dating?

Lesson 11.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Absolute ages are based on evidence from
   a. key beds.
   b. stratigraphy.
   c. index fossils.
   d. radiometric dating.
2. Which of the following atomic particles may vary for atoms of a given element?
   a. protons
   b. neutrons
   c. electrons
   d. all of the above
3. How many protons are found in each atom of carbon-14?
   a. 14
   b. 8
   c. 7
   d. 6
4. If a carbon atom has 7 neutrons, it is the isotope named
   a. carbon-11.
   b. carbon-12.
   c. carbon-13.
   d. carbon-14.
5. Plants use carbon dioxide for the process of
   a. respiration.
   b. germination.
   c. reproduction.
   d. photosynthesis.
6. New atoms of carbon-14 form in the atmosphere because of
   a. pollution.
   b. cosmic rays.
   c. global warming.
   d. burning of fossil fuels.
7. If you start with 1.00 g of carbon-14, the amount left after two half-lives will be
   a. 0 g.
   b. 0.25 g.
   c. 0.50 g.
   d. 0.75 g.

Lesson 11.3: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. using radioactive decay to estimate the age of a fossil or rock

_____ 2. radioactive element with a relatively long half-life

_____ 3. rate of decay of a radioactive element

_____ 4. atom of an element with a different number of neutrons

_____ 5. stable isotope of carbon

_____ 6. radioactive element with a relatively short half-life

_____ 7. breakdown of unstable elements into stable elements

Terms

a. isotope

b. carbon-14

c. carbon-12

d. uranium-238

e. radioactive decay

f. half-life

g. radiometric dating

Lesson 11.3: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. The age of a rock or fossil in years is its _____ age.
2. Two different isotopes of the same element differ in their number of _____.
3. Isotopes are named for their number of neutrons plus _____.
4. Atoms of carbon-14 form in the atmosphere from atoms of _____.
5. Carbon-14 enters food chains when plants take in _____.
6. All atoms of a given element contain the same number of _____.
7. The time it takes for half of a given amount of an unstable isotope to break down is its _____.

Lesson 11.3: Critical Writing

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

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

Radioactive elements have a constant half-life. Why is this necessary for radiometric dating to work?

CHAPTER 12

MS Earth's History Worksheets

Chapter Outline

12.1 THE ORIGIN OF EARTH

12.2 EARLY EARTH

12.3 HISTORY OF EARTH'S LIFE FORMS

12.1 The Origin of Earth

Lesson 12.1: True or False

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

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

_____ 1. The solar system formed from a giant mass of gas and dust.

_____ 2. The sun formed billions of years before other objects in the solar system.

_____ 3. The solar nebula formed a disk before it formed the sun.

_____ 4. Objects in our solar system include dwarf planets.

_____ 5. As Earth formed, gravity pulled lighter materials to the center of the planet.

_____ 6. Earth's mantle is made entirely of liquid rock.

_____ 7. There was a lot of space debris in the early solar system.

_____ 8. Earth's moon began as a dwarf planet orbiting the sun.

_____ 9. From the time it first formed, Earth has always had an atmosphere.

_____ 10. Some of the gases in Earth's early atmosphere came from comets.

Lesson 12.1: Critical Reading

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

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

How the Solar System Formed

Our solar system began to form about 5 billion years ago. The Sun, planets, and other solar system objects all formed at about the same time. They formed from a giant cloud of gas and dust called the solar nebula. The cloud pulled together and began to spin. As it contracted, its temperature and pressure increased. The cloud spun faster and formed into a disk.

Temperature and pressure at the center of the disk were extremely high. It was so hot that nuclear fusion reactions began. In these reactions, hydrogen atoms fuse, or join together, to form helium atoms. Extreme amounts of energy were released in these reactions. This is how the sun was born.

Other materials in the disk surrounding the Sun collided together. They formed the rest of the solar system. Small particles collided and became rocks. Rocks collided and became boulders. Eventually, the planets formed from the colliding material. Dwarf planets, comets, and asteroids formed as well.

Questions

1. How did our solar system begin?
2. Describe how the sun formed.

3. Explain how other bodies of the solar system came about

Lesson 12.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Our solar system began to form about
    a. 3 billion years ago.
    b. 4 billion years ago.
    c. 5 billion years ago.
    d. 10 billion years ago.
2. When the solar nebula contracted and began to spin, it
    a. increased in temperature.
    b. increased in pressure.
    c. formed into a disk.
    d. all of the above
3. The inner planets of our solar system include
    a. Pluto.
    b. Uranus.
    c. Saturn.
    d. Mercury.
4. After the sun formed, material at similar distances from the sun collided to form each of the
    a. moons.
    b. planets.
    c. asteroids.
    d. comets.
5. Earth formed about
    a. 4.5 billion years ago.
    b. 3 billion years ago.
    c. 1 billion years ago.
    d. 0.5 billion years ago.
6. Gases in Earth's early atmosphere included
    a. oxygen.
    b. water vapor.
    c. carbon dioxide.
    d. all of the above
7. After the oceans formed on Earth's surface, the
    a. water cycle began.
    b. atmosphere formed.
    c. mantle started to cool.
    d. all of the above

Lesson 12.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. ring of icy debris just beyond Neptune

_____ 2. example of an object in the solar system

_____ 3. water in the gaseous state

_____ 4. gas missing from Earth's early atmosphere

_____ 5. reaction in which hydrogen atoms change to helium

_____ 6. giant cloud of gas and dust from which the solar system formed

_____ 7. gases that surround a planet

Terms

a. atmosphere

b. nuclear fusion

c. comet

d. solar nebula

e. water vapor

f. Kuiper belt

g. oxygen

Lesson 12.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Nuclear fusion reactions release huge amounts of _____.
2. Scientists think that the moon formed when Earth was stuck by a(n) _____.
3. Earth's core is made mostly of the element _____.
4. Earth's _____ is made mostly of lightweight materials.
5. In between Earth's core and crust is the _____.
6. Gases from Earth's interior were released into the early atmosphere by _____.
7. The oceans could form only after Earth's atmosphere _____.

Lesson 12.1: Critical Writing

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

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

Explain how Earth's atmosphere and oceans formed.

12.2 Early Earth

Lesson 12.2: True or False

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

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

_____ 1. Nucleic acids in living things include DNA and RNA.

_____ 2. Continental crust first appeared on Earth about 2 billion years ago.

_____ 3. The first continents on Earth were very large compared with those today.

_____ 4. Pangaea was the first supercontinent to form on Earth.

_____ 5. Life may have originated on Earth more than once.

_____ 6. The first oxygen on Earth combined with iron to form iron oxide.

_____ 7. Some of the oxygen in Earth's early atmosphere became ozone.

_____ 8. The first photosynthetic organisms were most like modern E. coli.

_____ 9. There are no longer any prokaryotes living on Earth.

_____ 10. Ediacara fauna evolved toward the end of the Precambrian Era.

Lesson 12.2: Critical Reading

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

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

Early Continents

Earth's earliest crust probably consisted of basalt. It may have resembled the current seafloor. However, it formed before there were any oceans. More than 4 billion years ago, continental crust first appeared. The first continents were very small compared with those of today. Continents grew larger when small continents, called microcontinents, collided with each other or with larger continents. Oceanic island arcs also collided with continents to make them grow.

At least five times in Earth's history all of the continents came together to form a single supercontinent. Each time a supercontinent came together, it later broke apart. Pangaea was the last supercontinent on Earth. The supercontinent before Pangaea is called Rodinia. Rodinia formed about 1.1 billion years ago. It contained about 75 percent of the continental landmass that is present today.

Because early Earth was very hot, convection currents moved rapidly through the mantle. This allowed Earth's lithospheric plates to move relatively quickly. Therefore, early Earth was a very active place. There were abundant volcanic eruptions and earthquakes.

Questions

1. Describe Earth's first continents, and explain how they grew.
2. What are supercontinents? Describe the supercontinent named Rodinia.
3. Explain why early Earth was very active geologically.

Lesson 12.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The fourth supercontinent to form was
    a. Pangaea.
    b. Rodinia.
    c. Escherichia.
    d. none of the above
2. The supercontinent in question 1 formed about
    a. 5.0 billion years ago.
    b. 4.5 billion years ago.
    c. 4.0 billion years ago.
    d. 1.1 billion years ago.
3. Early Earth had
    a. many volcanoes.
    b. high temperatures.
    c. abundant earthquakes.
    d. all of the above
4. Earth's earliest life forms
    a. consisted of one cell.
    b. could breathe oxygen.
    c. lacked a cell membrane.
    d. none of the above
5. The earliest organisms to photosynthesize
    a. first appeared about a billion years ago.
    b. went extinct millions of years ago.
    c. are still common in lakes and seas.
    d. two of the above
6. Eukaryotes first evolved about
    a. 4.5 billion years ago.
    b. 3.5 billion years ago.
    c. 2.0 billion years ago.
    d. 0.5 billion years ago.
7. Which of the following types of organisms evolved first?
    a. multicellular organisms
    b. Ediacara fauna
    c. cyanobacteria
    d. eukaryotes

Lesson 12.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. first organisms to make food by photosynthesis

_____ 2. type of organism that contains a nucleus in its cell(s)

_____ 3. process that added oxygen to Earth's early atmosphere

_____ 4. gas that protects Earth from harmful radiation

_____ 5. type of organism that lacks a nucleus in its cell(s)

_____ 6. organic compound that stores genetic information

_____ 7. waste product of photosynthesis

Terms

a. nucleic acid

b. oxygen

c. eukaryote

d. prokaryote

e. cyanobacteria

f. ozone

g. photosynthesis

Lesson 12.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Earth's earliest crust was probably made of the rock named _____.
2. Continents grew on early Earth from collisions of very small continents called _____.
3. Scientists think that there have been a total of _____ supercontinents in Earth's history.
4. Life on Earth probably began in the planet's _____.
5. Eukaryote cells have structures called _____ that perform certain functions.
6. The earliest living cells took their nutrients directly from the _____around them.
7. There is little evidence of early life on Earth because the organisms did not form _____.

Lesson 12.2: Critical Writing

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

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

Outline the history of early life on Earth.

12.3 History of Earth's Life Forms

Lesson 12.3: True or False

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

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

_____ 1. More than a million species are known to live on Earth today.

_____ 2. Almost all existing species have now been discovered.

_____ 3. All organisms have a unique set of traits.

_____ 4. All gene mutations are harmful.

_____ 5. Adaptations evolve because they help organisms survive or reproduce.

_____ 6. All organisms alive today evolved from earlier life forms.

_____ 7. Ancient horses were much larger than they are today.

_____ 8. Most species that once lived on Earth are now extinct.

_____ 9. Paleozoic life was more diverse on land than in the oceans.

_____ 10. Moving from water to land required many new adaptations.

Lesson 12.3: Critical Reading

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

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

Variation and Adaptation

There is variation in the traits of a population. Every organism has its own unique traits. For example, human hair color has a lot of variation. There is an endless number of shades of blonde, brown, black, and red hair. Hair color—like many other traits—is controlled by genes, so genes vary in populations too.

How does genetic variation arise? The origin of variation is mutation. A mutation is a random change in a gene. Mutations are naturally occurring. Some are harmful, many are neutral, and a few are beneficial. A beneficial mutation gives an organism a better chance of surviving and having offspring. Genetic traits that help an organism survive or reproduce in a given environment are called adaptations. Through time, they may increase in frequency and become widespread throughout a population. A population that changes in this way has undergone evolution.

The following example illustrates how adaptations evolve. Think about a population of oak trees in North America. Imagine that a fungus has arrived from Asia and infected the North American trees. Most of the infected trees are killed by the fungus. But a few oak trees have a mutation that allows them to survive the fungus and reproduce. These oak trees are better adapted to the new environment than the others. They pass on their favorable mutation to their offspring. Eventually, the population of oak trees evolves. After many generations, most of the trees have the trait to survive the fungus.

Questions

1. How does genetic variation arise?
2. What are adaptations?
3. How do adaptations evolve?

Lesson 12.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The Cambrian Period occurred at the beginning of the
    a. Mesozoic Era.
    b. Paleozoic Era.
    c. Phanerozoic Eon.
    d. two of the above
2. Our own species evolved during the
    a. Cambrian Period.
    b. Cenozoic Era.
    c. Proterozoic Eon.
    d. two of the above
3. Which answer best completes the following sentence? "Adaptations help an organism survive ..."
    a. without new mutations.
    b. in a specific environment.
    c. during a given geologic eon.
    d. in any ecosystem on Earth.
4. Cacti have traits that help them survive in a
    a. tropical rainforest.
    b. very cold climate.
    c. desert.
    d. none of the above
5. Variation in a genetic trait is first introduced by
    a. mutation.
    b. evolution.
    c. adaptation.
    d. reproduction.
6. How did Earth's climate change during the Phanerozoic Eon?
    a. The climate became steadily colder.
    b. The climate became steadily warmer.
    c. The climate cycled between warmer and colder.
    d. none of the above
7. Which statement about the Cambrian Period is false?
    a. It began about 540 million years ago.
    b. It had a warm, humid tropical climate.
    c. It had an explosion of living things.
    d. It ended with the Permian mass extinction.

Lesson 12.3: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. geologic era known as the age of reptiles

_____ 2. trait that helps an organism survive or reproduce

_____ 3. random change in a gene

_____ 4. geologic era in which plants and animals first lived on land

_____ 5. genetic changes in a population or species over time

_____ 6. geologic era during which human beings evolved

_____ 7. difference in a genetic trait in a population

Terms

a. mutation

b. evolution

c. Paleozoic

d. variation

e. adaptation

f. Mesozoic

g. Cenozoic

Lesson 12.3: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. The _____ Eon began about 540 million years ago.
2. The huge increase in life diversity at the start of the Paleozoic is known as the _____.
3. The first insects evolved during the _____ Era.
4. The earliest amphibians evolved from a group of _____.
5. The first flowering plants evolved during the _____ Era.
6. The largest mass extinction is called the _____ mass extinction.
7. Dinosaurs died out during the _____ mass extinction.

Lesson 12.3: Critical Writing

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

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

Describe causes and consequences of mass extinctions. Use specific examples to illustrate your answer.

CHAPTER 13 MS Fresh Water Worksheets

Chapter Outline

13.1 WATER ON EARTH

13.2 SURFACE WATER

13.3 GROUNDWATER

13.1 Water on Earth

Lesson 13.1: True or False

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

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

_____ 1. Icebergs are made of frozen salt water.

_____ 2. Almost 80 percent of Earth's fresh water is frozen.

_____ 3. There is more water in Earth's living things than there is in the atmosphere.

_____ 4. Some water molecules may be billions of years old.

_____ 5. The water cycle has no beginning or end.

_____ 6. Water can go through the water cycle without changing state.

_____ 7. Most condensation of water takes place in the oceans.

_____ 8. Water that forms clouds always falls to the ground as precipitation.

_____ 9. Runoff may pollute rivers, lakes, and oceans.

_____ 10. Most of Earth's precipitation falls on land.

Lesson 13.1: Critical Reading

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

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

The Water Cycle

Earth's water is constantly recycled through the water cycle. The water cycle is the movement of water through the oceans, atmosphere, land, and living things. Several processes keep water moving through the water cycle:

- Evaporation changes liquid water to water vapor. Energy from the sun causes water to evaporate. Most evaporation is from the oceans because they cover so much area. The water vapor rises into the atmosphere.
- Transpiration is like evaporation because it changes liquid water to water vapor. In transpiration, plants release water vapor through their leaves. This water vapor also rises into the atmosphere.
- Condensation changes water vapor to liquid water. As air rises higher into the atmosphere, it cools. Cool air can hold less water vapor than warm air. So some of the water vapor condenses into water droplets. Water droplets may form clouds.
- Precipitation is water that falls from clouds to Earth's surface. Water droplets in clouds fall to Earth when they become too large to stay aloft. The water falls as rain if the air is warm. If the air is cold, the water may freeze and fall as snow, sleet, or hail. Most precipitation falls into the oceans. Some falls on land.
- Runoff is precipitation that flows over the surface of the land. This water may travel to a river, lake, or ocean. Runoff may pick up fertilizer and other pollutants and transport them to bodies of water such as rivers and

lakes.
- Infiltration is the process by which water soaks into the ground. Some of the water may seep deep underground. Some may stay in the soil, where plants can absorb it with their roots.

Questions

1. What is the water cycle?
2. In which processes of the water cycle does water always change state? How does water change state in each of these processes?
3. Which processes of the water cycle move liquid water over or under Earth's surface? How does water move in each of these processes?

Lesson 13.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. About what percent of Earth's surface is covered with water?
    a. 20 percent
    b. 50 percent
    c. 70 percent
    d. 90 percent
2. What percent of Earth's total water is fresh water?
    a. 3 percent
    b. 52 percent
    c. 79 percent
    d. 97 percent
3. Most of Earth's liquid fresh water is located in
    a. underground rocks.
    b. living organisms.
    c. surface soil.
    d. large lakes.
4. Most fresh water enters the atmosphere when water evaporates from
    a. oceans.
    b. plants.
    c. lakes.
    d. soils.
5. Clouds form when water vapor
    a. evaporates.
    b. condenses.
    c. transpires.
    d. freezes.
6. Forms of precipitation include
    a. rain.
    b. snow.

c. sleet.
d. all of the above

7. Water vapor enters the atmosphere through
   a. infiltration.
   b. transpiration.
   c. condensation.
   d. two of the above

Lesson 13.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. water that falls from clouds to Earth's surface

_____ 2. continuous movement of water through the oceans, atmosphere, land, and living things

_____ 3. process in which plants release water vapor through their leaves

_____ 4. precipitation that flows over the surface of the ground

_____ 5. process in which water vapor changes to liquid water

_____ 6. process in which liquid water changes to water vapor

_____ 7. process in which water soaks into the ground

Terms

a. condensation

b. evaporation

c. infiltration

d. water cycle

e. transpiration

f. precipitation

g. runoff

Lesson 13.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. The chemical formula for water is _____.
2. Water that contains little or no dissolved salt is called _____.
3. Most of Earth's fresh water exists in the _____ state.
4. Earth's water is recycled through the _____.
5. The water cycle is powered by energy from the _____.

6. Cool air can hold _____ water vapor than warm air.
7. Hail is one of several forms of _____.

Lesson 13.1: Critical Writing

Name_____ Class_____ Date_____

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

Water is one of the few substances that exist on Earth in all three states of matter. How does this fact relate to the water cycle?

13.2 Surface Water

Lesson 13.2: True or False

Name_____ Class_____ Date_____

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

_____ 1. A brook is a type of wetland.

_____ 2. A stream always flows from a higher to a lower elevation.

_____ 3. The bottom of a river channel is called the bank.

_____ 4. A single stream always has just one source.

_____ 5. Moving water slows down when it enters a body of still water.

_____ 6. A river's basin is also called its bed.

_____ 7. A divide is the lowest point between two river basins.

_____ 8. All lakes have fresh water.

_____ 9. Sunlight may not be able to reach the bottom of a deep lake.

_____ 10. The Great Lakes are volcanic lakes.

Lesson 13.2: Critical Reading

Name_____ Class_____ Date_____

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

Freshwater Wetlands

Some of Earth's fresh water is found in wetlands. A wetland is an area that is covered with water, or at least has very soggy soil, during all or part of the year. Certain species of plants thrive in wetlands, which are rich ecosystems. Freshwater wetlands are usually found at the edges of streams, rivers, ponds, or lakes.

Not all freshwater wetlands are the same. They vary in how wet they are and how much of the year they are soaked with water. They also vary in the kinds of plants that live in them. Types of wetlands include marshes, swamps, and bogs.

- A marsh is a wetland that is usually under water. It has grassy plants such as cattails.
- A swamp is a wetland that may or may not be covered with water but is always soggy. It has shrubs or trees.
- A bog is a wetland that just has soggy soil. It is generally covered with mosses.

Wetlands are extremely useful. They provide homes or breeding sites to a huge variety of species. Wetlands purify water. They filter sediments and toxins from runoff before it enters rivers, lakes, and oceans. Wetlands slow rushing water. During hurricanes and other extreme weather, they reduce the risk of floods.

People used to think that wetlands were useless. Many wetlands were filled in with rocks and soil to create roads, golf courses, and building sites. Now that we know how useful wetlands are, laws have been passed to protect them. Wetlands are still being destroyed but not as quickly as before.

Questions

1. How are wetlands defined?
2. Contrast marshes, swamps, and bogs.
3. Why are wetlands useful?
4. Explain why laws have been passed to protect wetlands.

Lesson 13.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Possible sources of water in a lake include
    a. rivers.
    b. runoff.
    c. precipitation.
    d. all of the above
2. Rift lakes form because of
    a. glaciers.
    b. volcanoes.
    c. plate tectonics.
    d. none of the above
3. Wetlands that have trees include
    a. marshes.
    b. swamps.
    c. bogs.
    d. two of the above
4. A bog is generally covered with
    a. grasses.
    b. cattails.
    c. mosses.
    d. shrubs.
5. Why are wetlands useful?
    a. They speed up runoff.
    b. They reduce the risk of floods.
    c. They are good places for golf courses.
    d. two of the above
6. A small stream that flows into a bigger stream is called a
    a. river.
    b. meander.
    c. tributary.
    d. river system.

7. When a river reaches its mouth, it may drop its sediment and form a
    a. divide.
    b. delta.
    c. basin.
    d. bog.

Lesson 13.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. small body of standing water

_____ 2. event in which a body of water overflows its banks

_____ 3. area that is covered with water or has soggy soil during all or part of the year

_____ 4. any body of fresh water that flows downhill in a channel

_____ 5. large body of fresh water that flows downhill in a channel

_____ 6. large body of standing water

_____ 7. all of the land drained by a river system

Terms

a. flood

b. lake

c. pond

d. river

e. stream

f. wetland

g. watershed

Lesson 13.2: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The place where a river starts is its _____.
2. The place where a river ends is its _____.
3. The force that keeps a stream flowing is _____.
4. A river and all of its tributaries make up a(n) _____.
5. The area of land that is covered with water when a river floods is a(n) _____.
6. Broad curves worn away by a river are called _____.
7. The highest point between two river basins is called a(n) _____.

Lesson 13.2: Critical Writing

Name_____ Class_____ Date_____

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

Explain how lakes form and where they get their water.

13.3 Groundwater

Lesson 13.3: True or False

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

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

_____ 1. The water table in an area may rise or fall.

_____ 2. An aquifer usually forms in a layer of clay.

_____ 3. The rock layer below an aquifer always consists of permeable rock.

_____ 4. Very few land areas have aquifers beneath them.

_____ 5. It is impossible for an aquifer to ever run dry.

_____ 6. The Ogallala aquifer is one of the biggest aquifers in the world.

_____ 7. Much of the water taken from the Ogallala aquifer is used to irrigate crops.

_____ 8. Many hot springs are also mineral springs.

_____ 9. The water table keeps water in an aquifer from seeping deeper underground.

_____ 10. Water flows out of a well due to gravity.

Lesson 13.3: Critical Reading

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

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

Aquifers

An aquifer is an underground layer of rock that is saturated with groundwater because it lies atop a layer of impermeable rock. Aquifers are generally found in porous rock, such as sandstone. Water infiltrates the aquifer from the surface. The water that enters the aquifer is called recharge.

Most land areas have aquifers beneath them. Many aquifers are used by people for fresh water. The water is obtained by digging or drilling wells down into the aquifer. The closer to the surface an aquifer is, the easier it is to get the water because wells do not have to be as deep. However, an aquifer close to the surface is also more likely to become polluted. Pollutants can seep down through porous rock in recharge water. An aquifer that is used by people may not be recharged as quickly as its water is removed. If this occurs, the water table drops. Eventually, the aquifer may run dry and the ground above the aquifer may sink. This is likely to damage any homes or other structures built on the surface above the aquifer.

One of the biggest aquifers in the world is the Ogallala aquifer. It lies beneath parts of eight U.S. states. It covers a total area of 451,000 square kilometers (174,000 square miles). In some places, it is less than a meter deep. In other places, it is hundreds of meters deep. The Ogallala aquifer is an important source of freshwater in the American Midwest. This is a major farming area, and much of the water is used to irrigate crops. The water in this aquifer is

being used up ten times faster than it is recharged.

Questions

1. What is an aquifer? Why does an aquifer form?
2. How are aquifers used?
3. How may water in an aquifer become polluted?
4. Describe the Ogallala aquifer.
5. If water in the Ogallala aquifer continues to be used up faster than it is recharged, predict what might happen to this aquifer.

Lesson 13.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Water infiltrates the ground where rock is
   a. permeable.
   b. recharged.
   c. saturated.
   d. shallow.
2. The water in an aquifer is more likely to be polluted if the aquifer
   a. is close to the surface.
   b. does not have a water table.
   c. lies below a layer of impermeable rock.
   d. is recharged as quickly as water is removed.
3. The Ogallala aquifer is an important source of water in the American
   a. Southwest.
   b. Northeast.
   c. Southeast.
   d. Midwest.
4. Water in a spring comes from a
   a. river or stream.
   b. lake or pond.
   c. layer of rock.
   d. none of the above
5. The majority of Earth's liquid fresh water is found in
   a. rocks.
   b. lakes.
   c. rivers.
   d. springs.
6. An aquifer is recharged by
   a. a well.
   b. surface water.
   c. the water table.
   d. a spring or geyser.

7. Rock that holds as much water as possible is said to be
    a. recharged.
    b. saturated.
    c. impermeable.
    d. infiltrated.

Lesson 13.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. not having tiny holes that water can pass through

_____ 2. underground rock layer that is saturated with water

_____ 3. having tiny holes that water can pass through

_____ 4. top of an underground rock layer that is saturated with water

_____ 5. hole dug or drilled into the ground to reach an aquifer

_____ 6. fresh water below Earth's surface

_____ 7. water that enters an aquifer

Terms

a. aquifer

b. groundwater

c. porous

d. water table

e. well

f. recharge

g. impermeable

Lesson 13.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. Water seeps down through the ground until it reaches a layer of rock that is _____.
2. The process in which surface water seeps into the ground is called _____.
3. Hot water can dissolve _____ minerals than cold water.
4. Heated water that bursts out of the ground at a crack is called a(n) _____.
5. A(n) _____ forms where the top of an aquifer meets the surface of the ground.
6. The best-known geyser in the world is _____ in Yellowstone National Park.
7. To be useful, a well must be deeper than the _____.

Lesson 13.3: Critical Writing

Name_____ Class_____ Date_____

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

Explain how surface water becomes groundwater. Then describe three ways that groundwater may end up on the surface again.

CHAPTER 14

MS Earth's Oceans Worksheets

Chapter Outline

14.1 INTRODUCTION TO THE OCEANS

14.2 OCEAN MOVEMENTS

14.3 THE OCEAN FLOOR

14.4 OCEAN LIFE

14.1 Introduction to the Oceans

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 oceans influence Earth's atmosphere.

_____ 2. Fewer organisms live in the oceans than on the land.

_____ 3. Early Earth was too cold for liquid water to exist.

_____ 4. Oceans cover more than 70 percent of Earth's surface.

_____ 5. Coastal areas always have colder climates than inland areas.

_____ 6. Ocean water is saltier than any other water on Earth's surface.

_____ 7. The amount of salt in ocean water is the same everywhere on Earth.

_____ 8. The water may be very deep in the neritic zone.

_____ 9. Nutrients may be scarce in the oceanic zone.

_____ 10. Temperature and pressure increase as you go deeper below the ocean's surface.

Lesson 14.1: Critical Reading

Name_____ Class_____ Date_____

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

Ocean Zones Based on Distance from Shore

Some ocean zones are based on distance from shore. Distance from shore influences how many nutrients are in the water. Most nutrients are washed into ocean water from the land. Therefore, water closer to shore tends to have more nutrients. Living things need nutrients, so distance from shore also influences how many organisms live in the water.

There are three main ocean zones based on distance from shore: the intertidal zone, neritic zone, and oceanic zone.

- The intertidal zone is closest to shore. At high tide, it is covered with water. At low tide, it is exposed to air. Living things must adapt to changing conditions and moving water in this zone.
- The neritic zone lies over the continental shelf, where the water is not very deep. There are plenty of nutrients and sunlight, so many organisms live in this zone.
- The oceanic zone is the open ocean out beyond the continental shelf. The water may be very deep. Nutrients may be scarce. Fewer organisms live in this zone.

Questions

1. Why does distance from shore influence how many organisms live in ocean water?
2. Describe the intertidal zone. Why is this zone challenging to living things?
3. Compare and contrast the neritic and oceanic zones.

Lesson 14.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Sources of water vapor in Earth's very early atmosphere included
    a. volcanic eruptions.
    b. precipitation.
    c. the oceans.
    d. the moon.
2. Gases the oceans exchange with the atmosphere include
    a. oxygen.
    b. carbon dioxide.
    c. water vapor.
    d. all of the above
3. Ocean water everywhere has a relatively moderate temperature because
    a. water flows throughout all the world's oceans.
    b. water warms up and cools down more quickly than land.
    c. landmasses protect the oceans from temperature changes.
    d. all of the above
4. Some ocean zones are based on
    a. distance from the equator.
    b. depth of water.
    c. longitude.
    d. two of the above
5. Which ocean zone receives a lot of sunlight and nutrients?
    a. oceanic zone
    b. aphotic zone
    c. neritic zone
    d. benthic zone
6. Earth's present oceans include the
    a. Antarctic Ocean.
    b. Tethys Ocean.
    c. Indian Ocean.
    d. two of the above
7. Most nutrients enter ocean water from the
    a. land.
    b. ocean floor.
    c. aphotic zone.
    d. atmosphere.

Lesson 14.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. ocean zone that is closest to shore

_____ 2. dissolved gas in ocean water

_____ 3. open ocean beyond the continental shelf

_____ 4. ocean zone on the ocean floor

_____ 5. ocean zone where sunlight does not reach

_____ 6. main salt in ocean water

_____ 7. ocean zone that lies over the continental shelf

Terms

a. aphotic zone

b. benthic zone

c. intertidal zone

d. neritic zone

e. oceanic zone

f. sodium chloride

g. carbon dioxide

Lesson 14.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. About 250 million years ago, Earth had one huge ocean called _____.
2. The oceans hold _____ percent of Earth's surface water.
3. Oceans are the major source of _____ in the atmosphere.
4. Salts make up about _____ percent of ocean water by mass.
5. The top 200 meters of ocean water make up the _____ zone.
6. Photosynthesis is not possible in the _____ zone.
7. The intertidal zone is covered with water only during _____.

Lesson 14.1: Critical Writing

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

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

How is the ocean divided into zones based on water depth? Compare and contrast these ocean zones.

14.2 Ocean Movements

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 highest point of a wave is its amplitude.

_____ 2. Wavelength is the difference between a crest and a trough.

_____ 3. The biggest ocean waves occur with hurricanes.

_____ 4. Waves break on shore because the water is shallow.

_____ 5. All waves are caused by winds.

_____ 6. Tides cause water levels to rise and fall once a day.

_____ 7. The difference between high and low tides is the tidal range.

_____ 8. The sun's gravity is the main cause of Earth's tides.

_____ 9. Spring tides occur when the sun and moon are in a straight line.

_____ 10. The Coriolis effect causes surface currents to flow diagonally across the ocean.

Lesson 14.2: Critical Reading

Name_____ Class_____ Date_____

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

Upwelling

Sometimes deep ocean water rises to the surface. This is called upwelling. Upwelling occurs where strong winds blow surface water away from shore. This allows deeper water to rise to the surface and take its place.

When water comes up from the deep, it brings a lot of nutrients with it. The nutrients come from dead organisms and other organic remains that have settled to the bottom of the water. Upwelling brings the nutrients up to the surface. All those nutrients can support large numbers of living things.

Questions

1. What is upwelling?
2. Explain why upwelling occurs.
3. Why are there large numbers of living things where upwellings occur?

Lesson 14.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. There two high tides and two low tides every
    a. day.
    b. week.
    c. month.
    d. year.
2. The main cause of tides is
    a. differences in water density.
    b. prevailing winds.
    c. Coriolis effect
    d. gravity.
3. Neap tides occur when the sun and moon are
    a. lined up with each other.
    b. at right angles to each other.
    c. on opposite sides of Earth from each other.
    d. none of the above
4. Spring tides have the
    a. highest low tide.
    b. greatest tidal range.
    c. least difference between high and low tides.
    d. two of the above
5. The Gulf Stream is a(n)
    a. river in Florida.
    b. area of upwelling.
    c. deep ocean current.
    d. surface ocean current.
6. Which of the following statements about upwelling is false?
    a. Upwelling brings a lot of nutrients to the surface.
    b. Many organisms live in an area where upwelling occurs.
    c. Upwelling occurs where wind blows surface water toward shore.
    d. none of the above
7. Ocean water is denser when it is
    a. warmer.
    b. colder.
    c. saltier.
    d. two of the above

Lesson 14.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. daily change in the level of ocean water

_____ 2. stream of moving water that flows through the ocean

_____ 3. tide that occurs during the first or third quarter of the moon

_____ 4. transfer of energy through matter

_____ 5. tide that occurs during a full moon or new moon

_____ 6. movement of deep ocean water to the surface

_____ 7. amount of mass per unit of volume

Terms

a. upwelling

b. neap tide

c. tide

d. spring tide

e. wave

f. density

g. current

Lesson 14.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Most waves are caused by _____.
2. The horizontal distance between the crests of adjacent waves is called _____.
3. A huge wave caused by an underwater earthquake is known as a(n) _____.
4. The greatest difference between high and low tides occurs during a(n) _____ tide.
5. _____ currents are caused by major wind belts.
6. The effect of Earth's rotation on the direction of winds and currents is called the _____.
7. _____ currents are caused by differences in the density of ocean water.

Lesson 14.2: Critical Writing

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

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

Compare and contrast surface currents and deep currents.

14.3 The Ocean Floor

Lesson 14.3: True or False

Name_____ Class_____ Date_____

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

_____ 1. Only a tiny fraction of the ocean floor has ever been studied.

_____ 2. The tallest mountains on Earth are located on the ocean floor.

_____ 3. Earth's deepest canyon is the Grand Canyon in the American Southwest.

_____ 4. Ocean water over the abyssal plain is shallow and warm.

_____ 5. The deepest ocean trench is 3 kilometers below sea level.

_____ 6. The mid-ocean ridge is created by magma that cools and hardens.

_____ 7. Most of the ocean floor is too deep for organisms to live there.

_____ 8. The only resources on or below the ocean floor are minerals such as manganese.

_____ 9. Oil rigs floating on the ocean extract petroleum from sea water.

_____ 10. Hot water escapes through vents in the ocean floor.

Lesson 14.3: Critical Reading

Name_____ Class_____ Date_____

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

Studying the Ocean Floor

Vast, unknown spaces still exist for humans to explore. Of course, outer space is still mostly unknown. But some of the most interesting and hardest to reach places are much closer to home. They are on the ocean floor. Humans can't travel deep below the water's surface without special vehicles. The pressure of the water is too great. Total darkness and extreme cold make it even more difficult. That's why people have worked for decades to invent technology for studying the ocean floor.

Scientists study the ocean floor in various ways. Scientists—or their devices— may actually travel to the ocean floor. Or they may study the ocean floor from the surface. One way to study the ocean floor from the surface is with a device called sonar. A sonar device on a ship sends sound waves down to the ocean floor. The sound waves bounce off the ocean floor and return to the device, like an echo. Sonar can be used to measure how deep the ocean is. The device records the time it takes the sound waves to travel from the surface to the ocean floor and back again. Sound waves travel through ocean water at a known speed. Once scientists know the travel time of the sound waves, they can calculate the distance to the ocean floor. They can combine many such distances to make a map of the ocean floor.

Only very special vehicles can travel down to the deep ocean floor. In 1960, scientists used a submersible vehicle

called the Trieste to travel into the Mariana Trench. They succeeded, but the trip was very risky. Making humans safe at such depths costs a lot of money. People have not traveled to this depth again. The submersible named Alvin was developed soon after Trieste. This submersible has made over 4000 dives deep into the ocean. People can stay underwater for up to 9 hours at a time in Alvin. It has been essential for developing a scientific understanding of the deep ocean. Today, remote-control vehicles go to the deepest ocean floor. They don't have any people on board. However, they carry devices that record many measurements. They also collect sediments and take photos.

Questions

1. Why is it difficult for scientists to study the deep ocean floor?
2. How does sonar work? What can be learned about the ocean floor with this technology?
3. What is a submersible? How has the submersible named Alvin been used?
4. What data do remote-control vehicles gather from the deepest ocean floor?

Lesson 14.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The main reason it is difficult to directly study the deep ocean floor is that the
    a. ocean floor has not been mapped.
    b. pressure is too high.
    c. distance is too far.
    d. water is too hot.
2. The ocean floor can be studied by scientists at the water's surface with
    a. submersibles.
    b. sonar devices.
    c. remote-control vehicles.
    d. two of the above
3. When using sonar, the distance to the ocean floor is calculated from the
    a. time it takes sound waves to travel to the ocean floor.
    b. pressure ocean water exerts on the ocean floor.
    c. speed of sound waves through ocean water.
    d. two of the above
4. The deepest oceanic trench occurs in the
    a. Atlantic Ocean.
    b. Pacific Ocean.
    c. Arctic Ocean.
    d. Indian Ocean.
5. The mid-ocean ridge forms where tectonic plates
    a. slide past one another.
    b. push together.
    c. pull apart.
    d. subduct.
6. Examples of minerals on the ocean floor include
    a. iron.

b. copper.
c. manganese.
d. all of the above

7. Nodules on the ocean floor are

a. deposits of petroleum.
b. pockets of natural gas.
c. fossils of organisms.
d. balls of minerals.

Lesson 14.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. volcanic mountain on the ocean floor

_____ 2. mostly flat part of the ocean floor under the open ocean

_____ 3. deep canyon on the ocean floor

_____ 4. part of the ocean floor that lies between the continental shelf and abyssal plain

_____ 5. mountain range that runs through all the world's oceans

_____ 6. structure on the ocean floor formed by minerals from hot water

_____ 7. ocean floor near the edge of a continent

Terms

a. abyssal plain

b. continental shelf

c. continental slope

d. mid-ocean ridge

e. oceanic trench

f. seamount

g. metallic chimney

Lesson 14.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The device that uses sound waves to study the ocean floor is known as _____.
2. A special vehicle that can carry people to the deep ocean floor is called a(n) _____.
3. The only vehicle to carry people to the Mariana Trench was named _____.
4. The part of the ocean floor called the continental _____ has a gentle slope.

5. The part of the ocean floor called the continental _____ has a steep slope.
6. Seamounts that rise above the surface of the water form _____.
7. Magma erupts through oceanic crust and forms new ocean floor at the _____.

Lesson 14.3: Critical Writing

Name_____ Class_____ Date_____

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

What nonliving natural resources are available on or below the ocean floor? What are the cons of extracting these resources?

14.4 Ocean Life

Lesson 14.4: True or False

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

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

_____ 1. All marine organisms are adapted to life in salt water.

_____ 2. No marine organism can withstand the extreme water pressure at the bottom of the ocean.

_____ 3. Fish are the most numerous life forms in the ocean.

_____ 4. Plankton range in size from bacteria to whales.

_____ 5. Plankton always remain in one place because they cannot swim.

_____ 6. Zooplankton feed on phytoplankton.

_____ 7. Some nekton are mammals.

_____ 8. Fish swim with their fins and gills.

_____ 9. Many benthic organisms attach themselves to rocks.

_____ 10. Sea cucumbers live on the ocean floor.

Lesson 14.4: Critical Reading

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

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

Marine Food Chains

Phytoplankton are the most important producers in the ocean. They form the base of most marine food chains. They use sunlight and nutrients in water to make food by photosynthesis. Zooplankton consume phytoplankton. Consumers such as small fish eat zooplankton. Larger consumers eat the smaller ones, and so on up the food chain. However, some large consumers, depend directly on plankton. Whales, for example, may filter tremendous amounts of these tiny creatures out of the water.

Different produces form the base of marine food chains around hot water vents on the ocean floor. No sunlight reaches the vents, so photosynthesis is not possible. Instead, bacteria make food from chemosynthesis. They break down chemicals in the hot water to make food. The bacteria live inside consumers called tubeworms. The bacteria get protection and the tubeworms get some of their food.

In all marine food chains, when marine organisms die, decomposers break down their remains. This returns their nutrients to the water. The nutrients can be used again to make food. Marine decomposers include bacteria and worms. Most of them live on the ocean floor. That's because many remains settle to the bottom due to gravity.

Questions

1. Describe a marine food chain in which phytoplankton are the producers.
2. Identify the producers and consumers in a marine food chain around a hot water vent on the ocean floor.
3. What organisms are decomposers in marine food chains? What is their role?

Lesson 14.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The three major groups of marine organisms include
    a. fish.
    b. worms.
    c. plankton.
    d. phytoplankton.
2. Most plankton are
    a. able to swim.
    b. microscopic in size.
    c. found in the aphotic zone.
    d. able to move on their own.
3. All nekton
    a. are fish.
    b. can swim.
    c. live in the photic zone.
    d. live in the aphotic zone.
4. Marine organisms that move by crawling are
    a. nekton.
    b. benthos.
    c. plankton.
    d. zooplankton.
5. An example of a benthic organism is a
    a. sea anemone.
    b. whale shark.
    c. lion fish.
    d. fish larva.
6. Tubeworms obtain food from
    a. algae.
    b. bacteria.
    c. sediments.
    d. phytoplankton.
7. The most important producers in the ocean are
    a. plants.
    b. bacteria.
    c. zooplankton.
    d. phytoplankton.

Lesson 14.4: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. marine organisms that swim

_____ 2. example of zooplankton

_____ 3. name for plant-like plankton

_____ 4. name for animal-like plankton

_____ 5. general term for marine organisms that float on water

_____ 6. organisms that live on the ocean floor

_____ 7. example of phytoplankton

Terms

a. benthos

b. nekton

c. phytoplankton

d. plankton

e. zooplankton

f. alga

g. fish larva

Lesson 14.4: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Living things in the oceans are called _____ organisms.
2. The most common life forms in the ocean are _____
3. _____ form the base of most marine food chains.
4. Using sunlight to make food is called _____.
5. Using chemicals to make food is called _____.
6. Marine organisms with adaptations for swimming are classified as _____.
7. Clams belong to the group of marine organisms called _____.

Lesson 14.4: Critical Writing

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

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

Compare and contrast phytoplankton and zooplankton.

CHAPTER 15 MS Earth's Atmosphere Worksheets

Chapter Outline

15.1 THE ATMOSPHERE

15.2 ENERGY IN THE ATMOSPHERE

15.3 LAYERS OF THE ATMOSPHERE

15.4 AIR MOVEMENT

15.1 The Atmosphere

Lesson 15.1: True or False

Name_____ Class_____ Date_____

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

_____ 1. Without the atmosphere, we could not hear most sounds.

_____ 2. The main reason Earth can support life is its atmosphere.

_____ 3. Earth's atmosphere consists mainly of oxygen.

_____ 4. Gases in the atmosphere are too thin to block any solar rays.

_____ 5. The atmosphere is about 10 percent water vapor.

_____ 6. Sound waves travel through empty spaces between air molecules.

_____ 7. Solid particles in the atmosphere may include dust and soil.

_____ 8. Clouds could not form if the air contained no solid particles.

_____ 9. The density of air depends on how closely gas molecules are packed together.

_____ 10. The density of air is greatest at high altitudes.

Lesson 15.1: Critical Reading

Name_____ Class_____ Date_____

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

The Role of the Atmosphere in the Water Cycle and Weathering

The atmosphere plays a crucial role in the water cycle. Water evaporates from Earth's surface, mostly from the oceans. The water vapor rises from Earth's surface into the atmosphere. As it rises, it cools. The water vapor may then condense to form water droplets and clouds. If water droplets in clouds become large enough, they fall to the ground as precipitation. This is how fresh water gets from the atmosphere back to Earth's surface.

Without the atmosphere, there would not only be no clouds or precipitation. There would be no weather at all. Most weather occurs because the atmosphere heats up more in some places than in others. Weather, in turn, causes weathering. Weathering is the slow wearing away of rocks on Earth's surface. Wind-blown sand scours rocks like sandpaper. Sediments frozen in the ice of glaciers scrape across rock surfaces. Even gentle rain may seep into rocks and slowly dissolve them. If the water freezes, it expands. This eventually causes rocks to crack. Without the atmosphere, none of this weathering would happen. Weathering of rocks is needed for soil to form. Without weather and weathering, Earth would have no soil.

Questions

1. Describe the role of the atmosphere in the water cycle.

2. Why would there be no weather without the atmosphere?
3. What is weathering? Give examples of how weathering occurs.
4. Why is the atmosphere important for the formation of soil?

Lesson 15.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The top four gases in Earth's atmosphere include
   a. helium.
   b. hydrogen.
   c. water vapor.
   d. carbon dioxide.
2. The atmosphere is needed for all of the following except
   a. weathering.
   b. life on Earth.
   c. plate tectonics.
   d. the water cycle.
3. Plants need oxygen in order to
   a. undertake photosynthesis.
   b. obtain energy from food.
   c. make their own food.
   d. breathe.
4. Solid particles in the atmosphere
   a. may include salt and ash.
   b. may harm human health.
   c. allow clouds to form.
   d. all of the above
5. Which property of air varies from sea level to the top of a high mountain?
   a. state
   b. pressure
   c. composition
   d. all of the above
6. Without the atmosphere, Earth would have
   a. a greater range of temperatures.
   b. more severe weather.
   c. more glaciers.
   d. two of the above
7. At sea level, the atmosphere presses down with a force of about
   a. 1 kg/cm^2.
   b. 1 g/cm^2.
   c. 1 lb/in^2.
   d. 1 ton/in^2.

Lesson 15.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. third most common gas in Earth's atmosphere

_____ 2. gas in Earth's atmosphere that varies in amount from place to place

_____ 3. gas in Earth's atmosphere that is needed for life

_____ 4. weight of air pushing against a given area

_____ 5. height above sea level

_____ 6. main gas in Earth's atmosphere

_____ 7. form of energy that travels through matter in waves

Terms

a. air pressure

b. altitude

c. sound

d. nitrogen

e. argon

f. carbon dioxide

g. water vapor

Lesson 15.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Without photosynthesis, there would be very little _____ in the air.
2. About 99 percent of the atmosphere consists of nitrogen and _____.
3. The _____ of air is the mass of air per unit of volume.
4. The density of air is higher at _____ altitudes.
5. Warm air is _____ dense that cool air.
6. The pressure of air is greatest at _____.
7. The pressure of air _____ as altitude increases.

Lesson 15.1: Critical Writing

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

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

Explain why the atmosphere is necessary for life on Earth.

15.2 Energy in the Atmosphere

Lesson 15.2: True or False

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

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

_____ 1. A campfire warms the campers sitting around it by conduction.

_____ 2. Energy can travel only through matter.

_____ 3. Most of the energy on Earth comes from the sun.

_____ 4. The electromagnetic spectrum is the range of wavelengths of visible light.

_____ 5. Light with the most energy is infrared light.

_____ 6. Gamma rays do not penetrate Earth's atmosphere.

_____ 7. Warmer molecules have more energy than cooler ones.

_____ 8. Conduction happens mainly in the upper atmosphere.

_____ 9. Warm air always sinks to the surface in a convection current.

_____ 10. The greenhouse effect causes more solar energy to reach Earth's surface.

Lesson 15.2: Critical Reading

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

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

How Energy Moves Through the Atmosphere

Heat energy is transferred through Earth's atmosphere in three ways: radiation, conduction, and convection.

Radiation is the transfer of energy by waves. Energy can travel as waves through air or empty space. Radiation is how the sun's energy travels to Earth through space and Earth's atmosphere. After sunlight heats the planet's surface, some heat re-radiates back into the atmosphere.

Conduction is the transfer of energy from molecule to molecule by direct contact. Warmer molecules vibrate faster than cooler ones. They bump into the cooler molecules and transfer some of their energy. Conduction works best in solids or denser fluids because their particles are closer together. Conduction occurs mainly in the lower atmosphere.

Convection is the transfer of heat by a current. Convection happens in liquids and gases. It is the most important way that energy travels through the atmosphere. Air near the ground is warmed by heat re-radiated from Earth's surface. The warm air is low in density, so it rises. As it rises, it cools. The cool air is dense, so it sinks to the surface. This creates a convection current that transfers heat through the atmosphere.

Questions

1. Describe how energy is transferred through the atmosphere by radiation.

2. Why does conduction occur mainly in the lower atmosphere?
3. How do convection currents form in the atmosphere?

Lesson 15.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Forms of energy include
    a. electrical energy.
    b. chemical energy.
    c. light energy.
    d. all of the above
2. Which statement about energy is false?
    a. Energy can change form.
    b. Energy can be created.
    c. Energy can do work.
    d. Energy can travel.
3. Convection occurs in
    a. gases.
    b. solids.
    c. liquids.
    d. two of the above
4. Energy can travel through space by
    a. conduction.
    b. convection.
    c. radiation.
    d. two of the above
5. Differences in solar energy by latitude result in
    a. winds.
    b. weather.
    c. ocean currents.
    d. all of the above
6. A greenhouse gas mainly absorbs heat that
    a. radiates directly from the sun.
    b. re-radiates from Earth's surface.
    c. comes from burning fossil fuels.
    d. before it reaches Earth's surface.
7. The greenhouse effect is caused
    a. completely by human actions.
    b. partly by natural processes.
    c. only by carbon dioxide.
    d. two of the above

Lesson 15.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. ability to do work

_____ 2. tiny packet of energy

_____ 3. transfer of energy by a current

_____ 4. transfer of energy by waves through air or empty space

_____ 5. light with wavelengths too long for humans to see

_____ 6. transfer of energy by direct contact between molecules

_____ 7. light with wavelengths too short for humans to see

Terms

a. radiation

b. convection

c. ultraviolet light

d. photon

e. energy

f. infrared light

g. conduction

Lesson 15.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. _____ waves have the longest wavelengths of all electromagnetic waves.
2. _____ rays have the highest energy of all electromagnetic waves.
3. The only light that humans can see is _____ light.
4. The sun's energy travels through space by _____.
5. The main way that heat moves through the atmosphere is by _____.
6. The sun's rays strike Earth's surface most directly near the _____.
7. Gases that absorb heat in the atmosphere are called _____ gases.

Lesson 15.2: Critical Writing

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

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

How does Earth's temperature vary by latitude? What causes this variation? How does the variation in temperature affect Earth's atmosphere?

15.3 Layers of the Atmosphere

Lesson 15.3: True or False

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

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

_____ 1. Most of the heat in the troposphere comes directly from the sun.

_____ 2. Convection currents occur in all five layers of the atmosphere.

_____ 3. Most of the heat that enters the mesosphere comes from the stratosphere.

_____ 4. Friction with gas molecules causes meteors to burn up in the atmosphere.

_____ 5. The troposphere rises to about 50 kilometers above Earth's surface.

_____ 6. The top of the mesosphere is warmer than the bottom.

_____ 7. The aurora borealis occurs because of storms on Earth's surface.

_____ 8. The thermosphere contains charged particles called ions.

_____ 9. The exosphere merges gradually with outer space.

_____ 10. Gas molecules in the exosphere are extremely cold.

Lesson 15.3: Critical Reading

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

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

Troposphere

The troposphere is the lowest layer of the atmosphere. It rises to only about 12 kilometers (7 miles) above Earth's surface. Even so, this layer holds 75 percent of all the gas molecules in the atmosphere. Therefore, air is densest in this layer.

The temperature of the troposphere decreases as you go higher above Earth's surface. The troposphere gets some of its heat directly from the sun. Most, however, comes from Earth's surface. The surface is heated by the sun and some of that heat re-radiates back into the troposphere. This makes the temperature higher near the surface than at higher altitudes. Warm air is less dense than cool air, so it rises higher in the troposphere. This starts a convection current. Convection mixes the air in the troposphere. Rising air is also a main cause of weather.

Sometimes air doesn't mix in the troposphere. This happens when air is cooler closer to the ground than it is higher above the surface. The cooler air is denser than the warmer air, so it stays near the ground. This is called a temperature inversion. A temperature inversion can trap air pollution near the surface. Temperature inversions are more common in the winter.

Questions

1. Identify and describe the troposphere.
2. Explain how temperature changes in the troposphere.
3. Why do convection currents occur in the troposphere?
4. Why do temperature inversions occur? Why do you think they are more common in the winter?
5. How does a temperature inversion affect air quality?

Lesson 15.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Earth's atmosphere is divided into layers based on
    a. density.
    b. pressure.
    c. composition.
    d. temperature.
2. The shortest layer of the atmosphere is the
    a. exosphere.
    b. mesosphere.
    c. troposphere.
    d. thermosphere.
3. The tropopause prevents cool air in the troposphere from mixing with
    a. warm air in the stratosphere.
    b. hot air in the thermosphere.
    c. cold air in the mesosphere.
    d. cold air in the exosphere.
4. Which sentence about ozone is false?
    a. The splitting of ozone molecules warms the mesosphere.
    b. Ozone protects Earth's surface from harmful radiation.
    c. A molecule of ozone consists of three oxygen atoms.
    d. Ozone molecules absorb ultraviolet light.
5. Temperature decreases as altitude increases in the
    a. mesosphere.
    b. stratosphere.
    c. thermosphere.
    d. two of the above
6. The coldest temperatures in the atmosphere occur in the
    a. mesopause.
    b. tropopause.
    c. stratopause.
    d. none of the above
7. The International Space Station orbits Earth in the
    a. exosphere.
    b. mesosphere.

c. stratosphere.
d. thermosphere.

Lesson 15.3: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. layer of the atmosphere above the troposphere

_____ 2. layer of the atmosphere above the mesosphere

_____ 3. boundary between the troposphere and stratosphere

_____ 4. layer of the atmosphere above the thermosphere

_____ 5. boundary between the stratosphere and mesosphere

_____ 6. lowest layer of the atmosphere

_____ 7. layer of the atmosphere above the stratosphere

Terms

a. exosphere

b. mesosphere

c. stratosphere

d. thermosphere

e. troposphere

f. tropopause

g. stratopause

Lesson 15.3: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. If cool air stays close to the ground below a layer of warm air, it creates a(n) _____.
2. A layer of ozone gas is located in the _____.
3. Meteors burn up as they pass through the _____.
4. The northern and southern lights occur in the _____.
5. The top layer of the atmosphere is called the _____.
6. The densest layer of air in the atmosphere is the _____.
7. All of Earth's weather takes place in the _____.

Lesson 15.3: Critical Writing

Name_____ Class_____ Date_____

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

What is the ozone layer? Why is it important for living things?

15.4 Air Movement

Lesson 15.4: True or False

Name_____ Class_____ Date_____

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

_____ 1. The strength of the wind depends on the difference in air pressure.

_____ 2. Ocean water warms up and cools down more quickly than land.

_____ 3. Land breezes blow when the land is warmer than the ocean.

_____ 4. Monsoons occur because of seasonal differences in temperature.

_____ 5. Global winds are caused by Earth's rotation on its axis.

_____ 6. Global winds called westerlies blow toward the northwest or southwest.

_____ 7. Global winds called easterlies blow away from the poles.

_____ 8. The strongest jet streams are the polar jets.

_____ 9. Warm air rises through the troposphere until it reaches the tropopause.

_____ 10. In the summer, ocean water is warmer than the land during the day.

Lesson 15.4: Critical Reading

Name_____ Class_____ Date_____

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

Global Winds

Global winds are winds that occur in belts that go all around the planet. Like all winds, global winds are caused by unequal heating of the atmosphere. Earth is hottest at the equator and gets cooler toward the poles. These differences in heating create huge convection currents in the troposphere. At the equator, for example, warm air rises up to the tropopause. It can't rise any higher, so it flows north or south. By the time the moving air reaches 30° N or S latitude, it has cooled. The cool air sinks to the surface. Then it flows over the surface back to the equator. Other global winds occur in much the same way.

There are three enormous convection cells north of the equator and three south of the equator. This results in three wind belts in the Northern Hemisphere and three in the Southern Hemisphere. The wind belts have names, which are the same in both hemispheres. The belt closest to the equator is called the trade winds. The next belt is the westerlies. Closest to the poles are the easterlies.

Earth is spinning as air moves over its surface. This causes the Coriolis effect. Because of the Coriolis effect, global winds blow on a diagonal over the surface, instead of due north or due south. For example, the northern trade winds blow from the northeast to the southwest. Without the Coriolis effect, the northern trade winds would blow from north to south instead.

Questions

1. What are global winds, and what causes them?
2. Identify Earth's six global wind belts.
3. What is the Coriolis effect? How does it change global winds?

Lesson 15.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Rising air creates an area of
   a. high pressure on the surface.
   b. low pressure near the ground.
   c. high wind in the stratosphere.
   d. low temperature close to the surface.
2. Winds always blow from an area of higher to lower
   a. mass.
   b. density.
   c. pressure.
   d. temperature.
3. Examples of local winds include
   a. easterlies.
   b. westerlies.
   c. monsoons.
   d. trade winds.
4. Air that rises over the equator sinks back to the surface at
   a. 90 °N and S.
   b. 45 °N and S.
   c. 30 °N and S.
   d. 15 °N and S.
5. North of the equator, the trade winds blow from
   a. northeast to southwest.
   b. northwest to southeast.
   c. southwest to northeast.
   d. southeast to northwest.
6. Which statement about jet streams is false?
   a. They result from unequal heating.
   b. They circle the planet.
   c. They are very fast.
   d. none of the above
7. The northern polar jet stream helps planes fly from
   a. east to west.
   b. west to east.
   c. south to north.
   d. north to south.

Lesson 15.4: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. wind that blows from the land to the ocean during the night

_____ 2. fast-moving air current high in the troposphere

_____ 3. any air movement that occurs because of unequal heating of the atmosphere

_____ 4. wind that blows over a limited area

_____ 5. wind that blows between the ocean and land in southern Asia

_____ 6. wind that blows from the ocean to the land during the day

_____ 7. wind that occurs in a belt that goes around the planet

Terms

a. global wind

b. jet stream

c. land breeze

d. local wind

e. monsoon

f. sea breeze

g. wind

Lesson 15.4: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. All winds occur in the layer of the atmosphere called the _____.
2. _____ winds are influenced by the geography of an area.
3. Ocean water is _____ than land during the winter.
4. Monsoons blow from land to water during the _____.
5. The wind belts closest to the equator are named _____.
6. There are _____ global wind belts in the Northern Hemisphere.
7. Global winds blow on a diagonal instead of due north or south because of the _____.

Lesson 15.4: Critical Writing

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

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

Compare and contrast land and sea breezes.

CHAPTER 16 MS Weather Worksheets

Chapter Outline

16.1 WEATHER AND WATER IN THE ATMOSPHERE
16.2 CHANGING WEATHER
16.3 STORMS
16.4 WEATHER FORECASTING

16.1 Weather and Water in the Atmosphere

Lesson 16.1: True or False

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

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

_____ 1. Weather occurs because of unequal heating of the atmosphere.

_____ 2. The water cycle plays an important role in weather.

_____ 3. Warm air always sinks toward Earth's surface.

_____ 4. If the relative humidity is 100 percent, it must be raining.

_____ 5. Cumulus clouds may grow very tall because of high air pressure.

_____ 6. Stratus clouds are clouds that form in the stratosphere.

_____ 7. Altostratus clouds form higher in the atmosphere than stratus clouds.

_____ 8. A single raindrop consists of millions of water molecules.

_____ 9. Freezing rain falls through the air as tiny pellets of frozen water.

_____ 10. Snow forms when rain falls through a layer of freezing air before it reaches the ground.

Lesson 16.1: Critical Reading

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

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

Humidity

Humidity is the amount of water vapor in a given amount of the air. High humidity increases the chances of clouds and precipitation. Humidity in a weather report usually refers to relative humidity. This is the percent of water vapor in the air relative to the total amount of water vapor the air can hold. The maximum amount of water vapor the air can hold depends on temperature. Warm air can hold more water vapor than cool air.

People often say, "It's not the heat but the humidity." Humidity can make a hot day feel even hotter. When sweat evaporates, it cools your body. But sweat can't evaporate when the air already contains as much water vapor as it can hold. The heat index is a measure of what the temperature feels like because of the humidity. It is higher than the actual temperature when the air is warm and humid.

You've probably noticed dew on the grass on a summer morning. Air that was warm and humid in the daytime cools over night. As the air cools, it can hold less water vapor. Some of the water vapor condenses on cool surfaces, such as blades of grass, forming dew drops. The temperature at which water vapor condenses is called the dew point. The dew point occurs at 100 percent relative humidity. If the dew point is below freezing, frost forms instead of dew.

Questions

1. Define humidity and relative humidity.
2. What does the heat index measure? Why does high humidity make a hot day feel even hotter?
3. Why does dew form?
4. What is the dew point? Why does it occur at100 percent relative humidity?

Lesson 16.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The amount of water vapor that the air can hold depends mainly on air
    a. density.
    b. pressure.
    c. movement.
    d. temperature.
2. Clouds form when air in the atmosphere reaches the
    a. dew point.
    b. tropopause.
    c. freezing point.
    d. convection point.
3. Cirrus clouds
    a. form high in the troposphere.
    b. always produce precipitation.
    c. are made of ice crystals.
    d. two of the above
4. The prefix nimbo- means
    a. tall.
    b. rain.
    c. cold.
    d. snow.
5. Hail forms only in
    a. cumulonimbus clouds.
    b. nimbostratus clouds.
    c. cirrocumulus clouds.
    d. cirrostratus clouds.
6. Types of precipitation that form when water vapor condenses as ice crystals include
    a. freezing rain.
    b. sleet.
    c. hail.
    d. two of the above
7. Weather factors that are part of the water cycle include
    a. humidity.
    b. precipitation.
    c. cloud formation.
    d. all of the above

Lesson 16.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. type of cloud that forms in low, horizontal layers

_____ 2. measure of what the temperature feels like because of humidity

_____ 3. type of cloud that is white and puffy

_____ 4. temperature at which water vapor condenses out of the air

_____ 5. type of precipitation that consists of small, clear ice pellets

_____ 6. type of cloud that is thin and wispy

_____ 7. type of precipitation that falls as liquid water but freezes on surfaces

Terms

a. cirrus

b. cumulus

c. dew point

d. heat index

e. stratus

f. freezing rain

g. sleet

Lesson 16.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. _____ refers to the conditions of the atmosphere at a given time and place.
2. The type of precipitation that falls when rain freezes into balls of ice is _____.
3. The amount of water vapor in the air is called _____.
4. A cloud that forms on the ground is referred to as _____.
5. _____ is the percent of water vapor in the air relative to the total amount the air can hold.
6. Cumulus clouds that produce rain are known as _____ clouds.
7. _____ falls when water vapor condenses as ice crystals that remain frozen all the way to the ground.

Lesson 16.1: Critical Writing

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

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

Explain how the water cycle is related to weather.

16.2 Changing Weather

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 main reason that weather changes is the movement of air masses.

_____ 2. Most air masses form over polar or tropical regions.

_____ 3. When air masses collide, their air mixes together.

_____ 4. Fronts usually have fair weather.

_____ 5. At a cold front, a warm air mass lifts a cold air mass out of its way.

_____ 6. Warm fronts move slowly and cover a wide area.

_____ 7. Air always flows from lower to higher pressure.

_____ 8. The Coriolis effect causes the winds of a cyclone to rotate.

_____ 9. Cyclones bring fair, dry weather.

_____ 10. Cyclones occur only in the Northern Hemisphere, and anticyclones occur only in the Southern Hemisphere.

Lesson 16.2: Critical Reading

Name_____ Class_____ Date_____

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

Air Masses

Weather is always changing. One day might be cold and cloudy. The next day might be warm and sunny. Even on the same day, the weather can change a lot. A beautiful morning might be followed by a stormy afternoon. The main reason weather changes is the movement of air masses.

An air mass is a large body of air that has about the same conditions throughout. The conditions depend on where the air mass formed. Most air masses form over polar or tropical regions. They may form over continents or oceans. An air mass takes on the conditions of the area where it forms.

- A continental polar air mass forms over a continent near the north or south pole. It has cold dry air.
- A maritime polar air mass forms over an ocean near the north or south pole. It has cold humid air.
- A continental tropical air mass forms over a continent near the equator. It has warm dry air.
- A maritime tropical air mass forms over an ocean near the equator. It has warm humid air.

When an air mass passes over an area, it brings its weather with it. It is likely to change the area's temperature and humidity.

Air masses move because winds and jet streams push them along. Cold air masses tend to move toward the equator. Warm air masses tend to move toward the poles. The Coriolis effect causes them to move on a diagonal in the same direction that global winds blow.

Questions

1. What is an air mass?
2. Assume that an air mass forms over Mexico. What type of air mass would it be? Describe the air mass.
3. If an air mass forms over the North Atlantic Ocean, in which direction is it likely to move?

Lesson 16.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Which type of air mass has cold dry air?
    a. maritime tropical
    b. continental polar
    c. maritime polar
    d. continental tropical
2. The air mass in question 1 might form over
    a. the North Atlantic.
    b. the mid-Atlantic.
    c. Canada.
    d. Mexico.
3. Air masses over the United States usually move toward the
    a. northwest.
    b. southwest.
    c. northeast.
    d. southeast.
4. After a cold front passes, the air mass behind it brings
    a. warm temperatures.
    b. cool temperatures.
    c. high humidity.
    d. two of the above
5. Which type of front usually moves most quickly?
    a. cold
    b. warm
    c. occluded
    d. stationary
6. How do winds blow in a cyclone?
    a. toward a center of high pressure
    b. toward a center of low pressure
    c. away from a center of high pressure
    d. away from a center of low pressure

7. In the Northern Hemisphere, the direction that winds blow around a center of high pressure is
    a. toward the southwest.
    b. from north to south.
    c. counterclockwise.
    d. none of the above

Lesson 16.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. large body of air that has about the same conditions throughout

_____ 2. front that occurs when a cold air mass runs into a warm air mass.

_____ 3. front that occurs when a warm air mass runs into a cold air mass

_____ 4. front that occurs when a warm air mass becomes trapped between two cold air masses

_____ 5. front that occurs between two stalled air masses

_____ 6. system of winds that rotates around a center of low pressure

_____ 7. system of winds that rotates around a center of high pressure

Terms

a. cold front

b. cyclone

c. warm front

d. anticyclone

e. occluded front

f. air mass

g. stationary front

Lesson 16.2: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. A maritime polar air mass has cold _____ air.
2. A continental tropical air mass has warm _____ air.
3. Air masses move because of global winds and _____.
4. The boundary between any two air masses is called a(n) _____.
5. Winds may be very strong along a(n) _____ front.
6. Clouds and precipitation may last for many days along a(n) _____ front.
7. A center of _____ pressure forms where cold air sinks.

Lesson 16.2: Critical Writing

Name_____ Class_____ Date_____

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

Compare and contrast cold fronts and warm fronts.

16.3 Storms

Lesson 16.3: True or False

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

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

_____ 1. Thunderstorms occur when the air is very warm and humid.

_____ 2. Thunder is caused by clouds rubbing together.

_____ 3. Severe thunderstorms may produce tornadoes.

_____ 4. Tornadoes may be hundreds of kilometers wide.

_____ 5. Hurricanes gain strength when they go ashore.

_____ 6. The Fujita scale is used to classify hurricanes.

_____ 7. All the damage done by hurricanes is caused by high winds.

_____ 8. Windchill depends on air temperature and wind speed.

_____ 9. Lake-effect snow occurs because of differences in temperature between land and water.

_____ 10. Storms that may have the greatest wind speeds are blizzards.

Lesson 16.3: Critical Reading

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

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

Hurricanes

Hurricanes are enormous storms with high winds and heavy rains. Hurricanes may be hundreds of kilometers wide. They may travel for thousands of kilometers. Their wind speeds can be greater than 250 kilometers per hour. Hurricanes commonly produce tornadoes.

Hurricanes develop from tropical cyclones. They form over very warm ocean water. The warm water gives them energy. As long as a hurricane stays over the warm ocean, it keeps growing stronger. However, if it goes ashore or moves over cooler water, it stops gaining energy. Then the storm loses strength and slowly fades away. At the center of a hurricane is a small area where the air is calm and clear. This is called the eye of the hurricane. The eye forms at the low-pressure center of the storm.

Hurricanes are classified on the basis of their wind speed and the damage they cause. The Saffir-Simpson hurricane scale is commonly used. High winds do a great deal of damage in hurricanes. However, much of the damage from hurricanes may be caused by storm surge. Storm surge is very high water below the eye of a hurricane. The low pressure of the eye allows the water level to rise above normal sea level. Storm surge is likely to cause flooding when it reaches land. High winds can also create very big waves. If the large waves are atop the storm surge, the flood water will rise higher. A hurricane that comes ashore at high tide can cause even more flooding.

Questions

1. What are characteristics of storms called hurricanes?
2. Where do hurricanes develop? Where do they get their energy?
3. How are hurricanes classified?
4. How do hurricanes cause damage?

Lesson 16.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. A strong thunderstorm may have
   a. heavy rain.
   b. high winds.
   c. hail.
   d. all of the above
2. The F scale classifies tornadoes on the basis of
   a. location.
   b. wind speed.
   c. damage done.
   d. two of the above
3. The wind speed of a tornado may be as high as
   a. 500 km/h.
   b. 250 km/h.
   c. 100 km/h.
   d. 50 km/h.
4. Hurricanes form over
   a. Florida.
   b. coastal states.
   c. South America.
   d. warm ocean water.
5. Factors that contribute to flooding by a hurricane include
   a. high tide.
   b. high winds.
   c. storm surge.
   d. all of the above
6. Winter storms develop from
   a. cyclones.
   b. anticyclones.
   c. high pressure centers.
   d. two of the above
7. To be classified as a blizzard, a snow storm must have
   a. visibility of $\frac{1}{4}$ mile or less.

b. wind speeds greater than 100 km/h.
c. snow falling at a rate of over 100 in/h.
d. all of the above

Lesson 16.3: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. what the temperature feels like when the wind is taken into account

_____ 2. funnel-shaped cloud of whirling high winds

_____ 3. heavy snowfall that occurs on the east side of lakes in North America

_____ 4. enormous storm with high winds and heavy rains

_____ 5. very high water below the eye of a hurricane

_____ 6. tall cumulonimbus cloud

_____ 7. snow storm with high winds

Terms

a. lake-effect snow

b. blizzard

c. hurricane

d. thunderhead

e. tornado

f. windchill

g. storm surge

Lesson 16.3: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. A(n) _____ is an episode of severe weather caused by a major disturbance in the atmosphere.
2. The size and strength of a storm depends on the amount of _____ in the atmosphere.
3. In the U.S., thunderstorms are most common and strongest in the _____.
4. The _____ of a hurricane is a small area at the center where the air is calm and clear.
5. Hurricanes develop from tropical _____.
6. A difference in electric charge between a cloud and the ground creates _____.
7. The area where the greatest number of tornadoes occur in the U.S. is called _____.

Lesson 16.3: Critical Writing

Name_____ Class_____ Date_____

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

Tornadoes can have higher wind speeds and do more damage to structures than hurricanes. However, hurricanes do more total damage. Explain why.

16.4 Weather Forecasting

Lesson 16.4: True or False

Name_____ Class_____ Date_____

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

_____ 1. Some weather stations float on the ocean.

_____ 2. A weather station has several weather instruments.

_____ 3. Weather balloons are tied down so they will not float away.

_____ 4. Weather balloons send out radio waves in all directions.

_____ 5. A single weather satellite orbits Earth.

_____ 6. Weather radar is used to detect high winds.

_____ 7. Computers and models are used to analyze weather data.

_____ 8. Weather predictions have become more accurate in recent decades.

_____ 9. A weather map shows weather conditions for a given area.

_____ 10. A weather map always shows temperature and precipitation.

Lesson 16.4: Critical Reading

Name_____ Class_____ Date_____

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

Collecting Weather Data

Weather stations are devices that contain many instruments for measuring weather conditions. There are thousands of weather stations all over the world. Many are on land. Some float on the oceans attached to buoys. There's probably at least one weather station near you.

Other weather devices are used to collect weather data in the atmosphere. They include weather balloons, satellites, and radar.

- A weather balloon carries instruments for measuring weather conditions. It rises into the atmosphere until it bursts. As it rises, it gathers weather data and sends them to the surface.
- Many weather satellites orbit Earth. They constantly collect and transmit weather data from high above the surface.
- A weather radar device sends out radio waves in all directions. The waves bounce off water in the atmosphere and return to the radar device. The radar data show where precipitation is falling.

Questions

1. What are weather stations? Where are they found?
2. Describe how weather balloons and weather satellites are used to collect weather data.
3. Explain how radar is used to find where precipitation is falling.

Lesson 16.4: Multiple Choice

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

Circle the letter of the correct choice.

1. Commonly used weather instruments include
    a. thermometers.
    b. barometers.
    c. rain gauges.
    d. all of the above
2. Instruments that measure air movement include
    a. anemometers.
    b. hygrometers.
    c. wind vanes.
    d. two of the above
3. Which type of weather should you expect if a low pressure center is moving your way?
    a. fair weather
    b. calm weather
    c. stormy weather
    d. none of the above
4. A scientist who studies and predicts the weather is a
    a. hygrometist.
    b. climatologist.
    c. meteorologist.
    d. weatherologist.
5. If the mercury is rising in a hygrometer, then the weather is likely to be
    a. stormy.
    b. snowy.
    c. windy.
    d. sunny.
6. Weather data are collected in the atmosphere by
    a. radar.
    b. satellites.
    c. balloons.
    d. all of the above

Lesson 16.4: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. instrument that measures wind speed

_____ 2. line on a weather map connecting places with the same temperature

_____ 3. instrument that measures air pressure

_____ 4. instrument that measures wind direction

_____ 5. instrument that measures humidity

_____ 6. instrument that measures temperature

_____ 7. line on a weather map connecting places with the same air pressure

Terms

a. anemometer

b. barometer

c. hygrometer

d. thermometer

e. wind vane

f. isobar

g. isotherm

Lesson 16.4: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. In a barometer, air pushes down on the element _____, which rises in a sealed tube.
2. The amount of liquid precipitation that falls is measured with a(n) _____.
3. The amount of solid precipitation that falls is measured with a(n) _____.
4. A(n) _____ measures the amount of water vapor in the air.
5. Weather data are gathered at thousands of _____ all over the world.
6. Air pressure is measured in a unit called the _____.
7. Weather _____ sends out radio waves to locate precipitation in the atmosphere.

Lesson 16.4: Critical Writing

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

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

Describe the information you would expect to find on an air pressure map. Explain why an air pressure map is very useful for predicting the weather.

CHAPTER 17 MS Climate Worksheets

Chapter Outline

17.1 CLIMATE AND ITS CAUSES
17.2 WORLD CLIMATES
17.3 CLIMATE CHANGE

17.1 Climate and Its Causes

Lesson 17.1: True or False

Name_____ Class_____ Date_____

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

_____ 1. Climate depends only on distance north or south of the equator.

_____ 2. Ice and snow absorb a lot of sunlight.

_____ 3. Precipitation is high where warm air from lower latitudes meets frigid air from the poles.

_____ 4. Dry air sinks to the surface at about 60 degrees north and south latitude.

_____ 5. Subtropical climates are dry for at least some of the year.

_____ 6. The movement of air masses causes weather.

_____ 7. A place far from the ocean typically has less variation in temperature than a place close to the ocean.

_____ 8. Ocean currents always bring warm water to cold regions.

_____ 9. Air is colder at high altitudes because it is less dense.

_____ 10. A rain shadow is an area that receives a lot of rain because of a nearby mountain.

Lesson 17.1: Critical Reading

Name_____ Class_____ Date_____

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

Oceans and Climate

When a place is near the ocean, the ocean water can have a big effect on the climate. Even places at the same latitude may have different climates if one is inland and one is on a coast.

- An inland climate is influenced by air over the land. This air may be dry, and its temperature may vary a lot by season. As a result, an inland climate may have very hot summers and very cold winters. Precipitation may also be low because the air is dry
- A coastal climate is influenced by air over the ocean. This air is likely to be moist and to vary less in temperature than air over the land. As a result, a coastal climate is usually relatively mild. Summers aren't too hot, and winters aren't too cold. Precipitation may also be because the air is moist.

Ocean currents carry warm or cold water throughout the world's oceans. They help to even out the temperature of ocean water. Currents that flow near a shore can have a big impact on the local climate. They may make the climate much colder or warmer than it would be otherwise. For example, the Gulf Stream moves warm subtropical water northeast across the Atlantic Ocean to the British Isles. As a result, the British Isles have warmer temperatures than inland areas at the same latitude.

Questions

1. Compare and contrast inland and coastal climates.
2. How do ocean currents affect climates? Give an example.

Lesson 17.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Climate includes
    a. temperature.
    b. precipitation.
    c. timing of precipitation.
    d. all of the above
2. The main factor that determines the climate of a place is
    a. vegetation.
    b. longitude.
    c. latitude.
    d. two of the above
3. Places between 45 and 60 degrees latitude have
    a. dry winters and wet summers.
    b. dry summers and wet winters.
    c. low precipitation in all seasons.
    d. high precipitation in all seasons.
4. In polar climates, precipitation is
    a. low all year.
    b. high all year.
    c. moderate all year.
    d. high in winter and low in summer.
5. In most of the U.S., air masses usually move from
    a. northeast to southwest.
    b. southwest to northeast.
    c. north to south.
    d. south to north.
6. The British Isles have relatively high average temperatures for their latitude because of the
    a. trade winds.
    b. Gulf Stream.
    c. prevailing easterlies.
    d. intertropical convergence zone.
7. On the west coast of North America, where do rain shadows occur?
    a. at the tops of mountains
    b. on the east side of mountain ranges
    c. between mountain ranges and the coast
    d. on the side of mountain ranges opposite the sun

Lesson 17.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. climate that is relatively mild year round

_____ 2. flowing water that carries warm or cold water through the oceans

_____ 3. global winds at a given latitude

_____ 4. average weather of a place over many years

_____ 5. climate that has extreme temperatures

_____ 6. distance north or south of the equator

_____ 7. low precipitation area on the leeward side of a mountain range

Terms

a. climate

b. rain shadow

c. latitude

d. coastal climate

e. inland climate

f. prevailing winds

g. current

Lesson 17.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. At higher latitudes, the sun's rays are _____ direct.
2. Many of the world's deserts occur at about _____ degrees latitude.
3. At the equator, the level of precipitation is generally _____.
4. Air masses move because of _____ winds.
5. There is usually _____ precipitation inland than on the coast.
6. The current named the _____ moves warm water from the southwestern Atlantic Ocean to the coast of Great Britain.
7. As you go higher up a mountain, the temperature of the air _____.

Lesson 17.1: Critical Writing

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

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

Explain factors that affect the climate where you live.

17.2 World Climates

Lesson 17.2: True or False

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

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

_____ 1. Each type of climate is associated with certain types of living things.

_____ 2. All tropical climates have high rainfall year round.

_____ 3. A desert is any area that receives less than 50 cm of rainfall per year.

_____ 4. Steppes are dry because they occur between 15 and 30 degrees latitude.

_____ 5. Temperate climates vary in the amount and timing of precipitation they receive.

_____ 6. The southeastern United States has a Mediterranean climate.

_____ 7. Subarctic climates have low precipitation, especially during the winter.

_____ 8. Ice caps are found in Alaska, Canada, and Greenland.

_____ 9. Tundra climates occur only near the poles.

_____ 10. Continental climates include humid continental and humid subtropical climates.

Lesson 17.2: Critical Reading

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

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

Major Climate Types

There are five major climate types: tropical, dry, temperate, continental, and polar climates. The major climate types are based on temperature and precipitation.

- Tropical climates are found near the equator. They have warm temperatures year round. They may be wet all year, or they may be wet in one season and dry in others.
- Dry climates receive very little rainfall. They also have high rates of evaporation. This makes them even drier. Some dry climates are found between 15 and 30 degrees latitude. This is where dry air sinks toward the surface. Other dry climates occur in continental interiors or rain shadows.
- Temperate climates are found between 20 and 60 degrees latitude. They have moderate temperatures. They vary in how much precipitation they get and when it falls. They are generally found on the west or east coasts of continents.
- Continental climates are found in inland areas, generally between 40 and 70 degrees north latitude. They are too far from oceans to experience the effects of ocean water. They have hot summers and cold winters. They may have low precipitation. Southern continents are too narrow to have inland areas far from oceans. Therefore, continental climates do not occur in the Southern Hemisphere.

- Polar climates are found near the North and South Poles. They also occur on high mountains at lower latitudes. The summers are very cool, and the winters are frigid. Precipitation is low because the air is too cold to hold much moisture.

Questions

1. Identify the five major climate types.
2. How are the major climate types classified?
3. Compare and contrast tropical and temperate climates.
4. Where do dry climates occur? Where do polar climates occur?
5. Why do continental climates occur only in the Northern Hemisphere?

Lesson 17.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Which of the following is a major climate type?
   a. desert
   b. steppe
   c. temperate climate
   d. Mediterranean climate
2. Which climate type occurs between 5 and 20 degrees latitude?
   a. tropical wet and dry climate
   b. humid subtropical climate
   c. marine west coast climate
   d. tropical wet climate
3. Arid climates are dry because they have
   a. low rates of precipitation.
   b. high rates of evaporation.
   c. high rates of condensation.
   d. two of the above
4. Which type of climate is found on the western coasts of continents between 45 and 60 degrees latitude?
   a. Mediterranean climate
   b. marine west coast climate
   c. humid subtropical climate
   d. humid continental climate
5. A humid subtropical climate is characterized by
   a. hot summers.
   b. warm winters.
   c. wet summers and dry winters.
   d. two of the above
6. Which type of forests grow in a humid continental climate?
   a. rainforests
   b. pine forests

c. conifer forests
d. deciduous forests

7. Which climate is most similar to a polar tundra climate?

a. highland climate
b. subarctic climate
c. semiarid climate
d. continental climate

Lesson 17.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. driest of all climates

_____ 2. climate found at very high altitudes

_____ 3. climate that has short grasses and low bushes

_____ 4. climate that has conifer forests

_____ 5. climate type that includes marine west coast climates

_____ 6. climate found on the coast of California

_____ 7. climate type that is found in inland areas of the Northern Hemisphere

Terms

a. alpine tundra

b. subarctic climate

c. continental climate

d. desert

e. Mediterranean climate

f. steppe

g. temperate climate

Lesson 17.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. A major type of climate and its living things make up a(n) _____.
2. Continental climates include humid continental climates and _____ climates.
3. The northeastern U.S. has a(n) _____ continental climate.
4. The type of climate over much of Canada and Alaska is a(n) _____ climate.
5. A layer of ground below the surface that is always frozen is known as _____.

6. A climate in a local area that differs from the major climate around it is called a(n) _____.
7. Most climates that occur between 20 and 60 degrees latitude are _____ climates.

Lesson 17.2: Critical Writing

Name_____ Class_____ Date_____

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

Explain why opposite sides of a hill are likely to have different microclimates.

17.3 Climate Change

Lesson 17.3: True or False

Name_____ Class_____ Date_____

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

_____ 1. It takes large changes in Earth's climate to affect living things.

_____ 2. Only one ice age occurred over the past billion years.

_____ 3. In the Pleistocene ice age, Earth's temperature was 5 °C cooler than it is today.

_____ 4. During the last ice age, glaciers covered much of North America.

_____ 5. Temperatures were higher during the Medieval warm period than they have been over the past decade.

_____ 6. Plate tectonics may cause ocean currents to shift.

_____ 7. An enormous volcanic eruption would increase Earth's temperature.

_____ 8. Solar storms are the main cause of recent global warming.

_____ 9. Greenhouse gases block sunlight and cool the planet.

_____ 10. The amount of carbon dioxide in the air has been increasing for many decades.

Lesson 17.3: Critical Reading

Name_____ Class_____ Date_____

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

El Niño and La Niña

El Niño and La Niña refer to certain short-term changes in climate. The changes are natural, and they occur in cycles. To understand the changes, you first need to know what happens in years when El Niño and La Niña do not occur. In these years, the trade winds blow from northeast to southwest across the Pacific Ocean. The winds blow warm surface water away from South America. This allows deeper, colder water to flow up to the surface near the coast. This is called upwelling.

El Niño occurs when the Pacific Ocean is warmer than usual. This causes the trade winds to change direction. The winds blow from northwest to southeast. They blow warm surface water toward South America. This prevents upwelling. These changes affect climates worldwide for a year or two. For example, some places may get more rain than normal. Other places may get less. Overall, the weather is more severe.

La Niña generally follows El Niño. It occurs when the Pacific Ocean is cooler than usual. The trade winds blow in their normal direction from northeast to southwest, but they are stronger than normal. They blow cool water across the Pacific Ocean toward Asia. These changes also affect climates worldwide.

Scientists think that global warming is affecting El Niño and La Niña. They seem to be cycling faster now than in the past. They are also more extreme.

Questions

1. What is El Niño? Why does El Niño occur? How does El Niño affect Earth's climate?
2. How does La Niña differ from El Niño?
3. How does global warming seem to be affecting El Niño and La Niña?

Lesson 17.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Which of the following statements about climate change is false?
   a. Earth's climate has changed many times in the past.
   b. Earth's climate has been hotter than it is today.
   c. Earth's climate has been colder than it is today.
   d. Earth's climate has never changed before now.
2. The 14 hottest years on record have all occurred since
   a. 1900.
   b. 1990.
   c. 1995.
   d. 1998.
3. Natural processes that may have affected Earth's temperature in the past include a ##change in the tilt of Earth's axis.
   a. large asteroid striking Earth.
   b. huge volcanic eruption.
   c. all of the above
4. Recent global warming is due mainly to
   a. plate tectonics.
   b. sunspot activity.
   c. human actions.
   d. none of the above
5. Effects of global warming include all of the following except
   a. sea ice melting.
   b. coral reefs dying out.
   c. more extreme weather.
   d. fewer short-term climate changes.
6. What happens during El Niño?
   a. The trade winds change direction.
   b. The Pacific Ocean cools off more than usual.
   c. Upwelling occurs off the west coast of South America.
   d. Warm water travels from northeast to southwest across the Pacific Ocean.
7. La Niña occurs
   a. when the Pacific Ocean is warmer than normal.
   b. because the trade winds change direction.
   c. only in the Atlantic Ocean.
   d. following El Niño.

Lesson 17.3: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. dramatic increase in Earth's temperature since the middle of the 1800s

_____ 2. short-term climate change in which the Pacific Ocean is warmer than usual

_____ 3. slight increase in Earth's temperature that occurred about 1000 years ago

_____ 4. period in Earth's history when temperatures were cooler than normal

_____ 5. movement of cold water from the bottom to the surface of the ocean

_____ 6. difference from average temperature

_____ 7. short-term climate change in which the Pacific Ocean is cooler than usual

Terms

a. medieval warm period

b. La Niña

c. ice age

d. global warming

e. El Niño

f. upwelling

g. temperature anomaly

Lesson 17.3: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Over much of Earth's history, the planet's average temperature was _____ than it is today.
2. During an ice age, _____ spread to lower latitudes.
3. The last major ice age occurred during the _____ epoch.
4. The burning of fossil fuels adds the greenhouse gas _____ to the atmosphere.
5. Global warming is causing sea levels to _____.
6. During El Niño, the northern trade winds blow from the _____.
7. If global warming predictions are correct, the Amazon basin and the _____ will experience the greatest temperature increases.

Lesson 17.3: Critical Writing

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

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

Describe how Earth's temperature has changed since the mid-1800s. Identify causes and effects of the temperature change.

CHAPTER 18 MS Ecosystems and Human Populations Worksheets

Chapter Outline

18.1 ECOSYSTEMS

18.2 CYCLES OF MATTER

18.3 THE HUMAN POPULATION

18.1 Ecosystems

Lesson 18.1: True or False

Name_____ Class_____ Date_____

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

_____ 1. Soil is an example of a biotic factor in an ecosystem.

_____ 2. All ecosystems have living things that play the same basic roles.

_____ 3. Algae are producers that make food by chemosynthesis.

_____ 4. Some consumers get food by eating decomposers.

_____ 5. An organism that eats only plants is called an herbivore.

_____ 6. Some plants are consumers.

_____ 7. Food chains can have dozens of levels.

_____ 8. Secondary consumers obtain food by eating producers.

_____ 9. Matter must be constantly added to food chains.

_____ 10. Carbon is an example of a nutrient.

Lesson 18.1: Critical Reading

Name_____ Class_____ Date_____

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

Roles in Ecosystems

In any ecosystem, some organisms are producers, some are consumers, and others are decomposers. All ecosystems must have organisms that play these three basic roles.

Producers are living thing that use energy to make food. They make food for themselves and for other living things in the ecosystem. There are two types of producers: photosynthesizers and chemosynthesizers.

- Most producers make food by photosynthesis. This is the process in which living things make food using energy from sunlight. Photosynthesizers include plants and algae.
- A few producers make food by chemosynthesis. This is the process in which living things make food using energy in chemicals. Certain bacteria make food in this way. They live in places that do not receive sunlight, such as the ocean floor.

Consumers are living things that obtain food by eating other organisms. There are several different types of consumers. For example, some consumers, such as rabbits, eat plants. Some consumers, such as hawks, kill and eat other animals. Other consumers, such as hyenas, eat animals that are already dead.

Decomposers are living things that obtain food by breaking down dead organisms or the wastes of living things. Examples include mushrooms and earthworms. Decomposers release nutrients from the matter they break down. The nutrients can then be used by plants or other producers to make food. In this way, nutrients are recycled through ecosystems.

Questions

1. Identify and describe the three basic roles of organisms in ecosystems.
2. Compare and contrast the two types of producers.
3. What are three different types of consumers? Give an example of each type.
4. How are nutrients recycled in ecosystems?

Lesson 18.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. How a species "makes a living" is its
   a. niche.
   b. habitat.
   c. ecosystem.
   d. abiotic factor.
2. Which grouping includes only members of the same species?
   a. ecosystem
   b. population
   c. community
   d. none of the above
3. Producers make food by
   a. photosynthesis.
   b. decomposition.
   c. chemosynthesis.
   d. two of the above
4. What does a carnivore eat?
   a. animals
   b. plants
   c. dung
   d. two of the above
5. Which of the following organisms is a grazer?
   a. mushroom
   b. mosquito
   c. hyena
   d. mole
6. The base of all food chains consists of
   a. primary consumers.
   b. decomposers.
   c. producers.

d. predators.

7. Which of the following is recycled in an ecosystem?

   a. heat
   b. energy
   c. nitrogen
   d. all of the above

Lesson 18.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. group of living things and their environment

_____ 2. unique type of organism

_____ 3. living part of an ecosystem

_____ 4. all the populations that make up an ecosystem

_____ 5. nonliving part of an ecosystem

_____ 6. all the members of a given species that live in the same area

_____ 7. nonliving matter needed by living things

Terms

a. abiotic factor

b. biotic factor

c. community

d. population

e. ecosystem

f. nutrient

g. species

Lesson 18.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Air and sunlight are examples of _____ factors in an ecosystem.
2. Members of the same _____ can breed together and produce fertile offspring.
3. The place where a species is best suited to live is its _____.
4. Any living thing that uses energy to make food is called a(n) _____.
5. Living things that depend on other organisms for their food are called _____.
6. Living things that break down dead organisms are called _____.

7. A(n) _____ is a consumer that feeds off living organisms without killing them.

Lesson 18.1: Critical Writing

Name_____ Class_____ Date_____

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

Compare and contrast the flow of energy and the flow of matter through ecosystems.

18.2 Cycles of Matter

Lesson 18.2: True or False

Name_____ Class_____ Date_____

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

_____ 1. The carbon cycle includes both living and nonliving things.

_____ 2. Carbon changes form as it moves through the carbon cycle.

_____ 3. Volcanic eruptions release carbon dioxide into the air.

_____ 4. The atmosphere contains more carbon than the oceans.

_____ 5. Carbon cycles very quickly through ocean water.

_____ 6. Nitrogen is one of the most important nutrients needed by plants.

_____ 7. Plants obtain nitrogen directly from the atmosphere.

_____ 8. Nitrogen in runoff that enters ponds kills algae and water plants.

_____ 9. When algae use food for energy, they release oxygen into the water.

_____ 10. There is a large dead zone in the Gulf of Mexico.

Lesson 18.2: Critical Reading

Name_____ Class_____ Date_____

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

Human Actions and Nutrient Cycles

Carbon and nitrogen are elements that are needed by living things. They are important nutrients that are recycled through ecosystems. The carbon cycle and nitrogen cycle are both being influenced by human actions.

One way human actions are influencing the carbon cycle is by adding large amounts of carbon dioxide to the atmosphere. This is occurring mainly because of the burning of fossil fuels. Carbon dioxide is a greenhouse gas and a cause of global warming. Humans are also destroying forests. Trees may be cut down for their wood, or they may be burned to clear land for farming. The burning of wood releases more carbon dioxide into the atmosphere. With forests shrinking, there are fewer trees to remove carbon dioxide from the air. This makes the greenhouse effect even worse.

Nitrogen is one of the most important nutrients needed by plants and algae. That's why most plant fertilizers contain nitrogen. Adding fertilizer to soil allows more plants to grow. As a result, a given amount of land can produce more food. Rain dissolves fertilizer in soil, and runoff carries it to bodies of water. The nitrogen in the dissolved fertilizer causes algae to grow out of control. The algae may use up so much oxygen in the water that nothing else can live there. Soon, even the algae die out. Decomposers break down the dead algae and use up the remaining oxygen in the water. This creates a dead zone. A dead zone is an area in a body of water where nothing lives because there is

too little oxygen in the water.

Questions

1. How does the burning of fossil fuels affect the carbon cycle?
2. What are two ways that the burning of wood increases the amount of carbon dioxide in the atmosphere?
3. How does nitrogen from fertilizer end up in bodies of water?
4. Why is too much nitrogen in bodies of water a problem?
5. What are dead zones, and what causes them?

Lesson 18.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Carbon dioxide enters the atmosphere during
    a. photosynthesis.
    b. burning.
    c. decay.
    d. all of the above
2. Which of the following compounds in living things contain carbon?
    a. sugars
    b. starches
    c. proteins
    d. all of the above
3. Consumers get carbon by
    a. photosynthesis.
    b. respiration.
    c. breathing.
    d. eating.
4. Human beings affect the carbon cycle by
    a. burning wood.
    b. using fossil fuels.
    c. cutting down forests.
    d. all of the above
5. Which process releases nitrogen into the air?
    a. breaking down waste
    b. fixing nitrogen
    c. using fertilizer
    d. making sugar
6. Without certain organisms that live in soil, plants would not be able to use
    a. carbon.
    b. oxygen.
    c. nitrogen.
    d. carbon dioxide.
7. The underlying cause of dead zones is

a. not enough carbon in the water.
b. too much nitrogen in the water.
c. too few organisms in the water.
d. none of the above

Lesson 18.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. process in which living things obtain energy from food

_____ 2. carbon compound used by plants to make sugar

_____ 3. key element in proteins

_____ 4. process that releases nitrogen from organic remains

_____ 5. process that changes nitrogen to a form that plants can use

_____ 6. element that is the basis of all life on Earth

_____ 7. type of carbon compound that includes sugars and starches

Terms

a. carbohydrate

b. respiration

c. carbon

d. decomposition

e. nitrogen

f. nitrogen fixing

g. carbon dioxide

Lesson 18.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Living things consist mostly of the element _____.
2. Respiration releases _____ into the atmosphere.
3. Producers combine water and _____ to make sugar.
4. About 78 percent of air is _____ gas.
5. Organisms that fix nitrogen are _____.
6. The nitrogen cycle includes air, living things, and _____.
7. A(n) _____ is an area in a body of water where there is too little oxygen to support life.

Lesson 18.2: Critical Writing

Name_____ Class_____ Date_____

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

Describe how carbon cycles through living and nonliving things.

18.3 The Human Population

Lesson 18.3: True or False

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

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

_____ 1. The population growth rate equals the number of births in a year per 100 people.

_____ 2. If the birth rate is less than the death rate, then the population has a growth rate of zero.

_____ 3. There is no limit on how large a population can grow.

_____ 4. The human population started to grow rapidly in the 1800s.

_____ 5. In the first phase of the demographic transition, populations grew slowly.

_____ 6. Pesticides increase crop production by killing weed plants.

_____ 7. Human population growth rates are highest in the United States.

_____ 8. We may run out of oil by the mid-2000s.

_____ 9. Alien species can cause native species to go extinct.

_____ 10. Some people think that sustainable development may require a smaller human population.

Lesson 18.3: Critical Reading

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

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

Changes in Human Population Growth

For tens of thousands of years, the human population grew very slowly. Then, in the 1800s, some human populations started to grow rapidly. These were populations of Europe, North America, and other places that were becoming industrialized. The reason for the rapid population growth was a decrease in death rates. Death rates fell for several reasons:

- New farm machines were invented. The machines increased the amount of food that could be grown.
- Steam engines and railroads were built. Trains could quickly carry food long distances. This made food shortages less likely.
- Sanitation was improved. Sewers were dug to carry away human wastes. This reduced the spread of disease.

Overall, more food and less disease caused death rates to fall. More children lived long enough to reach adulthood and have children of their own. As death rates fell, birth rates stayed at their usual high levels. This caused rapid population growth. However, after a few decades, birth rates started to fall as well. Soon, population growth rates were low again. All these changes in population growth are called the demographic transition.

In most other countries of the world, death rates fell somewhat later and more slowly. New advances contributed to the falling death rates. A green revolution began in the 1950s. New methods and products increased how much food could be grown. Medical advances during the mid-1900s also saved countless numbers of lives. Vaccinations were developed that could prevent many diseases. Antibiotics were discovered that could cure most infections caused by bacteria. Although death rates fell in these countries, birth rates continued to be high in many places. Today, a number of countries still have rapidly growing populations. Nonetheless, growth of the total human population has started to slow.

Questions

1. How did growth of the human population change in the 1800s?
2. What caused death rates to fall in Europe and other industrialized countries in the 19th century?
3. What is the demographic transition? Where and when did it occur?
4. What advances helped reduce death rates starting in the mid-1900s?

Lesson 18.3: Multiple Choice

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

Circle the letter of the correct choice.

1. About how many people live on Earth?
    a. 7 million
    b. 7 billion
    c. 9 billion
    d. 7 trillion
2. If the birth rate is greater than the death rate, then
    a. d is negative.
    b. b is negative.
    c. r is positive.
    d. two of the above
3. If a population reaches its carrying capacity, it is most likely to
    a. grow rapidly.
    b. stop growing.
    c. increase its size.
    d. increase its carrying capacity.
4. Food production increased during the
    a. green revolution.
    b. demographic transition.
    c. industrial revolution.
    d. all of the above
5. Human actions that lower death rates include
    a. improving sanitation.
    b. vaccinating children.
    c. purifying water.
    d. all of the above
6. Some people think that the human population has reached its carrying capacity because

a. we are saving the environment.
b. everyone has just enough resources.
c. we have enough fossil fuels for decades.
d. none of the above

7. Goals of sustainable development include

a. conserving resources.
b. distributing resources fairly.
c. using resources in ways that do not harm ecosystems.
d. all of the above

Lesson 18.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. annual births minus deaths per 100 population members

_____ 2. drug that kills bacteria

_____ 3. using resources in a way that gives everyone enough and protects the environment

_____ 4. substance that prevents a disease

_____ 5. largest population that can be supported by the environment

_____ 6. change from high birth and death rates to low birth and death rates

_____ 7. increase in food production due to new products and methods

Terms

a. green revolution

b. vaccine

c. carrying capacity

d. population growth rate

e. demographic transition

f. antibiotic

g. sustainable development

Lesson 18.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The formula for the population growth rate is _____.
2. The human population grew very _____ for tens of thousands of years.
3. The rapid development of industry that first began in Europe is called the _____.

4. The demographic transition started with a fall in _____ rates.
5. At the end of the demographic transition both birth and death rates were _____.
6. Scientists predict that the human population will peak at about _____ billion people.
7. A species that invades a new habitat is referred to as a(n) _____ species.

Lesson 18.3: Critical Writing

Name_____ Class_____ Date_____

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

Explain the relationship between population growth and carrying capacity.

CHAPTER 19 MS Human Actions and the Land Worksheets

Chapter Outline

19.1 LOSS OF SOIL

19.2 POLLUTION OF THE LAND

19.1 Loss of Soil

Lesson 19.1: True or False

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

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

_____ 1. Some of the soil from the Dust Bowl ended up in the Atlantic Ocean.

_____ 2. Most land organisms could not survive without soil.

_____ 3. Plants cause soil loss by using up soil nutrients.

_____ 4. Soil that is lost can never be replaced.

_____ 5. Large areas of pavement help prevent soil erosion.

_____ 6. Hiking is a form of recreation that does not increase soil erosion.

_____ 7. Frequently moving grazing animals from field to field increases soil loss.

_____ 8. Grasses are good groundcover plants for holding soil in place.

_____ 9. Topsoil stripped from a mining site can be saved and reused.

_____ 10. Barriers that reduce runoff can help prevent soil erosion at construction sites.

Lesson 19.1: Critical Reading

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

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

Farming and Soil Erosion

What humans do to soil makes it more or less likely to be eroded by wind or water. Human actions that can increase soil erosion include several traditional farming practices. When soil is covered by plants, plant roots penetrate the soil and keep it from eroding. Plowing cuts through plant roots and turns over bare soil. The bare soil is exposed to wind and water, which can erode the soil. The problem doesn't stop with plowing. Crops are usually planted in rows, with bare soil in between the rows. In places where crops grow only during part of the year, the land may be completely bare for several months each year.

Some grazing animals, especially sheep and goats, eat grass right down to the roots. They may even pull the grass plants out of the ground. Grazing animals can kill the grass or thin it out so much that it offers little protection to the soil. If animals are kept in the same place too long, the soil may become completely bare. The bare soil is easily eroded by wind and water.

Questions

1. Why does plowing increase the risk of soil erosion?
2. What other planting practices may lead to soil loss?

3. How can grazing animals cause soil erosion?

Lesson 19.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Factors that contributed to the Dust Bowl included
    a. plowing the land.
    b. lack of rain.
    c. high winds.
    d. all of the above
2. Plants need soil to
    a. obtain carbon dioxide.
    b. anchor their roots.
    c. prevent runoff.
    d. all of the above
3. The main cause of soil erosion is
    a. wind.
    b. abrasion.
    c. ice wedging.
    d. running water.
4. Farming practices that increase soil erosion include
    a. tilling
    b. strip cropping
    c. contour cropping
    d. two of the above
5. Grazing animals that are likely to leave the soil bare include
    a. cattle.
    b. sheep.
    c. goats.
    d. two of the above
6. Human actions that increase the risk of soil loss include
    a. logging.
    b. terracing.
    c. tree planting.
    d. no till planting.
7. Soil erosion can be reduced by
    a. paving the land.
    b. planting cover crops.
    c. planting crops in rows.
    d. riding off-road vehicles in hilly areas.

Lesson 19.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. plants that hold soil in place between growing seasons

_____ 2. planting fields without plowing them first

_____ 3. row of trees planted between fields

_____ 4. building broad "steps" on steep slopes before planting

_____ 5. planting crops in curved rows to follow the contour of hills

_____ 6. cutting through plant roots and turning over soil before planting

_____ 7. planting strips of groundcover plants between fields of crops

Terms

a. contour cropping

b. strip cropping

c. cover crop

d. windbreak

e. no-till planting

f. plowing

g. terracing

Lesson 19.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. The _____ was an area in the southern Plains states that lost a lot of topsoil in the 1930s.
2. Substances that soil provides to plants include nutrients and _____.
3. Plant roots penetrate soil and help prevent soil _____.
4. Soil is considered to be a(n) _____ resource.
5. Rows of trees planted between fields reduce soil erosion caused by _____.
6. Terracing and contour plowing reduce soil erosion caused by _____.
7. Mine lands are reclaimed by returning the top soil and covering the soil with _____.

Lesson 19.1: Critical Writing

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

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

Assume that you are building a new house on land that is covered with plants. What steps could you take to reduce the loss of topsoil during and after construction? Explain why these steps would help conserve the soil.

19.2 Pollution of the Land

Lesson 19.2: True or False

Name_____ Class_____ Date_____

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

_____ 1. Love Canal is considered to be one of the worst environmental disasters of all time.

_____ 2. The soil of Love Canal was contaminated with lead and mercury.

_____ 3. The Superfund Act requires safe disposal of hazardous waste.

_____ 4. All hazardous waste is corrosive and explosive.

_____ 5. Electronic products contain toxic chemicals.

_____ 6. Agriculture produces very little hazardous waste.

_____ 7. No hazardous wastes can be recycled safely.

_____ 8. Hazardous products should never be reused.

_____ 9. You should never put old batteries in the trash.

_____ 10. Most cities have centers for disposal of household hazardous waste.

Lesson 19.2: Critical Reading

Name_____ Class_____ Date_____

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

Household Hazardous Waste

Cleaning products, lawn chemicals, paints, batteries, motor oil—these are just some of the many hazardous materials that may be found in households. You might think that a household doesn't produce enough hazardous waste to worry about. But when you add up all the waste from all the households in a community, it's a different story. A city of just 50,000 people might produce more than 40 tons of hazardous waste each year! Clearly, how households deal with hazardous waste matters.

What can your family do? Reduce, reuse, recycle, and properly dispose of hazardous wastes.

- Reduce the amount of hazardous products that you buy. For example, if you need only need a quart of paint for a project, don't buy a gallon.
- Use less hazardous products if you can. For example, clean windows with vinegar and water instead of toxic window cleaners.
- Reuse products if it's safe to do so. For example, paint thinner that has been used to clean paintbrushes can be strained and reused.
- Recycle whenever possible. For example, some service stations allow you to drop off used motor oil, car batteries, or tires for recycling.

- Always properly dispose of hazardous waste. For example, let liquid waste evaporate before placing the container in the trash.

Proper disposal of hazardous waste depends on the particular waste. Many hazardous products have disposal guidelines on the label. That's one reason why you should keep the products in their original containers. The labels also explain how to use the products safely. Follow the instructions to protect yourself and the environment. Most communities have centers for disposing of household hazardous waste. There is likely to be one in your community.

Questions

1. What are some examples of hazardous materials that may be found in households?
2. A single household is likely to produce just a small amount of hazardous waste. Why is household hazardous waste a big problem?
3. "Reduce, reuse, recycle" is usually applied to valuable natural resources. Why does "reduce, reuse, recycle" also apply to household hazardous waste?
4. How can households dispose of their hazardous waste?

Lesson 19.2: Multiple Choice

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

Circle the letter of the correct choice.

1. The Love Canal disaster began with the disposal of chemical wastes in a canal in the
   a. 1940s.
   b. 1950s.
   c. 1970s.
   d. 1980s.
2. After a massive cleanup effort costing millions of dollars, Love Canal was
   a. safe for people.
   b. no longer toxic.
   c. still contaminated.
   d. two of the above
3. Because of the lessons learned from Love Canal
   a. the Superfund Act was passed.
   b. many other contaminated sites were found.
   c. safer waste disposal guidelines were developed.
   d. all of the above
4. Hazardous waste may be dangerous because it is
   a. toxic.
   b. corrosive.
   c. flammable.
   d. all of the above
5. Examples of hazardous wastes include
   a. used brake fluid.
   b. old computers.
   c. left over paint.

d. all of the above

6. If you have a can containing a very small amount of paint thinner, how could you safely dispose of it?
   a. Dilute the paint thinner with water and then toss the can in the trash.
   b. Let the paint thinner evaporate and then put the can in the trash.
   c. Put the lid tightly on the can and then throw the can in the trash.
   d. Pour the paint thinner down the drain and then recycle the can.
7. Assume you are going to use a bottle of a new cleaning product that you have never used before. What should you do first?
   a. Transfer the product to a disposable container.
   b. Read the safety guidelines on the label of the bottle.
   c. Test a small amount of the product to see if it is toxic.
   d. Put on latex gloves after you open the bottle.

Lesson 19.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. highly reactive with other substances

_____ 2. any waste that is dangerous to people or the environment

_____ 3. able to burn easily

_____ 4. act of contaminating the environment

_____ 5. law requiring that money be set aside to clean up toxic waste sites

Terms

a. Superfund Act

b. hazardous waste

c. corrosive

d. flammable

e. pollution

Lesson 19.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. In the 1970s, the _____ disaster opened people's eyes to the problem of buried toxic waste.
2. Hazardous waste that is toxic is _____.
3. Hazardous waste that is _____ is likely to explode
4. The greatest source of hazardous waste is _____.
5. Batteries contain materials that are both toxic and _____.

Lesson 19.2: Critical Writing

Name_____ Class_____ Date_____

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

Summarize the story of Love Canal. Then explain how it changed the way we deal with hazardous waste.

CHAPTER 20 MS Human Actions and Earth's Resources Worksheets

Chapter Outline

20.1 USE AND CONSERVATION OF RESOURCES

20.2 USE AND CONSERVATION OF ENERGY

20.1 Use and Conservation of Resources

Lesson 20.1: True or False

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

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

_____ 1. Renewable resources cannot be overused.

_____ 2. Both plastic and rubber are made from petroleum.

_____ 3. Elements that are used to produce nuclear power are renewable resources.

_____ 4. Oil reserves beneath land are running out.

_____ 5. When we conserve resources we also produce less trash.

_____ 6. We use less of fossil fuels today than we did in the 1970s.

_____ 7. China uses more paper per person than any other country.

_____ 8. It costs more to recycle resources than to use new resources.

_____ 9. Recycling used products is the same as reusing them.

_____ 10. Recycled plastic water bottles can be made into t-shirts.

Lesson 20.1: Critical Reading

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

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

Reducing Resource Use

Reducing resource use means just what it says—using fewer resources. There are several ways to reduce resource use.

- Buy durable goods. Choose items that are well made so they will last longer. You'll buy fewer items in the long run. This may save money as well as resources.
- Repair rather than replace. Fix your bike rather than buying a new one. Sew on a button instead of buying a new shirt. You'll use fewer resources and save money.
- Buy only what you need. Don't buy a gallon of milk if you can drink only half of it before it spoils. Instead, buy a half gallon and drink all of it. You won't be wasting resources (or money).
- Buy local. For example, buy local produce at a farmer's market. A lot of resources are saved by not shipping goods long distances. Products bought at farmer's markets also use less packaging.

About a third of what we throw out is packaging. Try to buy items with the least amount of packaging. For example, buy bulk items instead of those that are individually wrapped. Also, try to select items with packaging that can be reused or recycled. This is called precycling. Pop cans and plastic water bottles, for example, are fairly easy to

recycle. Some types of packaging are harder to recycle. For example, some plastics are more difficult to recycle than others. In addition, packaging made of more than one material may be difficult to recycle. If packaging can't be reused or recycled, it's a waste of resources.

Questions

1. What are three ways of reducing resource use?
2. How does buying local save resources?
3. What is precycling? How does it conserve resources?

Lesson 20.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Natural resources include
    a. wind.
    b. sunlight.
    c. living things.
    d. all of the above
2. Uses of natural resources include
    a. food.
    b. jewelry.
    c. clothing.
    d. all of the above
3. Minerals are used to make
    a. parts for vehicles.
    b. fabric for clothing.
    c. parts for electronics.
    d. two of the above
4. Which place uses the most gasoline and diesel oil?
    a. United States
    b. Europe
    c. China
    d. India
5. Which way of conserving resources is likely to use the most energy?
    a. reusing
    b. reducing
    c. recycling
    d. precycling
6. Which items can be recycled?
    a. telephone books
    b. lawn clippings
    c. food scraps
    d. all of the above
7. Which alternative for bagging groceries is the best way to conserve natural resources?

a. Use only paper bags.
b. Use only plastic bags.
c. Use a mix of paper and plastic bags.
d. Bring your own reusable cloth bags.

Lesson 20.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. example of a renewable resource

_____ 2. saving resources

_____ 3. any natural resource that will not run out if we use it wisely

_____ 4. anything in nature that humans need

_____ 5. buying items with reusable or recyclable packaging

_____ 6. example of a nonrenewable resource

_____ 7. any natural resource that will run out if we keep using it

Terms

a. natural resource

b. fossil fuel

c. conservation

d. renewable resource

e. water

f. precycling

g. nonrenewable resource

Lesson 20.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Timber is an example of a(n) _____ natural resource.
2. Minerals are examples of _____ natural resources.
3. Rich nations use _____ natural resources than poor nations.
4. Items that are thrown in the trash usually end up in a(n) _____.
5. The act of contaminating natural resources is called _____.
6. The three "R"s of conservation are _____, reuse, and recycle.
7. Buying bulk items instead of those that are individually wrapped is an example of _____.

Lesson 20.1: Critical Writing

Name_____ Class_____ Date_____

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

Use examples to illustrate how you could conserve resources on a trip to the grocery store.

20.2 Use and Conservation of Energy

Lesson 20.2: True or False

Name_____ Class_____ Date_____

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

_____ 1. In the U.S., more energy is used for transportation than for any other single purpose.

_____ 2. Nonrenewable energy resources used in the U.S. include nuclear energy.

_____ 3. The renewable energy resource that is used most in the U.S. is solar energy.

_____ 4. Solar energy usually must be transported long distances to be useful.

_____ 5. The purpose of solar panels is to prevent sunlight from overheating a home.

_____ 6. Most nonrenewable energy resources will last thousands of years if we conserve them.

_____ 7. Collecting sunlight for solar energy requires solar energy power plants.

_____ 8. You can save more energy by unplugging appliances than just turning them off.

_____ 9. A car uses gasoline more efficiently if it is driven faster than 55 mi/hr.

_____ 10. You can save electricity by using compact fluorescent light bulbs.

Lesson 20.2: Critical Reading

Name_____ Class_____ Date_____

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

Conserving Energy

Nonrenewable energy resources will run out before long. Using these energy resources also produces pollution and increases global warming. For all these reasons, you should try to use these energy resources less or at least use them more efficiently.

There are many ways you can use nonrenewable energy resources less. For example, you can use less energy for transportation by planning ahead to reduce the number of trips you make. You can also take a bus or train instead of driving. Better yet, you can walk or ride a bike, which doesn't use any nonrenewable energy at all. You can use less energy at home by unplugging appliances when not in use. You can also turn off lights when you leave a room. If you feel chilly, you can put on a sweater instead of turning up the heat. You will also use less energy if you run the dishwasher or washing machine only when it is full.

There are several ways you can get more work out of the energy you use. By using energy more efficiently, you won't need to use as much energy overall. For example, fuel-efficient cars result in a big savings of energy resources. Not driving faster than 90 km/hr (55 mi/hr) also saves energy. A well-insulated home with energy-efficient windows can save a lot of energy as well. Within the home, using compact fluorescent light bulbs and Energy Star appliances are other ways to use energy more efficiently.

Questions

1. Why is it important to conserve nonrenewable energy resources?
2. Describe several ways that people can conserve energy in transportation.
3. How can people conserve energy at home?

Lesson 20.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Which of the following uses the most total energy in the U.S.?
    a. stores.
    b. homes.
    c. businesses.
    d. shopping malls.
2. Of all the energy used in the U.S., industrial uses account for
    a. 17 percent.
    b. 21 percent.
    c. 28 percent.
    d. 33 percent.
3. The U.S. depends for energy mainly on
    a. wind.
    b. sunlight.
    c. fossil fuels.
    d. flowing water.
4. Fossil fuels include
    a. coal.
    b. petroleum.
    c. natural gas.
    d. all of the above
5. The first step in obtaining and using fossil fuels is
    a. changing fossil fuels to different forms of energy.
    b. removing fossil fuels from the ground.
    c. finding fossil fuel reserves.
    d. refining fossil fuels.
6. Petroleum is separated into different products by
    a. freezing.
    b. melting.
    c. cooling.
    d. heating.
7. Obtaining, refining, and transporting oil require energy. For every 5 barrels of oil we use, the oil required for these purposes is
    a. 1 barrel.

b. 2 barrels.
c. 3 barrels.
d. 4 barrels.

Lesson 20.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. fuel that is refined from petroleum

_____ 2. energy resource that is used more than any other in the U.S.

_____ 3. plant that separates petroleum into different products

_____ 4. example of a renewable energy resource

_____ 5. largest single use of energy in the U.S.

Terms

a. industry

b. gasoline

c. solar energy

d. refinery

e. petroleum

Lesson 20.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Everything we do uses _____.
2. The second greatest use of energy in the U.S. is _____.
3. Wind is a(n) _____ energy resource.
4. Petroleum is extracted from the ground with an oil drilling _____.
5. It takes _____ energy to obtain renewable than nonrenewable energy resources.
6. Using _____ energy resources produces pollution.
7. Appliances with the _____ logo use energy efficiently.

Lesson 20.2: Critical Writing

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

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

Summarize how energy is used in the U.S. and where the energy comes from.

CHAPTER 21 MS Human Actions and Earth's Water Worksheets

Chapter Outline

21.1 HUMANS AND THE WATER SUPPLY

21.2 WATER POLLUTION

21.3 PROTECTING THE WATER SUPPLY

21.1 Humans and the Water Supply

Lesson 21.1: True or False

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

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

_____ 1. All forms of life need water to survive.

_____ 2. We can live longer without water than we can without food.

_____ 3. Irrigation may add unwanted chemicals to groundwater.

_____ 4. Water can be used to generate electricity.

_____ 5. More than 70 percent of Earth's surface is covered with water.

_____ 6. Most people in the world have enough clean fresh water.

_____ 7. Most of the fresh water on Earth is under the ground.

_____ 8. Drier climates generally have less water for people to use.

_____ 9. Because of conservation, we use less water today than we did a century ago.

_____ 10. Water is safe to drink as long as it is moving water.

Lesson 21.1: Critical Reading

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

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

Water in Agriculture

Many crops are grown where there isn't enough rainfall for plants to thrive. For example, crops are grown in deserts of the American southwest. How is this possible? The answer is irrigation. Irrigation is any way of providing extra water to plants. Most of the water used in agriculture is used for irrigation. Livestock also use water, but they use much less.

Irrigation can waste a lot of water. Overhead irrigation systems are the most wasteful. Water is sprayed into the air, and then it falls to the ground like rain. But much of the water never reaches the crops. Instead, it evaporates in the air or runs off the fields.

In addition to wasting water, irrigation can cause other problems. Irrigation water may dissolve agricultural chemicals such as pesticides. When the water soaks into the ground, so do the dissolved chemicals. They may enter groundwater and end up in people's wells. Alternatively, dissolved chemicals may be carried in runoff to rivers or lakes and pollute these bodies of water. Salts in irrigation water can also collect in the soil. The soil may become too salty for plants to survive.

Questions

1. What is irrigation? Where is it used?
2. How does irrigation waste water?
3. What other problems can irrigation cause?

Lesson 21.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Municipal use of water refers to water that is used for
    a. manufacturing.
    b. growing crops.
    c. raising livestock.
    d. none of the above
2. Irrigation water may cause
    a. soil to become too salty for plants.
    b. pesticides to enter groundwater.
    c. a lot of water to be wasted.
    d. all of the above
3. Almost a quarter of the water used worldwide is used by
    a. farms.
    b. factories.
    c. businesses.
    d. households.
4. In industry, water is used for
    a. cooling machines.
    b. chemical reactions.
    c. purifying municipal sewage.
    d. two of the above
5. The main cause of disease and death in young children worldwide is
    a. food scarcity.
    b. water scarcity.
    c. water pollution.
    d. none of the above
6. Which of the following human actions increases the risk of drought?
    a. cutting down trees
    b. irrigating farmland
    c. building golf courses
    d. polluting water with wastes
7. A lot of irrigation water is wasted because it
    a. evaporates in the air.
    b. runs off the field.
    c. soaks into the soil.
    d. two of the above

Lesson 21.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. world's most serious resource problem

_____ 2. period of unusually low rainfall

_____ 3. degree to which water is polluted

_____ 4. any method of providing extra water to plants

_____ 5. underground pipe that collects runoff water

_____ 6. greatest use of water worldwide

Terms

a. agriculture

b. irrigation

c. storm sewer

d. drought

e. water scarcity

f. water quality

Lesson 21.1: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The second greatest use of water worldwide is _____.
2. Most of the water used in agriculture is used for _____.
3. The type of irrigation system that wastes the most water is a(n) _____ irrigation system.
4. Water that goes down the drain inside homes is treated and prepared for reuse at a(n) _____ plant.
5. Storm sewers generally carry water to a(n) _____ of water.
6. The type of recreation that uses up the most water is _____.
7. More than 97 percent of Earth's water is _____ water.

Lesson 21.1: Critical Writing

Name_____ Class_____ Date_____

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

How is an area's water supply related to rainfall and wealth?

21.2 Water Pollution

Lesson 21.2: True or False

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

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

_____ 1. Point source pollution is harder to control.

_____ 2. Agricultural pollution can contaminate well water.

_____ 3. Livestock waste is always stored safely in lagoons.

_____ 4. Industrial water pollution commonly includes toxic chemicals such as mercury.

_____ 5. No harm is done if lawn chemicals are washed into storm sewers.

_____ 6. Most of the pollution in the oceans is carried there by rivers and runoff.

_____ 7. Oil leaks and spills occur only in the oceans.

_____ 8. Thermal pollution kills fish by making the water too cold.

_____ 9. In some places, people dump trash and raw sewage into the ocean.

_____ 10. If polluted water infiltrates the ground, it is no longer a problem.

Lesson 21.2: Critical Reading

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

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

Ocean Water Pollution

The oceans are vast. You might think that they are too big to be harmed by pollution. But that's not the case. Ocean water is becoming seriously polluted. The oceans are most polluted along coasts because most pollution enters the oceans from the land. Runoff and rivers carry the majority of pollution into the oceans. Many cities dump their wastewater into coastal waters. The wastewater may not be adequately treated to make it safe. In some parts of the world, raw sewage and trash may be thrown directly into the water. Coastal water may become so polluted that people get sick if they swim in it or eat seafood from it. The polluted water may also kill fish and other ocean life.

Oil spills are another source of ocean water pollution. To get at oil buried beneath the seafloor, oil rigs are built to float on the water and drill into the ocean floor. Oil is pumped to the surface and transported to a refinery. Huge ocean tankers carry oil all over world. If something goes wrong with a rig or a tanker, millions of barrels of oil may end up in the water. The oil may coat and kill ocean animals. Oil also washes ashore. This oil may destroy coastal wetlands and ruin beaches.

Questions

1. Where are oceans most polluted? Why?

2. Describe sources of ocean water pollution.
3. Identify causes and consequences of oil spills in ocean water.

Lesson 21.2: Multiple Choice

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

Circle the letter of the correct choice.

1. Sources of water pollution include
    a. industry.
    b. agriculture.
    c. municipal sources.
    d. all of the above
2. Examples of non-point source pollution include
    a. a factory discharging chemicals into a lake through a pipe.
    b. runoff carrying pesticides into a lake from surrounding farmland.
    c. a nuclear power plant pumping warm water into a nearby lake.
    d. two of the above
3. If dissolved fertilizer enters bodies of water, it can lead to
    a. too many fish.
    b. too many algae.
    c. dead zones.
    d. two of the above
4. Bacteria are most likely to contaminate water if it is polluted by a(n)
    a. oil refinery.
    b. chemical plant.
    c. nuclear power plant.
    d. sewage treatment plant.
5. Nuclear power plants use water for
    a. cooling.
    b. chemical reactions.
    c. nuclear fusion reactions.
    d. neutralizing radioactive elements.
6. Water pollution is a problem
    a. only in poor nations.
    b. mainly in rich nations.
    c. all over the world.
    d. only for ocean animals.

Lesson 21.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. major cause of water pollution

_____ 2. pollution that enters water in many places

_____ 3. pollution that raises the temperature of water

_____ 4. where ocean pollution is worst

_____ 5. pollution that enters water in just one place

_____ 6. area in a body of water where nothing can live

Terms

a. non-point source pollution

b. dead zone

c. point source pollution

d. agriculture

e. coast

f. thermal pollution

Lesson 21.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. _____ carries agricultural chemicals from fields into bodies of water.
2. The type of pollution in question 1 is called _____ source pollution.
3. Water polluted with animal wastes causes human _____.
4. Nuclear power plants may pollute water with _____ chemicals.
5. Thermal pollution reduces the amount of _____ that water can hold.
6. Most pollution enters oceans from the _____.

Lesson 21.2: Critical Writing

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

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

Explain how agriculture can cause serious water pollution.

21.3 Protecting the Water Supply

Lesson 21.3: True or False

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

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

_____ 1. A burning river helped people realize the need to protect water.

_____ 2. Water pollution has been reduced by laws fining polluters.

_____ 3. Most water pollution is caused by recreation on the water.

_____ 4. Coagulation is used during water treatment to remove chemicals from water.

_____ 5. Filters are used during water treatment to remove bacteria from water.

_____ 6. People in wealthy nations waste more water than people in poor nations.

_____ 7. The single biggest use of water is for industry.

_____ 8. Water-saving toilets use only about half as much water as regular toilets.

_____ 9. When communities ration water, they ban its use by certain households.

_____ 10. Chemicals are added to untreated water to cause solids to clump together.

Lesson 21.3: Critical Reading

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

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

Conserving Water

Conserving water means using less of it. Of course, this mostly applies to people in the wealthy nations who have the most water and also waste the most. Irrigation is the single biggest use of water. Overhead irrigation wastes a lot of water. Drip irrigation wastes less. In drip irrigation, water pipes run over or just under the surface of the soil. There are tiny holes in the pipes close to the plants. Water slowly drips out of the holes and soaks into the soil around the plants. Very little of the water evaporates or runs off the ground.

Some communities save water with rationing, especially during droughts. Typically,, rationing saves water by banning its use for certain purposes. For example, communities may ban lawn watering and car washing. People may be fined if they use water for these purposes.

Individuals can conserve water at home in several ways. If they save even a few gallons a day, it will make a big difference over the long run. The best place to start saving water is in the bathroom. Toilet flushing is the single biggest use of water in the home. Showers and baths are the next biggest use. People can follow these tips to save water at home:

- Install water-saving toilets. They use only about half as much water per flush. A single household can save up to 20,000 gallons of water a year with this change alone.

- Take shorter showers. Taking a 5-minute shower instead of a 10-minute shower saves up to 50 gallons of water per shower.
- Use low-flow shower heads. They use about half as much water as regular shower heads. They save thousands of gallons of water a year.
- Fix leaky shower heads and faucets. All those drips really add up. At one drip per second, more than 6,000 gallons go down the drain in a year because of a single leaky faucet.
- Don't leave the water running while brushing teeth. This could save as much as 10 gallons per brushing.
- Landscape around the house with plants that don't need extra water. This could result in a huge savings in water use.

Questions

1. Why does drip irrigation waste less water than overhead irrigation?
2. When and how do communities ration water?
3. Identify three ways that people can save water in the home.

Lesson 21.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. To protect the water supply, you should dispose of motor oil by
   a. pouring it down the drain.
   b. spreading it over the ground.
   c. letting it run into a storm sewer.
   d. none of the above
2. If pet wastes pollute the water supply, they can
   a. add nitrogen to the water.
   b. cause overgrowth of algae.
   c. pollute the water with bacteria.
   d. all of the above
3. The goal of all water treatment is to
   a. make water pure enough to drink.
   b. remove unwanted substances from water.
   c. make water safe enough to return to the natural environment.
   d. all of the above
4. Which processes are involved in treating drinking water?
   a. coagulation
   b. sedimentation
   c. filtration
   d. all of the above
5. Ways that people can conserve water include all of the following except
   a. fixing leaky faucets.
   b. taking shorter showers.
   c. using low-flow shower heads.
   d. leaving on the water while brushing teeth.

6. The single biggest use of water in the home is
    a. toilet flushing.
    b. cooking.
    c. cleaning.
    d. laundry.

Lesson 21.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. process in water treatment in which small particles are separated from water

_____ 2. process in water treatment in which large particles settle to the bottom of the water

_____ 3. series of processes to improve the quality of water

_____ 4. process in water treatment in which chlorine is added to water

_____ 5. preserving a resource by using less of it

_____ 6. contamination with chemicals, waste, or other harmful substances

_____ 7. process in water treatment in which solids in water clump together

Terms

a. water treatment

b. pollution

c. conservation

d. sedimentation

e. filtration

f. coagulation

g. disinfection

Lesson 21.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. During water treatment, _____ is added to water to kill microbes.
2. A(n) _____ irrigation system wastes a lot of water.
3. A(n) _____ irrigation system wastes very little water.
4. When communities place limits on water use, this is called _____ of water.
5. In a home, the _____ is the room where most water is used.
6. The letters _____ stand for the U.S. government agency in charge of protecting the environment.
7. The U.S. law known as the _____ Act requires testing and cleanup of polluted water.

Lesson 21.3: Critical Writing

Name_____ Class_____ Date_____

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

Outline the steps in which water is treated for drinking. Explain how each step improves the quality of the water.

CHAPTER 22 MS Human Actions and the Atmosphere Worksheets

Chapter Outline

22.1 AIR POLLUTION

22.2 EFFECTS OF POLLUTION

22.3 REDUCING AIR POLLUTION

22.1 Air Pollution

Lesson 22.1: True or False

Name_____ Class_____ Date_____

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

_____ 1. Air pollution is caused completely by human actions.

_____ 2. The air in the U.S. is more polluted now than it was 50 years ago.

_____ 3. Livestock wastes pollute the air with methane.

_____ 4. Animal wastes add particulates to the atmosphere.

_____ 5. Particulates include only particles big enough to be seen by the unaided eye.

_____ 6. Ozone forms when certain air pollutants are heated by direct sunlight.

_____ 7. Paints and petroleum products release volatile organic compounds.

_____ 8. Air pollution contributes to global warming.

_____ 9. In California, mountain ranges can trap polluted air over cities.

_____ 10. All primary pollutants come from directly from motor vehicles and smokestacks.

Lesson 22.1: Critical Reading

Name_____ Class_____ Date_____

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

How Pollutants Enter the Atmosphere

Most pollutants enter the atmosphere when fossil fuels burn. Some pollutants are released when forests burn. Others evaporate into the air.

The burning of fossil fuels releases many pollutants into the air. These pollutants include carbon monoxide, carbon dioxide, nitrogen dioxide, and sulfur dioxide.

- Motor vehicles account for almost half of fossil fuel use. Most vehicles run on gasoline, which comes from petroleum.
- Power plants and factories account for more than a quarter of fossil fuel use. Power plants burn fossil fuels to generate electricity. Factories burn fossil fuels to power machines.
- Homes and other buildings also burn fossil fuels. They use fossil fuels for heating, cooking, and other purposes.

Millions of acres of forest have been cut and burned to make way for farms. The burning of trees produces most of the same pollutants as the burning of fossil fuels.

Volatile organic compounds, or VOCs, enter the air by evaporation. VOCs are found in many products, including paints and petroleum products. The VOC called methane evaporates into the air from livestock waste and landfills.

Questions

1. List three general sources of pollutants that enter the atmosphere.
2. Identify air pollutants produced by the burning of fossil fuels.
3. Where and why are fossil fuels burned?
4. Describe air pollution from the burning of forests.
5. What are VOCs? How do they enter the atmosphere?

Lesson 22.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The worst air pollution in the U.S. occurs in
    a. New York State.
    b. New Jersey.
    c. California.
    d. Florida.
2. The "Big Smoke" was an incident of deadly air pollution that occurred in the mid-1900s in
    a. Los Angeles.
    b. San Francisco.
    c. Mexico City.
    d. London.
3. In the U.S. today, air pollution comes from
    a. vehicles.
    b. factories.
    c. power plants.
    d. all of the above
4. Most primary pollutants are released by
    a. volcanic eruptions.
    b. natural processes.
    c. human activities.
    d. forest fires.
5. Pollutants released into the air when fossil fuels burn include
    a. carbon monoxide.
    b. carbon dioxide.
    c. particulates.
    d. all of the above
6. Smog consists mainly of
    a. smoke.
    b. particulates.
    c. water vapor.
    d. none of the above

7. Almost half of the fossil fuels that are burned are used by
    a. factories.
    b. power plants.
    c. cars and trucks.
    d. homes and other buildings.

Lesson 22.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. type of pollutant that forms when other pollutants undergo chemical reactions

_____ 2. primary pollutant that is a carbon compound such as methane

_____ 3. type of pollutant that enters the air directly

_____ 4. solid particle in the air

_____ 5. measure of the pollutants in air

_____ 6. brown haze that forms in air when certain pollutants react together in sunlight

_____ 7. primary component of photochemical smog

Terms

a. air quality

b. photochemical smog

c. primary pollutant

d. VOC

e. particulate

f. ozone

g. secondary pollutant

Lesson 22.1: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. In the U.S., the 1970 _____ Act placed limits on what can be released into the air.
2. Pollutants called sulfur oxides are released mainly when _____ burns.
3. Ash and dust are examples of common _____ in air.
4. Most pollutants enter the air when _____ burn.
5. VOCs enter the air by _____.
6. Poor air quality started to become a problem after the _____, when coal-burning factories became common.
7. Mercury and lead are toxic heavy _____ that may pollute the air.

Lesson 22.1: Critical Writing

Name_____ Class_____ Date_____

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

Photochemical smog forms more often in the summer than in the winter. Explain why.

22.2 Effects of Pollution

Lesson 22.2: True or False

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

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

_____ 1. Breathing polluted air increases the risk of lung cancer.

_____ 2. Ozone in smog can kill entire forests.

_____ 3. Some people are more sensitive to smog than others.

_____ 4. Small fish are likely to contain higher levels of lead than large fish.

_____ 5. Exposure to heavy metals can cause brain damage in unborn babies.

_____ 6. Acid rain contains higher-than-normal levels of carbonic acid.

_____ 7. Acid rain damages structures but does not harm living things.

_____ 8. The hole in the ozone layer shows that air quality is improving.

_____ 9. The ozone hole is bigger in some seasons than in others.

_____ 10. Ground-level ozone is especially harmful to people with heart disease.

Lesson 22.2: Critical Reading

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

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

Acid Rain

The pH value of normal rain is 5.6. A pH value of 7 is neutral, so normal rain is slightly acidic. That's because carbon dioxide in air dissolves in rain. This forms carbonic acid, a weak acid. Acid rain has a pH value of less than 5. Acid rain forms when nitrogen and sulfur oxides in air dissolve in rain. They form nitric and sulfuric acids. Both are strong acids. Acid rain may have a pH value as low as 4.0. Acid fog may be even more acidic than acid rain. Acid fog with a pH value as low as 1.7 has been recorded. That's the same pH value as toilet bowl cleaner!

Acid rain ends up in soil and bodies of water. This can make them very acidic. Acid can also strip soil of its nutrients. These changes can kill trees, fish, and other living things. In addition, acid rain dissolves limestone and marble. This can damage buildings, monuments, and statues.

Questions

1. Why is normal rain slightly acidic?
2. Compare the acidity of normal rain, acid rain, and acid fog.
3. What causes acid rain?
4. How does acid rain affect soil and water? How do these changes affect living things?

5. Why does acid rain damage buildings, monuments, and statues?

Lesson 22.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Air pollutants that increase the risk of asthma include
    a. ozone.
    b. particulates.
    c. heavy metals.
    d. two of the above
2. An air quality index of 120 parts of ozone per million parts of air is
    a. safe only for young people.
    b. unhealthy for some people.
    c. unhealthy for all people.
    d. safe for all people.
3. Nitrogen and sulfur oxides
    a. are toxic to humans.
    b. can cause lung diseases.
    c. form acid rain.
    d. all of the above
4. Which organisms in a food chain have the highest levels of heavy metals?
    a. producers
    b. primary consumers
    c. secondary consumers
    d. tertiary consumers
5. Sources of VOCs include
    a. cleaning solutions.
    b. building materials.
    c. paints.
    d. all of the above
6. Normal rain is slightly acidic because it contains dissolved
    a. oxygen.
    b. nitrogen.
    c. carbon dioxide.
    d. nitrogen dioxide.
7. The ozone layer in the atmosphere
    a. occurs in the stratosphere.
    b. is being destroyed by acid rain.
    c. protects Earth from harmful CFCs.
    d. forms only over the South Pole and Antarctica.

Lesson 22.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. type of pollutant that is usually higher in indoor than outdoor air

_____ 2. buildup of heavy metals in the tissues of organisms

_____ 3. harmful radiation blocked by the ozone layer

_____ 4. gas in smog that is harmful to plants and people

_____ 5. type of air pollutant that destroys the ozone layer

_____ 6. type of air pollutant that blocks sunlight from reaching Earth's surface

_____ 7. odorless, colorless gas that is deadly to people in a confined space

Terms

a. ozone

b. bioaccumulation

c. particulate

d. carbon monoxide

e. VOC

f. CFC

g. UV

Lesson 22.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Children are _____ likely than adults to be affected by air pollution.
2. Solid air pollutants called _____ may reduce the energy available for photosynthesis.
3. If nitrogen and sulfur oxides dissolve in raindrops, the result is _____ rain.
4. Mercury and lead are examples of pollutants called _____.
5. The pollutants in question 4 enter food chains from the _____.
6. Acid rain has a pH value of less than _____.
7. CFCs are human-made chemicals that contain the element _____.

Lesson 22.2: Critical Writing

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

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

What is bioaccumulation, and why does it occur?

22.3 Reducing Air Pollution

Lesson 22.3: True or False

Name_____ Class_____ Date_____

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

_____ 1. The Clean Air Act was passed in order to reduce global warming.

_____ 2. Because of the Clean Air Act, air pollution has been eliminated completely.

_____ 3. Pollution by ozone was reduced at least 50 percent by the Montreal Protocol.

_____ 4. Hydrogen cars produce about 10 percent of the air pollution of gas-burning cars.

_____ 5. Some scrubbers use steam to remove pollutants from exhaust.

_____ 6. The Kyoto Protocol has been more successful than the Montreal Protocol.

_____ 7. The size of the hole in the ozone layer has gotten somewhat smaller since 2006.

_____ 8. Cap-and-trade systems were developed to reduce the use of CFCs.

_____ 9. Carbon is sequestered naturally by forests.

_____ 10. The world's greatest producer of greenhouse gases is the U.S.

Lesson 22.3: Critical Reading

Name_____ Class_____ Date_____

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

Reducing Air Pollution from Fossil Fuels

There are two basic types of strategies for reducing air pollution from fossil fuels. One type of strategy is to reduce our use of fossil fuels. The other type of strategy is to prevent pollution from entering the air when fossil fuels are used.

We can reduce our use of fossil fuels in several ways:

- We can conserve fossil fuels. For example, turning out lights when we aren't using them saves electricity. That's because a lot of the electricity we use comes from coal-burning power plants.
- We can use fossil fuels more efficiently. For example, driving a fuel-efficient car lets you go farther on each gallon of gas. This can add up to a big savings in fossil fuel use.
- We can change to alternative energy sources that produce little or no air pollution. For example, hybrid cars run on electricity that the cars produce during braking. These cars use gas only as a backup fuel. As a result, they produce just 10 percent of the air pollution produced by cars that run only on gas. Cars that run on hydrogen produce no pollution at all.

We can prevent pollution from entering the air when fossil fuels are used by removing pollutants from exhaust before

it is released into the air. Two widely used technologies are scrubbers and catalytic converters. Scrubbers are used in factories and power plants. They remove particulates and waste gases from exhaust. Catalytic converters are used in motor vehicles. They break down pollutants in exhaust to non-toxic compounds. For example, they change nitrogen oxides to harmless nitrogen and oxygen gasses.

Questions

1. Identify two basic types of strategies for reducing pollution from fossil fuels.
2. Describe two specific ways we can reduce our use of fossil fuels.
3. Compare and contrast scrubbers and catalytic converters.

Lesson 22.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Pollutants regulated by the Clean Air Act include
    a. CFCs.
    b. carbon dioxide.
    c. carbon monoxide.
    d. all of the above
2. Air pollutants that destroy ozone high in the atmosphere are regulated by the
    a. Clean Air Act.
    b. Kyoto Protocol.
    c. Montreal Protocol.
    d. none of the above
3. In a cap-and-trade system, each nation is given a cap on emissions of
    a. CFCs.
    b. carbon dioxide.
    c. nitrogen oxides.
    d. all air pollutants.
4. Carbon taxes are meant to
    a. encourage people to use less fossil fuel.
    b. reduce carbon dioxide emissions.
    c. control greenhouse gases.
    d. all of the above
5. Ways of reducing air pollution include
    a. changing pollutants in exhaust to harmless gases.
    b. removing pollutants from exhaust before it is released.
    c. using fossil fuels more efficiently.
    d. all of the above
6. One purpose of catalytic converters is to
    a. reduce the use of fossil fuels.
    b. remove particulates from exhaust.
    c. break down pollutants to safe compounds.
    d. convert gas-burning cars to hybrid vehicles.

7. Scrubbers are used in
    a. motor vehicles.
    b. power plants.
    c. factories.
    d. two of the above

Lesson 22.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. worldwide agreement on air pollution that focuses on CFCs

_____ 2. device that changes pollutants in exhaust gases to non-toxic compounds

_____ 3. worldwide agreement on air pollution that focuses on greenhouse gases

_____ 4. device that filters pollutants from exhaust gases

_____ 5. U.S. law that regulates six major air pollutants

_____ 6. removing carbon dioxide from the atmosphere and storing it in another form

_____ 7. system of limits and allowances on carbon dioxide emissions that can be exchanged between nations

Terms

a. scrubber

b. catalytic converter

c. cap-and-trade

d. carbon sequestration

e. Montreal Protocol

f. Kyoto Protocol

g. Clean Air Act

Lesson 22.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. Driving less is an example of fossil fuel _____.
2. Cars that run on electricity and use gas only as a backup fuel are called _____ cars.
3. A major problem with hydrogen cars is the lack of _____.
4. A catalytic converter changes _____ in exhaust to nitrogen and oxygen gases.
5. The aim of the Montreal Protocol is to protect the _____.
6. The aim of the Kyoto Protocol is to control global _____.
7. The main greenhouse gas causing global warming is _____.

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 carbon taxation and carbon sequestration as ways of reducing carbon dioxide levels in the atmosphere.

CHAPTER 23 MS Observing and Exploring Space Worksheets

Chapter Outline

23.1 TELESCOPES

23.2 EARLY SPACE EXPLORATION

23.3 RECENT SPACE EXPLORATION

23.1 Telescopes

Lesson 23.1: True or False

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

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

_____ 1. Light travels as vibrating electric and magnetic fields.

_____ 2. All telescopes work by gathering and focusing visible light.

_____ 3. Visible light includes all the colors of the rainbow.

_____ 4. The only radiation emitted by the sun is visible light.

_____ 5. The light from distant stars is very old by the time it reaches Earth.

_____ 6. The largest optical telescopes today are refracting telescopes.

_____ 7. Radio telescopes look like satellite dishes.

_____ 8. The Hubble telescope is the only space telescope ever placed in orbit.

_____ 9. Galileo observed that Venus has phases like the moon.

_____ 10. Galileo's observations supported the theory that planets revolve around the sun.

Lesson 23.1: Critical Reading

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

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

Light from Stars

Earth is just a tiny speck in the universe. Our planet is surrounded by lots of space. Light travels across empty space at a speed of about 300,000,000 meters per second (670,000,000 miles per hour). At that rate, a beam of light could travel from New York to Los Angeles and back again nearly 40 times in just one second. Even at that amazing rate, objects in space are so far away that it takes a lot of time for their light to reach us. For example, light from the nearest star, our sun, takes about 8 minutes to reach Earth.

Because distances in space are so great, we need a really big unit to measure them. The unit commonly used is the light-year. One light-year is the distance that light travels in one year. That distance is 9.5 trillion kilometers (5.9 trillion miles). That may seem like a very long distance, but in space it's actually very short. Consider Proxima Centauri, the next-closest star to Earth after the Sun. It is 4.22 light-years away from our planet. This means that light from Proxima Centauri takes 4.22 years to reach Earth. Our galaxy, the Milky Way Galaxy, is about 100,000 light-years in diameter. Therefore, it takes light 100,000 years to travel from one side of the galaxy to the other. Even 100,000 light-years is a fairly short distance in space. The most-distant galaxies we have detected are more than 13 billion light-years away. That's over a hundred-billion-trillion kilometers!

When we look at light from stars and galaxies, we are seeing not only over great distances. We are also seeing back

in time because it takes so long for the light to reach us. When we see a distant galaxy, we are actually seeing how the galaxy used to look. For example, the Andromeda Galaxy is about 2.5 million light-years from Earth. When you see an image of the galaxy, you are seeing the galaxy as it was 2.5 million years ago. Because scientists can look back in time in this way, they can better understand the universe's history.

Questions

1. How fast does light travel through space?
2. How are distances measured in space?
3. Why are we seeing the past when we look at distant stars and galaxies?

Lesson 23.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The speed of light through space is
   a. 300 thousand m/s.
   b. 3 million m/s.
   c. 30 million m/s.
   d. 300 million m/s.
2. The ancient Greeks observed that some "stars" moved across the background of other stars. They named these stars "wanderers." Today, we call them
   a. moons.
   b. planets.
   c. galaxies.
   d. constellations.
3. The hottest stars emit primarily
   a. radio waves.
   b. microwaves.
   c. visible light.
   d. X rays and gamma rays.
4. The earliest telescopes were
   a. reflecting telescopes.
   b. refracting telescopes.
   c. radio telescopes.
   d. none of the above
5. The main reason that space telescopes can gather more information than telescopes on Earth's surface is that space telescopes are
   a. closer to objects in space.
   b. above Earth's atmosphere.
   c. optical telescopes.
   d. two of the above
6. Which of the following discoveries as made by Galileo with a telescope?
   a. Earth has a moon.
   b. The moon has craters.

c. Venus has moons.
d. all of the above

7. The spectrum of light from a star can be used to learn the star's
   a. speed.
   b. direction.
   c. temperature.
   d. all of the above

Lesson 23.1: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. type of electromagnetic wave with the highest frequency

_____ 2. number of waves that pass a given point per second

_____ 3. type of electromagnetic wave with the longest wavelength

_____ 4. horizontal distance between the same points on adjacent waves

_____ 5. device that collects and focuses radio waves from space

_____ 6. device that gathers and magnifies visible light from space

_____ 7. unit for measuring the vast distances of space

Terms

a. gamma ray

b. light-year

c. optical telescope

d. radio wave

e. wavelength

f. wave frequency

g. radio telescope

Lesson 23.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. The full range of radiation that travels across space from stars is called the _____.
2. A telescope that uses lenses to focus light is called a(n) _____ telescope.
3. The only light that humans can see is called _____ light.
4. A telescope that uses mirrors to focus light is called a(n) _____ telescope.
5. A(n) _____ analyzes light from stars to determine the elements the stars contain.

6. As wavelength decreases, wave frequency _____.
7. The color of visible light is determined by its _____.

Lesson 23.1: Critical Writing

Name_____ Class_____ Date_____

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

How do radio telescopes differ from optical telescopes? What might you observe with a radio telescope that you couldn't observe with an optical telescope?

23.2 Early Space Exploration

Lesson 23.2: True or False

Name_____ Class_____ Date_____

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

_____ 1. Humans first reached space at the beginning of the 20th century.

_____ 2. Rockets were developed before scientists knew how they worked.

_____ 3. The invention of gunpowder allowed rockets to travel to space.

_____ 4. The first use of rockets in space was to land astronauts on the moon.

_____ 5. Most satellites launch themselves into orbit.

_____ 6. Thousands of satellites are in orbit around Earth.

_____ 7. Landsat satellites make detailed images of continents and coasts.

_____ 8. Imaging satellites are placed in high orbits over Earth.

_____ 9. Alan Shepherd was the first astronaut to walk on the Moon.

_____ 10. The U.S. has landed space probes on Mars.

Lesson 23.2: Critical Reading

Name_____ Class_____ Date_____

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

The Space Race

The Cold War was a period of tension and competition between the Soviet Union (USSR) and the United States. It lasted from the end of World War II in 1945 to the breakup of the USSR in 1991. The hallmark of the Cold War was an arms race. The two nations spared no expense to create new and more powerful weapons. The development of better missiles to launch weapons led to better rocket technologies.

The USSR launched Sputnik 1 in October of 1957. This was the first artificial satellite ever put into orbit. Sputnik 1 sent out radio signals, which were detected by scientists and amateur radio operators around the world. The satellite stayed in orbit for about 3 months, until it burned up due to friction with Earth's atmosphere. About a month after Sputnik 1 was launched, the Soviets launched Sputnik 2. This satellite carried the first living creature into orbit, a dog named Laika.

The success of the Soviet Sputnik program started a space race between the USSR and the USA. Americans were shocked that the Soviets had the technology to put satellites into orbit. They worried that the Soviets might also be winning the arms race. In response to Sputnik program, the U.S. launched two satellites. Explorer I was launched in January of 1958 and Vanguard 1 in March of the same year. The National Aeronautics and Space Administration (NASA) was established in 1958 as well. In 1961, a Soviet cosmonaut became the first human in space. But less

than one month later, the U.S. sent its first person into space, astronaut Alan Shepherd.

In May of 1961, President John F. Kennedy challenged the U.S. Congress to fund a program for "landing a man on the Moon and returning him back safely to the Earth." The Soviets were also trying to reach the moon. Who would win? The answer came in 1969. That's when NASA's Apollo 11 mission put the first people on the moon: astronauts Neil Armstrong and Buzz Aldrin. In short order, NASA launched four more missions carrying astronauts to the moon. The last mission was Apollo 17, which landed on the moon in December of 1972. No other country has yet put a person on the moon.

Questions

1. What was the space race? How did it start?
2. Who were the first two people to travel to space? When did it happen?
3. What was the Apollo program? What did it achieve?
4. How do you think the Cold War affected space exploration in the second half of the 20th century?

Lesson 23.2: Multiple Choice

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

Circle the letter of the correct choice.

1. Rockets were first used as early as the
   a. 13th century.
   b. 17th century.
   c. 19th century.
   d. 20th century.
2. Isaac Newton's third law of motion states that
   a. an object in motion will remain in motion unless acted upon by a force.
   b. every object in the universe is attracted to every other object.
   c. for every action, there is an equal and opposite reaction.
   d. force equals mass multiplied by acceleration.
3. The first rocket to travel into space was used during
   a. the 1200s.
   b. World War I.
   c. World War II.
   d. the space race.
4. Satellites stay in orbit because of
   a. thrust.
   b. gravity.
   c. rockets.
   d. propulsion.
5. The Global Positioning System (GPS) uses
   a. communications satellites.
   b. navigational satellites.
   c. weather satellites.
   d. imaging satellites.
6. A satellite in a low orbit

a. travels from north to south over Earth's poles.
b. orbits Earth at the same rate that Earth spins.
c. moves in the same direction that Earth rotates.
d. remains over the same place on Earth's surface.

7. The first American to orbit Earth was

a. Neil Armstrong.
b. Buzz Aldrin.
c. John Glenn.
d. Alan Shepherd.

Lesson 23.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. circular or elliptical path around an object

_____ 2. force that pushes a rocket

_____ 3. object that orbits a larger object

_____ 4. largest artificial satellite

_____ 5. U.S. agency in charge of space exploration

_____ 6. vehicle pushed in one direction by particles flying out of it in the opposite direction

_____ 7. spacecraft that explores space without people aboard

Terms

a. rocket

b. thrust

c. space probe

d. satellite

e. ISS

f. orbit

g. NASA

Lesson 23.2: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. Humans could not go into space until they developed _____ to carry them past Earth's gravity.
2. _____ third law of motion explains how a rocket works.
3. _____ fuel is needed to give rockets enough power to escape Earth's gravity.

4. Human-made objects in orbit are called _____ satellites.
5. Newton's law of _____ explains why satellites stay in orbit.
6. The first artificial satellite ever put into orbit was named _____.
7. The space race took place between the USA and the _____.

Lesson 23.2: Critical Writing

Name_____ Class_____ Date_____

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

Apply Newton's laws to explain how rockets blast off and why satellites orbit Earth.

23.3 Recent Space Exploration

Lesson 23.3: True or False

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

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

_____ 1. The Huygens space mission is studying Pluto.

_____ 2. The Soviet Salyut space stations were all temporary stations.

_____ 3. Skylab studied the effects of staying in space for long periods of time

_____ 4. A space shuttle includes an orbiter, fuel tank, and booster rockets.

_____ 5. The space shuttle program flew a total of 10 missions.

_____ 6. The last space shuttle was retired in 2001.

_____ 7. Space shuttle disasters caused NASA to focus on missions without crews.

_____ 8. Saturn's moon Titan has some of the conditions needed to support life.

_____ 9. The Stardust mission collected dust particles from the surface of Mars.

_____ 10. Private companies will play more of role in future space missions.

Lesson 23.3: Critical Reading

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

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

Space Stations

In the early 1970s, the Soviets worked to build a space station. A space station is a large satellite where people live while it orbits Earth. Between 1971 and 1982, the Soviets used rockets to put a total of seven Salyut space stations into orbit. These were all temporary stations. They were launched and later inhabited by a human crew. Three of the Salyut stations were used for secret military purposes. The others were used to study the problems of living in space. Cosmonauts aboard the stations performed a variety of experiments in astronomy, biology, and Earth science.

During this same period, the U.S. launched only one space station, called Skylab. Skylab was launched in May of 1973. Three crews visited Skylab, all within its first year in orbit. Skylab was used to study the effects of staying in space for long periods. It also studied the Sun. Skylab re-entered Earth's atmosphere in 1979, sooner than expected.

The first space station designed for long-term use was the Mir space station. Mir was launched in several separate pieces. These pieces were put together in space. Mir holds the current record for the longest continued presence in space. There were people living on Mir continuously for almost 10 years. Mir was the first major space project in which the United States and Russia worked together. The cooperation allowed the two nations to learn from each other. Mir was taken out of orbit in 2001. It fell into the Pacific Ocean.

The International Space Station (ISS) is a joint project of space agencies in many nations These include the United

States, Russia, Japan, Canada, several European countries, and Brazil. The International Space Station is a very large station. It has many different sections and is still being assembled. The station has had people on board since 2000. American space shuttles have delivered most of the supplies and equipment to the station. Russian spacecraft carry people. The primary purpose of the station is scientific research. Experiments are done in biology, chemistry, physics, physiology, and medicine.

Questions

1. What is a space station? How is it put into space?
2. Outline the development of space stations, from the first space stations to the ISS.
3. How do crews and materials travel to and from space stations?
4. What is the purpose of space stations?

Lesson 23.3: Multiple Choice

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

Circle the letter of the correct choice.

1. While the U.S. flew missions to the moon in the early 1970s, the Soviets worked to build space
   a. orbiters.
   b. shuttles.
   c. stations.
   d. rovers.
2. The Soviet Salyut space stations were used for
   a. military purposes.
   b. scientific research.
   c. astronaut transport.
   d. two of the above
3. The first space station designed for long-term use was
   a. Salyut 7.
   b. Skylab.
   c. Mir.
   d. none of the above
4. Nations that have worked together on the International Space Station include
   a. U.S.
   b. Russia.
   c. Brazil.
   d. all of the above
5. Most people have been carried to and from the ISS by
   a. American shuttles.
   b. Russian spacecraft.
   c. U.S. and Soviet rovers.
   d. two of the above
6. Crews on U.S. space shuttles have
   a. transported materials to the ISS.
   b. repaired the Hubble space telescope.

c. launched satellites.
d. all of the above

7. The Hubble space telescope was put into orbit by the
   a. space shuttle Discovery.
   b. Deep Impact Probe.
   c. Cassini mission.
   d. Huygens Probe.

Lesson 23.3: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. space station that is a joint project of many nations

_____ 2. any large satellite that people can live on

_____ 3. part of a space shuttle that has wings

_____ 4. space station with the longest continuous use

_____ 5. reusable space vehicle for carrying equipment and people to and from space

_____ 6. first U.S. space station

_____ 7. first space telescope

Terms

a. space shuttle

b. ISS

c. space station

d. Skylab

e. Hubble

f. Mir

g. orbiter

Lesson 23.3: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. A space shuttle takes off like a(n) _____ and lands like an airplane.
2. The first space station ever put into orbit was named _____.
3. The _____ space station was the first major space project in which the U.S. and Russia worked together.
4. The main purpose of the International Space Station is _____.
5. Challenger was a(n) _____ that broke apart shortly after take-off.

6. A spacecraft on wheels that can roam the surface of a planet is called a(n) _____.
7. Pathfinder, Spirit, and Opportunity all studied the surface of _____.

Lesson 23.3: Critical Writing

Name_____ Class_____ Date_____

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

Contrast how space shuttles, rovers, and probes help us explore space.

CHAPTER 24 MS Earth, Moon, and Sun Worksheets

Chapter Outline

24.1 PLANET EARTH

24.2 EARTH'S MOON

24.3 THE SUN

24.4 THE SUN AND THE EARTH-MOON SYSTEM

24.1 Planet Earth

Lesson 24.1: True or False

Name_____ Class_____ Date_____

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

_____ 1. Earth is the only planet in the solar system known to have liquid water.

_____ 2. All objects in the solar system have gravitational attraction to each other.

_____ 3. If you look at Earth from the North Pole, the planet spins in a clockwise direction.

_____ 4. The moon appears to rise in the east because Earth rotates from east to west.

_____ 5. Earth tilts about 3 degrees on its axis.

_____ 6. Winter begins in the Southern Hemisphere on June 21.

_____ 7. The longest day in the Northern Hemisphere occurs on June 21.

_____ 8. To make one complete rotation takes Earth 365.24 days.

_____ 9. Planets closer to the sun that Earth have shorter years.

_____ 10. The hemisphere that receives less direct rays of sunlight is cooler.

Lesson 24.1: Critical Reading

Name_____ Class_____ Date_____

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

Earth and the Other Planets

As you walk over Earth's surface, the ground usually looks pretty flat. We have photos of Earth taken from space showing that Earth is actually round. However, long before we had photos of Earth from space, people knew that Earth was round. One way they could tell was by watching tall ships sail off into the distance. As the ships sailed over the horizon, the bottoms of the ships disappeared sooner than the tops. If Earth were flat instead of round, ships would just appear to get smaller as they sailed farther away.

Earth can be divided into four different layers: the lithosphere, atmosphere, hydrosphere, and biosphere.

- The lithosphere is the solid, rocky part of Earth. It includes both the continents and ocean basins.
- The atmosphere is the thin layer of gases that surrounds Earth. It consists mostly of nitrogen and oxygen.
- The hydrosphere consists of all the water on Earth. Most of Earth's surface is covered with water, and most of the water is salt water in the oceans. As far as we know, Earth is the only planet in the solar system that has liquid water.
- The biosphere is made up of all the living organisms on Earth. Earth appears to be the only planet in the solar system with living creatures. The water and oxygen on Earth are crucial to life as we know it.

In the solar system, Earth and the other planets orbit around the sun. Earth is the third planet from the Sun. It is one of the inner planets. The other three inner planets are Mercury, Venus, and Mars. Like Earth, the other inner planets are relatively small balls of solid rock. Jupiter is an outer planet. It is the largest planet in the solar system at about 1000 times the size of Earth. Jupiter and most of the outer planets are giant balls of swirling gas.

Questions

1. How did people know that Earth was round long before there were photos of Earth from space?
2. Identify the four layers of Earth.
3. Contrast the inner and outer planets of the solar system.

Lesson 24.1: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. The outer planets of the solar system are giant balls of
   a. solid ice.
   b. dense rock.
   c. liquid water.
   d. swirling gas.
2. Without gravity, the moon would
   a. drop to Earth's surface.
   b. start orbiting the sun.
   c. fly off into space.
   d. shrink in size.
3. The strength of the force of gravity between two objects depends on their
   a. mass.
   b. speed.
   c. distance apart.
   d. two of the above
4. Which statement about Earth's magnetic field is false?
   a. It extends into space.
   b. It is caused by gravity.
   c. It has north and south poles.
   d. It shields Earth from harmful radiation.
5. Earth's motions contribute to
   a. tides.
   b. seasons.
   c. day and night.
   d. all of the above
6. The side of Earth facing away from the sun is always
   a. in the dark.
   b. experiencing winter.
   c. cooler than the other side.
   d. two of the above

7. Earth has seasons because

    a. it tilts on its axis.
    b. its orbit is elliptical.
    c. it rotates on its axis.
    d. its distance from the sun varies.

Lesson 24.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. all of the water on Earth

_____ 2. half of a sphere

_____ 3. spinning motion around an axis

_____ 4. all of the living organisms on Earth

_____ 5. imaginary line passing through the poles of a planet

_____ 6. all of the solid rock of Earth

_____ 7. movement in an orbit around a larger body

Terms

a. axis

b. biosphere

c. hemisphere

d. hydrosphere

e. lithosphere

f. revolution

g. rotation

Lesson 24.1: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The inner planets of the solar system include Earth, Venus, Mars, and _____.
2. The largest planet in the solar system is _____.
3. The four layers of Earth are the lithosphere, biosphere, hydrosphere, and _____.
4. Earth's magnetic field is created by movements of molten metal in the _____.
5. Earth's _____ causes Earth's surface to experience repeated cycles of day and night.
6. During _____ in the Northern Hemisphere, the north pole points away from the sun.
7. It takes one _____ for Earth to make a complete revolution around the sun.

Lesson 24.1: Critical Writing

Name_____ Class_____ Date_____

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

Explain how Earth's motions cause cycles of day and night and also the seasons.

24.2 Earth's Moon

Lesson 24.2: True or False

Name_____ Class_____ Date_____

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

_____ 1. A total of six spaceships have landed on the moon.

_____ 2. There are no current plans for returning to the moon.

_____ 3. The moon's gravity is about half as strong as Earth's gravity.

_____ 4. It takes the moon the same amount of time to make one rotation as it does to make one revolution.

_____ 5. The far side of the moon has been seen only from spacecraft.

_____ 6. Most lunar maria are on the far side of the moon.

_____ 7. Natural processes continually alter the moon's surface.

_____ 8. Lunar highlands are made of light-colored rocks.

_____ 9. There are rivers but no lakes on the moon.

_____ 10. Astronauts brought moon rocks back to Earth.

Lesson 24.2: Critical Reading

Name_____ Class_____ Date_____

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

Lunar Characteristics

The moon is Earth's only natural satellite. With a diameter of about 3500 kilometers, the moon is about one-fourth the size of Earth. The gravity of the moon is only one-sixth as strong as Earth's gravity. As a result, if you weigh 120 pounds on Earth, you would weigh only one-sixth as much, or 20 pounds, on the moon. You would also be able to jump six times as high on the moon as you can on Earth. The moon makes no light of its own. Like every other body in the solar system except the sun, the moon is visible only because it reflects light from the sun.

The moon rotates on its axis once for every orbit it makes around Earth. As a result, the same side of the moon always faces Earth. This side of the moon is called the near side. The side of the moon that always faces away from Earth is called the far side. People have never been able to see the far side of the moon from Earth. It has only been viewed from spacecraft.

The moon has no atmosphere. With no atmosphere, the moon is not protected from extreme temperatures. The average surface temperature during the day is approximately 107 °C (225 °F). But the daytime temperature can reach as high as 123 °C (253 °F). At night, the average temperature drops to -153 °C (-243 °F). However, the nighttime temperature can be as low as -233 °C (-397 °F).

Questions

1. Compare the size and gravity of the moon with the size and gravity of Earth.
2. Why is only one side of the moon ever visible from Earth?
3. Describe temperatures on the moon. Why are the temperatures so extreme?

Lesson 24.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Astronauts last visited the moon in
   a. 1962.
   b. 1972.
   c. 1982.
   d. 1992.
2. The moon's size is
   a. [U+215B] the size of Earth.
   b. $\frac{1}{4}$ the size of Earth.
   c. $\frac{1}{2}$ the size of Earth.
   d. $\frac{3}{4}$ the size of Earth.
3. The surface of the moon always looks the same because the moon has no
   a. gravity.
   b. weather.
   c. running water.
   d. two of the above
4. The coldest temperatures on the moon are found
   a. deep in craters.
   b. at the north pole.
   c. where the sun never shines.
   d. two of the above
5. Which statement about lunar maria is false?
   a. They are still forming.
   b. They look dark from Earth.
   c. They formed billions of years ago.
   d. They formed when magma filled craters.
6. Which of the following would you not expect to find on the moon?
   a. ice
   b. dirt
   c. bacteria
   d. water molecules
7. You could find oxygen on the moon if you analyzed the
   a. core.
   b. crust.
   c. atmosphere.
   d. none of the above

Lesson 24.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. surface features of a moon or planet

_____ 2. highlands on the moon

_____ 3. cause of lunar craters

_____ 4. related to the moon

_____ 5. flat areas of lava on the moon's surface

_____ 6. bowl-shaped basin on the moon's surface

_____ 7. cause of lunar maria

Terms

a. lunar

b. maria

c. terrae

d. crater

e. landscape

f. meteorites

g. asteroids

Lesson 24.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. The moon is Earth's only natural _____.
2. NASA's Apollo missions landed on the _____.
3. The _____ side of the moon always faces Earth.
4. The moon has extreme temperatures because it has no _____.
5. The moon's crust is composed of _____ rock.
6. The moon's core consists mostly of the metal _____.
7. We can see the moon because it _____ light from the sun.

Lesson 24.2: Critical Writing

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

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

The last astronaut to walk on the moon did so more than 40 years ago. If you were to travel to the moon, you could still see the astronauts' footprints. Explain why.

24.3 The Sun

Lesson 24.3: True or False

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

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

_____ 1. The sun makes up over 99 percent of the mass of the solar system.

_____ 2. The sun's core is made of solid rock.

_____ 3. The sun has no atmosphere.

_____ 4. The sun's energy comes from reactions in which hydrogen changes to helium.

_____ 5. Energy travels through the radiative zone of the sun at the speed of light.

_____ 6. The part of the sun that we see shining is the convective zone.

_____ 7. The corona is the coolest layer of the sun.

_____ 8. Sunspots occur because of magnetic activity of the sun.

_____ 9. Solar wind is dangerous to spacecraft and astronauts.

_____ 10. Solar prominences are mountains on the sun's surface.

Lesson 24.3: Critical Reading

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

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

Surface Features of the Sun

The sun has many incredible surface features such as sunspots. Sunspots are relatively cool, dark areas on the sun's surface. Sunspots occur in an 11-year cycle. The number of sunspots begins at a minimum, gradually increases to a maximum, and then returns to a minimum again. Sunspots form because loops of the sun's magnetic field break through the surface. Sunspots usually occur in pairs. The loop breaks through the surface where it comes out of the sun. It breaks through again where it goes back into the sun. Sunspots disrupt the transfer of heat from the sun's lower layers.

Sometimes there is a break in a loop of the sun's magnetic field. This creates a solar flare. Solar flares are violent explosions that release huge amounts of energy. They emit streams of high-energy particles. The streams of particles are called solar wind. Solar wind is dangerous to spacecraft and astronauts. Solar flares can cause damage on Earth. They can knock out entire power grids. They can also disturb radio, satellite, and cell phone communications.

Another amazing feature of the Sun is a solar prominence. This is a glowing arch of plasma that flows along the loop between sunspots. Solar prominences can reach thousands of kilometers into the sun's atmosphere. They can last from a day to several months.

Questions

1. What are sunspots? When and why do they occur?
2. Define solar flare and solar wind.
3. What creates a solar flare? How can a solar flare affect Earth?
4. Describe solar prominences.

Lesson 24.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Most of the atoms of the sun exist as
   a. solids.
   b. liquids.
   c. gases.
   d. plasma.
2. Most of the solar system is powered by energy that originates in the sun's
   a. core.
   b. corona.
   c. photosphere.
   d. chromosphere.
3. Energy travels through the radiative zone of the sun as particles called
   a. photons.
   b. protons.
   c. plasmas.
   d. none of the above
4. Which of the following statements about sunspots is false?
   a. They usually occur in pairs.
   b. They repeat in 11-year cycles.
   c. They disrupt heat transfer in the sun.
   d. They are storms on the sun's surface.
5. Solar flares occur when
   a. there is a break in a loop of the sun's magnetic field.
   b. solar wind causes fires to flare up on the sun's surface.
   c. nuclear reactions take place in the sun's atmosphere.
   d. matter inside the sun changes to the plasma state.
6. The hottest part of the sun is the
   a. convection zone.
   b. radiative zone.
   c. corona.
   d. core.
7. Power grids and communication systems on Earth may be disturbed by a
   a. sunspot.
   b. solar flare.
   c. solar corona.
   d. solar fusion reaction.

Lesson 24.3: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. relatively cool, dark area on the sun's surface

_____ 2. superheated gas with an electrical charge

_____ 3. layer of the sun that surrounds the radiative zone

_____ 4. visible layer of the sun's atmosphere

_____ 5. layer of the sun's atmosphere that glows red

_____ 6. layer of the sun nearest the core

_____ 7. hottest layer of the sun's atmosphere

Terms

a. chromosphere

b. corona

c. photosphere

d. plasma

e. convection zone

f. radiative zone

g. sunspot

Lesson 24.3: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. The sun is made almost entirely of the elements hydrogen and _____.
2. The sun's innermost layer is called the _____.
3. The sun's energy is created by nuclear _____ reactions.
4. _____ form when loops of the sun's magnetic field break through the surface.
5. Solar _____ are violent explosions that release huge amounts of energy.
6. Streams of high energy particles from solar flares are called solar _____.
7. A solar _____ is a glowing arch where plasma flows between sunspots.

Lesson 24.3: Critical Writing

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

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

Where does the sun get its incredible energy? How does the energy travel through the sun?

24.4 The Sun and the Earth-Moon System

Lesson 24.4: True or False

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

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

_____ 1. The cone-shaped part of the moon's shadow is the penumbra.

_____ 2. Light is only partly blocked in the umbra part of a shadow.

_____ 3. Solar eclipses are rare events.

_____ 4. During a partial lunar eclipse, only part of the moon enters Earth's umbra.

_____ 5. A total lunar eclipse occurs once every month.

_____ 6. The full moon phase occurs when the moon is on the opposite side of Earth from the sun.

_____ 7. A crescent phase follows the first quarter phase of the moon.

_____ 8. If the new moon occurs on the 1st of the month, the full moon will occur on the 28th of the month.

_____ 9. When a lunar eclipse occurs, the sun cannot be seen from Earth.

_____ 10. When a solar eclipse occurs, the moon cannot be seen from Earth.

Lesson 24.4: Critical Reading

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

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

Phases of the Moon

The moon does not produce any light of its own. It only reflects light from the sun. As the moon moves around Earth, we see different portions of the near side of the moon as they are lit up by the sun. The moon appears to change from completely dark to fully lit and back to completely dark again. These changes are called phases of the moon.

A new moon occurs when the entire side of the moon facing Earth is unlit by the sun. This happens when the moon is between Earth and the sun. As the moon revolves around Earth, the near side starts to be lit up by the sun. By the end of one week, about half of the near side of the moon is lit. This makes the moon look like a half circle. This is called the first quarter phase of the moon. By the end of the second week, the entire near side of the moon is lit by the sun, and the moon looks like a full circle. This is the full moon phase. By the end of the third week, the third quarter phase occurs. Half the moon is lit, and it again looks like a half circle. The new moon returns by the end of the fourth week. Before and after the quarter moon phases are gibbous and crescent phases. During a crescent moon phase, the moon is less than half lit. During a gibbous moon phase, the moon is more than half lit.

Questions

1. Identify the four major phases of the moon. Describe how the moon looks from Earth during each phase.

2. Explain why moon phases occur.
3. Compare and contrast gibbous and crescent phases of the moon.

Lesson 24.4: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Interactions between the sun, moon, and Earth include
    a. lunar and solar eclipses.
    b. phases of the moon.
    c. Earth's tides.
    d. all of the above
2. The ecliptic is the
    a. plane in which Earth orbits the sun.
    b. distance between the moon and Earth.
    c. period during which an eclipse occurs.
    d. difference in size between the umbra and penumbra.
3. A total solar eclipse occurs when
    a. Earth's umbra falls on the moon.
    b. Earth's shadow completely blocks the moon.
    c. the moon's shadow completely blocks the sun.
    d. none of the above
4. A solar eclipse usually lasts for
    a. a few minutes.
    b. at least an hour.
    c. a few hours.
    d. a day or more.
5. The moon passes through all of its phases about once every
    a. week.
    b. 2 weeks.
    c. month.
    d. 2 months.
6. How much time goes by between the new moon and first quarter moon phases?
    a. 1 week
    b. 2 weeks
    c. 3 weeks
    d. 4 weeks
7. Which phase of the moon occurs next after the full moon phase?
    a. third quarter moon
    b. crescent moon
    c. gibbous moon
    d. new moon

Lesson 24.4: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. phase of the moon in which half of the side facing Earth is lit

_____ 2. phase of the moon in which the entire side facing Earth is dark

_____ 3. event in which Earth casts a shadow on the moon

_____ 4. inner part of the moon's shadow during an eclipse

_____ 5. event in which the moon casts a shadow on Earth

_____ 6. outer part of the moon's shadow during an eclipse

_____ 7. phase of the moon in which the entire side facing Earth is lit

Terms

a. full moon

b. quarter moon

c. lunar eclipse

d. umbra

e. solar eclipse

f. penumbra

g. new moon

Lesson 24.4: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. During a solar eclipse, some or all of our view of the _____ is blocked.
2. A solar eclipse occurs only during the _____ phase of the moon.
3. Lunar eclipses occur _____ often than solar eclipses.
4. A lunar eclipse occurs only during the _____ phase of the moon.
5. The _____ phase of the moon occurs when the moon is between Earth and the sun.
6. During a(n) _____ phase of the moon, the side of the moon facing Earth is less than half lit but still visible.
7. During a(n) _____ phase of the moon, the side of the moon facing Earth is more than half lit but not completely lit.

Lesson 24.4: Critical Writing

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

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

Compare and contrast lunar and solar eclipses.

CHAPTER 25 MS The Solar System Worksheets

Chapter Outline

25.1 INTRODUCTION TO THE SOLAR SYSTEM

25.2 INNER PLANETS

25.3 OUTER PLANETS

25.4 OTHER OBJECTS IN THE SOLAR SYSTEM

25.1 Introduction to the Solar System

Lesson 25.1: True or False

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

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

_____ 1. The planets in our solar system were named for Greek gods and goddesses.

_____ 2. We now know that the sun is the center of the universe.

_____ 3. Scientists think that our solar system formed from an asteroid belt.

_____ 4. The planets formed when pieces of matter collided and clumped together.

_____ 5. Our solar system contains five dwarf planets.

_____ 6. The planet closest to the sun is Venus.

_____ 7. The planet with the greatest mass and diameter is Saturn.

_____ 8. Planets farther from the sun have orbits that are farther apart.

_____ 9. The orbits of the planets are nearly circular.

_____ 10. Our sun is the only star that has planets revolving around it.

Lesson 25.1: Critical Reading

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

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

Formation of the Solar System

Scientists think that the solar system formed about 4.6 billion years ago from a huge cloud of gas and dust, called a nebula. This is the solar nebula hypothesis. The nebula was made mostly of hydrogen and helium, but there were heavier elements too. Gravity caused the nebula to contract. As the nebula contracted, it started to spin. As it spun, it got smaller, and this caused it to spin even faster. This is similar what happens when an ice skater pulls her arms to her sides during a spin. With her arms closer to her body, she spins faster. The spinning caused the nebula to form into a disk shape. This model explains why all the planets are found in a flat, disk-shaped region. It also explains why all the planets revolve in the same direction around the sun.

The sun was the first object to form from the disk. Gravity pulled matter together at the center of the disk. Density and pressure increased tremendously. Nuclear fusion reactions began. In these reactions, the nuclei of atoms came together to form new, heavier chemical elements. The fusion reactions released huge amounts of nuclear energy. From these reactions a star was born, the sun.

Meanwhile, the outer parts of the disk were cooling off. Small pieces of dust collided and combined to form clumps of matter. Larger clumps attracted smaller clumps with their gravity. Eventually, all these pieces grew into the planets and moons that we find in our solar system today.

The outer planets—Jupiter, Saturn, Uranus, and Neptune—formed from lighter materials. Hydrogen, helium, water, ammonia, and methane were among them. It is so cold this far from the sun that these materials can form solid particles. Closer to the Sun, they are gases. The gases can escape into space, so the inner planets—Mercury, Venus, Earth, and Mars—formed from denser materials. These materials remain solid even when heated by the nearby sun.

Questions

1. When and how do scientists think that the solar system formed?
2. Describe how the sun formed.
3. How did the planets and moons form?
4. Explain why the inner planets are made of heavier materials than the outer planets.

Lesson 25.1: Multiple Choice

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

Circle the letter of the correct choice.

1. Our solar system includes
    a. galaxies.
    b. asteroids.
    c. black holes.
    d. constellations.
2. The early Earth-centered model of the universe was proposed by
    a. Galileo.
    b. Ptolemy.
    c. Copernicus.
    d. none of the above
3. The planet that is most similar to Earth in mass and diameter is
    a. Mars.
    b. Venus.
    c. Jupiter.
    d. Mercury.
4. Which statement is true about the inner planets of our solar system?
    a. They formed before the sun formed.
    b. They formed from dense elements.
    c. They include Mars and Jupiter.
    d. They have very long years.
5. All planets of our solar system orbit the sun
    a. in the same plane.
    b. at the same speed.
    c. in the same direction.
    d. two of the above
6. How long the day lasts on a planet depends on its
    a. distance from the sun.
    b. speed of revolution.
    c. speed of rotation.

d. length of orbit.

7. To be a planet, an object must

   a. be big enough that its own gravity makes it round.
   b. have cleared its path of smaller objects.
   c. orbit a star.
   d. all of the above

Lesson 25.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. collection of many small objects beyond the orbit of Neptune

_____ 2. distance from Earth to the sun

_____ 3. star and the planets that orbit it

_____ 4. collection of many small objects between the orbits of Mars and Jupiter

_____ 5. planet that orbits a star other than the sun

_____ 6. planet such as Pluto

_____ 7. giant cloud of gas and dust

Terms

a. astronomical unit

b. Kuiper belt

c. nebula

d. dwarf planet

e. solar system

f. asteroid belt

g. exoplanet

Lesson 25.1: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. Planets are held in their orbits by the force of _____.
2. The ancient Greeks believed that _____ was the center of the universe.
3. Copernicus' developed his model of the solar system because it better explained the movements of the ____-_____.
4. Not counting dwarf planets, our solar system has a total of _____ planets.
5. The planet that is farthest from the sun is _____.

6. Distances in the solar system are measured in units called _____.
7. The unit in question 6 equals _____ kilometers.

Lesson 25.1: Critical Writing

Name_____ Class_____ Date_____

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

When Pluto was discovered, it was considered to be the ninth planet. Explain why Pluto is no longer classified this way.

25.2 Inner Planets

Lesson 25.2: True or False

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

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

_____ 1. None of the inner planets of the solar system has rings.

_____ 2. Compared with the outer planets, the inner planets spin more quickly.

_____ 3. All of the inner planets are made of cooled igneous rock.

_____ 4. Each year on Mercury lasts just 58 Earth days.

_____ 5. Most of Mercury is extremely wet.

_____ 6. Clouds on Venus contain sulfur.

_____ 7. A day on Venus is longer than a year on Venus.

_____ 8. Life could evolve on Earth because its atmosphere contained oxygen.

_____ 9. Some features on Mars' surface look as though they were eroded by water.

_____ 10. Mars' moons were meteorites that were captured by Martian gravity.

Lesson 25.2: Critical Reading

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

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

Mercury

Mercury is the smallest planet and the one closest to the sun. It has no moons. The surface of Mercury is covered with ancient craters, like Earth's moon. The presence of the craters means that Mercury hasn't changed much geologically for billions of years. With only a trace of an atmosphere, it has no weather to wear down the ancient craters.

Mercury is named for the Roman messenger god. Mercury was a messenger because he could run extremely fast. The Greeks gave the planet his name because Mercury moves very quickly. Mercury orbits the sun in just 88 Earth days, but the planet has very long days. Mercury rotates slowly on its axis, turning exactly three times for every two times it orbits the sun. Each day on Mercury is 58 Earth days long.

Mercury is very close to the sun, so it can get very hot. With virtually no atmosphere, it has temperature extremes. During the long day, there is no atmosphere to protect the surface of the planet from strong solar radiation. The surface can get as hot as 427 °C (801 °F). At night, there is no atmosphere to help retain the heat of the day. Then the surface can get as cold as –183 °C (–297 °F). Most of Mercury is extremely dry, although there may be small amounts of ice at the poles.

Mercury is one of the densest planets. Scientists think that the interior contains a large core made mostly of melted

iron. Mercury's core takes up about 42 percent of the planet's volume.

Questions

1. Explain what scientists can infer about Mercury from the presence of ancient craters on its surface.
2. Why was Mercury named for the Roman messenger god?
3. Describe the range of temperatures on Mercury. Why are temperatures so extreme on this planet?

Lesson 25.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. All of the inner planets
   a. have very rapid rotation.
   b. have a thick atmosphere.
   c. have one or more moons.
   d. are solid, dense, and rocky.
2. Which statement about Mercury's core is false?
   a. It is very small.
   b. It contains mostly iron.
   c. It exists in a molten state.
   d. It makes up 42% of Mercury's volume.
3. Venus has all of the following except
   a. moons.
   b. valleys.
   c. mountains.
   d. lava plains.
4. Which process explains why Venus is very hot?
   a. greenhouse effect
   b. volcanic activity
   c. plate tectonics
   d. none of the above
5. The inner planet with an average surface temperature of 14 °C is
   a. Mercury.
   b. Venus.
   c. Earth.
   d. Mars.
6. Mars does not usually have liquid water on its surface because the
   a. air of the planet's atmosphere is too dense.
   b. pressure of the planet's atmosphere is too low.
   c. temperature of the planet's surface is too high.
   d. two of the above
7. The largest canyon in the solar system is found on
   a. Mars.

b. Earth.
c. Venus.
d. Mercury.

Lesson 25.2: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. hottest of all the planets in the solar system

_____ 2. rover that explored Mars' surface

_____ 3. only planet in the solar system known to have plate tectonics

_____ 4. any of the four planets closest to the sun

_____ 5. smallest of all the planets in the solar system

_____ 6. spacecraft that is orbiting and studying Mercury

_____ 7. planet with the largest volcano in the solar system

Terms

a. Mercury

b. Opportunity

c. Mars

d. inner planet

e. Earth

f. Messenger

g. Venus

Lesson 25.2: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. The inner planet that has two moons is _____.
2. The only planet in the solar system with clockwise rotation is _____.
3. The surface of Mercury is covered with ancient _____.
4. The planet that is closest to Earth is _____.
5. _____ has more volcanoes than any other planet.
6. Earth's moon formed when a(n) _____ collided with Earth.
7. Mars is called the red planet because its soil contains the element _____.

Lesson 25.2: Critical Writing

Name_____ Class_____ Date_____

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

Explain why Mars is the planet other that Earth that is most likely to have once had life.

25.3 Outer Planets

Lesson 25.3: True or False

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

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

_____ 1. Saturn is the only planet with rings.

_____ 2. Jupiter may have a small rocky core.

_____ 3. Jupiter has fewer than 30 moons.

_____ 4. Jupiter's moon Europa has some conditions suitable for life.

_____ 5. Thunderstorms have been observed on Uranus.

_____ 6. Saturn's rings were first observed by the Hubble space telescope.

_____ 7. Uranus is tilted sideways because of the pull of Neptune's gravity.

_____ 8. Neptune is so far from Earth that it can be seen only with a telescope.

_____ 9. Scientists think that Neptune's moon Triton was once part of Neptune.

____ 10. The biggest moon in the solar system is Ganymede.

Lesson 25.3: Critical Reading

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

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

Jupiter

Jupiter is the largest planet in our solar system. Its mass is 318 times the mass of Earth, and its volume is more than 1300 times the volume of Earth. Because Jupiter is so large, it reflects a lot of sunlight. When it is visible, it is the brightest object in the night sky besides the Moon and Venus. Jupiter is far from Earth with a much longer orbit. It takes Jupiter about 12 Earth years to orbit once around the sun.

Jupiter is made mostly of hydrogen and helium with only small amounts of other elements. Therefore, the planet isn't very dense. The outer layers are gases. Deeper within the planet, intense pressure condenses the gases into a liquid state. At the center of the planet, there may be a small rocky core.

Jupiter's atmosphere is unlike any other in the solar system. The upper layer contains clouds of ammonia. The clouds form bands of different colors rotating around the planet. The ammonia clouds also swirl around in tremendous storms. The Great Red Spot is Jupiter's most noticeable feature. It is an enormous storm more than three times as wide as Earth. Jupiter's Great Red Spot was first observed in the 1600s. It may be a permanent feature of the planet.

As of 2011, Jupiter was known to have more than 60 moons. Four of them are big and bright enough to be seen from Earth using a pair of binoculars. They are named Ganymede, Europa, Io, and Callisto. These four moons were first discovered by Galileo, so they are called the Galilean moons. They are all bigger than the dwarf planet Pluto.

Ganymede is the biggest moon in the solar system. It is bigger than the planet Mercury.

Scientists think that Jupiter's moon Europa is a good place to look for extraterrestrial life. Europa's surface is a layer of ice that may cover an ocean of liquid water. Liquid water is needed for life as we know it. How could Europa have liquid water when it is so far from the Sun? Europa is heated by Jupiter. Jupiter's tidal forces are so great that they repeatedly stretch and compress its moons. This could produce enough heat for liquid water to exist on Europa. Space missions have been planned to explore Europa, including plans to drill through the ice and send a probe into the ocean. However, such a mission has not yet been attempted.

Questions

1. Compare Jupiter's mass and volume to Earth's.
2. Describe Jupiter's atmosphere. What is the Great Red Spot?
3. Why are the largest of Jupiter's moons called Galilean moons? Why is the moon Europa of special interest to scientists?

Lesson 25.3: Multiple Choice

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

Circle the letter of the correct choice.

1. The outer planets of the eight planets in our solar system include
    a. Mars.
    b. Jupiter.
    c. Pluto.
    d. two of the above
2. Compared with the inner planets, the outer planets
    a. are much larger.
    b. are much denser.
    c. have more moons.
    d. two of the above
3. The planet that has clouds of ammonia is
    a. Uranus.
    b. Neptune.
    c. Jupiter.
    d. Saturn.
4. The biggest moon in the solar system orbits
    a. Neptune.
    b. Uranus.
    c. Saturn.
    d. Jupiter.
5. Scientists think that Saturn's moon Titan may
    a. have an atmosphere like early Earth's.
    b. be larger than Earth's moon.
    c. have lakes of liquid water.
    d. all of the above
6. Which two outer planets are called "sister planets" because they are very similar?

a. Jupiter and Saturn
b. Saturn and Uranus
c. Uranus and Neptune
d. Jupiter and Uranus

7. Neptune and Uranus appear to be blue due to the

a. oceans of water on their surface.
b. methane gas in their atmosphere.
c. minerals in their rocky crust.
d. frigid cold of their surface.

Lesson 25.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. largest planet in the solar system

_____ 2. only planet that is tilted on its side

_____ 3. planet with stronger winds than any other planet in the solar system

_____ 4. gap in the clouds on Neptune

_____ 5. circular cloud of dust and other small particles that orbit an outer planet

_____ 6. least dense planet in the solar system

_____ 7. enormous storm on Jupiter

Terms

a. Great Dark Spot

b. Saturn

c. Neptune

d. planetary ring

e. Jupiter

f. Great Red Spot

g. Uranus

Lesson 25.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The four planets farthest from the sun are called the _____ planets.
2. Based on their composition and size, the planets in question 1 have been given the nickname of _____.
3. The outer planets consist mostly of the elements hydrogen and _____.

4. Four of the moons of Jupiter were first discovered by _____.
5. The planet best known for its planetary rings is _____.
6. _____ is the outer planet with the least mass.
7. _____ is the planet that is most distant from the sun.

Lesson 25.3: Critical Writing

Name_____ Class_____ Date_____

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

Explain how scientists were able to correctly predict the existence and location of Neptune before it was discovered.

25.4 Other Objects in the Solar System

Lesson 25.4: True or False

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

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

_____ 1. Most asteroids in the solar system are located between Mars and Earth.

_____ 2. Asteroids formed after the rest of the solar system formed.

_____ 3. Small asteroids sometimes collide with Earth.

_____ 4. After a meteor hits Earth's surface, it is called a meteorite.

_____ 5. Meteoroids are usually larger than asteroids.

_____ 6. Comets are commonly called "shooting stars."

_____ 7. A comet has an atmosphere only when it gets close to the sun.

_____ 8. Scientists think that comets may have brought water to early Earth.

_____ 9. The dwarf planet Ceres was originally considered to be the largest asteroid.

_____ 10. Pluto is always farther from the sun than Neptune is.

Lesson 25.4: Critical Reading

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

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

Asteroids

Asteroids are small, irregularly shaped, rocky bodies that orbit the sun. They formed at the same time as the rest of the solar system. Because asteroids are so small, they do not have enough gravity to become round. They are also too small to have an atmosphere. Asteroids have no internal heat so they are not geologically active. Therefore, an asteroid can change only if it collides with another body in space. A collision may cause an asteroid to break up, or it may create craters on the asteroid. An asteroid may strike a planet if it comes near enough to be pulled in by its gravity.

Hundreds of thousands of asteroids have been discovered. They are still being discovered at a rate of about 5,000 new asteroids per month! The majority of asteroids are located between the orbits of Mars and Jupiter. This region is called the asteroid belt. There are many thousands of asteroids in the asteroid belt, although their total mass adds up to only about 4 percent of the mass of Earth's moon. The asteroids in the asteroid belt have never come together to form a planet because Jupiter's gravity keeps them apart.

More than 4500 asteroids have orbits that cross Earth's orbit. These asteroids are called near-Earth asteroids. Because they cross Earth's orbit, near-Earth asteroids can collide with Earth. In fact, an asteroid between 5 and 10 meters in diameter hits Earth about once a year. Hundreds of near-Earth asteroids are more than a kilometer in

diameter. Large asteroids have hit Earth in the past. When this occurred, many organisms died. At times, many species went extinct. Astronomers are on the lookout for near-Earth asteroids. Their aim is to predict a possible collision early enough to try to stop it.

Scientists are very interested in asteroids for other reasons as well. Most asteroids consist of materials that have not changed since very early in the history of the solar system. Therefore, scientists think that asteroids can provide information about how the solar system formed. Asteroids may also be important for space travel. They could be mined for rare minerals or for construction projects in space.

Questions

1. What are asteroids?
2. What is the only way an asteroid can change? Why
3. Describe the asteroid belt.
4. What are near-Earth asteroids? Why are astronomers on the lookout for near-Earth asteroids?
5. Why do scientists think they can learn about how the solar system formed by studying asteroids?

Lesson 25.4: Multiple Choice

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

Circle the letter of the correct choice.

1. Asteroids do not have any of the following except
   a. gravity.
   b. internal heat.
   c. an atmosphere.
   d. geological activity.
2. Which of the following statements is true about short-period comets?
   a. They have periods of 200 years or less.
   b. They come from the asteroid belt.
   c. The originate in the Oort cloud.
   d. none of the above
3. Which of the following is a dwarf planet?
   a. Ceres
   b. Haumea
   c. Makemake
   d. all of the above
4. Pluto was once called a planet. Now it has been reclassified as a dwarf planet because
   a. its gravity is too weak to clear its orbit.
   b. it does not have any moons.
   c. it consists only of gases.
   d. its orbit is not elliptical.
5. The only dwarf planet located in the asteroid belt is
   a. Eris.
   b. Ceres.
   c. Haumea.
   d. Makemake.

6. Which dwarf planet is shaped more like an egg than a ball?
    a. Ceres
    b. Haumea
    c. Eris
    d. Pluto
7. The dwarf planet named Eris
    a. is bigger than Pluto.
    b. has more moons than Pluto.
    c. was discovered before Pluto.
    d. is closer to the sun than Pluto.

Lesson 25.4: Matching

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

Match each definition with the correct term.

Definitions

_____ 1. event that occurs when Earth passes through the tail of a comet

_____ 2. atmosphere of a comet

_____ 3. small, irregularly shaped, rocky body that orbits the sun

_____ 4. region from which many comets come

_____ 5. region where most asteroids are located

_____ 6. small chunk of space rock that burns up as it falls through Earth's atmosphere

_____ 7. small, icy object that orbits the sun

Terms

a. asteroid

b. asteroid belt

c. comet

d. Kuiper belt

e. meteor

f. coma

g. meteor shower

Lesson 25.4: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. Asteroids are not round like planets because they do not have enough _____.

2. Asteroids in the asteroid belt have never come together and formed a planet because the gravity of _____-__ keeps them apart.
3. Asteroids that cross Earth's orbit are called _____ asteroids.
4. Before meteors enter Earth's atmosphere, they are called _____.
5. Small objects that orbit the sun in highly elliptical orbits are known as _____.
6. A comet's tail always points away from the _____.
7. The time between one visit from a comet and the next is called the comet's _____.

Lesson 25.4: Critical Writing

Name_____ Class_____ Date_____

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

Compare and contrast asteroids and comets.

CHAPTER 26 MS Stars, Galaxies, and the Universe Worksheets

Chapter Outline

26.1 STARS

26.2 GALAXIES

26.3 THE UNIVERSE

26.1 Stars

Lesson 26.1: True or False

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

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

_____ 1. Constellations appear from Earth to move with the seasons.

_____ 2. Our sun is the biggest and brightest star in the galaxy.

_____ 3. Stars are made mostly of hydrogen and helium.

_____ 4. The coolest stars are red in color.

_____ 5. Once a star forms, it never changes.

_____ 6. Gravity causes a nebula to become denser at the center.

_____ 7. A larger star remains on the main sequence longer than a smaller star.

_____ 8. The next stage our sun will go through is white dwarf.

_____ 9. Betelgeuse is an example of a red supergiant.

_____ 10. A black hole is an empty place in space.

Lesson 26.1: Critical Reading

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

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

Introduction to Stars

When you look at the sky on a clear night, you may be able to see thousands of stars. A star is a giant ball of glowing gas that is extremely hot. Most of the stars you see in the night sky are medium-sized stars like our sun. But some stars are much smaller, and others are much larger. Except for the sun, all stars are so far away that they look like single points of light. Even through a telescope, stars appear this way.

The star we are most familiar with is our sun. Only a tiny bit of the sun's light reaches Earth, but it supplies most of Earth's energy. The sun is just an ordinary star, but it looks much bigger and brighter than any of the other stars we can see. Of course, this is just because the sun is much closer to Earth than any other star.

Stars generate incredible amounts of energy. The energy is produced by nuclear fusion reactions. The majority of stars are made mostly of hydrogen and helium. They contain so much hydrogen and helium that the weight of these gases is enormous. The pressure at the center of a star is great enough to heat the gases to extremely high temperatures. This causes nuclear fusion reactions, in which two atoms fuse, or join together, to create an atom of a different element. In stars like our sun, hydrogen atoms fuse to create helium atoms. Nuclear fusion reactions need a lot of energy to get started. Once they begin, they release far more energy.

You may have noticed that stars shine in different colors. A star's color is determined by the temperature of its

surface. The coolest stars are red. Warmer stars are orange, yellow, or white. The hottest stars are blue. The most common way of classifying stars is by color. Each color of star is associated with a range of temperatures. For example, red stars are classified as M stars, which range from 2000 to 3500 K. Yellow stars are classified as G stars, which range from 5500 to 6000 K. Blue stars are classified as O stars, which have temperatures of 30,000 K or higher. The surface temperature of a star is usually related to its size. Bigger stars generally produce more energy, so their surface is hotter. But some small stars are very hot, whereas some big stars are relatively cool.

Questions

1. What are stars?
2. How do stars generate energy?
3. Relate the color of a star to its temperature.
4. How does the size of a star relate to its surface temperature?

Lesson 26.1: Multiple Choice

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

Circle the letter of the correct choice.

1. A group of stars that seem from Earth to form the outline of a familiar shape is called a
   a. binary star system.
   b. constellation.
   c. solar system.
   d. galaxy.
2. Constellations appear to move across the sky each night because
   a. all stars have orbits.
   b. Earth rotates on its axis.
   c. Earth revolves around the sun.
   d. constellations are affected by Earth's gravity.
3. Which color of star has the highest temperature?
   a. red
   b. blue
   c. yellow
   d. orange
4. Which class of star is our sun?
   a. B
   b. F
   c. G
   d. K
5. A star forms from a nebula when the temperature is high enough for
   a. a supernova to occur.
   b. nuclear fusion to start.
   c. a black hole to collapse.
   d. heavy elements to form.
6. Astronomers measure the distance to very distant stars by comparing the stars to our sun. Which factor do they compare?

a. brightness
b. location
c. parallax
d. color

7. A star spends most of its "life" as a

a. main sequence star.
b. red supergiant.
c. white dwarf.
d. supernova.

Lesson 26.1: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. giant ball of glowing gas that is very hot

_____ 2. stage of a star's life in which hydrogen atoms fuse to form helium

_____ 3. stage of a star's life in which helium atoms fuse to form heavier elements

_____ 4. explosion of a red supergiant star

_____ 5. core of a star that has too much gravity to let light escape

_____ 6. cloud of gas and dust from which a star forms

_____ 7. two stars that orbit each other

Terms

a. binary star system

b. black hole

c. main sequence

d. nebula

e. red giant

f. supernova

g. star

Lesson 26.1: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. A star that is made almost entirely of neutrons is called a(n) _____ star.
2. The color of a star is determined by the star's _____.
3. The energy of stars comes from reactions called _____ reactions.

4. The next stage that a main sequence star will go through is _____.
5. After a supernova, the core that remains becomes either a neutron star of a(n) _____.
6. A shift in the position of a star over time is called _____.
7. Whether a red giant becomes a white dwarf or a red supergiant depends on its _____.

Lesson 26.1: Critical Writing

Name_____ Class_____ Date_____

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

Compare the life histories of a medium star like our sun and a massive star like Betelgeuse.

26.2 Galaxies

Lesson 26.2: True or False

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

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

_____ 1. There are billions of galaxies in the universe.

_____ 2. A star cluster may contain one or more galaxies.

_____ 3. Open star clusters contain more stars than globular star clusters.

_____ 4. Galaxies are divided into types based on size.

_____ 5. Spiral galaxies are generally older than elliptical galaxies.

_____ 6. Dwarf galaxies are often found near larger galaxies.

_____ 7. Some galaxies contain over a trillion stars.

_____ 8. Our solar system is within one of the spiral arms of our galaxy.

_____ 9. Our solar system orbits the central disk of our galaxy.

_____ 10. From Earth, our galaxy looks like a giant spiral.

Lesson 26.2: Critical Reading

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

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

Types of Galaxies

The biggest groups of stars in the universe are called galaxies. They may have a few million to more than a trillion stars. With the unaided eye, every star you can see is part of our own galaxy, the Milky Way Galaxy. All the other galaxies in the universe are extremely far away. The closest galaxy to our own, the Andromeda Galaxy, is 2.5 million light-years away.

Galaxies are divided into three types according to their shape. The types are spiral, elliptical, and irregular galaxies.

- A spiral galaxy is a rotating disk of stars and dust. At the center of the disk is a dense bulge of matter. Several arms spiral out from the center. A spiral galaxy has a lot of gas and dust and many young stars.
- An elliptical galaxy is oval in shape. The smallest elliptical galaxies are called dwarf elliptical galaxies. Giant elliptical galaxies can contain over a trillion stars. Stars in elliptical galaxies are mainly old stars. Most elliptical galaxies contain very little gas and dust because the material has already formed into stars.
- An irregular galaxy is neither spiral nor elliptical. Most irregular galaxies have been deformed. This can occur either by the pull of a larger galaxy or by a collision with another galaxy.

Questions

1. What are galaxies, and how do they range in size?
2. Contrast spiral and elliptical galaxies.
3. What are irregular galaxies, and how do they come about?

Lesson 26.2: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. Types of star clusters include
   a. open clusters.
   b. spiral clusters.
   c. elliptical clusters.
   d. all of the above
2. Elliptical galaxies contain
   a. a lot of gas and dust.
   b. mainly young stars.
   c. mostly red or yellow stars.
   d. two of the above
3. Types of galaxies include
   a. spiral galaxies.
   b. cluster galaxies.
   c. circular galaxies.
   d. globular galaxies.
4. The stars in an open cluster are mostly
   a. old stars.
   b. young stars.
   c. reddish stars.
   d. two of the above
5. Galaxies that do not have a clearly defined shape are called
   a. deformed galaxies.
   b. irregular galaxies.
   c. dwarf galaxies.
   d. open galaxies.
6. Scientists estimate that the Milky Way Galaxy contains about
   a. 40,000 stars.
   b. 400,000 stars.
   c. 40 million stars.
   d. 400 billion stars.
7. Some astronomers think that at the center of our galaxy there is a
   a. neutron star.
   b. supernova.
   c. red supergiant.
   d. black hole.

Lesson 26.2: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. type of galaxy that is a rotating disk of stars and dust

_____ 2. star cluster containing up to a few thousand stars

_____ 3. type of galaxy that is oval in shape

_____ 4. group of stars that is smaller than a galaxy

_____ 5. very large group of stars that are held together by gravity

_____ 6. star cluster containing up to tens of thousands of stars

_____ 7. type of galaxy that is neither spiral nor elliptical in shape

Terms

a. elliptical galaxy

b. globular cluster

c. irregular galaxy

d. open cluster

e. spiral galaxy

f. star cluster

g. galaxy

Lesson 26.2: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The stars in an open cluster are young stars that all formed from the same _____.
2. Every star you can see from Earth with the unaided eye is part of the _____ Galaxy.
3. Our own galaxy is the type of galaxy called a(n) _____ galaxy.
4. The major galaxy closest to our own is the _____ Galaxy.
5. A spiral galaxy has a rotating disk of stars and dust with several _____ projecting out from the center.
6. Most _____ galaxies have been deformed by gravity or a collision with another galaxy.
7. Globular clusters have a definite _____ shape.

Lesson 26.2: Critical Writing

Name_____ Class_____ Date_____

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

Describe our own galaxy, and explain why it looks different to us than all other galaxies?

26.3 The Universe

Lesson 26.3: True or False

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

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

_____ 1. Edwin Hubble used powerful telescopes to discover other galaxies.

_____ 2. As the distance between galaxies grows, the size of each galaxy shrinks.

_____ 3. When the universe began, it was much larger than it is today.

_____ 4. In the first few moments after the Big Bang, the universe was very hot and dense.

_____ 5. The first matter to form in the universe consisted of protons, neutrons, and electrons.

_____ 6. Scientists think that stars and galaxies make up only a small part of the matter in the universe.

_____ 7. Scientists have proven conclusively that dark matter and dark energy exist.

Lesson 26.3: Critical Reading

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

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

Explaining the Expanding Universe

In the early 1900s, the scientist Edwin Hubble measured the distances to other galaxies. He also studied the motions of galaxies. From his observations and measurements, Hubble noticed a relationship, now called Hubble's law: The farther away a galaxy is, the faster it is moving away from us. From this relationship, Hubble concluded that the universe must be expanding. To imagine an expanding universe, we can compare it with a balloon covered with tiny dots. When you blow up the balloon, the rubber stretches. The dots slowly move away from each other as the space between them increases. In an expanding universe, the space between galaxies increases like the space between dots on the expanding balloon.

Why is the universe expanding? The Big Bang theory was developed to explain it. The Big Bang theory is a theory about how the universe began. According to the theory, about 13.7 billion years ago, the entire universe was packed very tightly together. Everything was squeezed into a tiny volume. Then there was an enormous explosion. After this "big bang," the universe expanded rapidly. Moreover, all of the matter and energy in the universe has been expanding ever since. Scientists have evidence that this is how the universe formed. One piece of evidence is that we see galaxies moving away from us. If they are moving apart, they must once have been closer together. Also, there is energy left over from the big bang explosion that can be detected throughout the universe.

In the first few moments after the Big Bang, the universe was extremely hot and dense. As the universe expanded, it became less dense and began to cool. First protons, neutrons, and electrons formed. From these particles, hydrogen atoms were created. Then nuclear fusion reactions created helium atoms. Some parts of the universe had matter that was densely packed. Enormous clumps of matter were held together by gravity. Eventually, this material became

the stars, galaxies, and other structures that make up the universe today.

Questions

1. What is Hubble's law? What conclusion did Hubble draw from his law?
2. State the Big Bang theory. What evidence supports it?
3. What do scientists think happened after the Big Bang?

Lesson 26.3: Multiple Choice

Name_____ Class_____ Date_____

Circle the letter of the correct choice.

1. According to the Big Bang theory
   a. dark matter is changing to ordinary matter throughout the universe.
   b. dark energy is pulling the universe into black holes.
   c. the universe will someday end because of a "big bang."
   d. the universe began with an enormous explosion.
2. From our point of view in the Milky Way Galaxy, all other galaxies in the universe appear to be
   a. crowding closer together.
   b. moving away from us.
   c. getting dimmer.
   d. growing larger.
3. After the big bang occurred, the universe
   a. shrank in size.
   b. became denser.
   c. became hotter.
   d. began to cool.
4. Most scientists who study dark matter think that it is
   a. a mix of ordinary matter and matter we haven't yet discovered.
   b. matter that makes up black holes.
   c. just a tiny fraction of all the matter that exists in the universe.
   d. none of the above
5. Scientists recently discovered that the universe
   a. has started to contract in size.
   b. is expanding even faster than before.
   c. is no longer expanding or contracting.
   d. will soon go through another big bang.
6. Scientists have introduced the concept of dark energy to explain the
   a. rate of growth of the universe.
   b. contraction of the universe.
   c. origin of dark matter.
   d. all of the above

Lesson 26.3: Matching

Name_____ Class_____ Date_____

Match each definition with the correct term.

Definitions

_____ 1. idea that explains how the universe formed

_____ 2. matter that can be detected only by its effects on the motion of objects around it

_____ 3. observation that the farther away a galaxy is, the faster it is moving away from us

_____ 4. less than half of the total matter in the universe

_____ 5. all the matter and energy that exists and all of space and time

Terms

a. universe

b. Big Bang theory

c. ordinary matter

d. dark matter

e. Hubble's law

Lesson 26.3: Fill in the Blank

Name_____ Class_____ Date_____

Fill in the blank with the appropriate term.

1. The astronomer who concluded that the universe is expanding was _____.
2. The distance between galaxies appears to be getting _____.
3. Scientists think that the "big bang" occurred about _____ years ago.
4. After the big bang, the universe became less dense and its temperature _____.
5. The first element to form after the big bang was _____.
6. Huge clumps of matter held together by _____ eventually formed stars and galaxies.

Lesson 26.3: Critical Writing

Name_____ Class_____ Date_____

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

What are dark matter and dark energy, and why do scientists think they exist?

CHAPTER 27 CK-12 Earth Science for Middle School Workbook Answers

- The answer keys can be found in the Resource tab above the Table of Contents.